

Hedging in Scientifically Oriented Discourse  
Exploring Variation According to Discipline and Intended  
Audience

Teppo Varttala

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# Hedging in Scientifically Oriented Discourse

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Teppo Varttala

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English Philology  
University of Tampere

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Teppo Varttala  
Doctoral Dissertation, 2001  
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I have been guided by a number of inspiring linguists during my studies and research, but I think that my interest in language was originally aroused quite early indeed. Issues to do with the art of speaking and writing came up frequently in dinnertime discussions when I was a child and I think that my childhood home is where I was first sensitized to matters linguistic. I am therefore thankful to my parents not only for their encouragement and financial support but also for in some sense guiding me toward the linguistic path that I took later. Unfortunately, my late mother is no longer here to see where the path led. Scholarly work may sometimes be a rather solitary business and I would equally like to thank my parents, my brother and his family, and my friends for enjoyable breaks from the confinement of hedges.

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This study is dedicated to Tanja and Leo.

## Preface

Investigations into English for Specific Purposes (ESP), particularly sociologically and linguistically oriented studies of the rhetoric of scientific discourse have produced an abundance of information on the linguistic characteristics of the various fields of scientific inquiry over the years. Although studies and style manuals for the users of scientific language have given attention to various kinds of scientific discourse (e.g. student writing, textbooks, presentations), it is probably the genre of the scientific research article (RA) that has been dealt with most extensively in literature. It is now commonly pointed out that, despite the popular belief that scientific texts are neutral accounts of factual information derived from nature (mentioned e.g. by Gilbert 1976, Mulkey 1979, Bazerman 1988), RAs are in fact better regarded as socially constructed ‘rhetorical artifacts’ (cf. Hyland 1998: 16). Thus, instead of always putting forth information in a straightforward manner, the authors of RAs often engage in processes of negotiation and persuasion. For instance, when the accuracy or precision of the information presented may be subject to debate, RA authors may wish to formulate their statements cautiously, adherence to the central virtues of humility, caution and scientific honesty being normally expected by the scientific community. For instance, on certain occasions RA authors may not want to say that something *is* the case, but instead they say that something is *possibly* the case, that it *might* be the case, and so on. Accordingly, it is often said that the authors of RAs commonly qualify the information presented by means of items relating to vagueness, uncertainty, or tentativeness, devices that are commonly referred to as *hedges*, thus resorting to the strategy of *hedging*.

The use of hedges in scientific discourse has been studied to some extent in relatively recent work, the results of the studies having found practical applications in some pedagogical materials and style manuals. However, as Hyland (1998) states, the study of hedging in different contexts has only just begun. Hyland (op. cit.: 1) points out that straightforward definitions of hedging are not common in literature, and the area of hedging as concerns especially the more formal kinds of discourse has in fact been described as “a huge meadow of research” for linguists (Crystal 1995: 117). The relatively short history of investigations into hedging is reflected in the ideas expressed in earlier work. On the one hand, although studies have delved into hedging in various scientific disciplines, such as biology, economics, and medicine, there does not appear to be full agreement in literature as to the differences and similarities in the incidence of hedges between disciplines. Furthermore, the emphasis in many studies has been on the genre of the research article, whereas comments about other types of special-subject communication (e.g.

review articles, book-length studies, grant proposals, etc.) have been more scarce. Certain studies have also given some attention to the incidence of hedging in science-related materials for less specialized audiences, such as popular scientific magazine articles or introductory textbooks. These investigations, however, offer somewhat contradictory views of hedging in the more popular discourse as compared to RAs, some authors suggesting that hedges are *rare* in popularizations for instance because the audience is in no position to contest what is being said and is in fact only looking for definitive conclusions in such texts, not speculative formulations. Other studies claim the contrary, arguing that hedging is *common* in popularizations, sometimes even more common than in specialized texts like RAs. Such conflicting views, often based on intuition rather than a study of authentic material, provide a rather confusing picture of the occurrence of hedging in scientific texts representing different degrees of specialization.

There have been few systematic studies comparing the use of hedges in different RA subject fields and different kinds of special-subject communication. Furthermore, the status of hedging in popularized renderings of scientific activities as opposed to RAs and other types of discourse between experts has not been explored very thoroughly, many aspects of hedging in scientifically oriented language use obviously awaiting further inquiry. The aim of this study is to address some of these aspects in more detail. On the basis of authentic published texts from three broad scientific disciplines—economics, medicine, and technology—it is one of my aims to study whether or not the three subject fields differ from each other in the use of hedges. This issue is also linked to the larger question of whether ESP such as scientific discourse may be characterized universally across subject areas or in a more diversified manner according to subject field, a question which has been and still remains of particular importance in view of its pedagogical implications. My second main point of interest has to do with the question of hedging in scientific texts for audiences other than the scientific community proper. By examining the use of hedges in scientific popularizations representing the three disciplines, I will examine whether, apart from their observed uses in specialist-to-specialist communication such as RAs, hedges also figure in less specialized scientific discourse. Granted the increase in scientific popularization over the past decades (Peters 1995, Dixon 1980), this investigation will, it is hoped, also carry potential beneficial for the popularizers of science. By considering hedging in the communicative context of scientific popularization, my purpose is to investigate whether this rhetorical strategy might indeed involve functions other than those typically cited in work relating to discourse like RAs, functions that studies, style manuals, and pedagogical materials might have disregarded due



to their bias toward the most conventional kinds of scientific texts, such as RAs. Such potential variation between specialist-to-specialist communication and popularizations carries important implications for the study of scientific rhetoric, not only as concerns hedging, but also with regard to a number of other linguistic phenomena. By more careful analyses of the various kinds of scientific discourse, we might perceive differences that earlier studies, focusing on the most institutionalized types of scientific communication, may have overlooked.

In order to provide the reader with a clearer picture of the area to be examined, it is first useful to give a closer account of the concepts to be dealt with and to introduce earlier studies related to the topic investigated. Chapter 1 therefore offers an overview of the general notion of hedging, discussing its background and development as well as elucidating the functions and forms that hedges may be seen to take. A more in-depth introduction to the scope and aims of this study will be provided in Chapter 2, which will also present the materials studied and the methods of analysis. Chapter 3 then proceeds to a discussion of hedging in the context of professional scientific discourse such as RAs, discussing the suggested uses and motivations of the strategy in such language use. The following Chapter (4) will present both qualitative and quantitative information concerning the incidence and functions of various hedging phenomena in the RA corpus analyzed. A description of the potential of hedges in scientific popularization is given in Chapter 5, to be followed by results concerning the use of hedges in a corpus of popular scientific articles in Chapter 6. Finally, Chapter 7 offers an overview of the results, attention being drawn to both results concerning the different subject fields and the two levels of specialization, as well as to the implications of the results as concerns both the research and pedagogy of special-subject discourse.

## 1. Exploring the Concept of Hedging

The words *hedge* and *hedging* can be broadly defined as referring to a barrier, limit, defence, or the act or means of protection or defence (see *The Oxford English Dictionary* s.v. *hedge* and *hedging*). As will be illustrated below, especially many of the pragmatics-oriented interpretations of the two terms may be associated with these general meanings. Over the years, however, linguistic hedging has been viewed from different angles by researchers. In what follows, I shall therefore first discuss the development and uses of the concept in linguistic literature in general. The roles of hedging in scientifically oriented language use will be discussed in more detail in Chapter 3 as concerns scientific research articles and in Chapter 5 as regards popularized articles on scientific issues.

### 1.1 Hedging in Linguistic Literature: From Semantics to Pragmatics

Although the terms *hedge* and *hedging* have been part of the linguistic vocabulary for some thirty years now, no unified description of the concepts is to be found in literature. As Hyland states, straightforward definitions of the notions are rather rare (1998: 1), and the existing characterizations soon reveal that the terms are used in different ways by authors. Despite attempts to bring order into the multitude of definitions (e.g. Crompton 1997), it appears that researchers continue to approach the concepts of *hedge* and *hedging* in a variety of ways. Differences are also to be found in terminology relating to the area, terms other than *hedge* and *hedging* being employed to describe some of the linguistic phenomena elsewhere described as hedges. Notions like *stance marker* (e.g. Atkinson 1999), *understatement* (Hübler 1983), *downtoner* (Quirk et al. 1985: e.g. 597), and *downgrader* (House and Kasper 1981) at times appear in literature where the term *hedge* might be used by other scholars. Similarly, phenomena that certain studies call hedging have in other studies also been treated under headings such as *evidentiality* (Chafe 1986), *mitigation* (Labov and Fanshel 1977, Stubbs 1983), *indirectness* (Tannen 1982, Lakoff 1990, Hinkel 1997), *tentativeness* (Holmes 1983), and *vagueness* (Channell 1994, Myers 1996).

The earliest studies dealing with the concepts of *hedge* and *hedging* were based on Zadeh's (1965) work on fuzzy logic, where the author observed that some objects of the natural world do not easily fit into the linguistic categories available for describing the universe. The first primarily linguistically oriented treatment of hedges is found in the work of George Lakoff,<sup>1</sup> who drew

attention to the problem of relating natural phenomena to natural language concepts, which he claimed to have “vague boundaries and fuzzy edges” (1973: 458). Lakoff was especially interested in the linguistic phenomena used to talk about the more peripheral members of broad conceptual categories. To illustrate the practical possibility of studying such linguistic items in terms of formal logic and to address the questions involved in such analyses, Lakoff scrutinized a group of words that he regarded as hedges, “words whose meaning implicitly involves fuzziness—words whose job is to make things fuzzier or less fuzzy” (op. cit.: 471).

Lakoff’s early work and his definition of hedges have been used as a starting point in a number of later analyses of hedging phenomena. Although the meaning of the term *hedge* has since broadened to cover linguistic items other than the kinds listed in Lakoff’s paper, his discussion remains most useful for purposes of elucidating the semantic basis on which the notion of hedging rests. Lakoff’s treatment of hedges was by no means an attempt at a thorough analysis of such phenomena (op. cit.: 483); rather, it was intended to throw light on the theoretical significance and practical possibility of studying fuzzy expressions like hedges in natural languages with the help of formal logic.<sup>2</sup> Lakoff’s analysis involved linguistically indeterminate items that can be used to talk about those natural phenomena that fall outside the central core of the conceptual categories of natural language such as ‘animal’, ‘fish’, or ‘bird’. Hence, instead of saying that

(1) Whales are mammals.<sup>3</sup>

we may wish to point out that whales are in fact among the more peripheral members of the group in question and therefore say that

(2) Whales are *more or less* mammals.

The group membership of whales is thus qualified by the hedge *more or less*, because cetaceans are not apparently stereotypical mammals.

Lakoff’s (1973) initial treatment of hedges involved semantics, his main interest being in the way hedging functions *vis-à-vis* the conceptual categories of natural language.<sup>4</sup> Thus, Lakoff can be said to have dealt with the role of hedges in conceptualization as regards the *experiential* component of the *ideational* function of language<sup>5</sup> (Halliday 1970, 1978), that is, with the use of hedges in what Halliday (1978: 48) regards as the “‘content’ function of language; [...] language

as the expression of the processes and other phenomena of the external world”, roughly corresponding to Widdowson’s (1984: 71) *conceptual*<sup>6</sup> function of language.<sup>7</sup>

In many studies following Lakoff’s (1973) paper, the status of hedges in conceptualization has not been discussed at greater length, the emphasis being instead on the functions of hedging in social interaction between discourse participants. Hedging has thus more recently been approached as a pragmatic rather than a purely semantic phenomenon.<sup>8</sup> Hedging phenomena have often been perceived as contributing to the *interpersonal* function of language, by which we may “recognise the speech function, the type of offer, command, statement, or question, the attitudes and judgments embodied in it, and the rhetorical features that constitute it as a symbolic act” (Halliday and Hasan 1989: 45). Insofar as hedges also serve to comment on what is being said, they have been studied as a feature of *metadiscourse*, “discourse that calls attention either to the relationship between the author and the claims in the text or to the relationship between the author and the text’s readers” (Geisler 1994: 11), more specifically as a subtype of *interpersonal* metadiscourse (e.g. Crismore 1989).<sup>9</sup>

As Halliday and Hasan (1989: 45) point out, utterances always have both an ideational and interpersonal component,<sup>10</sup> and hedging has been treated with a view to both of these elements of discourse.<sup>11</sup> The different approaches adopted toward the analysis of hedging phenomena may therefore be described in view of their links to these two functions. To better understand the pragmatics of hedging, it seems that a thorough understanding of its ideational features, that is, its semantic aspects is necessary. Let us thus begin from a closer scrutiny of the semantics of hedges in order to lay the foundation for a discussion of how hedging has been characterized in interpersonal terms.

### 1.1.1 Hedging as a Semantic Phenomenon with an Ideational Function

Lakoff’s semantic characterization of hedging portrayed hedges as words<sup>12</sup> that may realize two seemingly contradictory functions, namely those of making things fuzzier or less fuzzy. What Lakoff himself exactly meant by this definition is not evident from his 1973 article, especially as concerns the latter half of the portrayal. In fact, it appears that most scholars have approached hedges as devices with the primary function of making things semantically fuzzier, whereas to my experience the idea of hedging as a strategy decreasing linguistic fuzziness comes up rarely in literature. However, by considering the status of hedges in how we conceptualize the universe, it

is possible to illustrate that at the semantic level hedging may indeed be seen to have both of these dimensions.

### Hedging as an Increase in Fuzziness

As Salager-Meyer (1994: 150) states, hedging is often linked to purposive vagueness and tentativeness, which suggests that hedges are typically associated with an increase in linguistic fuzziness. This view can be traced back to G. Lakoff's work, which emphasized that natural language sentences are not often entirely true, false, or nonsensical, but rather somewhat true and somewhat false,<sup>13</sup> and that membership in conceptual categories is not a simple yes-no question, but a matter of degree (1973: 458-459). Brown and Levinson (1987: 145) explicate Lakoff's work and say that hedges may be regarded as elements that can "modify the degree of membership of a predicate or noun phrase in a set." In this capacity, then, hedges can also be used to place the truth value of referential information somewhere on the continuum between absolute truth and falsehood. To provide a simple example, following Lakoff's (1973: 459) "birdiness hierarchy", instead of making a categorical statement such as (3),

(3) Penguins are birds.

we can insert a fuzzy expression into the statement to modify the degree of penguins' membership in the category of birds, vaguely placing penguins at the unspecified outer limits of birdiness:

(4) Penguins are *sort of* birds.

By virtue of its vagueness and imprecision, the hedge can be thought to render the conceptualization of the status of penguins more fuzzy, which, as we will see later, may in pragmatic terms be presumed to signal that the sender wishes to control his or her commitment to the accuracy of what is being said.

In the above case, the group membership of a single phenomenon is modified by hedging. George Lakoff (1973: 490-491) also reports Robin Lakoff's observation that some verbs and syntactic constructions convey hedged performatives,<sup>14</sup> that is, hedges can also be used to tone down the illocutionary force of entire speech acts as in the following,

- (5) He is leaving on the next train.
- (6) *I suppose that* he is leaving on the next train.

where the introductory *I suppose that* can be taken to reduce the force of the assertion.<sup>15</sup> In this particular case, however, it also seems that the hedge simultaneously comments on the validity of the following proposition in that it emphasizes that what is said may not be absolutely true.<sup>16</sup> In this sense, the hedges in (4) and (6) are functionally similar, because they can both be interpreted to insert an air of imprecision and fuzziness into the utterances. As a matter of fact, instances of hedging such as in (6) can also in a sense be associated with modification of category membership. Instead of being included within the category of ‘true’ propositions, the assertion in (6) is distanced from the category of absolute truthfulness and is placed at an unspecified point on the continuum between truth and falsehood. Lakoff’s work thus shows that hedging as an increase in fuzziness can be a useful means of expressing less than full commitment as concerns both membership in a specific conceptual category and the accuracy of entire propositions.

#### Hedging as a Decrease in Fuzziness

The view of hedging as an increase in fuzziness only accounts for the first half of Lakoff’s (1973) initial description of hedges. As stated, many studies have given precedence to this aspect, and disregarded Lakoff’s comment that hedges may also be thought to render things less fuzzy. This latter interpretation can nonetheless be motivated by reconsidering how hedging phenomena specify the status of a given phenomenon with regard to the conceptual categories of natural language. We may quite safely claim that it is occasionally virtually impossible to draw up accurate representations of the universe solely on grounds of the limited set of concepts that natural languages contain. Commenting on this, Burns (1991: 8) emphasizes that “we are sometimes faced with a range of cases where a predicate [or some other element] clearly applies at the one end and certainly fails to apply at the other but it is not at all clear what ought to be said about the cases in between.” This is particularly true as concerns contexts where the information-oriented nature of language use demands conceptual precision. As Brown (1995: 10) claims, the language of science is especially threatened by the imperfections of natural language. The limited nature of the conceptual categories of natural language may be seen as one manifestation of these imperfections, a flaw that can possibly be corrected to some extent by employing linguistic items

like hedges, which indicate the peripheral nature of a given phenomenon with regard to the conceptual categories of natural language.

To provide simplified examples, we may return to the hierarchies introduced by G. Lakoff (1973). In analogy with the “vegetableness hierarchy” (op. cit.: 459), one could state that

(7) Pickles are vegetables.

However, if we consider for instance *carrots*, it is evident that they are more readily associated with the core group of the conceptual category of vegetables and are therefore higher in Lakoff’s hierarchy than pickles. In some cases, it may be sufficient to describe pickles simply as vegetables, but if we have to be more precise and speculate about their vegetableness, we can hedge our conceptualization:

(8) Pickles *can be viewed as* vegetables.

Thus, apart from items increasing fuzziness by virtue of placing phenomena at the vague periphery of conceptual categories, hedges may alternatively be looked upon as devices that in fact decrease fuzziness. Hedges could indeed be interpreted to signal that the phenomenon under scrutiny does not conform to the limited conceptual categories of natural language, and by way of distancing the phenomenon from the core of a given conceptual category hedges actually render the relationship between the phenomena of the universe and the relevant conceptual categories more accurate. Whether this is what Lakoff intended to say in his definition is not clear, but represents one possible interpretation of what making things “less fuzzy” might mean. This portrayal may equally be extended to hedges commenting on the validity of entire propositions (see (6) above) in that the status of a given proposition with regard to the categories of ‘true’ and ‘false’ may thus be rendered more precise. Hedging may thus be employed to portray either the relationship between a phenomenon and a conceptual category or the truthfulness of a proposition as accurately as possible. In the case of this interpretation, too, the sender may be seen as exercising caution when constructing utterances, in an attempt to statements that would be too categorical.

To sum up the discussion of Lakoff's initial work on hedges, we can discern two seemingly different motivations for hedging in view of the conceptualization of the universe. On the one hand, in increasing the fuzziness of their utterances, language users can be thought to play down the degree of their commitment to the accuracy of concepts<sup>17</sup> or propositions. On the other hand, hedges can also be perceived to decrease fuzziness when the language user deems the relevant conceptual categories inadequate for purposes of describing a given phenomenon or when the accuracy of a proposition needs to be specified as not entirely certain. The latter might indeed often be the case in factual discourse, where hedges may be employed to give "the right representation of the state of knowledge under discussion, that is, to achieve greater preciseness" (Rounds 1981, summarized by Salager-Meyer 1994: 151). The latter interpretation can also be linked to Hyland's (1996/1998) concept of *content-oriented hedges*,<sup>18</sup> referring to items which "mitigate the relationship between propositional content and a non-linguistic mental representation of reality; they hedge the correspondence between what the writer says about the world and what the world is thought to be like", the subtype of *accuracy-oriented hedges* being concerned with achieving precision by either "marking a departure from an ideal" or "indicating that a proposition is based on plausible reasoning or logical deduction in the absence of full knowledge" (1998: 162 ff.).

The two semantic characterizations of hedging offered above both stem from the element of fuzziness inherent in hedging devices, it probably often being impossible to distinguish between the interpretations in practice. Nevertheless, being aware of these possible interpretations is useful when we turn to the way in which hedging occurs in different communication situations. In the abstract, I think, hedges can be described as items including an inherent component of fuzziness, or an element of what Burns (1991: 192) calls "vagueness of the ordinary kind", which results from "deliberate violations of the standards set by natural classification ranges." In view of the two broad interpretations of hedging discussed—making things fuzzier or less so—two main reasons as to why one might wish to resort to 'violations of the standards' of the categories of natural language can be put forth. First, hedges are sometimes needed in utterances to mark the information presented as uncertain, vague, or imprecise, that is, to indicate that one's knowledge of the world or the evidence available does not allow one to assign the phenomena under observation to the relevant conceptual categories or to put forth unhedged propositions. Second, hedging may be seen to take place when the limited set of natural language concepts or the use of an unhedged proposition is not deemed sufficiently precise to give the right representation of reality, that is, without qualification, all the necessary information cannot be presented. On such



occasions, then, items useful for indicating degrees of less than complete commitment toward specific concepts and propositions provide a useful semantic tool.

### Post-Lakoff Views of Hedging

As noted, most studies following Lakoff's treatment of hedges have concentrated on the pragmatic aspects of hedging instead of the semantics of the strategy. However, the semantic side of matters is also quite prominent in some studies, for example in the work of Prince et al. (1982) and Hübler (1983). Prince et al.'s (1982) work on hedging in pediatric intensive-care unit physicians' speech approaches hedges—which the authors only see as items making things fuzzier (p. 84), not less fuzzy—by dividing them into *approximators* and *shields*. The former category resembles G. Lakoff's (1973) semantic conception of hedges in that its members signal “non-prototypicalness with respect to class membership” (1982: 86). Approximators are further divided into two main types, *Adaptors*, which modify a term to suit a non-prototypical situation (e.g. *sort of*) and *Rounders*, which indicate that a term is not exactly precise (e.g. *about*). Shields, on the other hand, “affect the pragmatics by inducing implicatures conveying markedness with respect to speaker commitment” (ibid.) and also come in two varieties. *Plausibility Shields* indicate different degrees of uncertainty on part of the speaker (e.g. *I think, probably*), whereas *Attribution Shields* (e.g. *according to her estimates, mother says that*) attribute the degree of uncertainty toward a proposition to another party. Prince et al. suggest that only approximators affect truth value, whereas shields leave the truth conditions of propositions unchanged, only “affecting the degree of speaker-commitment” (p. 93). The approach advocated by Prince et al. has, however, been criticized in later work on hedging. While the distinctions drawn between the types of hedge elucidate the theoretical workings of hedging in isolated sentences, it seems that the division between approximators and shields may be very difficult to make in analyses of authentic language use. Commenting on this, Skelton (1988: 38) states that the distinction is “sustainable only in the abstract.” As Skelton sees it, the hedges classified as approximators by Prince et al. could equally function as shields following a ‘true’ shield such as *I suspect*. Markkanen and Schröder (1997: 5) are also doubtful about the usefulness of the division. In my opinion, too, such a division is rather difficult to uphold, as it seems that when one hedges so as to modify group membership or truth value in the way explained above in the discussion of Lakoff's work on hedges, one can simultaneously strive for pragmatic goals, for such semantic procedures do not take place in a void, but are determined according to the context. So, the underlying

motivation for semantic modifications can also be viewed from a pragmatic point of view as concerns the language users' reasons for making such modifications. Thus, I think, Prince et al.'s categories of approximators and shields may in fact be assumed to hold very similar pragmatic potential, which casts doubt on the usefulness of the distinction.

A basic characterization of hedging phenomena in some ways similar to that of Prince et al. (1982) can be found in Hübler's (1983) work. Hübler starts from the presumption that in language use "there are oppositions to all sentences" (p. 10), and the use of hedging phenomena provides an opportunity to prepare for possible opposition. This illustrates that Hübler takes the reasons underlying the use of hedges to be pragmatic by nature insofar as he emphasizes the interactional aspects underlying hedging. Hübler's study deals with linguistic indetermination as a means of reducing the negatability of sentences. According to Hübler, two main types of indetermination are available toward this end. Hübler distinguishes the two types from a semantic point of view on the basis of Hare's (1970) and Lyons' (1977) treatments of semantics and the speech act theory, distinguishing between indetermination within the *phrastic* and *neustic* components of a proposition. When indetermination occurs within the phrastic component, that is, concerns the propositional content and its correspondence with the outside world, Hübler speaks about *understatement*. Typical examples of understatement would then be many items mentioned by G. Lakoff (1973), because they can be used to mark the correspondence between natural language concepts and the outside world as indeterminate (e.g. *sort of*), an observation evidently closely associated with Lakoff's work. On the other hand, when indetermination reducing the negatability of a sentence is found within the neustic, that is, within "that part of the illocution which expresses the attitude of the speaker to the hearer regarding the proposition" (p. 11), Hübler talks about *hedges*. An explicitly modalized assertion such as

(9) I suspect that John is in love. (Hübler 1983: 114)

would then be a prime example of a hedged sentence in Hübler's sense, similar to Prince et al.'s (1982) pragmatics-oriented "Plausibility Shields."

Hübler's description of understatements and hedges is founded on a rationale quite similar to that seen in Prince et al.'s<sup>19</sup> work, and it also suffers from similar classificatory problems. One problem is that the Hüblerian understatements and hedges appear to be aimed at the same pragmatic goal, namely that of reducing the risk of negation. To my mind, it is precisely for this reason that, as Markkanen and Schröder (1997: 5) contend, "it can be asked what end this division

serves, what is gained by it besides making it easier for someone carrying out concrete analysis to limit his/her data.” Furthermore, I would like to re-emphasize that drawing a distinction between the two kinds of indetermination when analyzing longer stretches of discourse may be very difficult. Although the basic distinction between the phrastic and neustic components of propositions is theoretically straightforward, deciphering the difference between these elements in actual language use is not always as easy as Hübler’s simplified examples may suggest. If, for instance, Hübler’s understatements and hedges were to occur within the same sentence, criticisms similar to those posited against Prince et al.’s distinction between approximators and shields above may apply.<sup>20</sup> It therefore seems that both Prince et al.’s and Hübler’s categorizations of hedging phenomena are well justified in theoretical terms, but may not be very practical as concerns the analysis of actual linguistic data.

In conclusion, G. Lakoff’s (1973) as well as Prince et al.’s (1982), and Hübler’s (1983) characterizations of hedges and hedging provide further insights into the semantics of hedging, illustrating their ideational function. By elucidating the principles according to which fuzzy items affect the experiential component of the ideational function of language, we can perceive how hedging may work at the semantic level, how it can affect meaning in the abstract. What is more, in paying attention to the role of hedges in interaction between sender and addressee, Prince et al.’s and Hübler’s work equally provide a basis for a more pragmatics-oriented approach to hedging. It must be emphasized that these descriptions of hedging are theoretical constructs, illustrating different possibilities of interpretation, which may not be all that straightforward when actual language data is concerned. In practice, then, distinguishing Prince et al.’s approximators and Hübler’s understatements (more semantically motivated) from Prince et al.’s shields and Hübler’s hedges (more pragmatically oriented) may be most problematic indeed. In addition, even though a semantics-based approach to hedging may yield a good deal of interesting information, it does not reveal much about the interactional reasons underlying the use of hedges, which is one of the main points of interest in this study. In many cases, when the situation allows this, debatable conceptualizations and propositions may be put forth without any qualification, whereas in many other instances such unhedged utterances would be most unacceptable. What is therefore needed to understand the interactional rationale underlying the use or non-use of hedges in utterances is a closer analysis of the value of hedging in different communication situations, that is, a more thorough analysis of the pragmatic potential of the strategy (cf. Holmes 1995: 93 ff.). In what follows, the emphasis will thus move toward the pragmatic aspects of hedging.

### 1.1.2 Hedging as a Pragmatic Phenomenon with an Interpersonal Function

Apart from its central role in the conceptualization of the universe, language also has other functions. As Widdowson (1984: 71) says, language serves a social purpose in that it “provides the means for conveying basic conceptual propositions, for setting them in correspondence with those in the minds of other people, and for using concepts to get things done in the business of social interaction.” Alongside the ideational component, language thus equally has an *interpersonal* element, “the grammar of personal participation; it expresses the speaker’s role in the speech situation, his personal commitment and his interaction with others” (Halliday 1973: 99).

In much of the more recent work relating to hedging, it is the interpersonal aspect of the strategy that has been given emphasis,<sup>21</sup> hedging having been analyzed with an eye on the communication situation, particularly the effect of the strategy on the relationship between sender and addressee in face-to-face communication.<sup>22</sup> Generally speaking, the more pragmatics-oriented descriptions of hedging phenomena presented in literature are often rather circumspect *ad hoc* notions for the purposes of a particular research project rather than thorough deliberations of the phenomenon. Addressing hedging in newswriting, Zuck and Zuck (1985: 172) for instance define the strategy as “the process whereby the author reduces the strength of what he is writing” in case the information reported later turns out to be incorrect. Furthermore, in a cross-linguistic treatment of hedges in philosophical texts, Markkanen and Schröder (1987: 48) define hedging as a strategy of “saying less than one means”,<sup>23</sup> the functions of the strategy being to modify the writer’s responsibility for the truthfulness of an utterance, to modify the definiteness of an utterance or its information, and to modify the attitude of the author to the propositions and information put forth in a text or even to hide this attitude. Crismore and Vande Kopple (1988: 185), in turn, see hedges as items that “signal a tentative or cautious assessment of the truth of referential information”, which allows senders to reduce their responsibility toward the information presented.

Characterizations such as the ones above obviously capture some of the essential features of hedging, avoidance of sender responsibility toward the referential information presented evidently being the primary motivation of hedging in these depictions. However, many earlier pragmatic descriptions appear rather one-sided in that they mainly give attention to hedging as a strategy allowing senders to protect themselves, such approaches to a considerable degree resembling the dictionary definition referred to at the outset of this chapter. What many

discussions appear to be missing, however, is a more thorough analysis of hedges in linguistic interaction considered in more detail, with attention to not only the sender's self-protection, but also to the communication situation more widely, including the addressee and the relationship between the discourse participants. The most thorough treatment of the interpersonal features of hedging so far is to be found in literature relating to politeness theories,<sup>24</sup> mainly in work originating from Brown and Levinson's (1978/1987) well-known study of politeness phenomena. It seems that most of the earlier pragmatic portrayals of hedging may in one way or another be associated with the expression of linguistic politeness, the theory presented by Brown and Levinson (1978/1987) probably offering the most systematic basis for an analysis of the pragmatics of hedging and implicitly accounting for many of the descriptions suggested in other studies.

### Hedging as an Interpersonal Politeness Strategy

Watts et al. (1992) explain that the notion of linguistic politeness has to do with the way in which human beings "successfully manage interpersonal relationships to achieve both individual and group goals" (p. 1), linguistic politeness being "the various forms of language structure and usage which allow the members of a socio-cultural group to achieve these goals" (pp. 3-4). The notion of linguistic politeness first received attention in connection with Paul Grice's studies on *conversational maxims* from the late 1960s onwards. Grice suggested that so as to account for language use in context, a politeness maxim should perhaps be added to the well-known maxims he had established in connection with his *cooperative principle*<sup>25</sup> (maxims of quality, quantity, relation, and manner). Grice's idea became the basis for what Fraser (1990) calls the *conversational-maxim view* of politeness, found in the work of Robin Lakoff and Geoffrey Leech. One of the first studies to approach politeness from the conversational-maxim viewpoint was Robin Lakoff's (1973) paper where she called for an elaboration of the Gricean maxims with regard to politeness. Lakoff wished to show that in addition to abstract semantic and syntactic rules, language users follow rules of pragmatic competence for reasons of politeness. In brief, Lakoff wanted to emphasize that underlying our behavior during linguistic interactions are *two* basic areas of linguistic competence, one area being realized by adhering to the principle of *clarity* (realized by means of the original Gricean maxims) and the other by observing principle of *politeness*. Acknowledging the importance of both areas is necessary for an understanding of the mechanics of cooperative linguistic interaction.<sup>26</sup>

R. Lakoff's elaboration of Grice's original principles is developed further in the work of Geoffrey Leech (1983), who includes politeness in his *interpersonal rhetoric*. Interpersonal rhetoric involves *three* different sets of conversational maxims, namely those pertaining to Grice's cooperative principle, the principle of politeness akin to that of R. Lakoff, and the *irony principle*.<sup>27</sup> In Leech's (1983) theory, politeness may be realized by weighing one's linguistic behavior against a group of maxims whereby speakers can minimize hearer cost and maximize hearer benefit (*tact maxim*), minimize their own benefit and maximize that of the hearer (*generosity maxim*), minimize hearer dispraise and maximize hearer praise (*approbation maxim*), minimize self-praise and maximize self-dispraise (*modesty maxim*), minimize disagreement and maximize agreement between oneself and others (*agreement maxim*), and minimize antipathy and maximize sympathy between oneself and others (*sympathy maxim*).<sup>28</sup>

A somewhat different approach to the study of linguistic politeness was developed by Brown and Levinson (1978/1987). While R. Lakoff and Leech had been interested in politeness as part of a system of conversational principles, Brown and Levinson looked at politeness as if it were a reason *not* to follow conversational principles. Brown and Levinson's (see e.g. 1987: 5) position is that a clear distinction should be drawn between Grice's cooperative principle and linguistic politeness, the cooperative principle being a description of "an 'unmarked' or socially neutral (indeed asocial) presumptive framework for communication; the essential assumption is 'no deviation from rational efficiency without a reason'." In Brown and Levinson's work, principles of politeness are thus not included within the same framework as the kinds of principle postulated by Grice. Instead, politeness is seen as distinct from such rules, indeed as a social reason to deviate from Grice's 'asocial' principles of linguistic behavior.

Brown and Levinson built their theory of politeness around Goffman's anthropology-based concept of *face*, defined as "the positive social value a person effectively claims for himself by the line others assume he has taken during a particular contact. Face is an image of self delineated in terms of approved social attributes [...]" (Goffman 1967: 5). Brown and Levinson incorporated the notion of face into their theory of linguistic politeness, seeing it as a binary concept divided into *negative* and *positive face*. The backbone of Brown and Levinson's (1987: 13 ff.) model is thus the idea that interlocutors are aware of two basic kinds of desire regarding their face (i.e. face-want), namely "the desire to be unimpeded in one's actions (negative face), and the desire (in some respects) to be approved of (positive face)." By postulating a rational "Model Person" (op. cit.: 58), Brown and Levinson attempt to account for politeness as a systematic feature of linguistic interaction.<sup>29</sup>

Brown and Levinson's theory of politeness centers on the idea that in linguistic interaction certain illocutionary acts, even when in accordance with Grice's cooperative principle, threaten a person's face, either the negative or positive side of it. Such utterances are referred to as face-threatening acts (FTAs), and it was Brown and Levinson's view that politeness enters the picture when we want to play down the effects of FTAs.<sup>30</sup> The basic tenet underlying Brown and Levinson's work is then that "a face-bearing rational agent will tend to utilize the FTA-minimizing strategies according to a rational assessment of the face risk to participants" (1987: 91).<sup>31</sup> For example, a hearer's negative face may be under threat when a speaker is too assertive, thus imposing upon the hearer's own opinions, or a hearer's positive face may be threatened when a speaker insults the hearer. Similarly, an illocutionary act may be damaging to a speaker's own negative face when he or she is forced to make an involuntary offer or promise, or the speaker's positive face may be on the line when he or she has to admit to a mistake. Two kinds of politeness, negative and positive, can then be adopted so as to avoid doing FTAs baldly, that is, politeness may be used to counteract the threat that FTAs may impose. The strategy chosen is dependent on the power relationship (P) and social distance (D) between speaker and hearer, as well as on the ranking of the imposition (R) that an on-record FTA without redressive action would constitute (op. cit.: 74).<sup>32</sup>

### Hedging as an Interpersonal Negative Politeness Strategy

Much of previous work on the interpersonal aspects of hedging is based on Brown and Levinson's (1978/1987) treatment of hedges, where it is reasoned that hedges can be used to avoid "presuming or assuming that anything involved in the FTA is desired or believed by [the H[earer]" (1987: 144). By this is meant that hedging can be used to indicate that the speaker does not want to impose upon the hearer's desires or beliefs.<sup>33</sup> Brown and Levinson thus discuss hedging at greater length as one of ten strategies linked to negative face protection, although they do point out that hedges may have other functions as well, including the protection of positive face (op. cit.: 146).

Hübler (1983: 156-159) picks up the idea of hedging phenomena as indications of negative politeness and contends that hedges are primarily used in negative face work, hedging devices being "detensifying" elements which senders can employ "to maximize the emotional acceptability of the propositional content presented to the hearer for ratification." On the one hand, senders may hedge utterances so as to leave room for the audience's opinions, in this way

recognizing its want of self-determination. It is particularly this aspect of hedging that has been emphasized in literature on politeness, hedges being a useful means of avoiding “apodictic statements” that might be interpreted as “ex-cathedra formulations” overlooking the audience’s wish to judge for themselves (Hübler 1983: 159). On the other hand, hedges can also be interpreted as simultaneously serving the sender’s negative face needs. As explained above, hedging has previously been described as a means of self-protection. In being tentative and cautious through hedging, senders can limit their responsibility toward the information presented, and so obviously attempting to avoid potential impositions on their own views in the form of audience criticism. Should the audience not be sympathetic toward the sender’s views, hedging may then allow him or her to bow out more gracefully and maintain face regardless of critical comments, because the original utterances were toned down so as not to exclude the possibility of being proven wrong. In this case, hedging may be seen as a strategy protecting the sender’s negative face on occasions when the sender “indicates that he [or she] thinks he [or she] had good reason to do [...] an act which [the addressee] has just criticized” (Brown and Levinson 1987: 67). In the context of scientific discourse, for instance, this might be taken as a central motivation for hedges. As Salager-Meyer (1994: 150) suggests, in toning down the force of one’s conceptualizations of the universe by hedging, it is possible to limit one’s responsibility toward what is said and thus to avoid embarrassing situations in case one is found to be wrong (see also Zuck and Zuck 1985). Hedging may accordingly be characterized as “a primary and fundamental method of disarming routine interactional threats” (Brown and Levinson 1987: 146) which increases the probability of acceptance by the audience. By way of illustration,

- (10) Linguistic politeness is *more or less* the most interesting area of pragmatics.  
 (11) *I think that* politeness theories constitute the most interesting area of pragmatics.

In (10) and (11), expressions modifying group membership and illocutionary force are inserted to qualify the assertions. In conceptual terms, *more or less* distances *linguistic politeness* from the category of ‘the most interesting area of pragmatics’ and *I think that* modifies the force of the entire utterance, placing the proposition somewhere on the continuum between absolute truth (‘yes, they definitely are’) and falsehood (‘no, by means they are not’) by marking the utterance as a subjective view, not a categorically correct assertion. In terms of politeness, the hedges are very similar, it being possible to decipher two reasons for inserting the devices. Let us suppose that we are addressing a group of people with an interest in pragmatics. Firstly, the hedges may be seen as



indications that the sender does not want to impose his or her views on the addressees, the latter perhaps having their own areas of interest within pragmatics. This would constitute negative politeness toward the addressees. Secondly, granted that the addressees may have their own ideas about the importance of politeness theories, the hedges can be seen as a way out for the sender, should the addressees object to his or her views. By hedging the conceptual categorization in the first sentence and marking the proposition as a subjective assertion in the second the sender allows for other opinions and simultaneously protects his or her negative face against critical comments from the audience.

Turning to the semantic background of the types of negative politeness involved in the examples, the two interpretations described above, namely increasing and decreasing fuzziness, may be used to analyze the interpersonal potential of hedges. On the one hand, both *more or less* and *I think that* can be thought to increase conceptual imprecision and render things fuzzier. *More or less*, by virtue of making category membership indeterminate and *I think that*, in marking the truthfulness of the proposition as uncertain, underline that what is being said might not be accepted by everyone, the fuzziness of the expressions allowing the addressees to disagree and offering the sender the possibility to forestall potential opposition from the audience.

Alternatively, the hedges can be thought to increase the precision of the utterances, to make things less fuzzy. The hedges may be seen as signals either that the conceptual category involved (i.e. ‘the most interesting area of pragmatics’) is not an adequate portrayal of *politeness theories* or that the proposition does not fulfill the criteria of ‘true’, but is more accurately worded when hedged. By hedging in order to be more precise, the sender may thus also be perceived to acknowledge the addressee’s negative face by not imposing categorical utterances on an audience that may be presumed to understand that the information presented may in some way be subject to debate. At the same time, the sender can protect his or her own face against criticism that might follow utterances lacking the refinement brought by the hedges.

In brief, both increasing and decreasing fuzziness in terms of hedging may be interpreted as aiming at the interpersonal goal of negative politeness. Whether the underlying semantic basis is that of rendering things fuzzier or that of making them less fuzzy is difficult to decipher, because the same linguistic items can be interpreted to achieve both goals. Furthermore, it may not be always easy to say whether hedges aim at the protection of sender, addressee, or perhaps both. The rationale behind the use of hedges is always a matter of the individual language user and his or her conception of the communication situation. Hence, negative politeness may be employed on different grounds in different contexts. In sum, due to its negative politeness

potential, hedging can be regarded as part of “a system of interpersonal relations designed to facilitate interaction by minimizing the potential for conflict and confrontation inherent in all human interchange” (R. Lakoff 1990: 34).

### Hedging as an Interpersonal Positive Politeness Strategy

In much of previous work, hedging has been viewed as a negative politeness strategy, but it may also at times be seen to have a positive politeness dimension. This aspect of hedging has received scant attention in literature, but is nonetheless implied by some authors like Aijmer (1986: 15), who says that if “the focus in the communication situation is on the relationship between speaker and hearer, the hedge can [...] become a strategy signalling intimacy and ‘rapport’.” Brown and Levinson (1978/1987) are of the opinion that one way to express positive politeness toward one’s addressee, to communicate “that one’s own wants [...] are in some respects similar to the addressee’s wants” (1987: 101), is to avoid disagreement. One avoidance strategy (op. cit.: 113 ff.) is rendering one’s opinion safely vague, seeking agreement with the addressee when the latter has not made his or her position clear. Hedges can sometimes be used toward this end:

(12) *In a way*, that painting is beautiful.

Brown and Levinson argue that by using such hedging, the sender avoids communicating his or her opinion precisely and calls upon the addressee “to use his common knowledge” when interpreting the sender’s opinion (op. cit.: 117).

Similarly, when the positive face of the addressee is threatened because of the criticisms or complaints of the sender, the sender may choose to play down the threat and hedge:

(13) You made *a kind of* a mess of it, didn’t you?<sup>34</sup>

In both (12) and (13), the hedges can be analyzed as positive politeness markers that reduce the threat to the positive face of the addressee.

Equally, although this aspect of the matter is not discussed by Brown and Levinson, hedging may be approached as a strategy aiming at the protection of the sender’s positive face. In (12) the hedge *In a way* can also be conceived to function as a device by which the sender calls for cooperation and agreement regarding his or her own ideas in communication. By presenting an

opinion in a manner that may be presumed to invite the addressee to acknowledge the sender's proposal that at least some features of the painting are beautiful, the sender may fortify his or her positive face. Similarly, an utterance such as

(14) I made *a kind of* a mess of it, didn't I?

can be regarded to include the hedge *a kind of* for the purpose of gaining a sympathetic response from the addressee, who is thus invited to show approval toward the sender in a context where the opposite might otherwise be expected.

If we consider the way in which hedges work at the semantic level toward positive politeness, there is not much of a difference in comparison with the characteristics of hedges as indications of negative politeness. On the one hand, positive politeness may be associated with an *increase* in fuzziness. In fact, the hedge *In a way* provides an interesting example where the semantic status of the hedge is difficult to determine. The insertion of *In a way* into (12) can be thought to increase fuzziness and render the status of the proposition indeterminate with regard to the extremes of 'true' and 'false'. In this particular case, the hedge might also be seen to limit the membership of the painting in the conceptual category of 'beautiful', that is, to fuzzily indicate that some undefined aspects of the painting may be considered beautiful, which may be taken as an invitation for the addressee to acknowledge such aspects.<sup>35</sup> The two interpretations provide an interesting example of a case where it is difficult to see whether the hedge works at the level of a specific concept or the entire proposition. On the other hand, the hedge in the same example may also be interpreted to *decrease* fuzziness in that the hedge underlines that the proposition may not be seen as absolutely 'true' but is best worded with a limiting term or in that the painting does not fulfill the criteria that would allow one to classify it into the category of 'beautiful' without qualification, pointing out that the sender is seeking agreement by not making absolute, potentially debatable statements about the issue at hand. The hedge *a kind of* in (13) and (14) may be also be interpreted to increase fuzziness of expression in introducing indeterminacy into the conceptualizations involved, placing them vaguely along the continuum between being true messes and not being messes at all. Alternatively, the hedge may be thought to render the conceptualizations of the situations conceptually less fuzzy, because it indicates that what we are dealing with may perhaps not qualify as proper messes in the strictest meaning of the term, even though the situations may share some of the characteristics of a mess, hedging bringing refinement into the conceptual categorization in question.

## Interpersonal Functions of Hedging: Contexts and Interpretations

What appears problematic in the analysis of the above-discussed interpersonal aspects of hedging is the functional complexity of the phenomenon. As Thomas (1995: 176) points out in her criticisms of Brown and Levinson's account of politeness, their theory implies that negative and positive politeness are mutually exclusive, but in practice even a single utterance may be seen to aim at politeness of both types. As shown, hedges can frequently be analyzed as negative politeness markers, but their use for seeking agreement may also be regarded as protection of the positive face of sender and addressee. Furthermore, as is evident from the work of Brown and Levinson (1987: 116), the same linguistic forms (e.g. *sort of*) may fulfill these different functions, which is problematic for the analyst. Distinguishing between the functions in authentic language use is by no means a straightforward task and the reasons for using a hedge may only be analyzed on the basis of sufficient knowledge about the communication situation. Nonetheless, even then many interpretations remain subjective and potentially ambiguous.

As noted, it is the interpersonal negative politeness function of hedging that is primarily dealt with in literature, although there might be some noteworthy issues linked to hedging as an indication of positive politeness as well.<sup>36</sup> At times (e.g. Dillon 1986: 28), it seems to be presumed that procedures like hedging primarily take place in communication between relatively equal participants. This view is visible for instance in the work of Robin Lakoff, who contends that hedging (or indirectness, as she calls it) occurs as a negative politeness strategy when “the participants are on an approximately equal footing, but not one of true intimacy, so that both need protection and feel a need to protect each other” (1990: 32). On the other hand, negative politeness is not needed between unequal participants, because “[t]he powerful have less to fear through directness, they do not have to worry about being rude [...], and they do not have as much reason to worry about being found to be in error” (ibid.).

What is not taken into account in making such statements, however, is that the same linguistic features that can be interpreted as indicating a certain type of negative politeness in discourse between equals may have different functions in other contexts. This view is advocated by Holmes (1983), who deals with expressions of epistemic modality, including items that are elsewhere often described as hedging phenomena. Holmes (op. cit.: 106) points out that in situations where “a speaker feels socially out-classed, ill-at-ease, or simply wishes to avoid offending addressees who are of greater social status or who are not familiar”, speakers

commonly use hedging phenomena to soften their utterances. On the other hand, those who are of a socially superior status “may equally choose to attenuate or tone down the illocutionary force of a speech act, particularly one with negative affect [...]” (ibid.). Hedging phenomena, then, may conceivably also occur in discourse between unequal participants for example so that lower-status senders may exercise caution with regard to superior addressees. In such situations, Holmes’ (1983) work implies, hedging may equally have a negative politeness function, but one which is somewhat different from the kind seen in discourse between equals. Moreover, senders of a superior status may choose to qualify their utterances when addressing audiences of a lower social standing so as to play down the negative effect of their utterances, which suggests a positive politeness function for hedging (cf. example (13) above).

All in all, given the different views presented, hedging seems to have a range of purposes to which it can be put as a politeness phenomenon. In previous studies, various aspects of hedging in politeness function have been suggested, but the interpretations nonetheless at times appear conflicting, being restricted by the kinds of communication situation considered by researchers. Hence, there seems to be a call for a careful analysis of the various sociological variables involved in discourse when investigating the phenomenon of hedging. It is through an examination of the roles of the discourse participants in the communication situation under observation that we can attempt to arrive at a better understanding of the interactional workings of hedges as politeness phenomena in different contexts. In this study, none of the above descriptions of hedging as a means toward politeness is ascribed to as such, because earlier studies appear to give insufficient attention to the features of different communication situations. Instead, it is presumed here that hedging may *in principle* have any of the politeness functions described or implied in previous work, the value of individual hedges being determined according to the social construction of the situation at hand. However, it is also assumed here that in pragmatic terms hedging is not solely limited to the politeness functions it has been postulated to have in previous work, but that it may also carry other kinds of potential.

It is my contention in this study that the various functions of hedging have not been given equal attention in previous work, hedging being a multi-faceted linguistic strategy by which we can accommodate our communication to conform better to different situations. In order to understand the ways in which hedges may be employed, a close consideration of the semantic and pragmatic features of the phenomenon in different communicative contexts is necessary. In the present study, hedging is approached in broader terms as a process by which linguistic items including an inherent element of fuzziness are introduced into discourse. In different

communication situations, these elements can be seen to increase or decrease semantic fuzziness. Such semantic potential may be employed to modify group membership, affect truth value, and to tone down illocutionary force, and, accordingly, serve different pragmatic functions in linguistic interaction, including not only linguistic politeness but also pragmatic ends of other kinds.

## 1.2 Linguistic Realizations of Hedging

Thus far, I have discussed only a few examples of hedging. The earliest studies into hedging were limited to a fairly narrow selection of linguistic expressions, G. Lakoff's (1973) paper, for instance, listing only about 70 different items. More recently, numerous linguistic phenomena have been associated with hedging, there nevertheless being no absolute uniformity between studies as to which linguistic phenomena should be regarded as falling within the category. The multiplicity of the forms that hedging may take is indeed one of the main problems in the analysis of the phenomenon, as it appears that the devices cannot be classified exhaustively by referring to any clearly delimited traditional linguistic categories.

Literature relating to hedging seems to suggest—explicitly or implicitly—that hedges are linguistic choices that include an inherent component of fuzziness, providing the opportunity to comment on group membership, truth value, and illocutionary force. However, there is variation between studies as to the actual items treated as hedges. In some studies, as is the case with Prince et al.'s (1982) paper, the phenomena treated as hedges are not described very thoroughly. In other studies, the focus is on a specific linguistic feature, not the broad range of alternatives available for hedging. Lachowicz (1981), for instance, has examined the use of the actorless passive, pointing out that, in addition to its other uses, it is a useful strategy for hedging, because it is less dogmatic in tone and expresses a “tendency toward generalizing cases in point, allows for the author to be more open to other possibilities of interpretation” (p. 113).<sup>37</sup> Hedging has also often been associated with numerical imprecision. Dubois (1987), for instance, lists as hedges a number of items used for rounding numerical data, including items like *about*, *approximately*, *close to*, and *in that round*. The idea of numerical imprecision as hedging is also dealt with by Channell (1994).

While certain studies deal with a specific linguistic phenomenon, others have attempted to cover a wider range. Studying hedging in newswriting, Zuck and Zuck (1985), for example, draw attention to an array of devices. They first discuss how vagueness in presenting the sources of news items may amount to hedging and then proceed to presenting a list of other items typically

used as hedges. Most of the items on the list are verbal or adverbial expressions that involve different degrees of probability or otherwise play down the responsibility of the sender as concerns propositional content. The main categories consist of auxiliaries (e.g. *may, might, can, could*), semi-auxiliaries (*appear, seem*),<sup>38</sup> full verbs (*suggest*), the passive voice, various adverbs and adverbials (*probably, almost, relatively*), some adjectives (*probable*), and indefinite nouns and pronouns. Similar items are also mentioned by Markkanen and Schröder (1987), according to whom modal verbs, modal adverbs and particles, the use of some pronouns and even the avoidance of others,<sup>39</sup> agentless passives, other impersonal expressions, and certain vocabulary choices may be seen as central manifestations of hedging in English and German. Skelton (1988: 37) points out that “[t]here are a very large number of ways in which one can hedge in English”, including impersonal phrases, the system of modal expressions, verbs like *seem, look, and appear*, introductory phrases like *I think*, the suffix *-ish* in connection with certain adjectives, and so on. Other lists of linguistic phenomena with hedging potential are presented by, among others, Grabe and Kaplan (1997) and Hyland (e.g. 1994, 1998).

When we look at the linguistic items that researchers have associated with hedging, it becomes clear that the scope of hedging has broadened considerably since G. Lakoff’s (1973) initial work. The limited set of items dealt with by Lakoff has expanded to cover a wide range of phenomena from prosodic and kinesic hedges (Brown and Levinson 1978/1987) to the passive voice, certain lexical items, ways of citing one’s sources (Zuck and Zuck 1985), impersonality, numerical imprecision (Dubois 1987), questions (Webber 1994), tense and concessionals (Hyland 1994), and so on. This has evidently been a result of the widening of the notion of hedging. While G. Lakoff’s study mainly dealt with the semantics of hedges, in the following stages, as is already visible in work by R. Lakoff (1973), the pragmatics of hedging began to attract increasing attention. With the widening of functional scope, researchers also became interested in a wider array of devices, it now being commonly recognized that delimiting the items that can be associated with hedging is difficult. In fact, it is Brown and Levinson’s (1987: 146) opinion that the semantic potential needed for hedging “can be achieved in indefinite numbers of surface forms [...]”. Although Salager-Meyer (1994: 152) states that hedging may be regarded as “the product of a *mental attitude* which looks for prototypical linguistic forms [...] for its realization [...]”, there are also probably many other forms beyond the prototypical ones that may be perceived as hedges in certain contexts. Due to the difficulty of drawing up an exhaustive categorization of hedging phenomena, approaches not based on the identification of individual linguistic items have been suggested. Crompton (1997: 283-284), for instance, is of the opinion

that hedging might be better described by starting from the sentence patterns that hedges commonly occur in.<sup>40</sup>

Describing hedging exhaustively on the basis of any clearly delimited linguistic categories seems difficult. On the other hand, even though an exhaustive analysis of hedging on the basis of the traditional categories of linguistic description is problematic, it is possible to gain useful insights regarding hedges by choosing the linguistic phenomena representing the most typical realizations as the point of departure. Although the different lists of hedges mentioned in previous studies are varied and might not account for all potential cases of hedging, they are nonetheless useful in illustrating some of the most central linguistic phenomena pertaining to the strategy. In essence, the linguistic forms dealt with in literature as hedges indicate reservation, avoidance of commitment, and uncertainty regarding what is being said, the effects of hedging typically being those of modifying truth value, commenting on the accuracy of a given conceptualization, and/or influencing the truthfulness and force of propositions. This perspective suggests a close affinity between the notions of hedging and modality. In fact, as Markkanen (1985: 58) suggests, the definition of hedges offered by Brown and Levinson (1978) closely resembles, for example, Lyons' (1977) description of modality. A close association between hedging and modality is also visible in the work of Bloor and Bloor (1993), who use the terms almost interchangeably. Furthermore, Crompton (1997) and Hyland (1998) equally establish a close connection between hedging and modality, more precisely the *epistemic* type of modality.

The notion of modality has been treated extensively in literature. In general terms, modality can be defined as “the speaker’s opinion or attitude towards the proposition that the sentence expresses or the situation that the proposition describes” (Lyons 1977: 452). It is widely recognized that modality represents a broad domain and that modal expressions<sup>41</sup> are used in a variety of ways. In literature, a basic distinction is typically drawn between *epistemic* and *deontic* modality.<sup>42</sup> Epistemic modality is generally seen to occur when “the speaker explicitly qualifies his commitment to the truth of the proposition expressed by the sentence he utters” (Lyons 1977.: 797). Epistemic modality is thus related to the sender’s knowledge and beliefs concerning the information that is presented, extending to the sender’s “confidence or lack of confidence in the truth of the proposition expressed” (Coates 1987: 112). Deontic modality, on the other hand, is “concerned with the necessity or possibility of acts performed by morally responsible agents” (Lyons 1977: 823). Deontic modality thus has to do with expressions of obligation, duty, volition, and the like, reflecting the sender’s “attitude toward the desirability (or undesirability) of certain actions or events” (Simpson 1990: 67).



Hedging has characteristically been linked to epistemic modality, because the meaning of both epistemically modal devices and hedges is closely related to the sender's degree of confidence regarding what is being said. This idea is advocated by for example Nash (1990: 23), who says that modality is a useful insurance that limits our responsibility in pointing out the limitations of propositional information. By way of illustration,

(15) Researchers *may* have found a cure for influenza.

(16) Patients *may* only smoke outside the building.

the auxiliary in (15) is used epistemically, to express tentativeness toward the information presented, which may also be seen as hedging. In the following example, on the other hand, the auxiliary is used to express permission, a non-epistemic meaning not associated with hedging. The hedging value of epistemic modality is also acknowledged by Thompson (1993: 118), who says that modality may be used as a hedging strategy to express degrees of commitment in factual discourse. A similar opinion is worded by Hyland (1998: 2), who contends that “[t]he writer or speaker’s judgements about statements and their possible effects on interlocutors is the essence of hedging, and this clearly places epistemic modality at the centre of our interest [in the analysis of hedging].”

What with the increasing interest in the pragmatics of hedging and the recognition of the hedging value of epistemic modality, the focus of studies into hedging phenomena has expanded to a considerable degree since the early stages of studies concerning hedges. Many of the hedges that George Lakoff (1973) studied were not among the items most typically regarded as epistemic (Markkanen and Schröder 1997: 6). The same can also be said about some of the items treated by for instance Prince et al. (1982: 87-9), especially those belonging to their category of approximators (e.g. *sort of*, *somewhat*, *approximately*, *almost*). On the other hand, the potential of epistemic modality is clearly visible in Prince et al.’s category of shields, where items typically linked to epistemic meaning are common (e.g. *I think we can probably* just slow him down; was noted *presumably* very quickly). In many later studies of hedging, too, items characteristically seen as epistemic have been at center stage, but research has also addressed certain phenomena not always recognized as straightforward manifestations of epistemic modality (e.g. the passive voice, tense, questions, numerical imprecision). In broad terms, however, more or less all<sup>43</sup> of the linguistic elements seen as hedges in previous work may be included within the sphere of modality if we adopt an approach similar to that of Stubbs (1986), who points out that it might be

useful to approach grammar in a more communicative and functional manner than has been conventionally done. What Stubbs apparently calls for is a more functional pragmatics-based approach to the study of language that would take into consideration the variety of features that may be employed to “express personal beliefs, and adopt positions, to express agreement and disagreement with others, to make personal and social allegiances, contracts, and commitments, or alternatively to disassociate the speaker from points of view, and to remain vague or uncommitted” (1986: 1). What Stubbs thus has in mind is a “modal grammar of English” that accounts for the idea that “all utterances express not only content, but also the speaker’s attitude towards that content” (p. 15), the attitude in turn being realized in multifarious ways in actual language use. In adopting such an approach, then, we may also extend the domain of epistemic modality from the devices typically dealt with in work into modality to cover a variety of linguistic phenomena that may be seen as epistemic.<sup>44</sup> This approach, as Markkanen and Schröder (1997: 6-7) suggest, allows us to draw a parallel between the kinds of hedge mentioned by G. Lakoff (1973), the approximators introduced by Prince et al. (1982) and the more traditional category of epistemically modal expressions. In terms of function, hedges of different kinds seem to resemble each other insofar as they share many of the central characteristics of the traditional category of epistemically modal expressions, which thus appears to provide a useful point of departure in the study of hedging phenomena.

In addition to the basic distinction between epistemic and deontic modality, there have been attempts to refine the descriptions of the two main types of modality involved in language use. A further distinction is often made between the notions of modal *possibility* and *necessity*. In (15) and (16) above, we were dealing with epistemic and deontic possibility, whereas sentences such as

(17) You *must* be sick.

(18) You *must* leave now.

can be seen to exemplify expressions of epistemic (‘on the basis of the present evidence, I conclude that’) and deontic (‘you are obliged to’) necessity, respectively. As Lyons (1977: 802) points out, the notion of epistemic necessity has not always been discussed very thoroughly in work on modality. In fact, Lyons himself is of the opinion that it is the ‘possibility’ interpretation that “should be taken as primitive in the analysis of epistemic modality.” Whether Lyons’ view can in fact be taken to mean that in epistemic uses *must* hence involves possibility rather than

necessity is not altogether clear from what he says. Be that as it may, there on the one hand seems to be a certain degree of similarity in the epistemic uses of *must* and epistemic items more clearly involving a ‘possibility’ meaning insofar as epistemic *must* does inherently seem to involve some degree of doubt. On the other hand, nevertheless, it is evident that epistemic items like *must* are also different from epistemic devices such as *may*, which is most obviously associated with possibility:

(19) There *must* be some mistake. (Quirk et al. 1985: 224)

If we consider (19), a sentence with an instance of *must* that Quirk et al. (1985: 224) term *logical* or epistemic necessity, the modal in question might be seen to carry a slightly tentative meaning, but as Quirk et al. point out, it also indicates that the sender has drawn this conclusion on the basis of observation or earlier knowledge. Such uses of epistemic modals appear to express a rather strong likelihood based on evidence, whereas the use of a modal clearly indicating epistemic possibility (e.g. *may*) would constitute a considerably more tentative utterance without an indication of being founded on specific evidentiary justification. Declerck (1991: 406-407), in fact, expresses the view that *must* denoting epistemic modality points to what “the speaker considers as the only possible or plausible interpretation or explanation of a present or past situation.” Following this line of thought, it would appear that although both *may* and *must* can be seen to share some epistemic characteristics, the hedging effect of *may* is much stronger than that of *must*, but, due to its slight tentative potential, the latter is equally to be taken into consideration when dealing with hedging.

*Must* is of course not the only modal auxiliary associated with necessity. As for instance Coates (1983: 64 ff., 69 ff.) shows, other auxiliaries such as *should* and *ought* are often found as epistemic expressions, being in fact near-synonyms. Despite their associations with necessity,<sup>45</sup> the epistemic meaning of these two auxiliaries is nonetheless quite distinct from that of *must*. According to Coates (op. cit.: 64), “[w]here the speaker using Epistemic MUST says in effect ‘I am sure’,<sup>[46]</sup> the speaker using Epistemic SHOULD says ‘I think it’s probable’”, epistemic *ought* being likewise “concerned with the speaker’s assessment of probability based on a process of logical inference” (op. cit.: 73). Accordingly, as Leech and Svartvik (1994: 149) illustrate, the auxiliaries in sentences such as

(20) Our guests *should* be home by now.

(21) Our guests *ought* to be home by now.

are different from *must* in indicating that the speaker is not certain, and is expressing probability instead. Thus, some indications of epistemic necessity seem to approach the meaning of items more clearly associated with epistemic possibility (e.g. *may*) in indicating that a given state of affairs is probable, but not certain. The boundary between epistemic necessity and possibility is thus not a very clearly demarcated one, but it instead appears to form more of a continuum where some items may be understood as being more clearly related to necessity and others as clear expressions of possibility. Situated between these poles are expressions such as *should* and *ought*. Apart from the most central indications of epistemic possibility, then, it is also evident that attention should be given to the hedging potential of other items conveying epistemic meanings. Linguistic devices relating to epistemic possibility are apparently at the forefront of phenomena treated as hedges in much of previous work, but items indicating epistemic necessity have not been left completely without attention either—probably because even though they express a rather strong likelihood, they do involve a certain reservation as to what is stated.<sup>47</sup> In the present study, attention will also be paid to not only the devices with links to epistemic possibility, but also to those relating to epistemic necessity. The question as to which individual auxiliaries may be seen as hedges will be discussed further when the results of my analysis of scientifically oriented texts are reported.

It is in Lyons' (1977: 793 ff.) work that we also find a semantic distinction between *subjective* and *objective* epistemic modality. In the case of subjective epistemic modality, we are dealing with "the speaker's reservations about giving an unqualified, or categorical, 'I-say-so' to the factuality of the proposition embedded in his utterance" (Lyons 1977: 799), that is, the tentativeness indicated originates from the speaker (see Perkins 1983: 24). In objective epistemic modality, utterances have an "unqualified I-say-so component, but an it-is-so component that is qualified with respect to a certain degree of probability, which, if quantifiable, ranges between 1 and 0" (Lyons 1977: 800), and the speaker "is committed by the utterance of an objectively modalized utterance to the factuality of the information that he is giving to the addressee: he is performing an act of telling." In this case, then, the tentativeness expressed is not in the mind of the speaker, but stems from the imprecision of the state of affairs described (cf. Perkins, *ibid.*). However, as Lyons (1977: 797) himself states, the distinction between subjective and objective modality cannot be delineated clearly in ordinary language use, and "its epistemological justification is, to say the least, uncertain." As a matter of fact, Lyons (*op. cit.*: 805) adds that

linguists typically regard epistemic modality as subjective, a view also advocated by Palmer (1994: 2536), who contends that “although, in theory, epistemic modality could be either objective or subjective, in natural language epistemic judgements are almost always those of the speaker.” Hence, it appears that in the analysis of authentic language use the difference between subjective and objective epistemic modality is not a very straightforward matter, although the distinction may be of interest for theoretical purposes.

Granted the above, it seems that hedging may be quite usefully approached by associating it with the notion of epistemic modality understood in broad terms, especially phenomena associated with epistemic possibility having been of interest in previous work. In English, this means that a number of lexical categories, including certain modal auxiliaries (e.g. *may*, *might*, *could*), full verbs (e.g. *suggest*, *think*, *seem*), certain adverbs and adjectives (e.g. *perhaps*, *probably*, *potential*, *presumable*) and nouns (e.g. *possibility*, *probability*, *assumption*) become central items of interest for the linguist. This, however, is not to say that hedging may be studied on this basis without problems. Nor does it mean, as explained above, that hedging potential is limited to clear-cut cases of epistemic possibility only. The first problem has to do with the identification of epistemic meaning. As noted, Salager-Meyer says that hedging is generally realized by certain prototypical forms, “but these linguistic forms do not always carry a hedging nuance” (1994: 152). This can be taken to mean that the forms typically found in hedging function may also have other functions. This can be illustrated by considering some of the most common tokens of epistemic possibility, namely the modal auxiliaries (e.g. *may*), whose meaning potential is not limited to epistemic modality only. In (15) and (16) above, for example, *may* occurs in two distinct meanings. If the differences between the various uses of the modal auxiliaries were always as clear as in these examples, identifying the cases with hedging potential would not present any greater difficulty. However, additional problems are created by the indeterminacy of modal expressions. Coates, for example, says that in some contexts, typically formal, the difference between deontic and epistemic possibility is neutralized and it may therefore be virtually impossible to tell what the precise meaning of a modal auxiliary is. Declerck (1991: 398) illustrates this difficulty with the help of an example

- (22) The temperature in which they are kept [...] *may* influence the quality of these pharmaceutical products. (emphasis added)

where *may* can be seen as an indication of both epistemic and deontic possibility, the former meaning referring to what Declerck calls *factual possibility* (‘it is possible that’) and the latter

indicating *theoretical possibility* ('it is possible to'). In such cases, the meanings seem to merge (cf. Coates 1983: 145), making it difficult to decipher how the modal should be interpreted. (22) is an example of a case where the wider linguistic and non-linguistic context may be useful for the interpretation of the modal expression, but even then a straightforward interpretation may not be possible.

There are other cases where the wider context may have to be consulted to determine how a modal device is to be interpreted. For instance, on some occasions items at first sight obviously expressing deontic possibility may also be seen to acquire qualities of epistemic possibility. Declerck (1991: 370) discusses the uses of *may* in questions and contends that "[i]n many cases a question with *may I* does not really ask for permission but is used as a '**hedge**' (i.e. as a device for toning down the statement<sup>[48]</sup> or reducing the speaker's responsibility with respect to it)." In (23),

- (23) *May I take this opportunity to draw attention to some interesting figures?*  
(Declerck, *ibid.*, emphasis added)

Declerck says, the modal auxiliary is used with the intent of adjusting the tone of the question to the communication situation. Although the auxiliary at first sight seems to convey a deontic meaning, it nonetheless here acquires epistemic attributes by virtue of producing an air of tentativeness. Hence, in certain contexts a seemingly deontic modal auxiliary may in fact be taken to involve an epistemic meaning, which constitutes a further example of the indeterminacy of modal expressions.

These examples of the indeterminate nature of modal expressions highlight the difficulty of distinguishing between the different meanings of modal items, and, accordingly, of deciphering the hedging potential of such expressions, as it is only the epistemic meaning that can be associated with hedging. In numerous previous studies (Coates 1983, Perkins 1983, Quirk et al. 1985, Palmer 1990, to mention but a few), various types of constraints have been established to distinguish between the different kinds of modality. Coates (1983: 137 ff.), for example, contends that the epistemic cases of *may* can be associated with certain syntactic and lexical co-occurrence patterns, epistemic modality being typically found in connection with the perfective aspect, the progressive aspect, existential subjects, quasi-modals, stative verbs, and negation, as well as in combinations with harmonic modal expressions such as *well*.

While certain linguistic patterns may in principle be quite reliably used to identify epistemic meaning in some contexts, there nonetheless remain indeterminate cases, such as the ones above. It seems that no watertight linguistic criteria allowing us to distinguish between the

different kinds of modality have been established. In spite of numerous attempts to find procedures which would allow us to show the syntactic or lexical contexts in which the different kinds of modality occur, the ultimate interpretation may be solely dependent upon the judgment of the discourse participants, as must be the case with indeterminate occurrences as in (22). As a matter of fact, it is Nuyts' (1993: 282) opinion that a full portrayal of the notion of epistemic modality "is clearly beyond the capabilities of the linguistic types of representation." At times, then, the only possibility to attempt to distinguish between the different meanings of modal expressions is to extend the analysis beyond the immediate linguistic context, but even then a number of cases may remain indeterminate and interpretations may vary.

A second difficulty in viewing hedging with reference to epistemic modality has to do with the fact that in concentrating on the expressions traditionally linked to epistemic meaning we may indeed be overlooking many other phenomena with a similar communicative value (cf. Stubbs 1986). While the most central items pertaining to epistemic meaning, such as the modal auxiliaries, certain full verbs, adverbs, adjectives, and nouns are obvious candidates for use as hedges, one should also bear in mind that quite similar epistemic comments may additionally be expressed by a range of other items. Thus, apart from the typical tokens of epistemic possibility proper, we should pay attention to other items equally, but not as self-evidently, associated with similar epistemic qualification, as argued above in connection with my discussion of items such as *must*, *should*, and *ought*. What is more, we should also recognize that the notion of modality may be seen to embrace a number of other surface level expressions apart from those traditionally cited in literature, as suggested by Stubbs (1986). The main difficulty with this approach, however, is the analytic complexity involved. It is, for instance, possible to extend the concept of modality to phenomena such as agentless passives (Stubbs 1986, Markkanen and Schröder 1997: 6), but whether agentless passives are *always* used in an epistemic sense is by no means obvious. As implied in Lachowicz' (1981) work on passives, uses related to epistemic meaning may only be *one* function among others, that is, agentless passives cannot necessarily always be seen as epistemic. The problem for the analyst, then, is trying to determine the instances in which an epistemic meaning is possible. In order to come to grips with the meaning of putative indications of epistemic modality useful for hedging purposes, then, we need to take into account not only the linguistic context but also the different aspects of the communication situation at hand.

Despite the complexities involved, it nevertheless seems that relating hedging to epistemic modality provides us with a useful starting point for the analysis of hedging, allowing us to focus on inherently fuzzy items that can typically be used to hedge the information put forth. Due to the

close association between hedging and epistemic modality, studies on the modal system additionally reveal many of the problems involved in trying to determine whether or not a given linguistic phenomenon may be seen to express epistemic meaning and whether it possesses hedging potential.

### 1.3 Toward a Working Definition of Hedging

As can be seen from the discussion above, the concept of hedging is a multi-faceted phenomenon that has been approached in different ways in literature. In the present study, various aspects of the previous characterizations will be taken into account in the analysis of hedging in scientific discourse of different kinds. To begin with, hedges are semantically regarded as devices including an inherent component of what can be broadly seen as fuzziness, tentativeness, indeterminacy, or the like. When inserted into utterances, hedges may be perceived in semantic terms to occur in an experiential ideational function of language in that they can be used to modify group membership, truth value, and illocutionary force. In these capacities, they may be seen to either increase or decrease the fuzziness of our conceptualizations of the universe because of either uncertainty regarding a given state of affairs or due to the limitations of natural language that render the correspondence between linguistic conceptualizations and the universe less than absolute.

These semantic features of hedging also render the strategy useful in pragmatic terms. As shown above, hedging can be assigned different interpersonal functions in discourse, the most common interpretations of hedges being linked to the expression of linguistic politeness. In this study, however, it is presumed that hedging could in fact equally have functions other than the ones suggested in previous work, many earlier studies having (understandably) been limited to the uses of hedging in a fairly narrow range of communication situations. Thus, it is assumed here that hedging may fulfill numerous pragmatic functions in discourse, it often being possible to link one single hedge to more than one pragmatic function. Hedging may in my opinion best be described as a “polypragmatic” (Hyland 1996: 437) interactional strategy which may have myriad functions, depending on the communication situation.

In the present study, then, hedging will be defined in broad terms as a strategy by which one may indicate different degrees of less than full commitment to conceptualizations of the universe. This perspective establishes a close link between hedging and the linguistic forms used to express epistemic modality, particularly those to some degree pertaining to possibility. In addition to the traditional tokens of epistemic modality, however, the scope of the concept is here



extended to cover linguistic items conveying meanings similar to the most typical epistemic items like the auxiliaries *may* and *might*, the adverbs *possibly* and *probably*, the adjectives *potential* and *probable*, and so on. The approach adopted is thus not a form-based analysis of the most central items pertaining to hedging, but rather a data-driven exploration of the various kinds of linguistic items that may be found as modifications of group membership, truth value, and illocutionary force as suggested above. In linguistic interaction, such modifications may have a range of pragmatic functions, which we may best analyze by a close scrutiny of the communication situation. Before proceeding to such considerations, however, let us first take a closer look at the specific aims of this study and at the materials and methods used in the attempt to reach those aims.

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<sup>1</sup> Clemen (1997: 235) explains that the linguistic phenomenon of hedging had been dealt with earlier by Weinreich (1966) under the heading of “metalinguistic operators.” However, George Lakoff is commonly recognized as the scholar who introduced the term *hedge* into linguistics.

<sup>2</sup> In his later work (e.g. 1993: 217), Lakoff has acknowledged that formal logic leaves something to be desired in the description of human conceptual systems.

<sup>3</sup> Unless otherwise indicated, the examples are mine. The linguistic devices under discussion are italicized.

<sup>4</sup> The question of assigning natural phenomena to the categories of natural languages has been treated in a number of other studies, including work on prototype semantics (see e.g. Geeraerts 1989, Williamson 1994, Taylor 1995). Much of this work is founded on Rosch’s (for an overview, see e.g. 1978) psycholinguistic studies into the internal structure of perceptual and semantic categories.

<sup>5</sup> Apart from the experiential component, Halliday also distinguishes the *logical* component of the ideational function, which he states to be that element “which is represented in the linguistic system in the form of parataxis and hypotaxis, including such relations as coordination, apposition, condition and reported speech” (1978: 48-9). While the experiential component has to do with “the processes being referred to, the participants in these processes, and the circumstances—time, cause, etc.—associated with them”, the logical component is that part of the ideational function which allows us to “understand the relationship between one process and another, or one participant and another, that share the same position in the text” (Halliday and Hasan 1989: 45), the logical component thus having to do with the part of natural language that includes the meaning relations that constitute the logic of language.

<sup>6</sup> Widdowson’s notion of conceptual function is based on the observation that “[l]anguage serves the individual as a means of conceptualizing reality, of establishing some control over his environment. In this role it formalizes knowledge and facilitates thinking” (1984: 71).

<sup>7</sup> The functions of language have been delineated in myriad ways by linguists, as can be seen in the work of Bühler (1934), Jakobson (1960), Halliday (e.g. 1970, 1978, 1985), Widdowson (1984), Nuyts (1992), and many others. It seems that much of contemporary linguistic literature, particularly work relating to text linguistics, pragmatics and other research areas influenced by the functional approach to language study, has adopted the Hallidayan view of the functions of language. Halliday’s terminology will also be adopted in this study for reasons of clarity, but reference will also occasionally be made to some of the other descriptions when need be.

<sup>8</sup> The pragmatic potential of hedging phenomena was in fact acknowledged already in Lakoff’s 1973 paper, even though the study primarily dealt with the semantics of hedges.

<sup>9</sup> The concept of interpersonal metadiscourse, involving hedges as well as certain other types of device, are discussed in more detail by Crismore (1989), Chapter 3.

<sup>10</sup> In addition to the ideational and interpersonal components, Halliday has also postulated the *textual* function of language, which “expresses the structure of information, and the relation of each part of the discourse to the whole and to the setting” (1973: 99). In previous studies, no link has been established between the strategy of hedging and the textual function of language. As will be suggested later in this study, however, it may in fact be possible to view hedging in the light of the textual function as well if we approach the textual function in a broad sense. At this stage, however, no more will be said about hedges as a textual feature.

<sup>11</sup> Drawing a distinction between the ideational and interpersonal uses of hedging, or in fact of any linguistic phenomenon, is naturally an oversimplified procedure intended to illustrate the theoretical mechanics of linguistic

behavior from different vantage points. As Halliday and Hasan (1989: 23) point out, there have often been misconceptions as to the functional approach to language, it having been “assumed that each sentence has just one, or at least one primary, function; or, even if the sentence is recognised to be multifunctional, that it ought to be possible to point to each separate part of the sentence and to say that this part has this function, that part has that function, and the other part has the other function.” However, Halliday and Hasan say, this is not how one should approach language. Instead of analyzing language with regard to a specific function, it has to be acknowledged that language use involves more than one function, that a given utterance always involves the three main functions of language originally postulated by Halliday, namely the ideational (with its experiential and logical components), interpersonal, and textual. When considering actual language use, “[w]e cannot pick out one word or one phrase and say this has only experiential meaning, or this has only interpersonal meaning. What we [have] to do in analyzing our text [is] to go back each time over the sentence and examine it again from a new point of view” (ibid.). According to this functional approach to language, then, “[e]very sentence in a text is multifunctional; but not in such a way that you can point to one particular constituent or segment and say this segment has just this function. The meanings are woven together in a very dense fabric in such a way that, to understand them, we do not look separately at its different parts; rather, we look at the whole thing simultaneously from a number of different angles, each perspective contributing toward the total interpretation” (ibid.).

<sup>12</sup> Strictly speaking, the linguistic items that Lakoff (1973: 472) mentions as hedges and related phenomena do not always fall unproblematically into the category of ‘words’ (e.g. *more of a \_\_\_ than anything else, in one sense, he calls himself a ..., -ish, crypto-*) in the traditional sense of the term. Rather, Lakoff’s examples include a selection of phrasal and sentential constructions, affixes, and lexical items.

<sup>13</sup> As devices indicating that truth is a relative notion, many hedging phenomena have also been discussed in connection with the study of evidentiality (see e.g. Chafe and Nichols 1986, Givón 1989). In Chafe’s (1986: 270) work, only “markers of low codability” such as *sort of, kind of, and about*, i.e. indications that the match between a linguistic category and a piece of knowledge is less than perfect, are taken to be hedges. This approach is similar to Lakoff’s (1973) conception of hedges.

<sup>14</sup> The notion of hedged performatives has been applied in different ways in literature. While Robin Lakoff used the term to refer to sentences including items like *I suppose*, Fraser (1975) uses the concept to refer to performative sentences modified by hedging in the form of modal auxiliaries, as in *I might suggest that you ask again* (Fraser 1975: 187), not to the meaning potential of full verbs, as is the case with R. Lakoff.

<sup>15</sup> As Brown and Levinson (1987: 272) illustrate, hedging can also be used to tone down the force of for example requests, as in “Give me a hand, if you can.” In such cases, one might even say that the reservation included in the hedge may be seen as a way out for the addressee in case he or she in fact is not in a position to help, the hedge thus signaling the conditions under which the request may be disregarded by the addressee. In the case of assertions such as example (6), the assertiveness of the proposition is not suspended entirely by the hedge but is nevertheless substantially reduced due to hedging, the hedge in this sense affecting the force of the proposition.

<sup>16</sup> As work by Stubbs (1986) and Markkanen and Schröder (1997) illustrates, hedging may thus be taken to involve lexical items, propositions, and illocutionary forces. While distinguishing between hedges of these three types is illuminating in theoretical terms, it seems that the distinction between them is not always clear-cut. In example (6), for instance, hedging can be said to affect both the illocutionary force of the assertion (see previous note) and the truthfulness of the assertion following the hedge, the hedge thus involving two of the three types of hedging. In my opinion, in the case of assertions, hedging can typically be taken to affect both propositional and illocutionary commitment.

<sup>17</sup> Markkanen and Schröder (1997: 6), echoing Stubbs (1986: 4), say that hedges may indicate degrees of commitment to lexical items. More precisely, it is conceivably the degree of commitment to the suitability of specific lexical items in conceptualization that hedging modifies.

<sup>18</sup> In addition to hedging as a content-oriented strategy, Hyland (1996, 1998) analyzes hedging with reference to other functions, adopting a fuzzy-category model intended to take into account the “polypragmatic” (1996: 437) nature of the phenomenon in scientific discourse. Hyland’s work will be surveyed more closely in Chapter 3 in connection with a discussion of hedging in scientific discourse.

<sup>19</sup> As will be explained below, Hübler also addresses in more detail some of the pragmatic issues involved in hedging.

<sup>20</sup> If, for example, we have a sentence like *I suspect that John is sort of in love*, it may be difficult to say whether *sort of* involves a degree of reservation due to the speaker’s uncertainty about John’s true state of mind or whether (i.e. whether the item is a Hüblerian hedge) or whether the device merely indicates the difficulty of determining whether what John’s state of mind is in conceptual correspondence with what is generally meant by ‘in love’ (Hüblerian understatement).

<sup>21</sup> As will be illustrated later, in some contexts it might also be possible to analyze hedging with reference to the *textual* function of language, although this aspect of the strategy, as far as I know, has not been dealt with in literature.

<sup>22</sup> Hedging has been of considerable interest for those interested in the analysis of everyday spoken language (e.g. Brown and Levinson 1978/1987, Stubbs 1986, Coates 1987), but the incidence of hedging in written discourse and more specialized spoken and written language use has also been dealt with for quite some time now (e.g. Rounds 1981, Prince et al. 1982, Markkanen and Schröder 1987, 1988, Zuck and Zuck 1985, Clyne 1991).

<sup>23</sup> This characterization of hedging may be quite misleading in some contexts, because in certain cases it seems that senders are saying exactly what they mean in qualifying the information put forth by hedges. It is perhaps mainly in cases where senders resort to hedging in order to be modest in spite of having proof that would allow them to be more forceful that Markkanen and Schröder's depiction applies, as was perhaps the case in Watson and Crick's (1953) famous paper on the structure of DNA. In their work, the authors hedged their initial evaluation of their findings to quite an extent, although it must have been obvious to them that their findings were very valuable indeed (cf. Fahnestock 1986, Myers 1989).

<sup>24</sup> For an overview of the development of politeness theories, see e.g. Fraser (1990).

<sup>25</sup> In very general terms, the cooperative principle may be defined as "[a] basic assumption in conversation that each participant will attempt to contribute appropriately, at the required time, to the current exchange of talk" (Yule 1996: 128).

<sup>26</sup> According to R. Lakoff (1973: 298-300), politeness may be analyzed with regard to three basic rules, namely that of not imposing or intruding into other people's business, that of giving options to the addressee, and that of making the addressee feel good by being friendly toward him or her. In view of the criticisms concerning Brown and Levinson's later work on politeness (cf. e.g. Grundy 1995: 136-137), it is worth noticing that even though Lakoff takes these rules to be universal, their value may differ culturally, one rule taking precedence over another in some cultures.

<sup>27</sup> The irony principle, according to Leech (1983: 142), is "a 'second-order principle' which enables a speaker to be impolite while seeming polite; it does so by superficially breaking the C[operative]P[rinciple], but ultimately upholding it."

<sup>28</sup> As Thomas (1995: 167) states, Leech's theory is not rid of problems. For instance, it seems impossible to limit the number of maxims postulated by the theory, because any given regularity could be seen to constitute a new maxim. Also, the scales according to which the value of the different maxims should be assessed make practical analyses of language use difficult.

<sup>29</sup> In much of the work relating to linguistic politeness, the focus has been on spoken discourse, but the possibility of considering written discourse with regard to issues of politeness has also been illustrated in for instance Myers' (1989) work on scientific writing.

<sup>30</sup> For a more thorough discussion of the different kinds of FTA, see Brown and Levinson (1987: 65 ff.).

<sup>31</sup> Performing FTAs with face protection is referred to as doing the FTA *on record with redressive action* by Brown and Levinson (1987: 69), there also being other possible strategies for doing FTAs. The most straightforward way to avoid threat to face is naturally not doing FTAs at all, but when one does have to perform FTAs, they may be done either off record or on record. The former has to do with non-direct ways of saying what one means. A typical example of this would be for instance stating that one has forgotten one's wallet, the underlying intention possibly being to get the addressee to lend some money. If FTAs are done on record, either negative or positive politeness may be used as redressive action, depending on the situation. Of course, it is also at times possible to do FTAs on record without redressive action, typically when questions of urgency or efficiency demand this, when the threat to face is very small, or when the sender is vastly superior in power to the addressee.

<sup>32</sup> Brown and Levinson's model of politeness has been later criticized, objections being especially aimed toward its claims of universality (e.g. Grundy 1995: 136-137). It has been shown that languages do indeed differ in their politeness features, and the various aspects of Brown and Levinson's theory might not be applicable to all languages. Brown and Levinson's work dealt with data from a limited selection of languages (English, Tzeltal, Tamil, and occasionally Malagasy, Japanese, and some other languages), the claims of universality being based on the diversity of the languages scrutinized (1987: 59). In the introduction to the reissue of their study, Brown and Levinson (op. cit.: 13 ff.) discuss the universalistic nature of their work, acknowledging that there may indeed be differences in politeness features between languages. In addition, Brown and Levinson also address another important criticism toward their original account by recognizing that in some cultures there may also be other social features apart from P, D, and R that may affect linguistic behavior. Despite such criticisms, however, Brown and Levinson's theory has remained at the center of politeness study for a long time, probably being the most influential treatment of politeness to date (Thomas 1995: 168). There have also been attempts to introduce new theories of politeness avoiding the problems of the earlier approaches. Fraser (1990), for example, advocates the

so-called *conversational contract* view of politeness, where politeness is seen as part of the cooperative principle, not as a conversational component of its own. However, Thomas (op. cit.: 176-7) suggests, this model is rather vague and difficult to apply in practice. Although Brown and Levinson's politeness theory may not be applicable to all languages without problems, it seems more useful for purposes of analyzing authentic language data than many of the other models accounting for politeness that have been suggested in literature. In addition, its emphasis on English seems to make it useful for discussing the various aspects of politeness in this particular language.

<sup>33</sup> Brown and Levinson distinguish four different kinds of negative politeness hedge, namely those affecting illocutionary force, hedges on Grice's maxims, hedges addressed directly to politeness strategies, and hedges encoded in prosodic and kinesic strategies. The categorization, however, does not seem altogether unproblematic. For example, it is not absolutely clear as to why prosodic and kinesic hedges are treated as a category of their own, although they could conceivably also be seen as fulfilling the functions characteristic of the other categories, such as hedges on illocutionary force—evidently, our prosodic and kinesic choices may have a clear effect on the force that is attributed to our utterances. What seems problematic here is that the first three categories are based on the function of hedges within utterances, whereas the last category is established on formal grounds. It may also be questioned whether it is always a very straightforward matter to distinguish between hedges belonging to the first three groups. For instance, although certain items mentioned by Brown and Levinson (e.g. *I think/believe/assume*) might on the one hand be seen as hedges addressed to Grice's maxims (1987: 164), the same items can in my opinion also be taken to modify the illocutionary force of the utterance, the distinction between the categories established thus becoming blurred and making it debatable whether such a categorization is sustainable in the analysis of hedging in actual language data. It is of interest to note that in some accounts hedging is treated solely as a strategy to do with Grice's maxims. In his introductory textbook on pragmatics, Yule (1996: 38-9) adopts this view, explaining that hedges may be used to acknowledge potential breaches of the maxims of quality, quantity, relation, and manner and are therefore "good indications that [...] speakers are not only aware of the maxims, but that they want to show that they are trying to observe them." Although useful for illustrating that speakers may indeed be presumed to recognize the Gricean maxims in using language, Yule's limited discussion of hedges appears to leave many other pragmatic aspects of hedging unexplored.

<sup>34</sup> Brown and Levinson do not pay particular attention to the positive politeness potential of tag questions such as the one in (13). The authors (e.g. 1987: 160-161) suggest that in some languages certain particles resembling tag questions can be used as hedges aiming at negative politeness. Furthermore, it also seems that in some of Brown and Levinson's examples of *positive* politeness (e.g. p. 117), tag questions equally work toward positive politeness to some extent. Nevertheless, the devices discussed by Brown and Levinson in this context are sufficient for the purpose of illustrating the positive politeness dimension of hedging, which is why no more will be said about tag questions here. It should also be noted that tags are not central to the present study, because they did not come up in the material analyzed.

<sup>35</sup> Lakoff's (1973) treatment of hedges, including *in a way*, only supports the latter interpretation. However, if we consider utterances like *In a way, I suppose I'm frightened of failing* (*Collins COBUILD English Dictionary* s.v. *way*, sense 52), it seems clear that such hedges may also be used to comment on the validity of entire propositions.

<sup>36</sup> Hübler, for example, is of the opinion that "positive face work is not one of the actual functions of detensifying language devices" (1983: 157).

<sup>37</sup> It is interesting to see how very different linguistic features have been seen as hedging phenomena. While Lachowicz considers the use of the actorless passive as hedging in English for Science and Technology, Myers (1989: 14 ff.) points out that although impersonality is characteristic of scientific writing, the use of personal subjects (e.g. *we believe, I adopt the attitude that*) can also be taken as a form of hedging in scientific discourse. This idea is based on the notion that in scientific discourse, universal by nature, indications of *personal* beliefs weaken the universality of what is said.

<sup>38</sup> The term *semi-auxiliary* is used to refer to different kinds of phenomena in different studies. While Declerck (1991: 203) uses the term in the same way as Zuck and Zuck, Quirk et al. (1985: 143), for instance, say that the semi-auxiliaries "consist of a set of verb idioms which express modal or aspectual meaning and which are introduced by one of the primary verbs HAVE and BE", one example being the idiom *be likely to*. In order to avoid terminological confusion, verbs like *appear* and *seem* will henceforth be referred to as *tentative linking verbs* in this study.

<sup>39</sup> Conceivably, the avoidance of personal pronouns in certain kinds of discourse such as scientific texts could be linked to hedging, because the lack of personal pronouns increases the impersonality of expression, which in turn may be seen as a strategy by which one may avoid personal involvement and responsibility as concerns the information presented. As pointed out in note 37, however, from a slightly different perspective, personal subjects, which are apparently indications of personal involvement and responsibility, might equally be seen as hedging phenomena.

<sup>40</sup> Crompton is in my view on the right track in criticizing a purely form-based approach to hedging, but it may also be questioned whether his own proposed taxonomy of hedges goes very far beyond the kinds of categorization he himself criticizes. According to Crompton, a more useful approach to hedging “might be to compile a list of common sentence patterns [...] based largely on the common core of uncertainty as it has featured in the research work already discussed [...]” (1997: p. 284). Thus, Crompton provides a taxonomy including for instance sentences with copulas other than *be*, sentences with modals used epistemically, and sentences with clauses relating to the probability of the subsequent proposition being true. Apparently largely based on the co-occurrence patterns of the kinds of linguistic form mentioned in previous literature, it nonetheless appears that Crompton’s approach is not much of an improvement over the earlier categorizations. The taxonomy also seems to be based on the assumption that hedging is primarily manifested at the phrasal or lexical level, although it has been argued that hedges may assume an unlimited number of surface forms, which would thus require the inclusion of for instance considerations of tense and voice in the analysis of hedging, it also being perhaps being possible to view entire sentences (e.g. *We cannot be certain about the validity of our theory*) as hedges.

<sup>41</sup> As will be explained below, studies pertaining to modality typically start their considerations of modal expressions from the modal auxiliaries, which are in fact at times the sole group of items treated. Sometimes the scope of modal devices discussed is considerably wider, attention being also given to devices like full verbs, adverbs, adjectives, and so on. An example of a recent study with a more inclusive approach is for instance Biber et al.’s (1999) grammar of English, where, in addition to the modal auxiliaries, various other linguistic items (e.g. adverbs, prepositional phrases, comment clauses, verb/adjective/noun + complement clause constructions) are cited as examples of “epistemic stance markers” (pp. 972-4). As will be pointed out in what follows, the range of items seen as epistemic in this study is also quite broad, at times extending beyond phenomena traditionally seen as epistemic (e.g. *if*-clauses).

<sup>42</sup> Different kinds of division and terminology relating to modality are found in literature. Instead of epistemic and deontic modality, for example, Quirk et al. (1985: 219) speak of *intrinsic* and *extrinsic* modality, Halliday (1985) distinguishes between *modalization* and *modulation*, whereas Coates (1983: 1995) talks about *epistemic* and *root* modality. In addition to such binary divisions, more complex descriptions have also been proposed. For example, instead of dividing modality into two categories, Palmer (1979: 36-37), uses the terms *epistemic*, *deontic*, and *dynamic* modality, the difference here being that deontic modality basically refers to indications of permission and obligation, whereas dynamic modality has to do with indications as to what is possible or necessary for someone to do, or with ability and willingness. As the distinction apparently involves meanings elsewhere seen as deontic, the division is of no particular interest here. Furthermore, Bybee et al. (1994) discuss *agent-oriented* and *speaker-oriented* root modality as opposed to *epistemic* modality, and Perkins (1983) distinguishes between eight different types of modality. It seems that especially the more detailed classifications like Perkins’ are based on the philosophical study of modality (e.g. Rescher 1968), whereas categorizations in linguistic studies are broader. In this study, the main interest lies in the study of the broad category of epistemic modality, which is why the distinction between epistemic and deontic modality is taken to be sufficient for the present purposes. For the sake of clarity, the terms *epistemic* and *deontic* will be adopted to refer to the two main types of modality typically distinguished, although the use of the latter term has been criticized by for instance Coates (1983: 20-21).

<sup>43</sup> In some instances, it may be asked whether the items treated as hedges in certain studies can in fact be regarded as hedging devices. This concerns for instance the category of “Emotionally-charged intensifiers” (e.g. *extremely difficult/interesting, dishearteningly weak, surprisingly*) in the work of Salager-Meyer (1994). From the examples given in the study, it is not easy to see how such items would function as hedges in the senses suggested by the author (p. 153), i.e. how they could easily be interpreted (1) to express purposive fuzziness and vagueness (threat-minimizing strategy), (2) to reflect the authors’ modesty for their achievements and avoidance of personal commitment, or (3) to relate to the impossibility or unwillingness of reaching absolute accuracy and of quantifying all the phenomena under observation. Instead, this category might be better described as belonging to what Crismore and Farnsworth call *metadiscoursal attitude markers*, hedges in turn belonging to the group of *modality markers* in their categorization (1990: 124).

<sup>44</sup> As noted, the range of items to do with epistemic modality is understood quite broadly in more recent work, as exemplified by Biber et al.’s (1999) grammar of English. Incidentally, it is worth mentioning that Biber et al.’s description of hedges portrays them as a subtype of epistemic stance markers consisting of adverbs that indicate imprecision (e.g. *approximately, roughly, sort of, kind of*—although the latter two are not to my mind obvious candidates for the traditional category of adverbs). This description of a hedge differs quite radically in scope from what certain other recent studies (including the present one) understand by a hedge, an illustration of the various approaches to hedges and hedging to be found in literature.

<sup>45</sup> Palmer (1979: 49) is of the opinion that *should* in its epistemic meaning is not linked to necessity; “it expresses rather extreme likelihood or a reasonable assumption or conclusion.” Nonetheless, particularly granted their

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deontic potential in other contexts, referring to *should* and *ought to* as indications of epistemic necessity can be regarded as a useful terminological choice, because it allows us to distinguish them from those modal auxiliaries whose epistemic uses are not linked to obligation or necessity (e.g. *may, might, could*)

<sup>46</sup> In fact, Coates thus suggests that *must* is not associated with possibility in the way explained above, since it does not involve doubt.

<sup>47</sup> Grabe and Kaplan (1997), for instance, deal with the entire range of English modal auxiliaries in their treatment of hedges, not limiting their treatment to the ones indicating epistemic possibility only, as has apparently been done by for instance Salager-Meyer (1994) and others. Hyland (1998), too, has discussed the use of items not among the most typically scrutinized indications of epistemic possibility (e.g. *will, would, shall, should, etc.*). As a matter of fact, however, Grabe and Kaplan's approach seems problematic in that they count *all* modal auxiliaries as hedges in their study, apparently making no distinction between either the epistemic and deontic cases of the modal auxiliaries or the possibility and necessity meanings of the epistemic cases.

<sup>48</sup> It is of interest to notice that Declerck speaks of hedging in *statements*, although the example involved is in the form of a question. In much of the work relating to hedging, the terms *utterance, claim, assertion, statement, and proposition* seem to be used almost interchangeably, but it is also at times presumed that hedging only takes place in statements, not in utterances of other kinds such as questions. If we take (23) above at face value and regard it as a proper question, this idea apparently does not always apply. It can, of course, be argued that (23) in fact has the force of a suggestion instead, the hedge thus providing a more polite way of introducing one's own ideas. Brown and Levinson (1987: 147) also report that in Japanese hedging may be used to soften the force of orders, further illustrating that hedging is not necessarily limited to statements only.

## 2. Outline of Research Procedure

Having discussed some of the typical ways in which the general notion of hedging has been described in earlier studies, let us now steer more toward the primary object of study, hedging in scientific discourse. The purpose of the present chapter is to form an overview of this study's main points of interest, present the empirical material to be investigated, and discuss the methods of analysis.

### 2.1 Focal Points

Work relating to hedging phenomena, as implied above, has often been directed at the analysis of spoken interaction or at language use in general. However, especially from the mid-1980s onwards, the role of hedges in written discourse and particularly in academically and scientifically oriented language use has become a point of considerable interest for scholars. Thus, a number of studies have been published relating to hedging phenomena in disciplinary discourse such as biomedical slide talks (Dubois 1987), economic debates (Dudley-Evans 1993), and scientific research articles representing various fields of scientific inquiry, including biology (e.g. Myers 1989, Hyland 1996, 1998), economics (Bloor and Bloor 1993), and medicine (Salager-Meyer 1994, Nwogu 1997, Varttala 1999). Generally speaking, scholars appear to put forth, the (explicit or implicit) presumption that hedging is an important strategy in communication between experts.

In previous work on hedging in scientifically oriented language use, it is evidently the scientific research article (henceforth also RA) that has most often received attention, probably due to the central position of RAs within the academic world. The widely acknowledged importance of the research article as a means of communication between scientists is also the reason for choosing this type of text as one object of study here. Despite the fair number of studies into hedging in research articles, it nonetheless seems that researchers do not always see eye to eye on the incidence of hedges in RAs from different disciplines. While most studies seem to share the assumption that hedges are an important feature in discourse like RAs and may thus figure quite commonly in such texts, it is not altogether clear from previous work to what degree, if any, the incidence of hedges varies between disciplines. Some studies do offer comments to the effect that hedges may be employed differently in the various scientific subject areas, although lengthier considerations of such differences are scarce. In fact, even the few ideas on issues of disciplinary variation are often based on intuition rather than careful analyses of authentic texts representing different subject fields. Dudley-Evans (1993: 150), for example, simply states that

economists and biologists may use hedges in different ways, Backhouse et al. (1993: 14) comment on Bloor and Bloor's (1993) work and say that economics texts for experts may include fewer hedges than similar texts on biology, and Bloor (1996) is of the opinion that philosophers may hedge their statements less frequently than other scientists. These remarks, unfortunately not always based on actual data or clearly concerned with scientific research articles only, could be seen to suggest that there may indeed be noteworthy disciplinary differences in the use of hedges between research articles representing the various fields of inquiry, as is for instance suggested in Mauranen's (1997) work on language revisers' modifications to hedges in academic texts.

The idea of disciplinary variation, however, is not shared by everyone involved in the study of special-subject discourse. Markkanen and Schröder (1997: 10), for example, put forth a contrary view and argue that "the differences in the use of hedges in different fields are not so great as has often been assumed," a conception also implicit in some manuals offering guidance to the writers of special-subject texts. For instance, style guides by Master (1986: 274) and Van Leuven (1992: 120) provide advice on various linguistic features, including hedging, in very general terms, implying that hedging is used in the same way throughout all academic writing. In certain other manuals (e.g. Kiniry and Rose 1995: 7), on the other hand, linguistic variation between the different areas of science is emphasized, this approach suggesting that alongside other linguistic features, hedging might also differ from discipline to discipline, as implied in the afore-mentioned studies by Dudley-Evans, Backhouse & al., and Bloor.

As concerns the incidence of hedges in scientifically oriented texts other than highest-level expert communication like research articles, relatively little information based on authentic data has been published. It has been assumed—sometimes without clear empirical justification—that in scientific language use, hedges are first and foremost peculiar to discourse between highly trained experts, whereas in for instance scientific popularizations hedges would stand out as too uncertain (Fahnestock 1986: 275). This assumption, the reasons for which will be elaborated on at a later stage (Ch. 5), is visible in a fair number of studies (e.g. Myers 1989, 1992, 1994). However, certain other scholars (e.g. Varantola 1987, Crystal 1988, Crismore 1989, Grabe and Kaplan 1997, Varttala 1999) have instead put forth the view that hedging is in fact quite common in scientific discourse accommodated for the wider public, this idea in my opinion being based on analyses of actual data more often than the former view. Hence, it appears that scholars are not in agreement when it comes to the role of hedging in science popularizations—while some presume that hedges do not occur very often in for instance popularized articles dealing with scientific issues, some do in fact point out that hedging may be common on such occasions. The latter may very well be true in at least some disciplines, but potential disciplinary variation in hedging



should also be taken into account in commenting on popular scientific discourse, the present state of research being based on material from a relatively limited number of subject areas.

The basic presumption that hedging is common in scientific peer communication of the highest level of technicality, especially in research articles, has been rather well documented in literature, but it appears that sufficient attention may not have been given to disciplinary differences. Granted the contradictory views on issues of variation, it seems that further investigation into the use of hedges in special-subject discourse such as research articles is required, studies of authentic texts representing different disciplines being a necessary means to gain more reliable information on the incidence of hedging phenomena. Such information would be useful not only for purposes of research but also for providing a more solid basis for recommendations on hedging in style manuals and other educational materials. Furthermore, what with the different views concerning the role of hedges in scientific discourse representing lower levels of technicality and the paucity of research into possible differences between subject areas in the less specialized kinds of discourse, there seems to be room for further work. Generally speaking, there appears to be a growing need for information pertaining not only to traditional special-subject discourse of the kind represented by research articles in this study but also to the less technically oriented varieties of language use aimed at audiences with a lower level of presumed background knowledge. While most studies relating to scientific discourse and the greater part of the literature intended to aid the authors of special-subject texts focus on the most traditional kinds of special-subject communication, such as research articles, conference presentations, and other types of expert-to-expert communication, there is a clear lack of work on the popularization of science, as pointed out by Flood in 1957, an observation which to my mind has not lost its validity over the decades. Such information is of particular importance since, as Whitley (1985: 4) explains, over the past two centuries, there has been an increase in materials on specialized topics produced by scientists for a public wider than their fellow scientists, knowledge about the characteristics of popularization to my mind therefore being important for experts representing different fields of expertise. Moreover, apart from scientists themselves, the processes of popularization in the various fields of specialization are also of interest to a growing number of non-specialist “middlemen” (Pradal 1970), as journalists and other non-scholars have increasingly begun to engage in producing popular accounts of scientifically derived information. In order to elucidate the characteristics of popularization for the benefit of popularizers, then, there appears to be a call for more detailed analyses of popular scientific discourse.

The primary objectives of the present study have to do with the questions implicit in the previous paragraphs. First, this study is concerned with issues of disciplinary variation in the use

of hedges. The first question to be dealt with here is thus whether or not there indeed *are* differences in the use of hedges between scientific disciplines. Second, my work focuses on the incidence of hedges in texts meant for two distinct audiences as regards their assumed background knowledge. In what follows, I will thus begin by considering the use of hedging phenomena in scientific research articles, the emphasis in my empirical work being on three distinct disciplines, namely economics, medicine, and technology. By analyzing hedging in a corpus of published texts, my purpose is to see what kinds of disciplinary differences—if any—are discernible in authentic RA data. After this, I will examine a corpus of popular scientific articles to derive information on the use of hedges in discourse of this kind and to see whether disciplinary differences in hedging can be distinguished at this level of technicality. Once these tasks have been carried out, I will turn to a comparison of the use of hedging phenomena in the RAs and popular scientific articles analyzed.

The overall motivation for addressing these issues has to do with both the research and teaching of special-subject discourse. On the one hand, by considering disciplinary variation, the aim here is to determine whether or not we can put forth generalizations regarding hedging without closer considerations of the various subject areas. This question is tied in with the broader theoretical issues involved in analyzing and teaching special-subject discourse. According to scholars who have highlighted the need to provide learner-oriented material on special-subject discourse (e.g. Moore 1977, Sinclair 1979, Hutchinson and Waters 1980, 1987), English for Specific Purposes<sup>1</sup> can be usefully analyzed and especially taught without closer attention to the peculiarities of specific subject areas, a more rational approach being to emphasize the assumed processes of reasoning and interpretation common to all fields of specialization. However, particularly those working toward register and genre analyses<sup>2</sup> of special-subject discourse have emphasized the necessity of taking into account the variability of communication situations, one of the central variables affecting the nature of communication being the topic dealt with. Granted such contradictory views in approaches to variation, one of the aims of this study is to determine whether or not subject-specificity should be taken into consideration in analyzing hedging and in constructing materials intended to facilitate the task of those wishing to gain a better command of special-subject discourse.

On the other hand, a further factor motivating this study is a wish to broaden our knowledge of how scientific matters are communicated to audiences not made up of specialists. As will be explained later, opinions regarding the rarity of hedging in scientific popularizations are to be found in studies where the potential of the strategy is only approached by considering the functions in which it is typically found in expert-to-expert discourse such as RAs. This approach,

however, may result in the dismissal of the value of the strategy in popularizations, where hedging may be employed for reasons unlike those seen in for instance RAs. Furthermore, such views on hedging are not well justified in methodological terms especially if we recognize that hedging is a pragmatic phenomenon, the use and functions of which are only discernible by analyzing the strategy in a particular context. Thus, the presence or absence of hedging in popular science cannot be explained with reference to the functions of the strategy in other contexts such as RAs, but it should instead be taken into account that hedging devices similar to those found in RAs might (or, then again, might not) be present in popular scientific discourse as well, with pragmatic values somewhat different than in RAs. Thus, central to this study is also the principle that when the use of hedging devices (or any other linguistic phenomenon for that matter) in a specific type of text is considered, this should be done with regard to the characteristics of that particular communication situation, not to those of some other kind of discourse. Attention should be given to the idea that linguistic choices are not always founded on the same rationale, but may differ from situation to situation, one potential source of variation in the value of different linguistic strategies being the sender-addressee configuration. In sum, then, the second main motivation for this study is a wish to provide an account of the use of hedging in popular scientific articles.

## 2.2 Empirical Material

Due to the unavailability of a sufficiently large and suitable computerized corpus of recently published scientific texts, the empirical part of this study is based on a corpus consisting of paper copies of articles published in the United States in the 1990s. The choice to concentrate on material using American English here was made so as to avoid potential regional variation in scientific reporting. The corpus, comprising a total of 299,769 running words, is made up of articles representing the subject fields of economics, medicine, and technology and involving two distinct levels of technicality, research articles and popular scientific articles. Ten articles were chosen from each topic area and level of technicality, the corpus thus containing 60 articles in all. Only articles longer than 3,000 words were included in the corpus to secure a sufficient amount of data for each subject field and level of technicality.<sup>3</sup>

The data for the first level of technicality consists of RAs drawn from traditional printed copies or Internet editions of scholarly journals. The RAs on economics (henceforth also referred to as ECO1<sup>4</sup>) were selected from publications such as *Journal of Small Business Management*, *The American Economic Review*, and *Journal of Business Research*, the ten articles including altogether 63,294 running words.<sup>5</sup> The medical research articles (MED1), drawn from journals

such as *The New England Journal of Medicine*, *Archives of Internal Medicine*, and *Anesthesiology*, include a total of 48,305 running words. The technology articles, chosen from for instance *Journal of Engineering for Gas Turbines and Power*, *Optical Engineering*, and *Journal of Electronic Materials*, contain 63,522 running words. In each field of study, the data was selected so that articles on a variety of topics could be included in the corpus.<sup>6</sup>

The data for the second level of technicality examined was selected from only one publication, *Scientific American (SA)*, which is probably the best-known American popular scientific magazine.<sup>7</sup> Even though *SA* may be consulted by a variety of readers, including specialists in the areas dealt with, the magazine is clearly aimed at a wider audience than academic journals. The presumed audience of *SA* articles is described by the editors of the publication as follows:

*Scientific American* is written, edited and illustrated with the purpose of presenting recent advances and breakthroughs in scientific discovery and research, mostly from the point of view of major figures who are performing the research themselves. Our targeted audience is college-educated non-scientists who have some interest in science.  
(personal communication)

Hence, although the readers of *SA* might have some formally or less formally acquired background knowledge on the matters dealt with, it seems clear that the manner of reporting in *SA* is quite different from the technically oriented mode of presentation of RAs.<sup>8</sup> The lower level of specialization is manifest in for instance the tendency to omit detailed descriptions of the empirical principles adopted during a research process and in a visibly less formal style of presentation, the terminology and concepts adopted in popular science being more down-to-earth than in RAs.<sup>9</sup> The popular scientific articles chosen for analysis are all written by specialists within the fields scrutinized, the authors evidently being more knowledgeable in the area dealt with than the presumed average reader. The popular scientific articles representing each discipline were somewhat shorter than the RAs. The *SA* articles on economics (ECO2) chosen for the corpus contain a total of 39,623 words, the popular scientific articles on medicine (MED2) adding up to 46,777 words, and those on technology (TEC2) include 38,248 words.

What the RAs and popular scientific articles chosen as the object of scrutiny here have in common is an emphasis on information derived through research. Nonetheless, it is to be recognized that although all of the material dealt with here is oriented toward specific areas of interest, RAs and popular scientific articles differ from each other in ways that are interesting from the vantage points of both research and pedagogy. Not only do the two types of article vary

according to their level of technicality in the sense of containing different kinds of terminology and linguistic choice, but as will be explained later (Ch. 5), there are also noteworthy differences in the textual makeup of articles from the two levels of technicality. One obvious further difference is the relatively narrow subject focus of RAs as opposed to the relatively broad focus of popular scientific articles, that is, RA topics are generally speaking considerably more specific than those of popular scientific articles (e.g. “Alterations in Temporal Patterns of Heart Rate Variability after Coronary Artery Bypass Graft Surgery” [MED1, D] vs. “Stroke Therapy” [MED2, J]). What such differences imply, then, is noticeable variation in how specialized topics are treated when addressing different audiences—and it does appear that the recognition and more thorough analysis of such variation is useful for purposes of research and pedagogy.

### 2.3 Methods of Analysis

The present study, as explained, will approach hedging in broad terms as a strategy by which language users can indicate degrees of less than full commitment toward the accuracy of conceptualizations of the universe. The emphasis in this study is not on any specific single formal or functional group of hedges, since hedging is here assumed to take myriad forms and various functions in different contexts. Thus, the focus in this study is on the identification and contextual interpretation of linguistic phenomena that may be seen as devices modifying group membership, truth value, or illocutionary force in the ways described in Chapter 1. Obviously, even without consulting the corpus chosen for analysis, it is to be expected that certain typical expressions relating to tentativeness and uncertainty, such as modal auxiliaries, full verbs, and other lexical sets indicating epistemic possibility, will appear as hedges in the data. However, hedges are here perceived as an open-ended category, the present analysis also taking into account the hedging potential of a variety of other possible means that may be seen as epistemic. The aim in this study, then, is to examine the incidence of various kinds of hedges in the data analyzed and to offer insights into the possible contextual interpretations of hedging phenomena, the aim in each case being to determine whether or not variation exists between the disciplinary areas and levels of technicality investigated as concerns both the occurrence and functions of hedges.

Although the kind of inclusive view of hedging adopted in this study may be seen as fruitful in accounting for the multiplicity of forms that hedging can take, the approach is not altogether without problems. Accordingly, certain limits will have to be imposed on the types of hedging strategy to be analyzed in more detail here. Sometimes it does not seem overly complicated to say whether or not expressions commonly cited as pertaining to epistemic meaning

can be seen as hedges, that is, whether for instance the modal auxiliary *may* can be taken to express the kind of tentativeness intended to hedge the information put forth. However, when we turn to the less centrally cited ways of hedging, analyses may become considerably more complex. For instance, passivization is one of the linguistic strategies commonly mentioned in connection with hedging in scientific discourse, it being presumed that the passive voice, particularly when agentless, allows “writers to withhold full commitment to their propositions” (Hyland 1998: 77). While potentially at times associated with the kind of tentativeness and epistemic meaning useful for hedging purposes, however, it is not clear to what degree agentless passives can be interpreted in this way in scientific language use. Scientific research articles, for instance, typically contain a section describing the materials and methods of the experimental procedure reported on. It has been shown (e.g. Heslot 1982, cited in Swales 1990: 135) that this section contains a remarkably high number of passivized sentences. However, whether the passive voice can be regarded as hedging in this context is debatable. Instead of being a reflection of the authors’ wish to withhold full commitment to what is being said, the passive voice in depictions of the principles applied in research is perhaps more closely linked to issues of economy and a tendency “to emphasize what is important at the particular stage of research described”, agentless passives being devices “for the maximization of objectivity, both in the sense of minimizing the subjective, personal-human factor, and of attaching more weight to the external one: the concrete—the established factual features of the objects under study” (Lachowicz 1981: 107). As a matter of fact, in Lachowicz’s (p. 112) view, agentless passives can be associated with hedging when they occur in connection with modals, which suggests that in Lachowicz’ opinion passives might not amount to hedging by themselves. Instead, they may have to be accompanied by a modal to produce a hedging effect, although Hyland (1998: 77) seems to presume that the passive voice by itself can be seen as hedging because it enables “the writer to achieve some distance from a proposition”, even though Hyland does admit that “the role of the passive is a complex one” (ibid.).

Despite comments to the effect that agentless passives can function as hedges, it seems to me that in a number of examples elucidating the hedging value of passives—including some of the examples cited by Hyland (ibid.)—the passive voice is combined with devices that are more explicitly tentative by nature (e.g. *propose*, *might*, *expect*), an observation also supported by Lachowicz’s work. Hence, it may be asked whether it is precisely the choice of voice that primarily realizes hedging or whether hedging potential in fact derives from a more clear-cut modal element of some kind, one with epistemic potential. While it may occasionally be possible to view the use of agentless passives as an indication of hedging, very often hedging value as found in passive constructions can at least in part be attributed to more explicit markers of

tentativeness. In my experience, a similar situation also frequently applies to comments establishing a link between hedging and the choice of tense (see e.g. Hyland 1998: 129). While it may be possible to regard choices of voice and tense as strategies pertaining to hedging, a thoroughgoing analysis of the hedging potential of tense and voice would in all likelihood be impossible, not only because every sentence within the data chosen for scrutiny here involves choices of voice and tense but also because of the difficulty of determining where such choices are possibly intended to produce a hedging effect. Therefore, a conscious choice is made here not to attempt at quantifications of the hedging use of general syntactic strategies such as voice and tense, the quantitative analysis instead encompassing hedging as realized through the use of other epistemically oriented expressions ranging from lexical items to sentences.<sup>10</sup> This is not to say that the possible hedging value of features like voice and tense is dismissed here, but due to the problems involved in analyzing phenomena of this level, no attempt will be made to provide information as to the overall incidence of such phenomena as hedges.<sup>11</sup>

In order to identify hedging phenomena and analyze their potential functions in different disciplines and texts representing the two levels of technicality described above, the texts included in the corpus were scrutinized for linguistic devices that can in principle be seen to involve potential useful for expressing less than full commitment to the accuracy of conceptualizations of the universe. The context of each item identified was then analyzed. Each suspected hedge and a suitable amount of context for later reference was stored in computerized form, with codes indicating the linguistic status of the items, the particulars of the article in which they were found, their position within the texts, and, where possible, their potential functions *vis-à-vis* their position and other contextual information. The first phases of the analysis can thus be briefly described as what Hyland (1998: 98-99) terms a surface level analysis of hedging phenomena and as a reader-based pragmatic interpretation of the hedges identified.

Following this, measures were taken to account for certain problems inherent in the study of hedging in scientific discourse. First, as is often the case with linguistic research, despite the support provided by an extensive bulk of background literature, the present work is largely based on the researcher's interpretations of the data and the linguistic choices made therein. While the examples and sample analyses of the hedges discussed later on are in this study subjected to the critical eyes of other linguists, it may always be questioned whether I have managed to ferret out what needs to be unearthed from the texts to provide an accurate picture of hedging in the data. Second, it can be asked whether my subjective analyses of the hedges identified in the data are accurate and thorough enough, especially given that I am a non-native speaker of English. Third, one may raise doubt about my ability to determine the motivations behind the use of hedges in

specific disciplinary areas in which I do not have any extensive formal training.<sup>12</sup> To account for these problems, the following phase was to seek support for my interpretations. This was primarily done by contacting the authors of the texts examined to obtain authorial views as to the use of hedges. To quote Hyland, the motivation for this undertaking was “to validate the interpretations and determine the actual discursual practices of insiders and their interpretations of the features under study” (1998: 99). Furthermore, this procedure was undertaken so as to determine whether in the extracts examined features other than those perceived as hedges by myself during the initial analysis were seen as hedges by the authors. A letter<sup>13</sup> with a brief description of my research project and a request for information was sent to the corresponding author of each article included in the data if his or her current whereabouts could be verified.<sup>14</sup> Given that the articles dealt with all contain more than 3,000 words, requesting the authors to comment on each individual suspected hedging device would evidently have been unreasonably time-consuming and laborious for both the authors of the articles and myself. Therefore, it was decided that the authors would be asked to comment on hedging as found in extracts drawn from different parts of their articles.<sup>15</sup> Along with the cover letter, a copy containing four extracts constituting a coherent piece of text (varying from a few sentences to one paragraph) from each article was submitted to the authors, who were asked to provide their interpretations of each presumed case of hedging in the extracts and to indicate whether or not any other expressions within the extracts had been used to achieve similar ends.<sup>16</sup> It was hoped that this procedure would partially account for the subjectivity of my interpretations and the possibility that I, a non-native, non-specialist reader, might not be able to decipher the true motivations and intentions of the authors in employing different linguistic strategies. The second source of outside support frequently resorted to in the analysis of the intricacies of English were my native-speaker colleagues at the University of Tampere. Their help proved particularly valuable in resolving the potential meanings of ambiguous cases of epistemic expressions and other indeterminate devices.

Despite attempts to validate my analyses of hedging by authors’ views and native-speaker reactions, however, it must be recognized that a multi-faceted phenomenon such as hedging can hardly be studied exhaustively or to any absolute degree of reliability. As exemplified in Hyland’s (1996, 1998) work on hedging in scientific research articles, indeterminacy is a central feature of hedges. Accordingly, I think, in analyzing hedges we will always have to provide for the impossibility of reaching conclusive interpretations and comprehensive analyses. Although native-speaker reactions and particularly authors’ views on the hedging potential of different linguistic choices may be most useful in elucidating the different means and purposes of hedging, it may also well be the case that sometimes even such attempts at validation will prove



inconclusive. For instance, views as to the hedging potential of a given strategy might differ from one informant to the other, and it is not at all evident that the authors of scientific texts always consciously apply a given linguistic strategy as a hedge toward a specific end. For example, it is possible that linguistic choices with hedging potential in articles with more than one author are seen in different terms by the different authors, an observation supported by authorial responses to my questionnaire.<sup>17</sup> It is thus assumed here that we will probably never be able to scrutinize hedging with absolute objectivity and precision. By requesting information from native speaker informants and the authors of the texts examined, it is hopefully possible to gain support for analyses of hedging, but due to the indeterminacy and complexity of the phenomenon, the best we can nevertheless offer are subjectively colored views on a strategy that other people might perceive in slightly different terms. The aim here, then, is by no means that of offering final interpretations of hedging in the articles analyzed. Instead, the objective is to provide information as to the incidence of a variety of devices that can typically be perceived as hedges and to illustrate the *possibilities* that hedging offers in different kinds of disciplinary writing, information which will hopefully turn out to be of value for those involved in research and for those interested in the pedagogical applications of research into special-subject discourse.

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Having discussed the foci of this study as well as the materials and methods of analysis, I will next proceed to a more detailed discussion of the phenomenon of hedging in scientific discourse. In the following chapter, I will deal with the ways in which the role of hedging in expert-level scientific discourse such as scientific research articles has been described in earlier work and provide a more detailed account of how hedging in RAs will be approached in my work. In Chapter 4, I will go on to discuss my analysis of hedging in RAs representing the fields of economics, medicine, and technology, present the findings based on an investigation of the data and on views put forth by the informants. Chapter 5 will then discuss the status of hedges in popular scientific discourse, and Chapter 6 will present the results of a scrutiny of hedges in the popular scientific articles from the three disciplines and elucidate the incidence and possible functions of hedging with an eye on the context and ideas presented by the informants. The remainder of the study will be dedicated to a consideration of the results as concerns both disciplinary differences in the use of hedges and variation according to the level of technicality.

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<sup>1</sup> The scientific research article may be seen as an important point of interest for those involved in the research and teaching of English for Specific Purposes, as the research article constitutes a central means by which scientists communicate within their fields of specialization. The status of popular scientific discourse within the sphere of ESP research and pedagogy, on the other hand, is a more complex issue, as the field of ESP has been delimited and described in various ways. While some ESP scholars have approached the field in rather narrow terms, limiting the scope of ESP so that it is seen to presuppose “special education and [to be] restricted to communication among specialists in the same or closely related fields”, or to involve the initiation of experts-to-be (Sager et al. 1980: 69), there are also those who view Languages for Specific Purposes (LSP) more broadly. Picht and Draskau (1985: 3; see also e.g. Trimble 1985, Kragh 1991), for instance, say that the scope of LSP (and thus also ESP) can be seen to extend to “communicating information of a specialist nature at any level—at the highest level of complexity, between initiate experts, and, at lower levels of complexity, with the aim of informing or initiating other interested parties [...]”. In my view, adopting a wider conception of ESP is a rational choice, because an inclusive approach such as that presented by Picht and Draskau draws attention not only to the most traditional kinds of expert-to-expert communication but also to language use for other purposes, including discourse involving various kinds of discourse participants. Given that RAs and other expert-to-expert texts are not the only kinds of special-subject communication that those involved with specific subject areas may wish to master, a broader approach to ESP appears more fruitful.

<sup>2</sup> The notion of genre will be dealt with in more detail in the following chapter, where it will also be suggested that despite its emphasis on accounting for linguistic variation, the genre analytic approach to special-subject discourse may not have given sufficient attention to disciplinary variation.

<sup>3</sup> The articles included in the corpus are listed in the “Bibliography” according to subject field and level of technicality. Each of the articles, alphabetized according to the author(s), is assigned a letter from A to J for ease of reference.

<sup>4</sup> For ease of reference, all examples drawn from my corpus will hereafter be referred to with the help of abbreviations, the shorthand form ‘ECO1, A’, for example, referring to the first research article on economics in alphabetical order according to the author(s). The abbreviations for articles on medicine and technology will be MED and TEC, respectively, and the popular scientific articles dealt with will be indicated by the number 2, as in MED2. Some of the material included in the present corpus was obtained from Internet sources where page numbers were not available. In these cases, the reference indicates the section and the paragraph in which the example can be found.

<sup>5</sup> The word counts exclude lists of works cited and authors’ biographical notes. Other text components not included in the study are tables, graphs, legends, and bibliographical information, only the main body of each article, including titles and possible footnotes, being included in the corpus.

<sup>6</sup> Among the topic areas dealt with in the RAs on medicine were for instance ophthalmology, psychiatry, cardiology, geriatrics, preventive medicine, immunology, hematology, and anesthesiology.

<sup>7</sup> While a number of other American publications (e.g. *Discover*, *Harper’s*, *Popular Science*) also include popular scientific articles, the topic fields covered in many of the other magazines are rather limited in comparison with *SA*. Furthermore, the focus in this study is on popular scientific articles written by specialists, which is generally the case in *SA*, whereas the other publications often contain summaries of research articles popularized by journalists or articles authored by persons not professionals in the areas reported on. In some of the other magazines, moreover, the status of the authors is not always clearly indicated.

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<sup>8</sup> As Myers (1994: 179) implies, RAs and popularizations are different in that the former reflect the procedures and principles involved in scientific work whereas the latter are more focused on the phenomena under scrutiny than on the concepts and techniques of scientific inquiry. The characteristics of popular scientific writing will be dealt with in more detail in Ch. 5.

<sup>9</sup> In the data from popular scientific articles, for instance, lay terms such as “stroke” (MED2, J) and “aspirin” (MED2, I) occurred frequently instead of their more technical equivalents (apoplexy, acetylsalicylic acid), which we might expect to find more often in RAs. In addition, the lower level of technicality in popular scientific articles was visible in the tendency to provide definitions in suitable everyday terms for even relatively commonly used specialized concepts such as “gross domestic product”, defined as “the value of items produced within U. S. borders” in one of the popular scientific articles on economics examined in this study (ECO2, D, 22). Such a simple term would hardly have to be defined in an economics RA. For similar observations, see Varantola (1987).

<sup>10</sup> The items analyzed quantitatively will be discussed further in the chapters presenting the findings of data analysis.

<sup>11</sup> It should be noted that the intention is not to suggest that the list of items examined is an exhaustive presentation of the lexical devices that have can be viewed as hedges. As will be explained below (see 3.3.2), lexical items such as markers of authorial agentivity were excluded from the analysis, even though they are treated as hedges by e.g. Hyland (1998: 182).

<sup>12</sup> Dillon (1991: 11) also discusses the question of studying disciplinary discourse as a non-specialist. According to him, some aspects of special-subject discourse may well be “more penetrable and apparent to outsiders than others.” Dillon (*ibid.*) does acknowledge that there are problems involved in studying special-subject discourse as an outsider, but he implies that some of the problems may be resolved by the assistance of insiders in the field dealt with. In the analysis of hedging in disciplinary discourse, I think, it is relatively straightforward even for an outsider to identify the more central linguistic phenomena that may be seen as hedges. However, determining the motivation for the use of hedges may be a more difficult task for an outsider, and it is especially here that the help of insiders is necessary.

<sup>13</sup> A copy of the letter may be found in Appendix 1.

<sup>14</sup> If no corresponding author was indicated or he or she could not be located, the letter was sent to the first author according to the order in which authors’ names were listed whose current affiliation could be verified.

<sup>15</sup> Further comments as to the choice of extracts are to be found in the chapters reporting the results of the analysis (Chs. 4 and 6).

<sup>16</sup> A copy of the questionnaire used is also provided in Appendix 1.

<sup>17</sup> Although the questionnaire was sent to one author only even in the case of articles by two or more authors, two of the authors of one the popular scientific articles had both decided to respond to my request for information. The responses were noticeably different from one another as concerns many of the items that were seen as hedges and some of the motivations for hedging. Unfortunately, one of the authors had requested that the information be treated confidentially, which is why no authentic examples from the article can be given here.

### 3. Hedging in Expert-level Scientific Discourse

Having discussed the ways in which the general notion of hedging has been described in earlier studies, let us now steer more toward the subject of scientific discourse. As noted above, work relating to hedging phenomena has often been directed at the analysis of spoken interaction or at language use for general purposes. However, especially in the 1990s, the role of hedging in written discourse and particularly in academically or scientifically oriented writing has become a point of considerable interest for scholars. In what follows, I will therefore focus on the ways in which the roles of hedging have been discussed in the context of scientific language use, with an eye specifically on scientific research articles.

Scientific language use at the higher levels of expertise has been said to convey information on matters of a special nature in the most direct, precise, and objective terms possible, professional scientific writing having for instance sometimes been described as “the impersonal statement of facts that all add up to the truth”, as Crismore and Farnsworth (1990: 118) explain (see also e.g. Oláh 1984: 223, Jensen 1991: 155). Various handbooks intended for scholars and students preparing for scientific writing tasks also seem to advocate such a view to some degree. Huth (1982: 57), for example, says that those writing for the perusal of medical professionals should “[r]estrain from extending implications and speculations too far; readers of scientific papers are looking for firm conclusions supported by fact.” Furthermore, Alley (1987: 28) is of the opinion that precision is the most important goal in scientific language use and that vagueness should be avoided, and Hedge (1994: 92) states that directness, precision, and objectivity are among the central guidelines for scientific writing. Taken at face value, such comments could be seen to imply that the kind of fuzziness inherent in hedging devices might not be a desirable attribute in scientific discourse. Some authors have in fact stated this opinion in even more direct terms. Bolsky (1988: 61-2), for instance, advises the authors of scientific texts to avoid the use of “hedge words” (e.g. *may*, *perhaps*, *seem*) and encourages writers to use “direct words” to explicitly indicate if they are not certain about the accuracy of what is said (e.g. *I believe ... but can't be sure*).<sup>1</sup> Booth (1985: 11), too, warns those engaged in scientific discourse about the dangers of overflowing hedging, implying that if a person writing for publication has to hedge, it is questionable whether he or she is truly ready to publish. In a composition book for college students, Ferganchick-Neufang (1995: 99) similarly points out that by “[b]eing direct and concise, you avoid vagueness, wordiness, and complexity that can tire or annoy readers.” Some handbooks for the users of scientifically oriented language, then, seem to advocate the principles of

objectivity, precision, and impersonality present in the portrayal of 'ideal' scientific writing that Bazerman (1984: 163-4) has constructed to illustrate how scientific language use has been described traditionally:

1. the scientist must remove himself from reports of his own work and thus avoid all use of the first person;
2. scientific writing should be objective and precise, with mathematics as its model;
3. scientific writing should shun metaphor and other flights of rhetorical fancy to seek a univocal relationship between word and object; and
4. the scientific article should support its claims with empirical evidence from nature, preferably experimental [...].

If we approach scientific discourse from perspectives like those described above, it appears that hedging might not be a very useful strategy for the authors of scientific texts. In fact, Salager-Meyer (1994: 150) says, hedging has often been associated with unscientific vagueness, and Skelton (1988: 38) is of the opinion that, generally speaking, the notion of hedging carries unwelcome connotations which obscure "the inevitability and value of hedging."<sup>2</sup>

As a matter of fact, expressions such as hedges have been regarded as undesirable more generally in language use. Vande Kopple and Crismore (1990: 305) report a number of pejorative characterizations of hedging found in literature dealing with rhetoric, composition and style, where hedges are described in negatively laden terms such as "deadwood", "throat-clearing", "clutter words", and "empty qualifiers." Consequently, apart from being unsuitably vague in scientific discourse, hedging has at times been viewed rather negatively in other kinds of language use as well, the kind of vagueness involved in hedging apparently not being always valued very highly. Indeed, as Burns (1991: 7-8) says, vagueness<sup>3</sup> has been viewed as a defect of languages in philosophical terms because it is impossible to assign any definite meaning to vague linguistic items. According to such comments, hedges could be thought of as useless fillers that have no justifiable function in any kind of language use, let alone in scientific discourse.

However, such a depreciative view of expressions involving vagueness has not been adopted by all scholars and those offering advice for the users of scientific language. The kind of imprecision and vagueness involved in hedging can be seen as not only permissible but also appropriate (Skelton 1988: 39), Master's (1986: 274 ff.) style guide for example illustrating that the writers of scientific texts are now at times made aware of the potential of hedges in reporting their research. The value of hedging (also referred to as vague language) in English for Academic Purposes is equally dealt with in Jordan's (1997) guide and resource book for those teaching the

academically oriented use of English. In fact, the frequent presence of hedging phenomena in scientific discourse has been acknowledged for a considerable time. In the 17th century, reflecting on his experimental reports of the mechanics of water pumps, Robert Boyle observed that

in almost every one of the following essays I [...] speak so doubtingly, and use so often, *perhaps, it seems, it is not improbable*, and such other expressions, as argue a diffidence of the truth of the opinions I incline to, and [I am] so shy of laying down principles, and sometimes of so much as venturing at explications. [...] I dare speak confidently and positively of very few things, except of matters of fact. (1772: 307)<sup>4</sup>

Although the use of items relating to vagueness may not always have been appreciated, hedging phenomena can be taken to form an essential part of numerous types of communication. Due to the kinds of semantic and pragmatic potential of hedging described in Chapter 1, it can conceivably be a very useful strategy in various kinds of language use, including scientific discourse. Prince et al. (1982: 96), for instance, maintain that the presence of hedges in the speech of physicians “demonstrates a scholarly orderliness in their representation of knowledge”, the value of hedging in written scientific discourse such as research articles also being acknowledged by scholars (e.g. Myers 1989, Salager-Meyer 1994, Hyland 1996, 1998).

Hyland (1998: 13 ff.) states that in analyzing how hedges work in scientific writing we need to be aware of the context in which hedging takes place, that is, the reasons underlying hedging may only be scrutinized with reference to the community producing and using scientific texts. Hyland explains that studies relating to scientific discourse have been of two basic kinds. Within the field of applied linguistics, researchers have on the one hand engaged in pedagogically motivated analyses of the informational, rhetorical, and stylistic organization of scientific discourse, whereas sociologists of science have on the other hand given attention to how scientific discourse establishes and maintains social order. Although it is possible to distinguish these two research orientations, however, the way in which scientific discourse is organized in informational, rhetorical, and stylistic terms is in fact very much linked to the sociology of the scientific community itself. It can be argued that the organizing principles of scientific discourse are dependent on social relationships within the scientific community, which is why a consideration of social issues to do with the sociology of scientific knowledge-making is necessary for a deeper understanding of the manner in which scientific work is reported, an understanding also interesting from the point of view of special-language pedagogy.

### 3.1 The Social Nature of Scientific Knowledge and Communication

As Kaplan and Grabe (1991: 200) suggest, many comments on scientific written discourse seem to reflect the general presumption that scientific reports are truthful and precise accounts of experimental processes as they occur in the laboratory, an idea apparently advocated by Alley (1987: 28), whose advice to the scientific writer is that “[i]f your writing does not communicate exactly what you did, then you have changed your research.” This conception has been challenged in a number of studies into the social and linguistic aspects of scientific reporting. Commenting on the difference between what is said and takes place in the laboratory and what appears in the scientific experimental article reporting the research project, Knorr-Cetina (1981: 94-5) points out that

[t]he scientific paper hides more than it tells on its tame and civilised surface. For one thing, it deliberately forgets much of what happened in the laboratory, although it purports to present a ‘report’ of that research. Second, the written products of research employ a good deal of literary strategy largely unnoticed by the readers.

Among such strategies we can include many rhetorical procedures of “objectification” (Knorr-Cetina, *ibid.*) that fulfill a persuading role in discourse, for instance passivization, avoidance of explicit value statements, and the like, features contributing to an air of objectivity and accuracy, as well as enhancing the scientific credibility of a report.<sup>5</sup> Such strategies can be seen to add to the persuasiveness of scientific discourse in conforming to the conventions of the scientific community, because they may be perceived as a reflection of the traditional conception of scientific language in that they seemingly ‘remove’ the scientist from the report, add to the objectivity and precision of reporting, and are far from the ‘rhetorical fancy’ to be avoided in scientific writing (see Bazerman 1984: 163-4). Linguistic choices pertaining to objectivity and accuracy may thus be seen as a means of persuasion that places the information presented by scholars in a framework reflecting the traditional view of scientific discourse as a precise reflection of reality, although such reports may in fact be rather far removed from the true actions and observations of the scientist.<sup>6</sup>

The reason why persuasion is a central part of scientific discourse has to do with the production of scientific knowledge, and more precisely with how research findings and other information presented by scholars are offered for scrutiny before the scientific community. The nature of scientific knowledge production has been deliberated over widely in sociological

literature. Traditionally, it was presumed that scientific knowledge is beyond social factors, that it is “a special sociological case because it has a special epistemological status” (Mulkay 1979: 2). More recently, however, this conception has been refined by sociologists of science.<sup>7</sup> According to the traditional standard view of science adopted by sociologists,

the natural world is to be regarded as real and objective. Its characteristics cannot be determined by the preferences or intentions of its observers. These characteristics can, however, be more or less faithfully represented. Science is that intellectual enterprise concerned with providing an accurate account of the objects, processes and relationships occurring in the world of natural phenomena. To the extent that scientific knowledge is valid, it reveals and encapsulates in its systematic statements the true character of this world. (Mulkay 1979: 19-20)

According to this view, the production of scientific knowledge is understood as a process involving strict criteria against which the validity of knowledge is to be judged, whereby the production of scientific knowledge begins from “the plain and unembroidered evidence of the senses, with innocent, unprejudiced observation [...] and builds upon it a great mansion of natural law” (Medawar 1969: 147). The standard view thus presupposes that the production of scientific knowledge is subject to various socially determined constraints and principles which secure that scientists produce accurate portrayals of the physical world, it being possible to postulate a specific ‘scientific ethos’<sup>8</sup> according to which scientists may be seen to act. The best-known treatment of the social construction of scientific knowledge from this perspective is probably found in the work of Robert Merton, who says that

[t]he institutional goal of science is the extension of certified knowledge. The technical methods employed toward this end provide the relevant definition of knowledge: empirically confirmed and logically consistent statements of regularities (which are, in effect, predictions). The institutional imperatives (mores) derive from the goal and the methods. The entire structure of technical and moral norms implements the final objective. The technical norm of empirical evidence, adequate and reliable, is a prerequisite for sustained true prediction; the technical norm of logical consistency, a prerequisite for systematic and valid prediction. The mores of science possess a methodologic [sic] rationale but they are binding, not only because they are procedurally efficient, but because they are believed right and good. They are moral as well as technical prescriptions. (1973: 270)<sup>9</sup>

This approach, then, portrays scientific knowledge as not solely a matter of observed regularities *vis-à-vis* the universe, but the production of knowledge concerning the physical world is presumed to be judged against socially determined universal “criteria and rules of evidence



which transcend other differences among the contending intellectual traditions” (Merton 1975: 51). Knowledge claims may thus only be accepted after being found to be in accordance with universal institutional rules of conduct, adherence to these rules being guarded by the scientific community, because, Merton (1973: 276) says, “the activities of scientists are subject to rigorous policing, to a degree perhaps unparalleled in any other field of activity.”

However, what this approach presupposes is that when the scientist succeeds in applying these criteria, we are left with a truthful portrayal of a certain phenomenon of the universe, no matter what the methods and theories involved, as long as they are found to conform to the rules of conduct. It is precisely this positivistic assumption that has been widely criticized in later literature. As Mulkay (1979: 60) contends, it has been shown that many of the statements accepted as factual in science may indeed be based on speculation<sup>10</sup> and it has also been shown that the criteria according to which the validity of knowledge claims is judged may be indeterminate and variable, the kinds of principle and norm postulated by Merton not being applied universally at all (see also e.g. Blume 1977: 3). In consequence, there have been further attempts to develop the understanding of the sociology of scientific knowledge beyond the normative approach advocated by Merton. Mitroff (1974), for instance, has established that on some occasions scientists may in fact adopt strategies that are in stark contrast with those suggested by Merton, particularly when the audience is unsympathetic toward the scientist’s work. A critical stance toward Merton’s normative approach is also adopted by Mulkay, who argues that

[t]he indeterminacy of scientific criteria, the inconclusive character of the general knowledge claims of science, the dependence of such claims on the available symbolic resources all indicate that the physical world could be analysed perfectly adequately by means of language and presuppositions quite different from those employed in the modern scientific community. (1979: 60-1)

Instead of being straightforward reflections of the physical world, the conclusions of the scientific community are rather socially created, the meanings referring to the physical world being based on the scientist’s “attempts to interpret that world. These meanings [...] are inherently inconclusive, continually revised, and partly dependent on the social context in which interpretation occurs” (op. cit.: 61). What this approach ultimately suggests is that scientific knowledge is produced through a process of negotiation within a specific social context, that the cognitive and methodological processes chosen by the scientist are also affected by the expectations and presumptions of a specific scientific community. Accordingly, the choices made

during the research process and in reporting that process are founded on the scientists' own judgment and preferences in view of the conventions of the scientific community in question. It cannot thus be taken for granted that scientists automatically follow the kinds of normative rule and principle postulated by Merton or that the knowledge obtained by scientists may always be unquestionably regarded as accurately displaying regularities of the universe. Instead, it has to be acknowledged that the entire research procedure—starting from the choice of one's topic, methodology, theories, and other means of analysis—depends on choices made by individual scholars with an eye on the conventions of a specific group of scholars; what is finally accepted as knowledge may not necessarily be a true portrayal of the universe, but is a social construct based on a process of negotiation within a given research paradigm:

scientific knowledge is established by processes of negotiation, that is, by the interpretation of cultural resources in the course of social interaction. Cognitive/technical resources are employed by scientists in such negotiation; but the eventual outcome depends also on the availability of other kinds of social resources. The conclusions established through scientific negotiation are not, then, definitive accounts of the physical world. They are rather claims which have been deemed to be adequate by a specific group of actors in a particular cultural and social context. There is, then, at least a *prima facie* case in favour of the thesis that 'objects present themselves differently to scientists in different social settings, and that social resources enter into the structure of scientific assertions and conclusions' (Mulkay 1979: 95).

This social nature of scientific knowledge-making has been acknowledged in a number of studies (e.g. Gilbert and Mulkay 1984, Latour and Woolgar 1979, Knorr-Cetina 1981, Bazerman 1984, 1988), the social dimension apparently also being of great interest for scholars presenting their findings in publications aimed at a scientific peer audience.<sup>11</sup> It is precisely the social nature of the knowledge-making process that emphasizes the importance of considering how one presents one's scientific work. Although the technical aspects of knowledge production can in principle be viewed separately from the communication of knowledge,<sup>12</sup> in practice scientifically derived information may be warranted the status of 'true' only after being communicated to and accepted by the relevant scientific community. Thus, the communication of scientific information may equally be seen as an important component of the knowledge-validation process alongside the scientific research procedure itself, it being important to be aware of the conventions of the *discourse community* one addresses.<sup>13</sup>

As regards scientific work carried out by professional scientists, one of the aims of much of research is the production of reports put into print in professional publications.<sup>14</sup> As Hyland

(1996: 435) suggests, in publishing their findings, scientists aim at both institutional and individual goals. On the one hand, they put forth information presumed to increase the institutional understanding of the objects under study, but on the other hand they additionally try to boost their own reputation as scholars. If we were to apply Merton's afore-mentioned institutional imperatives in strict terms, aiming at individual goals in science might be seen as a breach of the scientific ethos, granted the idea that "[p]roperty rights in science are whittled down to a bare minimum by the rationale of the scientific ethic" (Merton 1973: 273). Although it is clear that, apart from contributing to the institutional understanding of their field of expertise, scientists equally aim at the advancement of their own careers by means of publication, the scientific community nonetheless appears to prefer a mode of communication where the personal issues involved in scientific activity do not come to the fore. It is probably partially for reasons of conforming to such a traditional conception of what is or is not ethical in science that the authors of scientific texts aimed at peer audiences often try to hide their presence and personal interests in reporting their research, the air of objectivity and impersonality conventionally attributed to scientific discourse being a strategy to enhance the communal nature of the information presented and to play down explicit authorial involvement.

Given the above social aspects, the production and validation of scientific knowledge is not simply a matter of the scientist's ability to analyze his or her topic reliably, but scientific knowledge is socially negotiated within the community made up of the scholars representing the field of study in question. Therefore, it is essential that in producing accounts of scientific work authors employ strategies that may be presumed to prompt a sympathetic response from the scientific community. This suggests that even though research article authors seeking recognition will "generally make the strongest claim possible for which they have epistemic authority" (Hyland 1996: 435), thus showing "the importance of the[ir] work, in relation both to prior literature and to possible future work" (Bazerman 1984: 163-4), it can be assumed that writers simultaneously pay attention to the conventions of the scientific community and attempt to secure that "their work is presented in a form that will meet the criteria of judgment likely to be imposed by the readers" (ibid.). This objective can indeed be seen to extend not only to knowledge claims based on the research results but also to the different stages of the research procedure, which the audience with its own theoretical and methodological preferences might not accept unconditionally. It may also be necessary for the author to convince the readership of the importance of studying the phenomenon in question, of the reliability and suitability of the theories and methods applied,<sup>15</sup> as well as of the validity of the interpretation of the results. In

consequence, what may be deemed important in reporting research “is how we really do convince each other, not ‘what is true according to abstract methods’” (Booth 1974: xiii-xiv, cited by McCloskey 1994: 106). Hence, the production of a research report such as an experimental research article depends critically “on various processes of writing and reading which can be summarized as literary inscription. The function of literary inscription is the successful persuasion of readers [...]” (Latour and Woolgar 1979: 76).

Underlying the use of persuasive language in scientific discourse, then, is the assumption that the information presented by an author may not be automatically accepted by the audience.<sup>16</sup> According to Hyland (1996: 436), the meaning potential of a scientific text derives from the lexical and grammatical choices made by the author, but the interpretation of a text depends on other factors apart from the form of linguistic expression. Central among these is the audience’s prior knowledge of the world, which may include information contrary to the views of the scientific writer. Hence, Hyland says, “[r]eaders may always refute a claim.” Due to this possibility, information put forth in reports of scientific activities have to be worded cautiously in order to avoid disagreement with the readership, scientific discourse being organized in a manner allowing the writer “systematically to diminish the contrary [...] view” (Woolgar 1988: 79). What we are thus looking at in scientific discourse is a sender-addressee relationship where social issues become a constitutive part of constructing texts for a specific discourse community in such a way that they can be presumed to achieve the afore-mentioned goals of the scientific writer, namely conveying information on the object of study and securing recognition as a credible scholar.<sup>17</sup> As Bazerman (1988: 329) points out,

[j]ust as a consideration of the process of text production helps gain control of the final text, an anticipation of a text’s reception helps gain control of the meaning likely to be attributed to a text. [...] Anticipation of the impact can help you shape the presentation to forestall unwarranted responses and heighten the desired ones. You can cut the opposition off at the pass, press your advantages, draw in desired audiences, and provoke desired follow-up work.

Hence, due to the social nature of scientific discourse “[t]he shaping of a written text by a writer reflects deeply embedded cultural and rhetorical assumptions about what material may be presented, how it is to be organized, and how it may be presented in a maximally acceptable way—not necessarily in a way which is objectively most transparent” (Kaplan and Grabe 1991: 200).

Achieving maximal acceptability in scientific discourse may be seen as the sum of many strategies. In scientific discourse, adherence to the literary conventions of the scientific community apparently constitutes a central means toward this end, these conventions conceivably differing from one type of text to the other depending on the purpose and sender-addressee configuration and also possibly according to discipline. Although various channels are nowadays available for conveying information on scientific work, for instance conference papers and posters, book-length reports, electronic discussion groups, review articles and so on—all possibly with certain conventions of their own—it is in all probability the scientific research article (RA) that holds the most prominent position in the dispersal of scientific information among scientists in a number of disciplines (cf. R. Holmes 1997: 322). As Swales (1990: 95) explains, the growth in the number of scientific journals and research articles has been exponential, the research article having become “a gargantuan genre”.<sup>18</sup> What with its central role within the scientific world, the research article is probably the most thoroughly studied type of text in literature relating to scientific discourse, the literary conventions of RAs having been commented on in a number of studies. Despite a fair number of studies into their characteristics, nevertheless, there remain various gaps in research into RAs. This is also why RAs will be analyzed in this study alongside popularized renderings of scientific activities. Before proceeding to a discussion of hedging in scientific research articles, let us first consider the general characteristics of the genre in more detail so as to foreground a discussion of the role of hedges in RAs.

### 3.2 Characteristics of Scientific Research Articles

According to Swales’ definition, a scientific research article is

taken to be a written text (although often containing non-verbal elements), usually limited to a few thousand words, that reports on some investigation carried out by its author or authors. In addition, the RA will usually relate the findings within it to those of others, and may also examine issues of theory and/or methodology. It is to appear or has appeared in a research journal or, less typically, in an edited book-length collection of papers. (1990: 93)

As the central component of scientific journals, the scientific research article is an important means of communication between scientists, whose goal in such communication can be described not only as “the discovery of scientific knowledge and the verification of such discovery” (DeBakey 1976: 1) but also as the furtherance of their own professional standing. As explained above, scientific knowledge is now typically taken to be socially constructed, the information

reported by scholars in RAs having to undergo the scrutiny of the community of scientific peers before the views put forth by a scholar are possibly accepted as scientific knowledge.<sup>19</sup> The RA thus represents a primary means of distributing information derived from scientific work, subjecting it to the potential criticisms of other specialists in the field, and verifying (or falsifying) its content, all of which is critical to the professional status of the RA author.

Conceivably due to its institutional status, the research article has become relatively conventionalized in its presentation of scientific information, although the RA has undoubtedly undergone various changes during the centuries and continues to do so.<sup>20</sup> Having begun from letters written by scientists (Ard 1983 [summarized by Swales 1990: 110], Atkinson 1999), the scientific research article has developed through a number of stages toward its present-day format. Whether the generalizations regarding the development of RAs established in literature apply to all fields of science or whether changes in their characteristics differ from field to field is not altogether clear, as research into different disciplines is rather limited. Based on research into the development of research papers on physics, it can nonetheless for example be said that during its history spanning 300 years the physics RA has become more theory-based and knowledge-embedded, the work reported is more explicitly integrated into the relevant literature, the amount of information incorporated into the RA has increased exponentially, and the argumentation in RAs has become more focused (Bazerman 1984). In a study of the rhetorical development of the *Philosophical Transactions of the Royal Society of London* between 1675 and 1975, Atkinson (1999: 141 ff.) reports three main sets of findings. First, the material studied revealed a “decline of an ‘author-centered’ rhetoric” and a shift from involved to informational discourse. Second, Atkinson observed an increase in “‘object-centered’” rhetoric and a rise in the abstraction and passivization of the discourse. Third, during the three centuries, there appears to have occurred a loss of narrative elements (e.g. narrative accounts of how experiments were carried out). Findings such as those presented by Bazerman and Atkinson illustrate that the RA, at least in some fields, has not been a stable genre, but has changed considerably over the centuries.

The overall construction of the RA is nowadays typically described with reference to the conventional Introduction-Methods-Results-Discussion (IMRD) structure known especially from the work of John Swales (e.g. 1990). On the surface of things, these four sections may be seen as a reflection of an idealized research procedure where, in the Introduction,<sup>21</sup> the scholar first observes a phenomenon worth scrutinizing, analyzes the relevant literature to find out whether this phenomenon has been satisfactorily dealt with before, and shows that something of scientific value can be gained by studying the phenomenon in question. In so doing, the researcher creates

him- or herself a research space (cf. Swales 1990: 140). The scholar then continues on the ideal path of research by choosing and discussing the empirical materials and methods of the study, which are reported in the Methods section. Having carried out the research, the scholar goes on to present his or her findings in the Results.<sup>22</sup> This is followed by a Discussion possibly including a brief review of the research problem and of the results, a discussion of whether or not the outcome was in accordance with the scientist's expectations, comparisons to previous work, explanations of the findings, examples to support the explanations, deductions and hypotheses about the generalizability of the findings, and recommendations for future lines of action or further work (see Swales 1990: 172-3).<sup>23</sup>

However, as pointed out above, the way in which scientific work is reported in literature is often far removed from what actually takes place during the course of research. As Gilbert and Mulkey (1984: 40) state, formal accounts of scientific work "are couched in terms of an empiricist representation of scientific action."<sup>24</sup> On the surface, RAs appear to follow the ideal scientific procedure as closely and precisely as possible so that it is in theory possible to follow the scientists' reasoning throughout the research process, which also implies that the format of RAs would later allow another scholar to replicate the research reported.<sup>25</sup> However, this presumption seems rather far-fetched as already implied above, it in fact being possible to argue that

[f]irst, published articles in science do not reflect what actually happens in a laboratory; they omit false starts, digressions, failed procedures, and factors initially underlying the choice of problem and of research design through which to investigate the problem. Second, published reports seldom supply adequate information to permit other independent researchers to replicate the experiment. Third, reader research among the readership of scientific papers suggests that the acceptance of claims made in scientific papers is dependent on factors other than the proof actually offered in the paper itself. (Kaplan and Grabe 1991: 209)

Thus, in fact, writers may provide rather selective accounts of their research, modifying the ideal IMRD structure to a considerable degree, in order to convey information in a way that they find most effective and rational. Furthermore, the structure of RAs may not be solely determined on the basis of the author's judgment, because the various journals in which RAs are published may often have their own structural preferences and editorial guidelines that authors must adhere to. Hence, it may not always be possible to analyze RAs with regard to the general IMRD patterns and the relevant moves unproblematically. As Swales himself (1990: 170) suggests, the boundaries between the rhetorical sections may be fluid, or sometimes the sections may be combined. This applies particularly to the Results and Discussion sections, which may frequently

be joined into one section in RAs. Moreover, it is not unusual that the Results sections include much of the material presented in the Discussion section in other articles, and vice versa. Thus, especially in the case of the last two sections, the IMRD structure may not always be fully applicable in its general form.

What seems most problematic to me in describing RAs according to the IMRD pattern, however, is that the model does not give sufficient attention to variation between the different scientific disciplines, although such variation has been suggested to exist at various levels of linguistic description.<sup>26</sup> It seems to me that the presumption of generic homogeneity where a certain degree of heterogeneity may indeed prevail might also be a factor contributing to the low number of studies (see R. Holmes 1997: 322) dealing with disciplinary variation in RA discourse structure.<sup>27</sup> It is my own experience that the IMRD structure can most characteristically be found in RAs relating to subject fields such as medicine, biology, chemistry, physics, and to some degree for instance to economics. However, if one considers further subject areas like astronomy, mathematics, engineering, literary criticism, linguistics, and many others, it soon becomes clear that applying the IMRD model in the way presented in genre analytic literature may not always be a straightforward matter. In its basic format, the model approaches the RA in rather narrow terms, being apparently based on the prototypical form of experimental reporting in the natural sciences (cf. R. Holmes 1997: 323), but as such it does not take into account the potential complexity of research articles across the disciplines. In addition to articles solely reporting on scientific experiments, scientific journals representing certain disciplines (e.g. economics) also frequently include theory-oriented articles, and at times one may come across articles including a hefty theoretical component linked to a report of an experiment relating to the theory. In such cases, analyzing RAs with reference to the basic IMRD structure would probably turn out to be problematic.

Despite certain problems, the genre analytic approach has nevertheless to my mind succeeded well in demonstrating how the rhetorical structure of texts can be analyzed with reference to their purpose, genre analysts also having put forth insightful information as to how text production is constrained by the conventions of the discourse community for which they are meant. Genre analyses of research articles representing different scientific disciplines have also been valuable in pointing toward rhetorical differences between the various RA sections—whatever these sections in particular articles may be. As Swales (1990: 136) says, the different sections can be seen to have different rhetorical functions, and different linguistic features therefore appear in the various sections to realize these functions. In understanding how the



various RA sections work toward different rhetorical goals, we may better understand the incidence of certain linguistic features in the different parts of RAs,<sup>28</sup> the phenomenon of hedging for instance having been shown to be applied differently in the various RA sections (see e.g. Myers 1989, Salager-Meyer 1994, Hyland 1998).

### 3.3 Hedging in Scientific Research Articles

The use of hedges in research articles is obviously based on the above-mentioned idea that scholars writing for other scholars have to prepare for a less than fully sympathetic response from the audience. As established, instead of being straightforward descriptions of scientific work, RAs are rather reports intended to increase institutional knowledge and to boost the authors' reputation, reports where the authors rather selectively reconstruct a suitable depiction of their scientific activities (cf. Swales 1990: 175). One of the reasons underlying such reconstruction is the persuasion of the audience, as there is frequently "a need to anticipate and discountenance negative reactions to the knowledge claims advanced" (Swales: *ibid.*). This need apparently arises from the requirements imposed upon the RA author by the assumed degree of the audience's background knowledge and the possibility of opposing views on the part of the readership, it being clear that alongside the theories and methods preferred and conclusions drawn by one scientist or a group of scientists, there may exist other approaches to the phenomenon under scrutiny. Therefore, instead of presenting the various stages of their research procedure as self-evident choices, RA authors have to take into account potential audience opposition. Naturally, some of the information included in RAs is such that audience opposition would be very unlikely, such as remarks concerning generally accepted principles of a given field of study, opposition probably being typically anticipated where authors discuss *claims*, *suggestions*, and *conjectures* or *speculations* rather than established facts (see Latour and Woolgar 1979: 78-9). In such instances scientific writing can be characterized in Nash's (1990: 10) words as "a dialectical interpenetration of subjective and objective aspects", which in *ideal* terms can be taken to mean that the writer "evaluates and criticizes the information and the propositions he or she tries to set down as fully, accurately, and objectively as possible. For centuries this dialectical processing of objective fact and subjective evaluation has been the goal of academic writing and of the training that leads to academic writing." However, whether such processing in actual fact *always* takes place when less than absolute issues are reported is subject to doubt—one might also argue that

this is so where it seems possible that without indications of such processing, opposition might arise among the audience.

The use of hedges can be regarded as a strategy by which RA authors may indicate that they have explored the limitations of their own research process, and that they have approached their own procedures critically, meticulously indicating to the readership to what degree their accounts can be seen to correspond to reality. This interpretation, establishing a clear link between the linguistic strategy of hedging and the social nature of scientific knowledge-making, appears to be the dominant one in literature dealing with hedges in RAs and in other kinds of communication between scientific peers, hedging being seen as essential in scientific writing because it “signals the writer’s anticipation of the opposition to a proposition” (Hyland 1996: 436). Thompson (1993: 118), for instance, explains that hedging in RA Results sections indicates the author’s reluctance to make absolute truth claims on the basis of the experiments carried out, the unwillingness being “designed to bring the reader into agreement with the author on what the experimental results mean.” The idea of hedging as a feature associated with authorial unwillingness to be absolute is also present in Markkanen and Schröder’s (1987: 48) work, where they describe hedging as being linked to “a kind of reluctance to show one’s colours.” Crismore and Farnsworth (1990: 124), too, advocate a rather similar view, defining hedges as items permitting “authors to convey necessary doubt or to come across to readers with civilized diffidence.” According to Salager-Meyer (1994: 150), the scientific community does not appreciate arrogance or exuberance in making claims, whereas “contrast, humility, coyness, and cautiousness” are the expected virtues in scientific discourse. Instead of straightforward claims, “everything<sup>[29]</sup> must be toned down; speculation can obviously be made but it must be apologized for.” Thus, Salager-Meyer contends, authors often resort to the use of hedges, which she defines as “understatements used to convey (purposive) vagueness and tentativeness, and to make sentences more acceptable to the hearer/reader, thus increasing their chance of ratification and reducing the risk of negation.”<sup>30</sup>

The potential of hedges to forestall criticism is also implied in certain style manuals for the authors of scientific texts.<sup>31</sup> Williams (1989), for instance, emphasizes the protective potential of hedges, which he sees as items that “let us sound small notes of civilized diffidence. They give us room to backpedal and to make exceptions” (p. 95). Another manual commenting on hedging is Maher’s (1992) book offering advice for the authors of medical texts, where it is stated that

[a] conclusion may be *hedged* in which the author carefully avoids giving a direct and strong commitment to a position or point of view but without seeming too vague. [...] An author may not want to state something too definitely or concretely. The writer might

simply wish to suggest an interpretation or point to a likelihood. This is a strategy for writing about data which not only allows for the possibility of alternative interpretations, but also partly shelters the author from strong criticism.

Van Leuven (1992: 120), too, is of the opinion that “[m]ost scholarly prose is hedged round with caution and qualification, as well it should be [...],” but she also hurries to emphasize that there are dangers involved in using hedges excessively: “doubling and tripling up on qualifications gives your writing the texture of an unmolded custard, soft and runny at the edges.”

As seen above, the functions of hedging in research articles have been worded in myriad ways by scholars. However, none of the depictions referred to in my opinion provides a very solid basis for analyzing hedges in the context of RAs. What these descriptions often have in common, however, is a concern for the potential of confrontation which in turn may be associated with linguistic politeness. Indeed, perhaps the first more systematic way of examining hedging in the context of scientific discourse such as RAs has been the application of theories of politeness.

### 3.3.1 The Politeness Interpretation of Hedging in RAs

As a strategy associated with reducing the risk of confrontation, hedging in scientific discourse has also been handled in terms of linguistic politeness on the basis of Brown and Levinson’s (1978/1987) theory. In such use, as seen in section 1.1.2, hedges can be taken to occupy an interpersonal function in language. The concept of hedging as a politeness feature in scientific articles has become known particularly from Greg Myers’ (1989) work regarding scientific articles on biology. As Bloor and Bloor (1993: 154) surmise, the use of hedges as politeness markers had been acknowledged for a long time, but Myers was the first scholar to pay closer attention to the role that politeness markers, including hedges, may play in scientific discourse. Myers’ (1989) account, then, appears useful in showing how hedging may serve as an indication of negative politeness in scientific articles.<sup>32</sup> The idea that hedges may be employed to protect negative face is founded on the rationale that, granted the notable social distance arising from the supposedly objective and formal nature of communication between the writers and readers of scientific articles,<sup>33</sup> the authors of such texts may feel a need to assure the readers that the ideas put forth are not intended to exclude alternative views.<sup>34</sup> By hedging information pertaining to those aspects of RAs that might give rise to objections, authors can mark “a claim, or any other

statement, as being provisional, pending acceptance in the literature, acceptance by the community—in other words, acceptance by the readers” (Myers 1989: 12).

The ideas put forth by Myers provided a novel framework for the analysis of hedging as a politeness phenomenon in scientific discourse. Salager-Meyer (1994: 150-1), for instance, shows that hedges may be seen to have different functions based on their politeness potential in specialized medical writing in English. Hedges can be used to modify the information presented so that, on the one hand, the author expresses negative politeness toward the addressees by leaving them room for other interpretations. On the other hand, Salager-Meyer’s account also implies that hedges can additionally be thought to protect the negative face of the author by marking the information expressed as tentative and thus protecting the author against the criticism of the audience in matters where full agreement or certainty might not yet exist, for instance when one feels it necessary to “protect one’s reputation as a scientist, to avoid absolute statements which might put the researchers (and the institution they work at) in an embarrassing situation” (Salager-Meyer, *ibid.*). Both Myers (1989) and Salager-Meyer point out differences in the distribution of such hedging phenomena in RAs, Myers (*op. cit.*: 13) saying that especially the Discussion sections of RAs are heavily hedged and Salager-Meyer (*op. cit.*: 156) adding that hedging may also occur relatively often in the Results and Introduction sections of medical RAs.

To illustrate Myers’ discussion of hedging as a politeness phenomenon, let us consider a few examples from the research articles included in my corpus.<sup>35</sup>

- (1) The results in Table 3 suggest that a model using strategic type as the independent variable and type of company as a covariate should be chosen to investigate differences in responses for the four strategic types for each of the six quality dimensions. (ECO1, I, “Results”, paragraph 6 [Results])
- (2) The observed greater numbers of NK [Natural Killer] cells in the hurricane group as compared with the normal controls may possibly serve as a compensatory mechanism for the lowered NKCC [Natural Killer Cell Cytotoxicity]. (MED1, E, 139 [Discussion])
- (3) We assume that the input species [of computer viruses] are all related: that the tripartite graph joining characters to species that have them is connected. (TEC1, B, 189 [Introduction])

Following Myers’ ideas, the underlined items in the examples might be seen as hedges indicating politeness. In the first passage, *suggest* may be regarded as an expression involving tentativeness about the importance of the results presented, which may in turn be linked to negative politeness toward both audience and author. By saying that the results ‘suggest’ instead of for instance

‘showing’, the author may be seen to leave room for the opinions of the audience as well as to shield himself against potential criticism in case of being proven wrong. In similar terms, the authors of the following extract use the compound hedge *may possibly* in discussing the outcome of their research. Hedging may here be assumed to be employed so as not to present the conclusion too forcefully, because absolute statements of knowledge derived from research results are on the one hand potentially threatening to the audience’s possibility to judge for themselves and on the other hand represent a potential threat to the authors’ face in case of being found to be in error. In the last example, the authors report research on computer viruses, hedging in this case occurring in the introductory section, where it is used to qualify one of the premises of the study. Such hedging might equally be analyzed as a politeness phenomenon allowing for the expert audience’s own views regarding the nature of computer viruses, thus providing protection for the audience’s negative face, but also possibly being a protective device for the negative face of the authors, should the audience object to such initial assumptions, not necessarily shared by the entire community of scholars interested in the topic.

The politeness interpretation of hedges has no doubt provided new insights into the value that hedging phenomena may be seen to have in scientific RAs. According to Crompton (1997: 275-6), Myers’ account of hedges usefully demonstrates that scientific discourse abides by principles of social interaction akin to those of all linguistic activity,<sup>36</sup> people involved in scientific communication equally paying attention to the effects of the way in which one addresses the scientific community, that is, considering questions of social distance, power relations, and the seriousness of the impositions that unqualified utterances might create.<sup>37</sup> Given the goals of those publishing RAs, providing information for the scientific community and especially attempting to achieve recognition as scientists, it is of the utmost importance that the social features of scientific communication receive due attention when producing RAs. In extending theories of politeness to hedging in RAs, Myers implies that instead of putting forth information without considering the effects of one’s utterances RA authors may attempt to facilitate the ratification of their contribution and allow for the readers’ wish to judge for themselves, the use of hedging as a politeness strategy providing a central means toward these ends. In consequence, it seems, what is needed when constructing accounts of scientific activities is an understanding of the way in which the force of face threatening acts (FTAs) may be reduced when it is assumed that utterances pertaining to scientific information may be threatening to face. From the audience’s viewpoint, the threat to face arises from the possibility that the author may put forth unqualified utterances without providing for the idea that the audience may have their

own views of what is said, the author thus imposing upon the audience's desire for self-determination and threatening the audience's negative face. On the other hand, such utterances may also threaten the RA author's own negative face, because the scientifically competent audience may in fact be opposed to the information presented and may threaten the author's negative face by criticizing the information presented by the author and thus impose not only on the author's desires and beliefs but also question his or her skills and reputation as a researcher. The possibility of such impositions, however, may be played down by means of negative politeness strategies, hedging being one of numerous strategies recognized as useful for this purpose (cf. Brown and Levinson 1978/1987 and the discussion in Ch. 1).

Myers' account of hedging as a politeness phenomenon in scientific research articles is doubtless valuable in elucidating how social reasons similar to those involved in other kinds of communication might be taken as the basis for strategies such as hedging in scientific discourse. It can be argued that the politeness interpretation of hedging offers one interesting—but not the only—way in which hedges may be approached in RAs, there however also being notable problems involved in applying the politeness interpretation to hedges in RAs. Some such difficulties are brought up by Hyland (1998: 67-9), who says that in adopting the model of politeness originally devised by Brown and Levinson, Myers (1989) appears to suggest that scientific discourse is a “fundamentally dangerous and antagonistic” form of communication, hedging being used in a manner similar to the context of everyday conversation to avoid conflict inherent in linguistic activity (Hyland 1998: 67).

However, the politeness interpretation of hedges has not been accepted by all scholars interested in the uses of hedging in RAs. The politeness approach is criticized by Hyland (*op. cit.*: 68), who proposes that portraying hedging in RAs as a politeness phenomenon in the sense suggested by for instance Brown and Levinson (1978/1987) “over-emphasises the instrumental aspects of language use at the expense of the normative, under-estimating the importance of the scientific peer group in maintaining standards, judging merit and evaluating reputations.” In view of Hyland's criticism, it seems to me that one of the central problems of the politeness approach to hedges in RAs is associated with the model's emphasis on the social relationship between sender and addressee and on the concerns relating to the face needs of the two. As Hyland says (*op. cit.*: 68-9), “while the choice of linguistic form in science is undoubtedly partly determined by the writer's appreciation of a responsibility to the reader, a failure to observe ‘politeness’ will not merely prevent individuals securing goals, but will incur social sanctions.” In other words, in RAs hedging is not first and foremost a question of protecting the face of the addressee or that of

the sender in interaction, but is a strategy that is determined by the principles of the scientific community as a whole. In consequence, hedging is not primarily a question of politeness with an interpersonal motivation in the same way as in Brown and Levinson's original scheme, but it is also to be understood as a strategy aiming toward the kind of *communal* acceptance suggested earlier in this chapter. This perspective, however, renders problematic practical analyses of hedging on the basis of the original politeness model postulated by Brown and Levinson, because the model does not account for the kinds of institutional constraint imposed upon language users by the entire discourse community. Instead, in focusing on the avoidance of face-threatening acts with regard to the variables of relative power and social distance between sender and addressee as well as the degree of imposition that an FTA without redress would create in face-to-face communication, Brown and Levinson's model does not seem completely suitable for describing politeness in social situations where it is also the wider context of the community in question that we have to consider when analyzing the application of linguistic phenomena. A disregard for indications of politeness may not only result in a face-threatening conflict between sender and addressee, but is linked to establishing the author's reputation within the entire community; "to be 'polite' is to abide by the rules of a relationship established by the scientific discourse community", hedging thus being better seen as adherence to an institutional "interactional contract" whereby RA authors observe "limits on self-assurance and norms concerning the deference due to the views of other researchers" (Hyland, op. cit.: 69).

Moreover, even if we were to broaden the concept of politeness beyond the original framework established by Brown and Levinson to cover situations where community constraints become a guiding principle in the application of politeness markers, another criticism of the politeness interpretation of hedges may be formulated by reconsidering Myers' (1989: 5) account of politeness in Watson and Crick's (1953) famous *Nature* article presenting a structure for DNA. Myers implies that Watson and Crick's opening paragraphs include indications of politeness that may be assumed to tone down the force of the FTA inherent in presenting a new structure for DNA. In fact, the very first paragraph of the article at first sight appears to be hedged for reasons of politeness à la Brown and Levinson:

We wish to suggest a structure for the salt of deoxyribose nucleic acid (D.N.A.). This structure has novel features which are of considerable biological interest. (Watson and Crick 1953: 737)

In terms of politeness, the introductory *wish to suggest* could be seen as a hedge redressing the initial statement's threat to face, a threat arising from the idea that by putting forth a structure of their own, the authors deny or supersede the earlier structures and impose limitations on other researchers' freedom to act (Myers 1989: 5). Hence, in toning down the force of their arguments by hedging, Watson and Crick may be thought to play down the threat to the face of other scholars.<sup>38</sup> Alternatively, although this is not discussed by Myers, hedging here could equally be seen as a device protecting the face of the authors. Should the structure they present later turn out to be incorrect, the tentativeness inherent in the formulation of the introductory paragraph could in principle be thought to provide a 'crash barrier' for the authors—they cannot be judged in absolute terms if their utterances were not absolute to begin with.

However, what Myers does not really address in his treatment are the individual characteristics of the two authors whose work he comments on. In my view, Myers offers a rather consensual view of Watson and Crick's way of presenting their findings, even though these two particular researchers may not have been especially consensual in their behavior, having "informally announced to anyone who would listen that they had discovered the secret of life"<sup>39</sup> (Hyland 1998: 65). Granted Watson and Crick's celebratory frame of mind, we may also presume that instead of simply being a cautious formulation intended to prepare for threats to face or to imply "humility before the facticity of the object, [...] the phrase [*wish to suggest*] also has the boldness of the authors' presumption that their claim indeed will be confirmed by nature. Mild speech is possible because the suggestion will gain all the force it needs from the observation of reality; nature will stand up for scientists" (Bazerman 1988: 30). As illustrated, the politeness interpretation of hedging can be associated with the author's anticipation of opposing views on part of the audience, but, as a closer consideration of the mentality surrounding Watson and Crick's work on DNA exemplifies, the politeness interpretation of hedges in the language of these two researchers may be subject to debate. As Hyland (1998: 65) explains, "Watson and Crick were well aware that the world would acknowledge the enormous consequences of their breakthrough", which gives us reason to believe that instead of preparing or allowing for opposing views by 'wishing to suggest', the authors may indeed have used the tentative wording for other reasons. Despite being very certain about their findings, the authors have chosen to hedge and thus, to borrow Markkanen and Schröder's (1987: 48) wording, to 'say less than they mean'. Given the magnitude of their findings, Fahnestock (1998: 333) says, "Watson and Crick could afford to be coy." We may therefore postulate that hedging in this case could also be seen as a manifestation of traditional scientific "modesty" (Swales 1990: 175) in putting forth claims in



spite of the authors' evident certainty as to the value of the information presented rather than as a strategy directly related to the avoidance of threat to face.<sup>40</sup>

A further, more general, question as to the politeness use of hedging—not often discussed in literature on linguistic politeness—is the apparent presumption that once a language user has decided to adopt a certain politeness strategy, it will also prove successful. In my view, however, it appears that some studies tend to over-estimate the potential of politeness markers. I think that particularly in scientific discourse it may very well be the case that, although perhaps meant to do so, hedges never end up providing the kind of face protection they are assumed to. In other words, the politeness interpretation of hedges seems to present the strategy as a ready-made solution for RA authors by which threats to the face of sender or addressee may be eradicated. However, it would appear very naïve indeed to presume that once threat to face has been superficially disguised by means of hedges, information presented in RAs is then automatically viewed in more agreeable and sympathetic light. In actual fact, this may be far from what actually happens within a given scientific community. The readership may feel that in spite of hedging, the information presented is put forth in a way threatening to their face in contradicting their own views, or the audience may for instance strongly criticize the information presented, thus threatening the author's face. For example, we must bear in mind that a specific discipline may involve various, often contending, theories and research paradigms. When proponents of the different approaches encounter on the pages of a scientific journal, it is to be expected that the choices made and claims put forth by a scholar from one camp are not accepted without hesitation by the adversary party, no matter how well the author has motivated his or her views and to what extent the information is hedged. Despite its conceivable politeness potential, hedging might not always reach its politeness goal and may thus occasionally remain an illusory politeness feature, thus ending up being little more than a literary convention of academia.

Furthermore, considering that scientific communities are hierarchies (cf. Harré 1993: viii) including members ranging from novices to Nobel laureates and otherwise highly acclaimed scholars with remarkably different degrees of scientific credibility within their specific communities, it is reasonable to assume that the writings of scholars with different levels of experience and credibility are not judged on the same basis.<sup>41</sup> Instead, one might presume that the contentions of scholars with an acknowledged position within their community would be approached with less of a reservation than those of a newcomer in the field, hedging thus constituting more of a politeness-related feature in texts produced by the less experienced and acclaimed scholars. Even though hedges probably also appear in the writings of established

scholars, the more widely recognized scientists may be in a better position to put forth information without a constant concern for the audience's reactions. It can therefore be hypothesized that on such occasions hedging might not always be consciously aimed at the goal of linguistic politeness as often as for instance in the work of novice scholars, but could merely be a reflection of the discursual conventions of academia. Granted the above, it may be asked whether hedging—in spite of its surface value as a politeness marker—might not in fact often end up being more of a tradition of scientific discourse with politeness potential, which may nonetheless not always materialize.

It thus seems that, despite the explanatory power of the politeness interpretation of hedges in face-to-face communication, hedging in scientific RAs cannot be approached unproblematically in terms of linguistic politeness. Although hedges may at times be thought to protect the negative face of both RA authors and readers, the communal nature of scientific communication renders comprehensive explanations of hedging as a politeness phenomenon within the framework suggested by Brown and Levinson (1978/1987) difficult. In addition, even if it were possible to analyze hedging with reference to politeness, it is debatable whether hedging is *always* truly applied for reasons of politeness and whether hedges invariably attain the politeness goals they were intended to. Hence, it can be claimed that the politeness interpretation of hedging is not generally speaking a sufficient framework for analyzing hedging as found in the context of scientific RAs.<sup>42</sup> Commenting on Myers' theory, Hyland (1998: 69) concludes that we

have to reject the politeness model as an adequate explanation for the use of hedging in science and conclude that discourse community norms are likely to play a larger part than credited by the Myers / Brown and Levinson model. To be 'polite' is to abide by the rules of a relationship established by the scientific discourse community. [...] Contributing to a scientific debate involves the writer entering into an interactional contract with specific rights and obligations, among which are limits of self-assurance and norms concerning the deference due to the views of other researchers. Adherence to such an interactional contract may exert a stronger influence on scientists than considerations of face [...].

Regardless of the afore-mentioned criticisms of the politeness approach to hedging in the context of RAs, I would nonetheless like to point out that the very basic motivations for hedging in scientific discourse may not always be so *very* different from the reasons for hedging cited by scholars interested in hedges as politeness markers. After all, in many cases we are dealing with general concerns such as the avoidance of embarrassment or criticism, the wish to facilitate the acceptance of what is being said, or the reduction of conflict between the discourse participants. What makes it commonly difficult to apply the politeness approach to hedging in the context of

RAs are thus not so much the basic motivations for hedging. Instead, it seems to me that the main problems in employing the politeness model mainly have to do with the difficulty (or even impossibility) of analyzing the use of hedges in *communally* constrained discourse like RAs with reference to the contextual variables that are central to Brown and Levinson's original politeness theory (i.e. P, D, R; see 1.1.2 and Brown and Levinson 1987: 15 ff., 74 ff.), because the variables are in my view based on *interpersonal* rather than *communal* considerations. Granted the problems to do with the analytic framework of the politeness approach in the context of RAs, there seems to be a need for an alternative means of analysis that we can apply in examining hedges.

### 3.3.2 Hedging as a Polypragmatic Strategy in RAs

A model devised precisely for the analysis of hedging in scientific RAs—with specific attention given to the social features of such discourse—has been established by Hyland (e.g. 1996, 1998), whose work is based on a scrutiny of hedges in a corpus of biology RAs. For purposes of comparison, Hyland's work also includes observations regarding the incidence of hedges in certain other corpora, this latter material also including scientifically oriented language use from sources other than RAs.<sup>43</sup> Hyland illustrates the various ways in which hedging may be realized in RAs, offers numerical information as to the incidence of various hedging phenomena in his corpus, and shows that hedges can be interpreted in different ways in RAs and are employed to varying degrees in the different rhetorical sections of RAs. Instead of approaching hedging within a rigid interpretive model such as the politeness theory, Hyland begins from the basic observation that hedging devices not only have different semantic interpretations,<sup>44</sup> “but they also convey a range of meanings for particular users in particular contexts” (1998: 156), hedging being useful for reaching a number of different pragmatic goals. Hyland's approach may thus be described as a sociopragmatic treatment of hedging devices where it is recognized that hedges may be used in various ways by members of different discourse communities, hedging constituting a “polypragmatic” strategy. In addition, Hyland states, particular linguistic forms cannot automatically be associated with specific interpretations, but one and the same form may be seen to involve various functions.<sup>45</sup> Therefore, in analyzing the different uses to which hedging is put in RAs, a certain degree of indeterminacy in the functions of hedging is to be acknowledged by the analyst. Instead of attempting to assign hedges rigidly into functional categories, the nature of the phenomenon may be better grasped by viewing it as multifunctional:

[b]ecause indeterminacy appears to be an inherent feature of the epistemic use of language, an adequate account of hedging in scientific discourse must look beyond a mono-meaning model. In other words, hedges seem to require a ‘more-or-less’ rather than an ‘all-or-nothing’ account. (Hyland 1998: 157)

Drawing on the theories of prototypicality (for a discussion of prototype semantics, see e.g. Geeraerts 1989, Taylor 1995) and fuzzy sets (see Zadeh 1965, 1972), Hyland has established a polypragmatic model of hedging. As I have noted above (e.g. in section 1.2), hedging does not fully coincide with any traditional category of linguistic description, although a link can be established between indications of epistemic modality, especially possibility, and hedging. Granted that there are innumerable surface forms that hedging may assume, however, describing the strategy simply with reference to central tokens of epistemic modality could be problematic, as such an approach may for instance disregard items useful for hedging purposes but not necessarily commonly regarded as epistemic (e.g. the passive voice). Nonetheless, by starting our consideration of hedging phenomena from the theory of prototypicality in the way Hyland does, we can account for the complexity of the category of hedges. We may better deal with the kind of indeterminacy involved in analyzing hedging by recognizing that “members do not necessarily share the same discrete attributes but can be linked by family resemblance. Categories are not homogeneous but have a prototype, good and bad members and fuzzy borders” (Hyland 1998: 159). It can be suggested that instead of being associated with any traditional category of linguistic description or any straightforward functional interpretation, hedging may be viewed as a

category offering the largest number of correlated attributes, such as *weakens the force of statements, contains modal expressions, expresses deference, signals uncertainty*, and so on. While forms are likely to overlap with other categories to express functions such as politeness or usuality [...], the term allows a fairly reliable gestalt perception as it includes the greatest number of attributes not shared with members of other categories. (Hyland 1998: 160)

By adopting a categorization based on prototype theory, on the one hand, we may acknowledge the hedging value of not only the most central devices, but also that of less typically cited items that share some, but perhaps not all, of the traits of the more central devices, such as the prototypically epistemic expressions like *possibility, might, and suppose* cited by Hyland (ibid.). This approach resembles the afore-mentioned functional-pragmatic approach to markers of speaker attitude found in the work of Stubbs (1986), on the basis of which it has been suggested

that the domain of modality can be extended to cover not only the prototypical cases traditionally dealt with, but also some other functionally similar linguistic phenomena regardless of their surface form.

In applying the fuzzy set model of conceptual membership established by Zadeh (1965, 1972), on the other hand, we may account for another indeterminate aspect of hedging phenomena. Hyland (1996: 437) states that hedging devices, granted their polypragmatic potential, “can convey a range of different meanings, often at the same time. As a result, they do not fit into a neat scheme of discrete categories which allows one meaning to be clearly distinguished from others. [...] [T]he choice of a particular device does not permit a single, unequivocal pragmatic interpretation.” Therefore, Hyland says, a model accounting for the possibility of multiple interpretations of a single item seems justified, such a framework being found in Zadeh’s model of fuzzy sets, adopted for similar reasons by Coates (1983) in a study of the English modal auxiliaries.

The main categories of hedges distinguished in the context of RAs by Hyland are *content-oriented hedges* and *reader-oriented hedges*, the former being further subdivided as indicated in Figure 1:

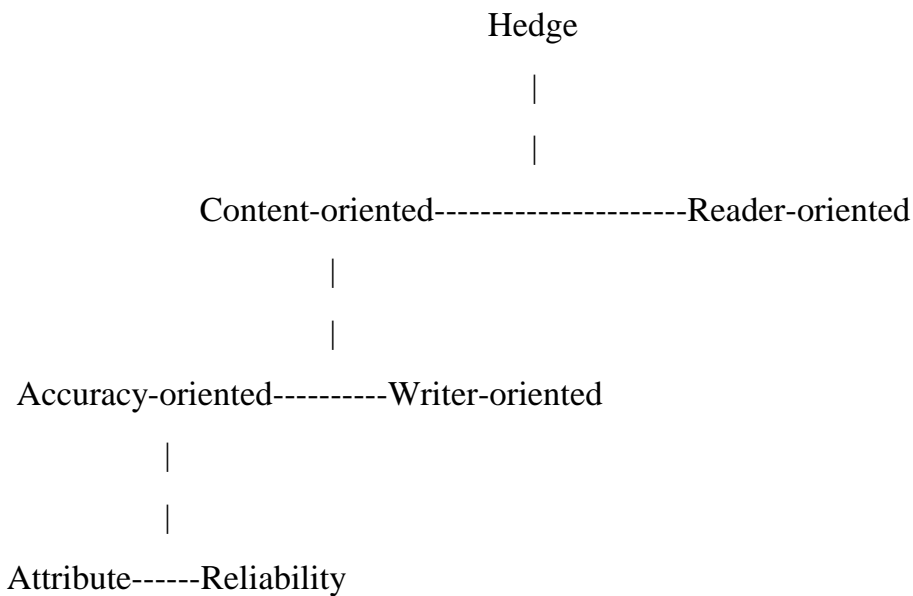


Figure 1: Hyland’s (1996/1998) categorization of hedges in scientific research articles

The distinction between the two main categories of hedges is based on the rationale that content-oriented hedges concern the correspondence conditions of propositions and the real world.<sup>46</sup> Thus, content-oriented hedges “mitigate the relationship between propositional content and a

representation of reality; they hedge the correspondence between what the writer says about the world and what the world is thought to be like” (Hyland 1996: 439, see also 1998: 162). Hyland’s reader-oriented hedges, on the other hand, have more to do with the relationship between author and audience, they “confirm the attention writers give to the interactional effects of their statements” and “solicit collusion by addressing the reader as an intelligent colleague capable of participating in the discourse with an open mind” (1996: 446). Furthermore, in addition to the sender-addressee relationship, reader-oriented hedges also pertain to the more normative scientific “obligation on the writer to defer to the views of colleagues, adhere to limits on self-assurance and engage in debate with peers” (ibid.). Hence, the essence of the distinction between content- and reader-oriented hedges is that the former have more to do with accuracy *vis-à-vis* the world whereas the latter are associated with a certain regard for the audience and the established rules of conduct of the scientific community. Hyland emphasizes (1996: 439), however, that although one can form such categories, the indeterminacy of hedging devices entails that a given hedge does not always have a given function, but may involve multiple meanings. This also means that even though it may at least in theory be possible to identify ideal cases of content- or reader-oriented hedges, in practice a hedge may often be related to both kinds of interpretation. Due to its flexibility in portraying the various functions of hedges, however, Hyland’s model seems useful in illustrating the different interpretations that may be extended to hedges in different contexts in RAs, which is why the approach merits closer consideration for the purposes of this study.

The motivation for the use of content-oriented hedges is of two overlapping kinds, namely the writers’ interest in either “stating propositional accord with reality” or “seeking self protection from the negative consequences of poor judgment” (Hyland 1998: 162). On the basis of these two motivations, Hyland introduces a further distinction of content-oriented hedges into *accuracy-oriented* and *writer-oriented hedges*. Accuracy-oriented hedges are associated with RA authors’ wish to be as precise as possible in cases where the propositions put forth and the state of affairs in the world may not be in full correspondence. What should be noticed here is that in the context of scientific peer-to-peer communication such as RAs, hedging may be primarily analyzed as a strategy with the function of making things *more* precise, of rendering the relationship between conceptualizations and the state of affairs in the extralinguistic world more accurate. Although certain studies (see e.g. Salager-Meyer 1994: 153) associate hedging in RAs with deliberate fuzziness and vagueness, one might in fact argue that

scientific writing exhibits little use of deliberate vagueness in the sense of withholding necessary information. Vagueness is simply not a viable communicative option in most scientific writing where propositional precision is central to persuasive argument as it is the only control a writer has influencing the reader's views (Hyland 1996: 451)

Accuracy-oriented hedging thus provides a possibility to be accurate in presenting information which is potentially less than absolute and “seeks to meet adequacy conditions by reducing the risk of negation on objective grounds” (Hyland 1998: 162). In academic discourse, Hyland contends, there is a striving for “a balance of fact and evaluation, as writers try to present information as fully, accurately and objectively as possible.” Whether this is indeed always the case in constructing RAs is, however, subject to debate. Hyland's conception of accuracy-oriented hedges appears slightly idealistic in its approach to scientific discourse as encountered in RAs. As illustrated earlier in this chapter, RAs may indeed be far from altogether full, accurate and objective reports of the work of scientists. Instead, RAs may present information on researchers' procedures in a rather selective manner, omitting and reconstructing much of what was actually done and observed by the scientist. This, nevertheless, is not to say that Hyland's category of accuracy-oriented hedges is without foundation—the function postulated by Hyland may well frequently be the motivation behind the use of hedges, but it should also be borne in mind that what appears on the pages of a professional journal may not always be exactly on a par with what the scientist has found out or done during the research process. Hence, although Hyland (1998: 163) posits that accuracy-oriented hedges are “archetypal” in academic discourse such as RAs because “they help determine exactly what the state of knowledge is, promoting an objectivity which enables the reader to distinguish the actual from the simply potential or inferential”, it may also be presumed that some less than absolutely certain information may be put forth without the support of hedging when deemed possible by the author—hedging being possibly applied only where the risk of negation is seen as “acute” (cf. Hübler 1983: 23)

Hyland's category of accuracy-oriented hedges consists of two subtypes with different kinds of motivation and characteristic realization, namely *attribute hedges* and *reliability hedges*. First, attribute hedges are expressions that can be applied to “allow deviations between idealised models of nature and instances of actual behaviour to be accurately expressed” (Hyland 1998: 164). Such hedges are concerned with the *specification* of propositional elements, they specify the extent to which “the terms<sup>[47]</sup> used accurately describe the events and states of affairs referred to”, or they indicate “limits on certainty by restricting the time, quality or generalisability of the proposition” (op. cit.: 187). A hedge of this kind can for example indicate that “results vary from

an assumed ideal of how nature behaves and allows a better match with familiar descriptive terms” (op. cit.: 164). This category is thus quite closely associated with the kinds of hedge originally dealt with by G. Lakoff (1973).<sup>48</sup> In Hyland’s work, ‘downtoners’, typically adverbs or other adverbial devices, expressing precision in terms of degree or frequency (e.g. *approximately*, *generally*) are among the central manifestations of this hedge type. To elucidate the nature of such hedges, we can consider the following examples from my data:<sup>49</sup>

- (4) Linkage analysis to affective illness with 310 DNA markers (covering *about* 50% of the genome) was performed in a series of BP [bipolar] pedigrees [...]. (MED1, A, 30 [Results])
- (5) Large temperature spreads *usually* result from combustion problems. (TEC1, A, 215 [Discussion])

In (4), *about* in connection with numerical data may be considered to occur as an indication of “the degree of precision intended and [to] convey the sense in which an idea may be held to be true” (Hyland 1998: 165). In (5), *usually* also apparently conveys a certain qualification with regard to the degree of accuracy of the conclusion offered, indicating that what is said is “true or accurate within certain limits” (op. cit.: 187). The examples can thus be viewed as being marked by means of hedging so as to “qualify the predicate intensity or the validity of the state of affairs expressed in the proposition. In sum, writers use attribute hedges to seek precision in expression, and core examples encode variability [from an ideal], rather than writer perspective” (op. cit.: 166).

Hyland’s subcategory of reliability hedges, in turn, is related to the notion of *verification*, “the linguistic acknowledgement of uncertainties in the truth of a proposition” (op. cit.: 187). This category is distinguished on grounds of the view that certain hedges “express simple subjective uncertainty in a proposition and are motivated by the writer’s desire to explicitly convey the extent to which, and in which, it corresponds to his or her understanding of ‘truth’” (op. cit. 1998: 166). Hedging of this type appears to be associated with R. Lakoff’s (1973: 299) idea of hedges as devices commenting on the validity of entire propositions, as items reflecting “the speaker’s feelings about the sentence”. According to Hyland, the main motivation of this category is not that of securing protection against overstatement, but is more clearly linked to authors’ wish to “clarify the state of knowledge, [to] hedge against complete accuracy” (op. cit.: 167). Among typical manifestations of such hedging, Hyland says, is the use of items traditionally viewed as



epistemic, primarily modal auxiliaries, full verbs, modal adverbs, adjectives, and nouns, reliability hedges characteristically expressing “a conviction about propositional truth as warranted by deductions from available facts, relying on inference, deduction, or repeated experience. They refer to present states and are usually in the active voice without writer agentivity” (op. cit.: 169). The following examples from my corpus could be seen as cases typically assigned to this category:

- (6) Another *possibility* is related to the personality traits of many women entrepreneurs. (ECO1, A, 23 [Discussion])
- (7) After the cessation of erythropoietin treatment, the calculated half-life for the return of fetal-hemoglobin levels to the levels in patients receiving hydroxyurea alone was greater than 60 days [...], *presumably* because of the long survival of the newly created F cells. (MED1, J, 77 [Results])

In (6), the hedge *possibility* can be claimed to mark the explanation offered in such a way as to acknowledge its “factual uncertainty” (Hyland 1998: 167), to specify that what is stated has not been proven absolutely correct, but is an inference on the basis of the evidence available. In the following example, *presumably* may be taken to represent a strategy whereby the authors specify the degree of commitment possible in drawing conclusions and avoid excessive certainty, because there may be “some hesitation about the strength of the connection between observed and assumed events” (op. cit.: 168). In brief, hedges such as the ones cited in (6) and (7) characteristically “indicate the writer’s confidence in the truth of a proposition. They acknowledge subjective uncertainties and are motivated by the writer’s desire to explicitly convey an assessment of the reliability of propositional validity” (Hyland 1996: 441).

The second main type of content-oriented hedging phenomena, *writer-oriented* hedges, represents a strategy intended to “shield the writer from the possible consequences of negatability by limiting personal commitment” (Hyland 1998: 170).<sup>50</sup> In this capacity, writer-oriented hedges are distinct from the other kinds of content-oriented hedge, which Hyland sees as proposition-focused due to their concern with increasing propositional precision and indicating how propositions should be interpreted. Writer-oriented hedges “*diminish* the author’s presence in the text rather than *increase* the precision of claims” (Hyland 1996: 443). In view of Hyland’s discussion, certain devices in the following examples might be regarded as writer-oriented hedges:

- (8) Older men who have poor cognitive function, especially those in their eighties, have a significantly greater mortality risk than cognitively intact men in the same age range. This differential mortality *appears to* be associated with the level of cognitive impairment, resulting in the selective survival of oldest men [...]. (MED1, I, 1197 [Discussion])
- (9) These results *suggest that* the ACI 1.2 factor *might* be reduced slightly for No. 8 and smaller bars. (TEC1, C, 62 [Discussion])

In both of these examples, we are dealing with hedged sentences including verbs reducing the writer's commitment to what is being said. A central feature of such hedges, too, Hyland (1998: 172) says, is the absence of writer agentivity, that is, sentences with writer-oriented hedges typically involve impersonal constructions, the passive voice, or other means of avoiding direct reference to the authors. As the examples illustrate, employing "abstract rhetors" (Hyland, *ibid.*) is equally a useful avoidance strategy in connection with writer-oriented hedges. Accordingly, in (8), *appear* in connection with an impersonal subject may be interpreted as a device "implying that the writer does not wish to be thought fully and personally committed to a belief in the proposed state of affairs" (*op. cit.*: 173) and in (9) the epistemic judgmental full verb *suggest* as well as the auxiliary *might* can be seen as linguistic choices implying that "the writer is not prepared to personally guarantee the proposition" (*ibid.*).

The last main category of hedges distinguished by Hyland is the main category of *reader-oriented hedges*, which, as explained, contrasts with content-oriented hedges in being more concerned with interaction between writer and audience as well as with "conformity to research community expectations concerning deference due to colleagues in presenting information" (1998: 178). At times, then, the primary function of hedging may be presumed to be the avoidance of categorical claims due to the expert audience's role in the construction of scientific knowledge. If the writer were to present claims as *ex-cathedra* assertions to an audience whose acceptance of the information presented is critical to its validation, he or she would display "an unacceptable deviant persona" in ignoring any involvement by the audience in the ratification of knowledge (*ibid.*).<sup>51</sup> In hedging the kind of information that may be presumed not to be automatically accepted by the community, RA authors may invite the readers to become involved in the discourse and participate in negotiating the status of the information presented, in this way conforming to the social conventions guiding knowledge accreditation within their scientific community. According to Hyland, reader-oriented hedges often involve "explicit personal alignment with findings, models and analyses" (*op. cit.*: 182), the presence of personal references

to the author displaying him or her as one who holds a view that has been formed individually, not communally. In sum, personal attribution as in the examples below can be regarded as indicating that there may exist alternative explanations concerning the state of affairs described by the author and that what is said by the author “is a personal opinion”, the information offered being “left open to the reader’s judgment” (ibid.):<sup>52</sup>

- (10) *Our underlying assumption*, however, is that quality practices both support the implementation of a given strategy and help shape the choice of new strategy as follows: [...]. (ECO1, I, “Introduction”, paragraph 6 [Introduction])
- (11) *We believe that* preoperative control of inflammation for three months or longer is a key factor in the successful outcome of these patients. (MED1, H, 203 [Discussion])

Other kinds of reader-oriented hedge mentioned by Hyland include various ways of suggesting that there may be alternatives to what is being said, such as hypothetical conditionals.

Furthermore, Hyland says, questions in RAs can equally be approached as reader-oriented hedging phenomena insofar as they “involve the reader more closely in the research and convey the communality of the scientific quest”, conceivably in this manner indicating that the expert readers are taken to be prepared to draw conclusions and answer questions just as the author is:

- (12) But which functional form is more nearly correct, particularly at longer or shorter lives? (TEC1, A, 214 [Results])

All in all, the primary feature distinguishing reader-oriented hedges from the other types is writer agentivity. Whereas impersonality as realized by the use of abstract rhetors, the passive voice, and other structures lacking overt authorial reference is typical of content-oriented hedges, explicit authorial presence in Hyland’s opinion “indicates an attempt to limit the generalisability of the proposition for interpersonal reasons, and marks the hedge as a reader-based strategy” (1998: 188).

Having illustrated Hyland’s approach to hedging in RAs, it is also necessary to point out that his treatment is not completely free of problems. To begin with, as Hyland (1998: e.g. 161) himself suggests, analyzing hedges according to the categorization presented is by no means a straightforward matter, there being variation in how different analysts interpret hedges. Analyzing a polypragmatic strategy such as hedging objectively and with absolute precision is undoubtedly an impossible task, and interpretations therefore always remain subjective and quite often

ambiguous. In order to resolve some of these problems, the data dealt with by Hyland (1998) was analyzed not only by himself but a group of expert readers to boost the validity of the findings, but, as Hyland admits, even then irresolvable cases remain.

Apart from such basic interpretive difficulties probably inherent in more or less all attempts to analyze the pragmatics of authentic language use, we might also wish to consider some potential shortcomings and pitfalls of Hyland's account applied to hedging in authentic RA data. The first question that may be raised concerns the distinction between the different categories of hedges established by Hyland. As explained, Hyland's categorization takes into account that a hedge may have more than one of the functions postulated in the model, it in fact at times being difficult to determine what the primary function of a given hedge might be. Nonetheless, in establishing his categorization Hyland offers core examples representing each category. The core cases of the category of attribute hedges, for example, seem rather unproblematic in that identifying items with the primary function of adjusting terms to suit nonprototypical situations (e.g. *essentially, quite, more or less, approximately, generally*) is fairly straightforward and there is no clear overlap with the remaining categories. However, when we turn to the other categories, the limits immediately seem less clear even in the case of some of the core examples cited by Hyland.<sup>53</sup> For instance, to my mind, the distinction between reliability hedges and writer-oriented hedges does not appear at all obvious in examples such as

(13) ...it appears possible that the mechanism causing the light-activated fluorescence quenching may be triggered by either photosystem. (Hyland 1998: 167)

(14) It seems that the stomata do not use the Calvin cycle... (op. cit.: 173)

According to Hyland, the example reproduced as (13) can be seen to involve hedging "against complete accuracy, rather than a wish to seek protection against overstatement" (op. cit.: 167), whereas in his opinion the latter example includes a writer-oriented hedge "implying that the writer does not wish to be thought fully and personally committed to a belief" (op. cit.: 173). When considered side by side, however, the difference in hedging between these examples seems less than clear, as the devices employed and the contexts provided appear quite similar. Hyland (op. cit.: 170) implies that one way to differentiate between reliability hedges and writer-oriented hedges might be the possibility that hedges of the latter type are concerned with higher-level claims than the former, writer-oriented hedging thus typically occurring when for example

research results are generalized. Unfortunately, the limited contexts provided in Hyland's examples do not reveal whether or not this is indeed the differentiating factor between the two cases above. To my mind, furthermore, attempting to distinguish between higher- and lower-level claims is a problematic issue in the analysis of RAs. Evidently, it is possible to draw a line between extreme cases, generalizations from experimental results conceivably representing higher-level claims and for instance footnotes on matters marginally bordering on the issue at hand being low-level claims insofar as they have a relatively low degree of relevance to the topic dealt with. Nonetheless, how one should approach cases placed between these extremes, such as claims relating to methodology, previous work, and other information presented in RAs is not entirely clear. Occasionally, then, distinguishing between hedges of the reliability and writer-oriented types as defined by Hyland might be difficult.

Further problems appear to arise from Hyland's core examples of hedging as concerns the distinction between the main categories of reader- and content-oriented hedges. Hyland (op. cit.: 187) says that these two types of hedge can be distinguished on the basis of the contextual variable of agentivity, explicit author presence implying a reader-oriented function, whereas the absence of clear author agentivity suggests content-orientation. The first problem relates to one of Hyland's (op. cit.: 167) examples of content-oriented reliability hedges:

- (15) This insertion, which we suspect is the membrane anchor, could associate peripherally with the membrane or might span half the bilayer...

Although clearly marked by writer agentivity, Hyland's informants regarded this example as a core case of content-oriented reliability hedging. However, provided that writer agentivity is central to reader-oriented hedges, one might also suppose that this example could equally be seen as a core case of reader-oriented hedging in the same way as

- (16) I believe that the major organisational principle of thylakoids is that of continuous unstacking and restacking of sections of the membrane.... (op. cit.: 182)

Another problem to do with the distinction between content- and reader-oriented hedges concerns the scope of the notion of writer agentivity. As far as can be inferred from Hyland's examples, writer agentivity is understood to refer to explicit indications of authorial presence, as manifested by the use of pronouns like *I*, *we*, *my*, and *our*. Thus, expressions with authorial presence such as *we propose*, *we infer*, *our analysis*, *my analogy*, and *our interpretation* may be

taken as hedges signaling to the reader that what is said is a personal view, open to the judgment of the readers. However, what is not addressed by Hyland is the possibility that the author's agentivity might also be signaled without an immediate reference to him or her. For instance, in certain examples of writer-oriented hedges, a subtype of content-oriented hedging, it is on some occasions possible to detect what might be an implicit reference to authorial agentivity, although this assumption cannot be confirmed, because Hyland's examples do not provide a sufficient amount of context for validating this view. In theory, nevertheless, cases such as

(17) These data indicate that phytochrome A possesses the... (Hyland 1998: 172)

(18) The model implies that the function of granna is to... (ibid.)

(19) Thus the evidence strongly favours the conclusion that [...]. (op. cit.: 175)

could be seen to imply authorial presence specifically if the text immediately preceding these examples were to contain an explicit reference to the author—a tendency that is to my experience not very uncommon in RAs. In certain contexts, each of these cases could be thought by the reader to clearly refer to the authors' work ('Our data', 'Our model', 'our evidence') even though explicit markers of writer agentivity were absent. Thus, the line between certain core cases of writer-oriented hedges and reader-oriented hedges with an explicit reference to the author may as a matter of fact be a very thin one, if not even non-existent. In my opinion, such indeterminacy casts doubt on the usefulness of using the contextual variable of writer agentivity in distinguishing between the different kinds of hedge and indeed raises questions about the possibility of saying whether even the cases regarded as core examples of the different hedge types by Hyland can be seen as primarily belonging to one category of hedges rather than another.

What also seems somewhat problematic in some of Hyland's examples involving authorial agentivity is that hedging value seems to be directly attributed to the choice of a personal subject. It is Hyland's contention that "an overt acceptance of personal responsibility" can also be seen as reader-oriented hedging. However, I am not absolutely certain if this is *invariably* so when overt authorial reference is being made. In theory, it could be the case that in expressions such as *our study*, *my findings*, and the like, personal reference is made so as to indicate authorial responsibility and potential subjectivity when it comes to what is said. However, in for example RA Introductions overt personal reference may just as well be merely a means of indicating where

the focus is on the actions of the authors as opposed to other researchers in the same field. In simple terms, the use of items such as *I*, *we*, *my*, and *our*, might not have anything to do with epistemic qualification, but is a means of identifying the actor in question. Due to the difficulty of determining which individual cases of personal reference might be taken as hedging, such potential means of hedging were not quantified in this study, a hedging interpretation only being made where a more explicit epistemic device was present.

In terms of methodology, Hyland's account of hedging also includes a point worthy of attention, namely that of using expert *readers* against whose reactions Hyland's own interpretations were checked.<sup>54</sup> In constructing the taxonomy of hedges described above, Hyland has resorted to reader responses to validate his views, which in itself is a useful strategy for partially accounting for the obvious subjectivity of interpretations. What seems problematic, however, is that throughout his study Hyland refers to hedging as a strategy having to do with the *writer's* desires, concerns, and uncertain knowledge, that is, hedging is approached as a strategy dependent on the writer's judgment of how to express oneself in a given context. In Hyland's work, however, we are purely dealing with reader responses to hedging phenomena, it being debatable whether the use of expert *readers* of RAs instead of the expert *writers* of the RAs examined captures the essence of how the writers employ hedging. Naturally, it can be presumed that the expert readers might also have authored some RAs of their own, which is why they could be argued to possess some insight into the rationale of hedging in RAs. However, it should also be borne in mind that each of these readers may approach the data scrutinized by Hyland from vantage points of their own, interpretations being colored by the readers' own knowledge and beliefs, possibly quite far removed from those of the authors of the RAs. Instead of revealing the motivations of the original authors, then, expert readers may also provide educated—but potentially biased—guesses at what the authors initially wanted to achieve by hedging—the true motivations, provided that hedges are always consciously motivated, perhaps only being traceable by obtaining the views of the authors.

To sum up, Hyland's treatment of hedges in scientific RAs seems to be quite a rational way to approach hedging in the context of scientific peer-to-peer communication, the taxonomy presented offering a useful amalgamation of earlier approaches to hedging adapted with an eye on the communicative context of RAs. By integrating aspects of the theories of prototypicality and fuzzy sets into the treatment, Hyland manages to take into account the multiplicity of forms that hedging may take and the multifunctional nature of even a single hedging device. Hyland's model succeeds in elucidating that in the context of scientific RAs, the pragmatics of a given hedging

device may have to do not only with precision as concerns correspondence between the term (see note 47) and the phenomenon under scrutiny (attribute hedges) or the writer's confidence in the accuracy of what he or she says (reliability hedges), but that hedging in RAs may also provide the means for avoiding authorial responsibility (writer-oriented hedges) or aim at a more interpersonal goal by allowing for the expert readers' attitudes and opinions, as expected by the scientific community (reader-oriented hedges). At times, however, it seems that Hyland's categorization is rather difficult to apply. As Hyland (1998: 177) recognizes, the hedging phenomena he deals with often "occur in the skirt and periphery", particularly the more peripheral cases clearly being multifunctional. However, at times the taxonomy also seems difficult to uphold even when dealing with some of the core cases mentioned by Hyland. In my opinion, Hyland's categorization is at its most valuable in summarizing the major functions that hedges may have in the context of RAs, but at times I am hesitant about the analyses of what Hyland claims to be core cases of the different categories. Although Hyland starts from the idea that a given hedge is multifunctional, his categorization nonetheless occasionally tends to follow certain earlier treatments (e.g. Prince & et al. 1982, Salager-Meyer 1994) in regarding hedges of a given form (e.g. those with explicit writer agentivity) as belonging to the core of a certain functional category. Instead of acknowledging such a connection between form and function, I would like to suggest that what Hyland succeeds in is providing a useful taxonomy of the various functions that a given hedge may have. Which of these functions an individual hedge can be seen to fulfill is a more complex matter and may not always be traceable on the basis of the contextual variables introduced by Hyland. Presumably, when writers hedge in their texts, they can be seen to aim at one or *more* of the functions mentioned by Hyland, the ultimate reason(s) for hedging perhaps being best confirmed by the original author(s), not expert readers, although Hyland has chosen to consult the latter. The readers of RAs doubtless equally have their own views about the functions of hedging in different contexts, but whether their interpretations always correspond to the motivations of the author is not obvious.

### 3.3.3 Approach Adopted in the Present Study

Having now illustrated ways in which the roles of hedges in RAs have been approached in earlier studies, it remains to be determined how the present study will proceed in its analysis of hedging.



The preceding discussion implies that earlier descriptions and taxonomies relating to hedging are not rid of problems, particularly as regards the analysis of authentic RA data. An additional difficulty linked to a straightforward adoption of previous approaches in this study is that the present analysis is focused on potential variation in the use of hedges in RAs representing different fields, whereas many of the earlier treatments are based on a scrutiny of one specific area of expertise (e.g. Myers 1989, Salager-Meyer 1994, Hyland 1998), the subject fields of biology and medicine having been particularly well represented in previous work. It is not absolutely certain whether earlier descriptions can be fully applied to other fields of inquiry in the same way as in the original studies.

Despite certain complexities involved in applying previous treatments of hedging to my analysis, some of the earlier studies provide useful principles to be employed as starting points in the analysis. Thus, the present study shares Hyland's view that the best way to approach hedging in RAs is to acknowledge that hedging has certain prototypical realizations, such as epistemic modal auxiliaries, full verbs, adverbs, adjectives and nouns, but that there are also other devices useful for similar ends. The strategy of hedging is thus here understood to involve items that, due to their implicit component of tentativeness, weaken the force of statements, contain modal expressions, express deference, signal uncertainty, and so on, it being taken for granted here that "[w]e can, generally, recognise a hedge" (Hyland 1998: 160) by resorting to such a broad characterization. Hedging in RAs, then, is here understood to refer to *all* linguistic phenomena that can be interpreted to limit the suitability of conceptualizations to describe a phenomenon (cf. G. Lakoff 1973) or to signal less than full certainty regarding what is being said (cf. R. Lakoff 1973). For practical reasons, however, certain potential ways of expressing such meaning had to be left outside the quantitative analysis here due to difficulties of determining which potential cases might or might not involve epistemic meaning (e.g. overt authorial reference, the use of the passive voice).

As to analyzing the functions of the hedging devices identified in the RA data scrutinized, I agree with Hyland in that the analysis of hedging on the sole basis of theories of politeness does not seem applicable in the social context of RAs. In addition, the approach adopted resembles that of Hyland in that hedging is here approached as a multifunctional, polypragmatic phenomenon. The starting point for my analysis of the functions of hedges will be along the lines of the categories established by Hyland. However, the categorization is here understood to represent a taxonomy of potential *functions* that any hedge—whatever its surface form—may fulfill. Thus, Hyland's categorization is *not* understood as a taxonomy of *hedges*. The function(s) that specific

hedges can be taken to have will not be taxonomized in the way Hyland has chosen to do. Instead, attention will be given to the *potential* functions that hedges may have in different contexts, information on the motivation behind specific hedges also being requested from the authors of the RAs examined. In addition, Hyland's taxonomy of the uses to which hedges may be put is not taken as exhaustive here. As illustrated above in my discussion of the problems relating to the politeness interpretation of hedging, it may sometimes be asked whether hedging is always at heart a strategy aimed at minimizing the possibility of disagreement or whether it is in the nature of a tradition rather than anything else. It may similarly be asked whether it is truly the case that hedges are invariably pointed toward at least one of the functions suggested by Hyland. On the basis of the example from Watson and Crick's (1953) paper (see 3.3.1), it might be speculated that on some occasions writers use hedges in ways that do not correspond to any of Hyland's functions, hedging for instance merely being a question of convention where matters of precision, accuracy, and writer or sender protection are not really acute. Therefore, Hyland's categorization is here regarded as open-ended, allowing for further alternatives of analyzing the pragmatics of hedging in RAs. As illustrated by researchers' and style manual authors' comments on hedging, the strategy may be seen to involve a number of functions depending on the context of use and the perspective adopted by the analyst. Hence, the present analysis will allow for an even wider interpretive framework, not excluding alternatives of interpretation extending beyond those offered by Hyland and other scholars.

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<sup>1</sup> Bolsky does not define the term *hedge words* very clearly. In fact, the "direct words" he refers to, by virtue of pointing out that what is said may not necessarily be absolutely true, are among the items that are classified as hedging phenomena elsewhere.

<sup>2</sup> Skelton abandons the term *hedge* in his study, conceivably because of the negative connotations of the concept, and instead adopts the notion of *comment* in discussing hedging phenomena. However, as Crompton (1997: 274) argues, the use of the term *comment* is problematic due to its wide scope. In my opinion there is no clear reason as to why we could not use the terms *hedge* and *hedging* in spite of the presumed negative hue of the terms, granted that the value of the phenomenon of hedging is made explicit.

<sup>3</sup> Burns (1991: 7) states that characterizing or defining the term *vagueness* is not easy, because there are a "range of things which may be claimed to be vague" and there have been "debates about the nature of the vagueness in each case." Vagueness has been linked to the semantics and pragmatics of language, as well as to the possibility that psychological phenomena such as thoughts and beliefs or even the objects, events and states of affairs in the world are sources of vagueness (op. cit.: 7, 9, 12, 14). The question of linguistic vagueness at the level of concrete linguistic expressions has been studied by Channell (1994), who says that an expression or a word may be deemed vague "if

- a. it can be contrasted with another word or expression which appears to render the same proposition;
- b. it is 'purposely and unabashedly vague';
- c. its meaning arises from the 'intrinsic uncertainty' referred to by Peirce" ("not uncertain in consequence of any ignorance of the interpreter, but because the speaker's habits of language were indeterminate; so that one day he would regard the proposition as excluding, another as admitting" a given state of things [Peirce 1902: 748, cited by Channell 1994: 7].) In comments relating to hedging in studies and style manuals, however, the terms *vague* and *vagueness* are not described in such theoretical terms, but instead often seem to be used in their more everyday meanings without any explicit link to the more philosophical treatments, the terms to do with hedging in such

works to my mind rather being associated with statements “[c]ouched in general or indefinite terms; not definitely or precisely expressed; deficient in details and particulars” and language that is “[n]ot precise or exact in meaning” (see the *OED* s.v. *vague*, *a*, *adv.*, and *sb.*<sup>2</sup>).

<sup>4</sup> For further discussions of Boyle’s scientific work and thought, see Shapin (1984) and Shapin and Schaffer (1985).

<sup>5</sup> In addition to linguistic strategies, Knorr-Cetina (*ibid.*) points out, the persuasive effect of a scientific paper may also be enhanced by the mere fact that it is seen to constitute a *report* of scientific work, the term in itself suggesting that it is an accurate portrayal of laboratory activities and thus also in my opinion apparently warranting it a high degree of credibility as such.

<sup>6</sup> Gilbert and Mulkay’s (1984) discussion of research papers and more informal accounts of scientific work, for instance, exemplify that when scientists construct research papers, they may indeed distance their accounts from what they have actually done and observed during their research. In the introductory sections of research papers scientific conclusions used as starting points in the research reported “are made to appear as if they followed unproblematically from empirical evidence produced by means of impersonal experimental procedures” (p. 46). Similarly, although the methods applied in research are generally acknowledged to vary according to the skills, intuitions, knowledge, experience, and equipment of individual researchers, the authors of research papers may present information in such a way that the sections on methodology “appear to be formally constructed as if all the actions of researchers relevant to their results can be expressed as impersonal rules; as if the individual characteristics of researchers have no bearing on the production of results; as if the application of these rules to particular actions is unproblematic; and as if, therefore, the reproduction of equivalent observations can be easily obtained by any competent scientist through compliance with the rules” (p. 52).

<sup>7</sup> The literature dealing with the sociology of science is, as Blume (1977: 1) implies, diverse and vast. Due to considerations of conciseness, the present discussion of the sociology of science will by necessity be microscopic.

<sup>8</sup> The ethos of science is defined by Merton (1973: 268-9) as “that affectively toned complex of values and norms which is held to be binding on the man of science. The norms are expressed in the forms of prescriptions, proscriptions, preferences, and permissions. They are legitimized in terms of institutional values. [...] Although the ethos of science has not been codified, it can be inferred from the moral consensus of scientists as expressed in use and wont, in countless writings on the scientific spirit and in moral indignation directed toward contraventions of the ethos.”

<sup>9</sup> According to Merton (1973: 270 ff.), four sets of *institutional imperatives*, also referred to as *mores*, comprise the ethos of science. The first imperative, *universalism*, “finds immediate expression in the canon that truth-claims, whatever their source, are to be subjected to *preestablished impersonal criteria*: consonant with observation and with previously confirmed knowledge.” By this Merton means that when the validity of information yielded by research is evaluated, no attention is to be given to the race, religion, creed, or other personal attributes of the researcher, it thus also accordingly being expected that such aspects do not affect the information produced by the researcher. The second imperative, *communism*, presupposes that the “substantive findings of science are a product of social collaboration and are assigned to the community”, meaning that the individual researcher’s “claim to ‘his’ intellectual ‘property’ is limited to that of recognition and esteem which [...] is roughly commensurate with the significance of the increments brought to the common fund of knowledge.” The third more, *disinterestedness*, refers to a general idea of impartiality and personal uninvolvedness in research, the behavior of the scientist being characterized by “a distinctive pattern of institutional control of a wide range of motives” instead of personal interest. Finally, the fourth more, *organized skepticism*, is “variously interrelated with the other elements of the scientific ethos”, being described as “[t]he temporary suspension of judgment and the detached scrutiny of beliefs in terms of empirical and logical criteria.” As will be suggested shortly, later work has implied that Merton’s ideal notion of the scientific ethos, rational at first sight, may not after all be an altogether realistic portrayal of the workings of the scientific community.

<sup>10</sup> A colorful discussion of the speculative nature of scientific activity is offered by Peter Medawar (1985: 83-4), who asserts that “[a]lthough some diehard inductivists still believe, as John Stuart Mill did, that there may be propounded a calculus of discovery—a formulary of thought which can conduct us from observation statements to general truths—most methodologists, however much they may differ in other ways, believe that the generative act in science is the brainwave, inspiration or flash of imaginative insight that is the propounding of a hypothesis, a hypothesis being always an imaginative preconception of what the truth might be. William Whewell [...] at first described hypotheses as ‘happy guesses,’ though later the then holder of the most prestigious academic post in England spoke—ahem—of ‘felicitous strokes of inventive talent.’”

<sup>11</sup> The term *peer* is used here in relatively loose terms, it naturally being the case that the group reading publications meant for scholars within a given field may indeed be rather heterogeneous, ranging from novice researchers to Nobel laureates or other highly qualified and acknowledged specialists (cf. Harré 1993: viii).

<sup>12</sup> As Swales (1990: 117-8) says, “any vision we may have of the scientist-researcher working away in the lab or in the field and then retiring to a quiet place to type up quickly the experimental report according to some stereotyped format is decidedly at odds with reality.”

<sup>13</sup> Granted the close links between the construction of scientific communication and the sociology of scientific knowledge, the scientific community may thus also be approached as a discourse community. A discourse community can be briefly described as “a group of people who share certain language-using practices” (Bizzell 1992: 222), these practices being regulated by certain socially determined stylistic expectations and by canonical knowledge shared by the group members. One of the most widely cited definitions of a discourse community in literature on applied linguistics is probably found in Swales’ (1990: 24-27) work on genre, where he describes the concept in the following terms:

1. A discourse community has a broadly agreed set of common public goals.
2. A discourse community has mechanisms of intercommunication among its members.
3. A discourse community uses its participatory mechanisms primarily to convey information and feedback.
4. A discourse community utilizes and hence possesses one or more genres in the communicative furtherance of its aims.
5. In addition to owning genres, a discourse community has acquired some specific lexis.
6. A discourse community has a threshold level of members with a suitable degree of relevant content and discursual expertise.

In view of the depictions found in literature, a discourse community is on the one hand similar to the well-known notion of *speech community* established by Hymes (1974), who defines the latter concept as “a community sharing knowledge of rules for the conduct and interpretation of speech. Such sharing comprises knowledge of at least one form of speech, and knowledge also of its patterns of use” (p. 51). However, as Swales (1990: 24) explains, the terms *speech* and *discourse community* also differ from one another in various respects. For instance, in a speech community, the determinants affecting language use are first and foremost social, whereas discourse communities are sociorhetorical communities, the determinants of language use being functional, because “a discourse community consists of a group of people who link up in order to pursue objectives that are prior to those of socialization and solidarity, even if these latter should consequently occur. In a discourse community, the communicative needs of the *goals* tend to predominate in the development and maintenance of its discursual characteristics.” In addition, Swales contends, a speech community differs from a discourse community in inheriting “its membership by birth, accident or adoption”, whereas discourse communities have a tendency to divide people into specific interest groups with regard to training or other means of qualification.

Another concept often associated with discourse communities, Bizzell (1992) continues, is the literary-critical notion of *interpretive community*. According to Fish (1980: 14), “interpretive communities, rather than either the text or the reader, [...] produce meanings and are responsible for the emergence of formal features. Interpretive communities are made up of those who share interpretive strategies not for reading but for writing texts, for constituting their properties.” The link between the notions of discourse community and interpretive community is then based on the idea that in both cases “canonical knowledge regulates the world views of group members; how they interpret experience” (Bizzell 1992: 222). However, the notions of discourse and interpretive community also differ from one another to a considerable degree. In the case of a discourse community, for example, community membership is not solely assigned to those involved with the writing of texts. Instead, discourse communities involve both writers and readers with a given field of interest and certain common expectations concerning the linguistic conventions to be used in dealing with that field. What is more, membership in an interpretive community as seen by Fish (1980) is not linked to all of the kinds of feature attributed to a discourse community by Swales (1990). For example, an interpretive community is not explicitly seen to possess a lexis of its own and it can be questioned whether the concept of interpretive community is based on the existence of some “broadly agreed set of common public goals” (Swales 1990: 24) or if membership in an interpretive community is determined according to “a suitable degree of relevant content or discursual expertise” (op. cit.: 27) to the same degree as is the case with a discourse community.

<sup>14</sup> There are, of course, various types of scientifically oriented written texts not meant for publication, typically texts for occupational purposes, such as surgical reports, informal laboratory reports, and the like. In addition, certain unpublished scientific texts are aimed at a very limited audience, not the entire community of scientific peers. This is evidently the case with for instance grant proposals, which nonetheless in my opinion share some of the concerns of published research reports, for example the introductory parts of research articles and scholarly books, insofar as they are aimed at persuading the reader that the project described would be a valuable contribution to the existing body of knowledge regarding the issue at hand. However, Swales (1990: 187) notes, the introductory parts of grant proposals may also be somewhat less specialized in their content than scientific

articles so that for instance administrators and other non-specialists potentially handling the proposals may by and large understand what the proposed projects deal with.

<sup>15</sup> Peter Medawar (1985: 51) points out that certain people still believe that “scientists make their discoveries by the application of a procedure known to them as the scientific method”, a belief “based on a misconception dating from the days of John Stuart Mill’s *A System of Logic* and Karl Pearson’s *The Grammar of Science*.” Instead of such a unified method, Medawar says, “[a] scientist uses a very great variety of exploratory stratagems, and although a scientist has a certain address to his problems [...] he uses no procedure of discovery that can be logically scripted.”

<sup>16</sup> In their manual for those writing for academic publication, Parker and Riley (1995: 150) put forth the view that in writing articles for an academic audience, one should assume the worst, because “[y]our all-forgiving mother may try to read your article, but it should be worded and documented to withstand the scrutiny of the most unsympathetic reader. Your readers may not agree with what you write, but they should never be able to dismantle your argument.” One may naturally ask whether the degree of antagonism implied by Parker and Riley is in fact always on a par with reality, but pointing out the possibility of such antagonism appears important so that where a possibility of disagreement exists, authors can produce depictions that take into account the possibility of opposition.

<sup>17</sup> It should be emphasized here that the members of the scientific community are not always equal as regards scientific reputation and credibility, there conceivably being differences in for instance how we on the one hand approach the work of novice scholars and that of scholars of high repute on the other. As Harré (1993: viii) remarks, “[s]cientific communities are hierarchies. Scientific reputation is a kind of social power. The writings of those who stand high in the social order of scientific communities have greater power to convince than do those of more junior members. So we must also pay attention to the ways that social position is represented in the forms of scientific discourse. Scientific writings are products. Their valuation occurs in specific environments or ‘markets’.” Even though this is probably an accurate evaluation of the situation within the scientific world, I nevertheless think that nobody engaged in scientific reporting, whether a novice or a highly esteemed scholar, can entirely overlook the social nature of scientific knowledge and communication. Thus, whatever the professional status of a scholar, a certain respect toward the conventions of the community will probably be a useful means toward gaining ratification for the information presented. It is therefore assumed here that no-one within the scientific world is *completely* beyond the scrutiny and potential criticism of other scholars, which every scholar composing reports of scientific work will have to take into account.

<sup>18</sup> Scientific research articles have been of particular interest for those involved with *genre analysis*. This research orientation has become known within the sphere of applied linguistics particularly from the work of John Swales (e.g. 1981, 1990), where the emphasis is on the analysis of different kinds of special-subject discourse. The genre analysis approach to the study of English for Specific Purposes has been one of the most influential developments within special-language research and pedagogy during the past few decades. Genre analysis typically approaches the language of professional and scientific communities by analyzing the structure of discourse with regard to communicative purpose, also acknowledging that “exemplars of a given genre exhibit various patterns of similarity in terms of structure, style, content, and intended audience” (Swales 1990: 58). The value of genre analysis in scrutinizing professional language use is also emphasized in the work of Bhatia (e.g. 1993, 1997), who defines genres as “the media through which members of professional or academic communities communicate with each other. [...] Genres, in other words, are socially authorized through conventions, which, in turn, are embedded in the discursive practices of members of specific disciplinary cultures” (1997: 360).

In practice, genre analysts are interested in the linguistic and communicative characteristics of functional text categories such as reports of laboratory experiments, surgical reports, scientific research articles, or the traditional sections of such articles from a top-down perspective with reference to their communicative purpose within a specific discourse community, beginning their analyses from the overall organization of discourse and seeing the choices made at the lower levels as related to the higher-level structure. According to Swales (1985: 212-213), studies making use of the concept of genre may have a number of important implications for ESP research and teaching. In addition to drawing attention to patterns of information structuring in different varieties of ESP, it may also turn out that “it is only within genres that viable correlations between cognitive, rhetorical and linguistic features can be established.”

Notwithstanding its benefits in ESP research and pedagogy, genre analysis also has certain problems. Dudley-Evans (1997), for instance, points out that certain ESP genres (such as the traditional sections of research articles) may not be universal. Attempts to classify texts into genres may overlook differences between cultures and communities, there for instance probably being noticeable generic differences in the discourse structure of research articles representing the various fields of science such as, say, astronomy and medicine. In spite of being included within the genre of the research article, papers from these two fields might differ considerably in their

structure and linguistic choices. To my mind, the question as to how to account for differences in generic conventions between topic areas has not been addressed very thoroughly so far in genre analytic literature. This shortcoming is also implicitly mentioned by Swales himself when he points out that “the RA varies from one disciplinary sector to another in terms of degree of standardization and of the prevalence of a nominalized impersonal style” (1990: 175), but he does not explain whether or how the genre analytic approach deals with such potential complexity. Although the present study shares many of the interests of genre analysts in being focused on the workings of hedging in texts with differing communicative purposes, this study additionally emphasizes subject-specific differences found within the texts under scrutiny, differences which the genre analytic approach does not address to any greater degree. Hence, despite fairly close links to the concerns of genre analysts, this study is not intended to be a strict application of the genre analytic approach as such.

<sup>19</sup> As a matter of fact, before being subjected to the criticisms of the scientific community, an RA often undergoes a close scrutiny by scientific referees, the author first having to convince this small audience of the value of the work in order to get published. For examples of the kinds of modification made to RAs due to the refereeing process, see Myers’ (1985) work on biology RAs.

<sup>20</sup> The historical development of scientific writing has been studied by for instance Bazerman (1983, 1984) and Atkinson (1999). In addition, Berkenkotter and Huckin (1993: 481) comment on Huckin’s (1987) research illustrating certain changes in the genre conventions of science journals, changes deriving from the information explosion of the recent decades that has altered the reading habits of the scientific audience, the readers’ emphasis now often being on searching the most newsworthy points in journals. As Huckin’s work illustrates, this has for instance resulted in a reduction of the role of the section describing the methodology of the research project reported, although, as Swales (1990: 169) says, this may not be so in all disciplines.

<sup>21</sup> The first genre analytic investigations of RAs dealt with the textual organization of the Introduction section (e.g. Swales 1981), the same section also being studied since by many other scholars, including Cooper (1985), Dudley-Evans and Henderson (1990) and R. Holmes (1995).

<sup>22</sup> Relatively little has been written about the structure of the Methods and Results sections, whereas the Introduction and Discussion sections have received a fair share of attention in literature. This may be due to the idea that the Methods and Results sections “seem to be generally regarded as relatively straightforward and unproblematic” (R. Holmes 1997: 322).

<sup>23</sup> In genre analytic studies of RAs, the different stages within the main sections are commonly described in terms of ‘moves’ associated with the various rhetorical goals at which the authors aim by means of the steps taken in reporting research. In his 1981 study, Swales for example identified four major rhetorical moves within the Introduction section, namely those relating to (1) establishing the field to be studied, (2) summarizing previous research, (3) preparing for present research, and (4) introducing present research. The difficulties involved in the analysis of rhetorical moves are discussed by e.g. Crookes (1986), who points out that although such general patterns can typically be deciphered in RAs, “[i]n more complex passages, a variety of alternative arrangements is possible, involving repeated use of mainly the ‘internal’ units Two and Three. In the corpus under consideration, writers normally, though not universally, begin with a One and end with a Four (11/16 times)” (p. 65).

Furthermore, Crookes says (p. 67), there may be disciplinary differences in the occurrence of the four moves.

<sup>24</sup> In their consideration of the different contexts of scientific discourse, Gilbert and Mulkey distinguish between scientists’ formal and informal ways of talking about their actions and beliefs. The formal kind, as found in for instance research articles, is referred to as the “empiricist repertoire”, which “portrays scientists’ actions and beliefs as following unproblematically and inescapably from the empirical characteristics of an impersonal natural world” (1984: 56). The informal kind, found in for example less technical surroundings such as personal interviews of scientists, is termed the “contingent repertoire”, where “scientists’ actions are no longer depicted as generic responses to the realities of the natural world, but as the activities and judgements of specific individuals acting on the basis of their personal inclinations and particular social positions” (op. cit.: 57). Gilbert and Mulkey (ibid.) also suggest that communication between specialists and laypeople belongs to the contingent repertoire, apparently due to the close association with ‘informality’. However, certain studies on the rhetoric of scientific popularization also seem to put forth a view where the empiricist repertoire can be associated with popular science (e.g. Fahnestock 1986: 275, Myers 1994: 188-9), implying that in popularized renderings of scientific activities interpretive difficulties and other features potentially biasing the information presented may be omitted altogether, the information presented being granted a higher degree of factuality than in scientific peer communication and thus in a sense presenting scientists’ actions and beliefs as directly deriving from the natural world. In addition, whether or not the presumed empiricist repertoire is always adopted in formal scientific discourse such as RAs is subject to debate. According to Latour and Woolgar (1979: 76-7), uncontroversial claims are not typically found in formal discourse between experts, although such claims are “often taken as the prototype of scientific assertion.”

<sup>25</sup> Gilbert and Mulkey (1991: 165) say that scientists “sometimes seem to suggest that exact experimental replication is crucial to science.” However, in practice scientists apparently demonstrate a “lack of interest in close experimental copying” (op. cit.: 166), the validation of scientific knowledge not being concerned with one-to-one replication, but a more intricate process of negotiation.

<sup>26</sup> Dillon (1991: 6), for example, is of the opinion that academic writing may be seen to differ socially with regard to disciplinary group “according to the passions and interests, the position and influence, of its members.” In a study concentrating on research articles from different disciplines, MacDonald (1992: 535) says that we can “expect to find disciplinary differences [in academic journal articles] relevant to knowledge making at both the sentence level and the text level.” Comments relating to disciplinary variation can also be found in guide books for the users of scientific discourse. In a manual intended to develop college students’ critical writing and thinking strategies, Kiniry and Rose (1995: 7), for example, point out that “[a]s your academic experience broadens, you’ll also start to notice [...] how much the voices vary as you move from one field of study to another. Some academic language remains the same across the university, but each discipline also has its specialized vocabulary and emphases—a different variety of language for representing its own angle on the world.”

<sup>27</sup> Among the fairly limited number of studies addressing disciplinary variation in RA structure are for instance Swales and Najjar’s (1987) treatment of RA Introductions in physics and educational psychology, MacDonald’s (1992) sentence-level analysis of differences in knowledge-making between journal articles on psychology, history, and literature, and R. Holmes’ (1997) paper on RA Discussion sections in history, political science, and sociology.

<sup>28</sup> Among studies scrutinizing specific linguistic features across RA sections are for example Adams Smith’s (1984) study of authorial comment, Gosden’s (1993) work on the functions of the grammatical subject in the different RA sections, Williams’ (1996) paper on full verbs in medical RAs, and Swales et al.’s (1998) treatment of imperatives in RAs representing ten different disciplines. In a recent paper (Varttala, forthcoming), I have also addressed the question of hedging in the different sections of RAs from the same three fields that are examined here.

<sup>29</sup> In my opinion, it is certainly not the case that *everything* is always automatically toned down in scientific discourse such as RAs. Latour and Woolgar (1979), for example, have established five different degrees of truth claims found in scientific discourse. Statements of the most certain type (type five) “assert the sort of knowledge that seems self-evident to insiders, knowledge that only surfaces when an outsider’s questions force the exposure of presupposed information. Type four statements consist of uncontroversial information that is made explicit [...]” (Fahnestock 1998: 342). Although Fahnestock claims that statements of these two types—often perhaps somewhat mistakenly seen as prototypical scientific assertions (Latour and Woolgar 1979: 77)—most typically occur in scientific popularizations, it is nonetheless evident that at least some type four statements also occur in RAs. Conceivably, most RAs do include at least some information that has already been accepted by the scientific community and thus does not have to be toned down. In addition, as Myers (1989: 12-13) explains in his discussion of Watson and Crick’s seminal RA on the structure of DNA, researchers may well use hedges in order to qualify new knowledge claims when they are first introduced, but articles may then proceed without constant hedging.

<sup>30</sup> As will be pointed out shortly (in 3.3.2), portraying hedges in RAs as items that indicate *purposive* vagueness might not be an entirely unproblematic description.

<sup>31</sup> As Hyland (1994: 250) points out, some style manuals offer comments on the value of hedging phenomena in scientific discourse. However, as Hyland has observed, the presentation of hedging in guide books is not generally very encouraging.

<sup>32</sup> Salager-Meyer (1994) is of the opinion that Myers (1989) treats hedging as both a negative and positive politeness strategy. However, in Myers’ article, hedging is first and foremost associated with negative politeness, whereas strategies such as solidarity as indicated by the use of personal pronouns, certain emotive expressions, identification with a viewpoint being criticized, and joking are dealt with in connection with positive politeness.

<sup>33</sup> R. Lakoff (1979: 52) mentions that the style of professional scientific journals is characterized by distance.

<sup>34</sup> The rhetorical situation in which communication between RA authors and readers takes place may to my mind be seen as one where “the participants are on an approximately equal footing, but not one of true intimacy, so that both need protection and feel a need to protect each other” (R. Lakoff 1990: 32).

<sup>35</sup> The bracketed information in the reference indicates the rhetorical section from which the passage originates. In cases where the structure of an RA does not conform to the general Introduction-Methods-Results-Discussion structure (see 4.3 for further details), the information refers to the context in which the passage originally occurred, that is, it states whether the authors are introducing their topic, explaining the methods employed, providing experimental results, or discussing the outcome of their work.

<sup>36</sup> As will be pointed out below, the social features that RA authors have to take into account may not after all be exactly the same ones involved in the kinds of interaction investigated by for instance Brown and Levinson (1978/1987).

<sup>37</sup> As noted previously, despite traditional claims to the contrary, scientifically derived knowledge cannot be said to have any special sociological status. Instead, scientific knowledge is very much a socially determined phenomenon. In suggesting that social variables linked to politeness in other kinds of communication can be equally applied to scientific communication, we simultaneously acknowledge that scientific communication does not have a special social status any more than scientific knowledge does. Comments regarding the *purely* objective, precise, ‘mathematical’, and, indeed, asocial nature of scientific communication may indeed be seen as a reflection of the conventional idea of scientific knowledge with a special sociological status.

<sup>38</sup> As noted above, in his discussion of Watson and Crick’s (1953) paper, Myers pays attention to threats to both negative and positive face, claiming that both negative and positive politeness features may be deciphered in scientific articles. Nevertheless, in Myers’ study hedging phenomena are only linked to the expression of negative politeness.

<sup>39</sup> Watson and Crick’s way toward the discovery of the structure DNA was by no means altogether without problems. Before the successful experiments leading to the celebrated findings, the scholars had already twice “proudly announced that they had solved the riddle and both times their model had been reduced to ashes” (Latour 1987: 2).

<sup>40</sup> The corpus analyzed for the purposes of the present study also included certain occurrences of hedging that cast doubt on the politeness interpretation offered by Myers (1989). For example, the authors of an economics RA, discussing the relationship between company strategies and quality management, put forth the following statements at the beginning of the concluding section:

The majority of the respondents (78%) were CEOs, Directors, Presidents, or Vice Presidents of the company. *It would seem a reasonable assumption that* these respondents have a strong hand in the policies implemented by the company. (ECO1, I, “Conclusions”, paragraph 1)

As we can see, the authors have chosen to hedge the second sentence to a remarkable degree, but in this case it appears that hedging occurs in a statement of something that, even in the eyes of a non-economist, is rather obvious. At least in my opinion, CEOs, Directors, Presidents, and Vice Presidents are the ones characteristically in charge of the policies of a company, and it seems unlikely that economics scholars would contest the validity of this view. Given that hedging in this example occurs in a statement that few, if anyone, would be likely to oppose, it is difficult to see how hedging here could be linked to negative politeness as discussed by Myers (1989). After all, negative politeness devices are assumed to occur when a possibility of opposing views exists. If we recognize that the idea presented here is common knowledge and not subject to debate, it may then be suggested that hedging is more of a purely conventional choice than a politeness strategy. In fact, in putting forth such evident information in such a tentative manner, one might even suggest that the authors are adding—intentionally or not—a certain tone of sarcasm or irony (cf. Leech 1983: 143) into the statement.

<sup>41</sup> On the strength of the conventional view of the sociology of science (cf. Merton’s [1973] imperative of universalism mentioned earlier in this chapter), one might wish to state the exact opposite.

<sup>42</sup> As will be illustrated in the chapters to follow, the politeness interpretation of hedges might just be viable in certain contexts in RAs when it may be presumed that the principles of the scientific community are overridden by interpersonal considerations, but even then the politeness model may be employed to only a limited number of cases in specific contexts.

<sup>43</sup> In addition to a corpus of biology RAs, the material treated by Hyland includes scientific discourse included in the “Learned” sections of the Brown and LOB corpora as well as in the JDEST science corpus compiled at Jiao Dong University, Shanghai. These corpora include data representing a variety of disciplines and types of text. It should be noted that the results regarding some of these additional corpora were not obtained by Hyland himself, but are based on other scholars’ work (e.g. Butler 1990).

<sup>44</sup> Hyland (1998: 156) says that hedges “often have different semantic interpretations”, for instance between root and epistemic meanings. However, as suggested in Chapter 1 above, it is the epistemic meaning that can most clearly be associated with hedging, whereas I find it doubtful whether items with a root meaning may be regarded as hedges at all.

<sup>45</sup> In the work of Salager-Meyer (1994), it seems to be presumed that a hedge of a certain form has a given function. Salager-Meyer (pp. 154-5) forms a five-category taxonomy of hedges, distinguishing between *shields*, *approximators*, indications of *authors’ personal doubt and direct involvement*, *emotionally-charged intensifiers*, and *compound hedges*. As noted above (Ch. 1, note 43), it is debatable whether the devices listed under the



heading of emotionally-charged intensifiers can be regarded as hedging phenomena at all. While the difference between shields (e.g. *appear, seem, probably, suggest*, etc.) and approximators (e.g. *approximately, roughly, occasionally*, etc.) seems sustainable at least in the abstract, the meanings and contexts of such items generally being quite different from one another, it also seems that many of items that Salager-Meyer lists in the category of shields could also be seen to belong to the third category, indications of authors' personal doubt and direct involvement (e.g. *I believe, to our knowledge*). It appears to be presumed that only expressions including a direct personal reference to the author(s) can be used to express authorial doubt and involvement. However, studies have suggested, for instance, that sentences including the agentless passive can equally be used as indications of authorial doubt (see e.g. Lachowicz 1981). Further problems inherent in Salager-Meyer's taxonomy are created by the category of compound hedges (e.g. *it could be suggested that, it would seem somewhat unlikely that*). It seems rather odd to assign such expressions into a category of their own when the items can be seen to fulfill more or less the same functions and take the same forms as hedges belonging to some of the other categories. By mixing formal and functional criteria in the categorization, Salager-Meyer seems to end up in a rather confusing situation, where items with similar functions, only separated by complexity, end up in different categories.

<sup>46</sup> Examples of the types of hedge distinguished by Hyland will be provided below when discussing the various subtypes of hedges, but let us first consider the nature of the two major types distinguished by Hyland.

<sup>47</sup> We may debate whether such hedges only specify the extent to which a particular *term* describes the phenomenon dealt with or whether we should rather speak of conceptualizations more generally, be they individual linguistic items or larger units of linguistic description.

<sup>48</sup> While Lakoff was mainly interested in the semantics of how hedges may be used to talk about phenomena not in full correspondence with the conceptual categories of natural language, Hyland's work is more focused on the pragmatic side of matters, hedging of the attribute type being viewed with reference to the sociorhetorical context of scientific peer-to-peer communication. In this kind of discourse, typically seen as precision-oriented, hedges specifying the suitability of particular terms in describing a given phenomenon may be seen as a socially determined strategy due to the expectations of the expert audience.

<sup>49</sup> Only a few examples associated with each category of hedges established by Hyland will be provided here to illustrate the different types. For a closer discussion and further examples of the various expressions dealt with in establishing the categorization, see Hyland (1996, 1998). In Hyland's work, interpretations of examples provided were validated by expert readers. It should be noted that the extracts used to illustrate Hyland's categories here are for the most part only subjective interpretations of the present author.

<sup>50</sup> This category of hedges is to some degree associated with the politeness interpretation of hedging discussed above, hedging of this type apparently being a strategy by which the face of the writer may be protected against audience opposition. However, as mentioned, the original politeness interpretation offered by Brown and Levinson does not seem directly applicable in the context of scientific RAs.

<sup>51</sup> As explained, this idea has also been discussed in for instance Myers' (1989) work on politeness in scientific articles, hedging having been posited to be a useful strategy to protect the negative face of the readership.

<sup>52</sup> It should be noted that Hyland's concept of reader-oriented hedges is not limited to indications of personal attribution linked to explicitly tentative items such as the ones in the examples cited here. Some of Hyland's (1998: 182) examples suggest that reader-oriented hedging is also realized through personal references to the author in accounts of experimental findings, models and analyses even without the presence of clear indications of tentativeness.

<sup>53</sup> Often, the examples provided by Hyland are quite short, only including a small part of the sentence in which a hedge occurs. At times, this produces difficulties for a reader attempting to relate the examples to the interpretations put forth by Hyland.

<sup>54</sup> The section describing Hyland's (1998) methods is not very thorough in its explanation of the way in which information provided by the expert readers was treated. For instance, it is not altogether clear how their responses were analyzed and how well they corresponded to the classification of hedges established.

#### 4. Hedging in a Corpus of Research Articles on Economics, Medicine, and Technology

As we have seen above, hedging phenomena can be expected to occur quite frequently in research articles to fulfill a variety of functions. What has not been addressed in very precise terms earlier, however, are the potential disciplinary differences in the use of hedges in RAs. To investigate the possibility of such variation, let us now turn to the current corpus for results as concerns the presence of linguistic phenomena that may be seen as typical realizations of hedging, namely various devices marked by uncertainty, hesitation, vagueness, and the like—items that are often employed so as to indicate degrees of less than full commitment to the accuracy or precision of what is said. In what follows, I will begin by presenting an overall quantitative summary of the hedging phenomena analyzed quantitatively, after which the hedges will be considered in more detail as regards their identification, their formal characteristics, and the contexts in which they occurred. Following this, the scope will shift to the way in which hedges were distributed in the RA data and to the motivations that RA authors cited for the use of hedges in the disciplines examined.

##### 4.1 Overall Incidence of Categories of Hedges in the RA Corpus

As we can see from Table 1 below, certain disciplinary differences in the incidence of typical hedging phenomena were detected in the data investigated:<sup>1</sup>

Table 1. Relative frequencies (n/1,000 words) and raw numbers of hedging devices in a corpus of research articles on economics, medicine, and technology.<sup>2</sup>

	Economics	Medicine	Technology
Modal auxiliaries	5.18 (328)	3.42 (165)	1.95 (124)
Full verbs	7.46 (472)	4.99 (241)	3.90 (248)
Adverbs	4.72 (299)	2.61 (126)	5.57 (354)
Adjectives	2.50 (158)	2.22 (107)	2.47 (157)
Nouns	6.07 (384)	2.09 (101)	2.46 (156)
Clausal elements	2.21 (140)	1.39 (67)	1.13 (72)
Questions	0.08 (5)	0.02 (1)	0.06 (4)
Other <sup>3</sup>	2.43 (154)	5.32 (257)	4.30 (273)
<b>Total</b>	<b>30.65 (1940)</b>	<b>22.05 (1065)</b>	<b>21.85 (1388)</b>

The main disciplinary differences in the incidence of hedges that this table illustrate are of two obvious kinds, namely variation in the overall incidence of hedges and variation in the relative shares of the different categories found as hedges.

As concerns differences in the overall frequency of hedging, economics emerged as the area of specialization where hedges figured most often out of the three disciplines, the number of hedges in both medicine and technology being quite similar, about two thirds of the number seen in the economics RAs. In view of earlier comments on disciplinary discourse, this result is in fact somewhat unexpected, because it has for instance been pointed out previously that discourse on economics may be hedged to a lower degree than discourse on sciences such as biology (Backhouse et al. 1993: 14). It has also been claimed that economists indeed tend to argue their cases rather forcefully (Klamer 1984, 1990), which suggests that devices such as hedges might be relatively uncommon in discourse on economics. The present results, however, indicate that in comparison with medicine and technology hedging may be noticeably more frequent in RAs on economics. The reasons and implications of such results will be discussed at a later stage, the main concern at the time being a closer examination of the various categories of hedges studied and an investigation of the distribution of hedging phenomena in the RAs examined, aspects which may also reveal disciplinary variation in the data.

When it comes to the relative shares of the categories distinguished, it is useful to begin by considering the status of the modal auxiliaries in the current results. As pointed out earlier, hedging is closely associated with the notion of modality, which at least in the case of English is in turn often approached with reference to the system of the modal auxiliaries, implicating this category as a central token of hedging. As the current results exemplify, however, the kind of modality needed for hedging can be expressed by a variety of other means, some of them indeed being noticeably more frequent than the modal auxiliaries. This result is not altogether different from that emerging from Hyland's (1998: 104) analysis of biology RAs<sup>4</sup>, where, out of the lexical categories of hedges dealt with, the modal auxiliaries were found to be the second least common hedge type. As concerns the categories of hedges distinguished, in economics and medicine the primary means of hedging in the present data were full verbs and in the field of technology adverbs. As Table 2 illustrates, when we list the categories of hedges in descending order of frequency in each discipline, some uniformity can be detected:<sup>5</sup>

Table 2. Categories of hedges in descending order of frequency in each discipline. (The figures indicate frequency per 1,000 words in the data and the percentage of each category out of the total in each discipline)

Economics	Medicine	Technology
1. Full verbs (7.47, 24.4%)	1. Full verbs (4.99, 22.6%)	1. Adverbs (5.57, 25.5%)
2. Nouns (6.07, 19.8%)	2. Modal auxiliaries (3.42, 15.5%)	2. Full verbs (3.90, 17.9%)
3. Modal auxiliaries (5.18, 16.9%)	3. Adverbs (2.61, 11.8%)	3. Adjectives (2.47, 11.3%)
4. Adverbs (4.72, 15.4%)	4. Adjectives (2.22, 10.0%)	4. Nouns (2.46, 11.3%)
5. Adjectives (2.50, 8.1%)	5. Nouns (2.09, 9.5%)	5. Modal auxiliaries (1.95, 8.9%)
6. Clausal elements (2.21, 7.2%)	6. Clausal elements (1.39, 6.3%)	6. Clausal elements (1.13, 5.2%)
7. Questions (0.08, 0.3%)	7. Questions (0.02, 0.1%)	7. Questions (0.06, 0.1%)
[Other (2.43, 7.9%)]	[Other (5.32, 24.1%)]	[Other (4.30, 19.7%)]
(Total 30.65, 100%)	(Total 22.05, 100%)	(Total 21.85, 100%)

In each discipline, hedging of the most frequent kind is close to a quarter of the overall incidence of the categories established. Furthermore, full verbs figured quite commonly in each discipline, being among the top two categories in all fields examined. On the basis of the present corpus, the categories of clausal elements and questions<sup>6</sup> are among the more infrequent categories of hedges, whereas the lexical devices included in the first five categories seem to be the central means of hedging in the corpus. While this finding is consistent with Hyland's (1998: 104) view that "scientific hedging is primarily a lexical phenomenon", some disciplinary variation is to be detected in this respect as well. The share of the categories of lexical hedges distinguished out of the total number of hedges identified was highest in economics, 84.6%.<sup>7</sup> In the other two disciplines, however, the ratios were noticeably lower, 69.5% of the total number of hedges in medicine and 74.9% in technology.<sup>8</sup>

The overall results in themselves are sufficient to illustrate that there may indeed be noteworthy differences between disciplines as regards hedging in RAs. However, the results presented say very little about the use of specific hedging phenomena and their uses in the different parts of RAs. Hence, in order to provide more detailed information about these matters, let us proceed to a closer scrutiny of each hedge category.

#### 4.2 Categories of Hedges in the RA Corpus

While it is clear that there are numerous ways in which hedging may be realized in English, there are certain evident types of linguistic expression that spring to mind in this respect. As noted earlier, in the seminal work by George Lakoff (1973), hedging was first approached with reference to a relatively limited set of hedges, including lexical items and phrases such as *roughly*, *sort of*, *strictly speaking*, and so on. In the course of time, the concept of hedging has come to be understood more broadly as including a number ways of expressing uncertainty, vagueness, hesitation, and the like, that is, to cover various linguistic manifestations of feelings and thoughts pertaining to limited knowledge or accuracy. From this perspective, then, hedging may be paralleled with qualifications realized by means of elements expressing epistemic modality. While the notion of modality has at times been approached rather narrowly with an emphasis on the modal auxiliaries,<sup>9</sup> the present work approaches epistemic qualification from a wider perspective. Nevertheless, it may be that when the notions of hedging and epistemic qualification are in question, certain modal auxiliaries and other lexical elements with related meanings are the devices that one almost automatically thinks of. As noted, Hyland (1998: 104) is of the opinion that hedging in academic writing is first and foremost a lexical phenomenon. Whether or not this applies in all disciplines and kinds of academic discourse is not certain, but at least the present results as well as those by Hyland (1998) lead us to believe that the modal auxiliaries—the starting point in many studies into modality in English—and certain other lexical manifestations of epistemic meaning occupy a central position when it comes to hedging and consequently obviously provide a fruitful vantage point in scrutinizing hedging in academic language use. Although the modal auxiliaries are not quantitatively speaking the most prominent group of hedges in the RA data and lexical devices are not the only kinds of hedge dealt with, in what follows I will begin by looking into how the modal auxiliaries were used as hedges in the data, to be followed by closer examinations of other lexical hedging phenomena. Following this, attention

will turn to non-lexical hedging devices, namely clausal elements, questions, and the ragbag category of ‘Other’, which also includes some non-lexical hedges.

#### 4.2.1 Modal Auxiliaries

The data from the three disciplines included eight different modal auxiliaries that could be interpreted to express the kind of epistemic meaning useful for hedging, namely *can*, *could*, *may*, *might*, *must*, *should*, *will*, and *would*.<sup>10</sup> The incidence of these items across the three disciplines differed to quite a degree, hedges in the form of modal auxiliaries being most common in economics (5.18 per 1,000 words, n=328), whereas medicine and technology (3.42, n=165 and 1.95, n=124, respectively) included fewer hedges of this kind. Out of the eight modal auxiliaries found as hedges in the data, three were above the others in quantitative terms, which is why I will begin by looking at each of the three separately, that is, *may*, *might*, and *could*.<sup>11</sup>

**a. *May*.** In all three disciplines examined, *may* was the most common modal auxiliary found as a hedge (altogether 361 occurrences in the RA corpus), amounting to more than half of the modal auxiliary hedges in each discipline.<sup>12</sup> In economics, the relative incidence of the auxiliary as a hedge was 2.97 per 1,000 words (n=188), as opposed to 2.22 (n=107) in medicine, and 1.04 (n=66) in technology. The predominance of *may* is to be expected, granted that studies into modality have illustrated that *may* is the modal auxiliary most typically found as a token of epistemic meaning (see e.g. Coates 1983). In my RA corpus, *may* was indeed also the single most frequent hedging device in all three disciplines. The following are typical examples of *may* in hedging use in the data,

- (1) The phyloDAG model allows the possibility that a species *may* be derived from several ancestors rather than from a single ancestor. (TEC1, B, 190 [Introduction])
- (2) These statistics are computed on all possible affected pairs. This procedure *may* inflate the contribution of sibships with large numbers of affecteds. (MED1, A, 29 [Methods])
- (3) Interestingly, the number of different coordination mechanisms used was significantly negatively related to the product’s design quality ( $r=-.22$ ). One explanation for this result would be that involving a large number of individuals from different departments through a large number of coordinating structures forces more design and engineering compromises, which *may* lower the overall design quality. (ECO1, J, 59 [Results])

- (4) Recent authors have claimed that traditional point-factor job evaluation programs, which are found in pay programs emphasizing internal equity, are more likely to pay over the market (Lawler, 1990; Schuster & Zingheim, 1992) and thus *may* be more attractive to recruits. (ECO1, D, “Predictors of Recruitment Effectiveness”, paragraph 1 [Discussion])

each occurrence of *may* clearly toning down the degree of confidence invested in the accuracy of what is stated.<sup>13</sup>

As illustrated earlier in the study (see 1.2), *may* can also quite often be found in non-epistemic uses, which could present problems for the analyst. The majority of the cases in the present data, however, were not too problematic, it being generally possible to distinguish between the epistemic and non-epistemic cases. The items where distinguishing the intended meaning was not altogether straightforward were similar to the kinds of “merger” mentioned by Coates (1983: 145). In Coates’ data, such indeterminate cases between epistemic and deontic (or “root”, as Coates calls the latter) modality were reported to be quite frequent in formal, often academic, contexts. In the present RA corpus, such cases were not all that common.<sup>14</sup> In principle, occurrences of *may* such as

- (5) That TNF *may* play a role in vivo has been supported by more recent studies demonstrating increased expression of TNF and its receptors at sites of chronic inflammation [...]. (MED1, C, 1573 [Introduction])

might be seen as cases of merger between epistemic and deontic possibility (paraphrasable by both ‘it is possible that’ and ‘it is possible for .... to’, respectively; see Coates, *ibid.*). However, given that in such cases the *possibility* exists that the intended meaning of the auxiliary is epistemic, all instances of *may* indeterminate between deontic and epistemic meanings were counted as hedges.

**b. *Might*.** In the RA data considered overall, *might* was the second most frequent modal auxiliary found in hedging use (n=72). This is, again, not unexpected, because *might* is often mentioned as a common way of expressing epistemic possibility (see e.g. Coates 1983, Perkins 1983). The relative share of *might* out of the auxiliaries used as hedges was greatest in economics, where the item was the second most common of the auxiliaries in hedging use, with a relative incidence of 0.74 per 1,000 words (n=47), whereas in medicine *might* was the third most common auxiliary (0.35 per 1,000 words, n=17) and the fourth most common in technology (0.13 per 1,000 words,

n=8). Hence, despite the centrality of *might* in the data viewed overall, disciplinary differences in incidence also emerged from the RAs.

As concerns the meaning of *might* in epistemic use, the auxiliary has been described in somewhat different terms in literature. In certain studies it is claimed that the meaning of epistemic *might* is more or less similar to that of *may*, Coates' (1983) data for instance indicating that the two auxiliaries "are usually interchangeable" (p. 147). Despite uses similar to epistemic *may*, however, *might* is a more complex case because it can be used as a past form and a hypothetical alternative to both epistemic and non-epistemic cases of *may*. According to some scholars, *might* is even generally speaking different from *may* insofar as it is more "tentative" and "unreal" (Palmer 1979: 48), Perkins (1983: 50 ff.) also implying that *might* is by definition a more hypothetical alternative to *may*. Coates' (1983: 146 ff.) study, on the other hand, presents evidence illustrating that *may* and *might* are indeed quite often interchangeable in epistemic use, with little difference in meaning ('it is possible that').<sup>15</sup> Coates does of course acknowledge that *might* has some characteristic uses of its own, including the expression of hypothetical epistemic possibility ('it is possible that ... would'), but she also states that these uses may not be as frequent as suggested in certain other studies.

Whether *may* and *might* are interchangeable as regards the degree of tentativeness is not altogether clear in my data:

- (6) While women business owners may be more similar to men than different, the nature of differences *might* affect advertising strategy. (ECO1, A, 11 [Introduction])
- (7) However, some product types—such as military weaponry or pharmaceuticals—were excluded from the study to avoid possible distortions due to extensive government regulations and other externalities that *might* influence the development process or the time required to complete a project. (ECO1, J, 55 [Methods])
- (8) A gene for an adrenocorticotrophic hormone receptor (MC2) has been localized to 18p11.2 and genetically mapped to the region of linkage. Mutations in this gene *might* explain some of the hypothalamic-pituitary-adrenal axis abnormalities seen in patients with severe mood disorders. (MED1, A, 33 [Discussion])

In each example, the use of *may* would result in well-formed structures as well, but it does nonetheless seem likely that in each case some people would perceive the choice of *might* as somewhat more tentative than *may*.<sup>16</sup> My data does include instances where *might* can be



interpreted to express similar tentativeness as *may*, but these are occurrences where *might* occurs as a past form of *may*, as in (9):

- (9) Because of a concern that nonresponding restaurants *might* have closed, we hired an interviewer to drive to each of the 39 nonrespondents and determine whether the store was still open, and to conduct a personal interview if possible. (ECO1, B, 775 [Methods])

In this example, *might* can be taken to indicate that the closure of the restaurants was just one reasonable possibility why the restaurants had not responded to a survey.<sup>17</sup>

Hence, although it has been suggested that it sometimes makes little difference in terms of meaning whether *may* or *might* is selected as the exponent of epistemic possibility, in certain cases one may feel that there is something of a difference between the two in the degree of tentativeness expressed. Although Coates (1983) is of the opinion that epistemic possibility as expressed by *may* and *might* is often of the same degree of tentativeness, this view is perhaps not shared by all of those participating in scientific communication. As concerns the mere identification of hedges, this difference carries little importance, as both meanings may be associated with hedging, but in terms of the effect that specific hedges have, the distinction is noteworthy. This can be especially so in peer communication between scientists, where a close consideration of the degree of certainty attributed to the information put forth may be vital for the scientist's success and reputation. Thus, although *may* and *might* are perhaps at times used interchangeably, their potential meaning distinction should merit at least some thought for example in pedagogical materials relating to scientific communication.

As noted, *might* may also be found in uses other than the kinds of epistemic case exemplified (past and hypothetical deontic possibility, past and hypothetical permission). In the majority of cases, there was no ambiguity between these and the epistemic uses, although Coates (1983: 163) does point out that some mergers between hypothetical epistemic possibility and hypothetical deontic possibility were found in her data. In my RA corpus, such mergers were quite rare, although not entirely absent:

- (10) If this were true, differences *might* be detected in the advertising strategies selected by female entrepreneurs as compared to male entrepreneurs [...]. (ECO1, A, 12 [Introduction])

Even though cases such as (10) might be ambiguous between hypothetical epistemic ('it is possible that differences would be detected') and hypothetical deontic ('it would be possible to detect differences') meanings, all mergers of this type were classified as hedging phenomena because of the possibility that their intended meaning *could* be epistemic.

**c. *Could*.** In the RA data overall, *could* emerged as the third most common modal auxiliary in hedging use, with a total of 64 occurrences. In economics, its incidence was 0.43 per 1,000 words (n=27; third most common after *may* and *might*) and it was the second most common of the modal auxiliaries (after *may*) in both medicine and technology, amounting to 0.46 per 1,000 words (n=22) in the former and 0.24 per 1,000 words (n=15) in the latter. Thus, the disciplinary differences in relative incidence were not as clear as in the case of *may* and *might*.

As to the uses of *could*, it is employed to express a range of modal meanings. In its deontic uses, the auxiliary is employed as either a past or a hypothetical form of *can* (see Coates 1983: 107) in expressions of deontic possibility ('it was/would be possible for...'), permission ('it was/would be permissible for...'), and ability ('x was/would be able to...'). The meaning of interest from the perspective of hedging, however, is naturally the epistemic one, which Coates sees as "semantically quite distinct from all other uses of COULD" (op. cit.: 167). In both Coates' and Butler's (1990) data, this meaning is relatively rare in comparison with the other central tokens of epistemic possibility (*may* and *might*). In my corpus, however, the number of *could* in epistemic use in fact surpassed the number of epistemic *might* in medicine and technology.<sup>18</sup> The corpus contained quite a few cases of *could* taken as hedges, the following representing typical occurrences in the RA data:

- (11) There is growing appreciation of the relation between cardiac sympathovagal imbalance and adverse outcomes in other disease processes of the heart as well as after noncardiac surgery. Thus, understanding whether reduced HRV after cardiac surgery is the result of nonspecific perioperative factors or the result of perturbations associated with cardiac surgery *could* be of clinical importance. (MED1, D, 1356 [Introduction])
- (12) If there were such racial discrimination in mortgage lending, we would expect defaults by minority borrowers to be lower than normal. Thus, the default rate *could* be a misleading indicator of risk for use in an analysis of redlining. (ECO1, G, 86 [Methods])

- (13) An increase in the minimum wage *could* lead to an increase in full-time employment relative to part-time employment for at least two reasons. (ECO1, B, 784 [Results])
- (14) The benefit of the single vane segment *could* be a 50 percent or greater reduction in stresses, as explained in the section on stress analysis. (TEC1, A, 215 [Discussion])

As the examples illustrate, the contexts in which *could* was found as a hedge are similar to the ones seen in connection with *may* and *might*, the auxiliaries clearly marking the information presented as less than absolute.

As seen above, the modal auxiliaries may be problematic for the analyst due to their multiple meanings and the possibility of ‘mergers’, where it is difficult to tell what the intended meaning actually is. As far as *could* is concerned, however, such difficulties were not encountered in the present data, it being possible to distinguish the epistemic occurrences without problems. What is perhaps more problematic when dealing with *could* is its relationship with the other exponents of epistemic meaning, particularly *may* and *might*. Although it would also have been possible to formulate most of the examples above with the help of *may* and *might*, the choice of *could* seems to result in statements that are marked by quite a high degree of tentativeness, especially in comparison with *may*. Whether *might* would be similarly tentative or less so in these contexts is not evident as opinions on the meaning relation between *may* and *might* differ. Be this as it may, it is evident that *could* provides an alternative to express epistemic possibility with quite a high degree of tentativeness. Such a possibility is important not solely from the theoretical standpoint of the linguist, but should also be acknowledged by language users so that they can invest their utterances with the degree of tentativeness that they deem suitable.

**d. Other Modal Auxiliaries.** By virtue of being the central tokens of epistemic possibility, *may*, *might*, and *could* are among the first English modal auxiliaries to spring to mind when speaking of hedging. In the RA corpus, one of the three was involved in a great number of cases where hedging took place, the three items amounting to a total of 88.5% of the hedges in the form of modal auxiliaries in the RAs on medicine, the respective shares being 79.9% and 71.8% in economics and technology. However, this still leaves us with five other epistemic auxiliaries identified as hedges, namely *can*, *must*, *should*, *will*, and *would*, which will be discussed in this section in decreasing order of frequency in the RA data.

**Should.** Alongside its other meanings, deontic obligation apparently being the commonest one (see e.g. Palmer 1979, Coates 1983), *should* is also occasionally used to convey an epistemic meaning. This meaning can be described as a “rather extreme likelihood, or a reasonable assumption or conclusion”, which “implicitly allows for the speaker to be mistaken” (Palmer 1979: 49). Hence, this usage clearly involves the kind of meaning associated with hedging, since it expresses “a tentative assumption, an assessment of probability, based on facts known to the speaker” (Coates 1983: 64). Coates (op. cit.: 77-8) points out that *should* may sometimes be interpreted as a ‘merger’ between epistemic and deontic meanings, but in my data no apparent cases of such mergers were to be detected.

Hedging as realized by epistemic *should* occurred a total of 42 times in the RA corpus, amounting to 0.39 per 1,000 words (n=25) in economics, as opposed to 0.08 (n=4) in medicine, and 0.20 (n=13) in technology. Below are some typical examples of such cases:

- (15) We therefore expect that as information and other resource flows increase, the use of less formalized coordination mechanisms *should* also increase. (ECO1, J, 53 [Introduction])
- (16) Methods are currently under study that *should* greatly enhance the ability of the inspector to acquire accurate suction side data. (TEC1, A, 209 [Methods])
- (17) Since the proportional change in average employment is an employment-weighted average of the proportional changes at each store, a weighted version of the proportional-change model *should* give rise to elasticities that are similar to the implied elasticities arising from the levels models. (ECO1, B, 782 [Results])
- (18) A possible defense of the competitive model is that unobserved demand shocks affected certain stores in New Jersey—specifically, those stores that were initially paying wages less than \$5.00 per hour. However, such localized demand shocks *should* also affect product prices. (ECO1, B, 791 [Discussion])

While in each example the auxiliary employed is more forceful than the three auxiliaries examined above, the choice of *should* nonetheless clearly marks the information presented as not categorically certain and may therefore be seen as a hedge.

**Would.** The status of *would* as an expression of the kind of meaning that hedges are understood to involve is somewhat problematic in view of work on modality. Coates (1983: 205 ff.) states that in her data *would* is most commonly found in an epistemic meaning, whereas the other meanings

involve deontic modality pertaining to willingness, intention, and volition. In epistemic use, the auxiliary may be found as a past form of *will* to express “predictability” or “prediction”<sup>19</sup> (cf. *That will be the milkman.* vs. *That would be the milkman.*). Since my RA data did not exhibit cases of *would* employed as a past form of *will* to indicate predictability or prediction, this meaning of the auxiliary will not be discussed further here. However, a more interesting epistemic use as concerns scientific hedging is *would* as a “general hypothetical marker” (Coates 1983: 213), as in the following example from my data:

- (19) Stimulating fetal hemoglobin by increasing  $\gamma$ -globin synthesis in patients with sickle cell disease *would*, if the production of  $\beta^s$ -globin decreased concomitantly, have a large “sparing” effect on the formation of intracellular hemoglobin S polymer [...].  
(MED1, J, 73 [Introduction])

On the basis of Coates’ analysis, this example involving an expressed condition could be seen to convey conditional predictability and in a sense involve epistemic meaning. However, it should be noted that the meaning expressed here does not really have to do with tentativeness in the same way as the hedging uses of the auxiliaries dealt with above, but we are instead faced with an unreal ‘if x, then y’ type of condition based on the authors’ or other researchers’ experience. Although cases such as (19) are classified as epistemic in work by Coates (1983) and others, they are not in my opinion epistemic in the sense of marking the information qualified by the auxiliary as uncertain. What is rather at stake here is tentativeness as to whether or not the condition expressed by the *if*-clause is realized. Thus, what example (19) might in fact be seen to mean is that, assuming that the process described in the subordinate clause takes place, stimulating fetal hemoglobin will *certainly* have the beneficial effect described. Thus, the information qualified by the auxiliary is actually not subject to doubt, but the process involved is solely dependent on the condition expressed in the *if*-clause, which is why the *auxiliary* cannot really be said to function as a hedge in such a context.<sup>20</sup>

However, as Coates points out (1983: 216-8), *would* may also be found in uses not genuinely pertaining to a condition, but in ones relating to politeness or tentativeness<sup>21</sup>, uses which to my mind can be more readily associated with hedging. Coates says that such instances are in fact typically used without an expressed condition, and even an implied condition is difficult to reconstruct from the surrounding text. Consequently, what one may at times be dealing with is not a conditional hypothetical use of *would*. Instead, Coates points out, the item may commonly occur as a hedge, “an unreal form used to avoid naked assertion” (op. cit.: 218). In

Coates' data, such cases were less common in writing than in speech. When it comes to scientifically oriented writing, the hedging use of *would* may be quite rare indeed, as evidenced by Butler's (1990: 159) study, where only two out of 21 occurrences of *would* were deemed as tentativeness markers. Thus, although *would* might be applied quite frequently in English, its hedging use may be relatively limited in writing, especially in academic discourse. As concerns RAs, Hyland (1998) also discusses the status of *would* to some degree, actually not making it altogether clear what kinds of uses of the auxiliary are interpreted as hedges in his study.

In my own data, occurrences of *would* deemed as hedges were rather rare, amounting to a total of 40 in the corpus. In economics, *would* occurred as a hedge 0.33 times per 1,000 words (n=21), the corresponding figures being 0.19 (n=9) in medicine and 0.16 (n=10) in technology. Most of the occurrences were found in contexts similar to those cited by Huddleston (1971: 307-9), that is, in connection with verbs like *seem*, *appear*, *expect*, and the like.<sup>22</sup>

- (20) Thus, one *would* expect aliasing errors to be less important for finite-difference simulations than for spectral calculations. (TEC1, D, 315 [Methods])
- (21) Some projects employed mechanisms that were either more hierarchical or more participative than the firm's level of experience with the concept being developed *would* seem to require. (ECO1, J, 57 [Results])
- (22) Such a reporting error *would* tend to result in an underestimation of the true effect of anger on the risk of M[yocardial]I[nfarction] onset. (MED1, G, "Education, Hostility, and Reactivity, paragraph 5 [Discussion])

Such uses of *would* are also in accordance with Coates' (1983: 218) analysis because they are dissimilar from genuine hypothetical examples insofar as they do not involve an explicit or even implicit condition. Hence, the use of the unreal auxiliary is apparently meant 'to avoid a naked assertion', in the cases above to increase the tentativeness of one's comments relating to various aspects of the research reported.

**Can.** The majority of studies into modality seem to agree that, apart from its uses in interrogative and negative constructions, *can* is not linked to epistemic modality (see e.g. Leech 1971: 76, Coates 1983: 103, Butler 1990: 154). While both *may* and *can* frequently occur as indications of possibility, they are seen as crucially different from each other in that, as for example Declerck explains (1991: 397), *may* is often employed to indicate factual, i.e. epistemic, possibility ('it is possible that'), whereas the kind of possibility indicated by *can* is of the theoretical (deontic/root)

sort ('it is possible for ... to'). This distinction between the auxiliaries has been prevalent in literature, and it has been emphasized that, except where it appears negatively to indicate the non-existence of epistemic possibility ('it is not possible that')<sup>23</sup> or to question epistemic possibility<sup>24</sup>, *can* simply cannot be used to express epistemic possibility, even though certain teaching materials have suggested otherwise (cf. Coates 1983: 107).

Granted the above, then, one might assume that *can* would have little to do with hedging. However, relatively recent work indicates that such categorical views regarding the meaning of *can* might not be altogether accurate, at least as far as academically oriented discourse is concerned. One source presenting views to this effect is (regardless of what was said in the previous paragraph) Declerck (1991: 398), who states that in cases of 'merger' when theoretical and factual possibility are indistinguishable on the basis of the context either *may* or *can* is possible.<sup>25</sup> This view suggests that in some cases it would be possible to perceive *can* epistemically. There are also clues about the possibility that *can* might be in the process of developing something of an epistemic meaning which can be found in non-negative, non-interrogative surroundings. This idea is presented by Coates in her later work (1995), where it is illustrated that especially in American English, *can* seems to acquire an epistemic meaning in certain contexts. Coates (op. cit.: 63-4) reports observing the following example in a conference presentation on mood and modality:

We hope this coding system can be useful [to other linguists in the field].

According to the comments of the person uttering the example, the auxiliary was intended as nothing other than "a sort of hedge." Such examples imply that *can* may, despite comments to the contrary in literature on modality, nevertheless occasionally be used in an epistemic meaning as a hedge in certain surroundings, such as academic spoken discourse. According to Coates, it is likely that this meaning generally co-occurs with "syntactic features such as inanimate subject and stative verb, and in contexts where accompanying words support an epistemic meaning." Yet another piece of evidence that supports the existence of epistemic *can* is presented by Quirk et al. (1985: 588), who state that, alongside *may*, *might*, and *could*, it is possible to link *can* with *well* in order to imply probability as in,

It *may/might/can/could* well be true that he beat her. (= It may indeed be true that')

the auxiliary alone, Quirk et al. say, connoting possibility, which in my opinion is clearly epistemic in the example cited.<sup>26</sup>

In my RA corpus, no less than 27 occurrences of *can* were found in uses where an epistemic interpretation was possible. In the economics RAs, *can* was identified as a hedge 0.27 times per 1,000 words (n=17), with shares of 0.08 (n=4) in medicine and 0.09 (n=6) in technology. Typically, *can* could be interpreted as marking the information presented as less than absolute in a way similar to *may*, as illustrated by the following examples:

- (23) It is well known that vibration suppression in slewing mechanical structures, whose parameters depend on the configuration (i.e., are time varying), *can* be extremely difficult to achieve. (TEC1, G, 392 [Introduction])
- (24) However, the effects of large sample size in conjunction with the implications from using two group models cast suspicion on the  $\chi^2$  statistic. The sample size of 324 respondents *can* limit the value of the  $\chi^2$  evaluation since trivial differences between the model and the data often lead to false rejection of the null hypothesis [...]. (ECO1, F, 232 [Results])

In comparison with Declerck's (1991: 398) example involving a 'merger' between deontic and epistemic meaning,

An accident of this kind can/may sometimes happen.

the cases in my corpus actually appear to be more on the epistemic side, the non-epistemic paraphrase 'it is possible for .... to' appearing somewhat unnatural in these contexts. Hence, in contrast with what is often stated in literature on modality, at least in my RA data non-negative, non-interrogative instances of epistemic *can* were to be found. This finding is indeed most interesting, and it might not even be altogether far-fetched to think that *can* may be in the process of developing an epistemic meaning even more generally than in just academic discourse, although Coates is probably right in saying that "it is difficult to imagine *can* becoming a serious contender in the expression of epistemic possibility" (1995: 64).

**Must.** The auxiliary *must* has two characteristic uses, one deontic (obligation) and the other epistemic, the latter being typically described by terms such as "logical necessity", "epistemic necessity" (see e.g. Quirk et al. 1985: 224) and "confident inference" (Coates 1983: 31). In view of these characterizations, *must* may be perceived as a hedge where it is used epistemically to



draw attention to the idea that in employing the auxiliary, speakers or writers are providing information that is *likely*—not absolutely—true in view of their knowledge and observations.

Instances of *must* in either deontic or epistemic use were infrequent in the RA corpus. The rarity of *must* in epistemic use in scientific discourse has also been observed by Butler (1990) and Hyland (1998). Butler (op. cit.: 163) points out that his data exhibited at least one ambiguous case between the deontic and epistemic meanings of *must*, but in the limited number of occurrences identified in my corpus, no evident ‘mergers’ were found. Altogether eight occurrences of the auxiliary were deemed as hedges in the RAs, six of them in the RAs on technology (0.09 occurrences per 1,000 words), two (0.04) in the medical RAs, but none in the economics RAs. Below are two examples from the data:

(25) Since we have already absorbed the mirror losses into our equivalent waveguide, a lasing mode *must* have  $\Re(\zeta)=0$ ; therefore  $\zeta$  is pure imaginary and we may write  $\zeta = i\zeta_i$ , where  $\zeta_i$  is purely real. (TEC1, E, 313 [Methods])

(26) While the difference in body composition between men and women is due in large part to genetic and hormonal differences between the sexes, the differences observed between sites among these genetically similar populations *must* be due primarily to environment. (MED1, F, 625 [Discussion])

As (25) and (26) indicate, the auxiliary is useful in marking the information presented as being based on inference, both examples not being as assertive as they would be without the auxiliary. Thus, although *must* does express quite a high degree of likelihood, it can be interpreted as a hedge in that it renders the information put forth less categorical.

**Will.** The auxiliary *will* may be used to realize a range of non-epistemic meanings, such as willingness, intention, and insistence (see e.g. Coates 1983: 196 ff., Quirk et al. 1985: 228-9), which are not relevant as regards hedging. As to the other uses of the auxiliary, they are often dealt with as cases of epistemic modality (see the discussion of *would* above). In Coates’ (1983: 177-181) work, the epistemic meanings are characterized as having to do with “predictability” about the present (“I [confidently] predict that it is the case that p”) or “prediction” about the future (“I predict that...”), the former use being based on the speaker’s or writer’s common sense or repeated experience whereas the latter has to do with future reference, often also including an inherent element of uncertainty.

However, cases seen as epistemic by some scholars have also been viewed in other terms. Palmer (1979), for example, distinguishes between *will* as an expression of futurity and an indication of epistemic modality. It seems true that there indeed are cases where *will* clearly has an epistemic ‘predictability’ meaning not to do with futurity:

The French will be on holiday today. (Palmer 1979: 47)

The example could be roughly paraphrased by ‘a reasonable inference is that...’, the inference not being based on logical necessity as would be the case with *must*, but being a case of predictability based on prior experience or common sense. Furthermore, it has also been stated that there may be relatively clear-cut cases of futurity,

It will be lovely to see you. (adapted from Coates 1983: 179)

with no evident element of tentativeness involved. However, as Coates (*ibid.*) states, occurrences of *will* with future reference commonly involve a component of uncertainty. A similar observation is made by Hyland (1998: 116), according to whom distinguishing between indications of futurity and epistemic meaning is very difficult. This is because referring to the future “inevitably involves some uncertainty or doubt”, although Hyland does point out that there are cases where *will* “is simply a marker of future tense” (*ibid.*).

In my RA data, *will* did not occur very often and. Despite the epistemic potential of the auxiliary, the majority of the cases could not be seen as markers of epistemic meaning, and there were only a few cases where an epistemic meaning was even theoretically possible, a finding not dissimilar from those of Butler (1990) and Hyland (1998). Even cases of *will* with future reference did not commonly involve epistemic meaning, instead for instance describing the intentions of the authors:

(27) We are considering only low-threshold devices [...], so we *will* use a linear gain-current relation. (TEC1, E, 314)

Within the entire corpus, only three occurrences of *will* with epistemic potential were identified, all of them occurring in the RAs on economics. Even there, the relative occurrence was as low as 0.05 per 1,000 words, and it was also quite difficult to say whether the epistemic meaning

conveyed truly derived from the auxiliary or from another (more evident) expression of tentativeness found nearby:

- (28) Certainly measurement standards should be agreed on early in a relationship and a “quid pro quo” mentality should be replaced by the ideal of doing what it takes to benefit others where necessary, understanding that this *will* probably allow suboptimization. (ECO1, F, 235 [Discussion])

Despite the difficulty of determining whether we are dealing with *will* as a marker of pure futurity or a combination of futurity and tentativeness, a hedging interpretation of the auxiliary in cases like (28) appears justified in that the intended meaning may at least in theory involve tentativeness. This is particularly so if we speculate along the same lines with Coates (1983: 184), who says that especially in scientific contexts the ‘prediction’ sense of *will* can be thought to reduce authorial commitment to the factuality of what is said. In science, she says, a prediction does “not have the same weight” as an utterance where results are deduced from clear evidence, the accompanying adverb in the present example also strengthening the indecisive nature of the prediction.

\* \* \*

To summarize the results so far, it can be said that noticeable disciplinary variation in the degree of hedging in the form of modal auxiliaries could be deciphered in my RA data. In the medical RAs, the results on modal auxiliaries (3.42 per 1,000 words) are more or less on a par with some earlier studies, the relative incidence being close to Hyland’s (1998: 107) account of Butler’s work dealing with physics, botany, and animal physiology (2.94 per 1,000 words) and to Hyland’s own results (3.44 per 1,000 words) based on a corpus of biology RAs. In the field of technology, modal auxiliaries used as hedges were less common (1.95 per 1,000 words), whereas in economics their incidence was noticeably higher (5.18 per 1,000 words) than in medicine. Interestingly enough, the incidence in economics happens to be at the same level as the results that Hyland (1998: 107) presents on the basis of information yielded by the JDEST corpus<sup>27</sup> (5.20 per 1,000 words), the results regarding economics also being relatively close to those emerging from Holmes’ (1988) investigation of the ‘learned’ sections of the Brown and LOB corpora.

As concerns the individual auxiliaries found as hedges, some disciplinary differences were detected in this respect as well. The relative shares of the auxiliaries are summarized in Table 3

below, the most noticeable difference between my results and those from previous studies (cf. Hyland 1998: 107) obviously concerning the use of *would*, which, contrary to some earlier studies, was not found to be a very common hedge in my data.

Table 3. The relative shares of the modal auxiliaries identified as hedges in the data. (The figures indicate frequency per 1,000 words and percentage out of all modal auxiliaries found as hedges in the discipline.)

	Economics	Medicine	Technology
<i>may</i>	2.97 (57.3%)	2.22 (64.8%)	1.04 (53.2%)
<i>might</i>	0.74 (14.3%)	0.35 (10.3%)	0.13 (6.5%)
<i>could</i>	0.43 (8.2%)	0.46 (13.3%)	0.24 (12.1%)
<i>should</i>	0.39 (7.6%)	0.08 (2.4%)	0.20 (10.5%)
<i>would</i>	0.33 (6.4%)	0.19 (5.5%)	0.16 (8.1%)
<i>can</i>	0.27 (5.2%)	0.08 (2.4%)	0.09 (4.8%)
<i>must</i>	none	0.04 (1.2%)	0.09 (4.8%)
<i>will</i>	0.05 (0.9%)	none	none
<b>Total</b>	<b>5.18 (100%)</b>	<b>3.42 (100%)</b>	<b>1.95 (100%)</b>

#### 4.2.2 Full Verbs

While auxiliaries are commonly viewed as a central way of producing modal meanings, they are by no means the only devices with such potential. As concerns epistemic modality, it in fact seems that particularly full verbs may often be an even more common exponent of modality than the modal auxiliaries. As seen above, hedging by means of epistemic full verbs was indeed more frequent than the use of the modal auxiliaries across the disciplines in the RAs investigated. The use of epistemic full verbs is also advocated in some of the literature intended for the guidance of those engaged in scientifically oriented writing tasks. Whereas some studies (e.g. Sager et al. 1980: 186) state that in scientific English sentences typically consist of a noun phrase, a neutral verb (e.g. *be*, *have*, *give*) and another noun phrase, certain manuals on scientific writing urge authors to use more tentative full verbs (see e.g. Arnaudet and Barrett 1984: 84, 153 ff.), the reason for such recommendations characteristically being the avoidance of excessive assertiveness where the information presented might not be altogether accurate.

There exist a number of full verbs that can be described as modal, as exemplified by for instance Perkins (1983: 94-5). Of greatest interest from the perspective of hedging are naturally verbs to do with epistemic modality. Items of this kind have been approached in various ways in literature on modality, and it has not always been made clear which specific categories of verbs are useful for hedging purposes. One of the earlier studies into full verbs used as hedges was carried out by Lysvåg (1975), where the main emphasis was on the grammatical characteristics of “hedgers” such as *believe*, *appear*, *assume*, and so on. In studies concentrating on the notion of hedging in more pragmatic terms, such devices have also been viewed somewhat differently. In Hübler’s (1983: 114 ff.) work, the emphasis is still much on the grammatical features of the kinds of verb treated by Lysvåg (1975), no clear delineations being presented as to what broad kinds of full verb are employed as hedges. Although Skelton (1988) also provides examples of full verbs as hedges and proposes sets of devices useful for hedging purposes, his discussion does not extend to more general suggestions as to the broader categories of full verbs with hedging potential. Furthermore, in her analysis of scientific hedging, Salager-Meyer (1994: 154) taxonomizes epistemic full verbs according to their presumed functions in her data, not providing any lengthier discussion of the characteristics of such verbs. A more in-depth discussion of categories of full verbs employed as hedging phenomena is presented by Hyland (1998: 119 ff.), whose framework of epistemic full verbs rests on Palmer’s (1986: 51) analysis of epistemic modality. Hyland distinguishes between what he calls “epistemic judgment verbs” and “epistemic evidential verbs”, the former category including epistemic full verbs used to express that what is being said is tentative in so far as the information involves “epistemic judgments by the writer” (op. cit.: 120).<sup>28</sup> The latter category, on the other hand, encompasses devices that illustrate that the information presented is not certifiable because it is derived from other sources, since it is dependent on the evidence yielded by the writers’ senses, or because the possibility of reaching the experimental objectives or of “acquiring appropriate evidence” is limited (op. cit.: 125).<sup>29</sup>

Even though such a division of epistemic full verbs may be feasible in the case of Hyland’s corpus, it seems that this approach is not altogether without problems when applied to other corpora. Let us consider the following example from my RA data on medicine:

- (29) One possible interpretation of the moderate affinity observed with Mab 4 is that its epitope is largely buried in the molecule. The resistance of the D,D(35)E region to digestion with either trypsin or V8 protease similarly *suggests* a highly compact or perhaps solvent-inaccessible domain. [note omitted] (MED1, B, 1113 [Discussion])

Such an occurrence of the verb *suggest*, the most typical epistemic full verb found in my data, exemplifies some of the problems inherent in Hyland's categorization. On the one hand, the verb might be taken as an epistemic judgment verb relating to authorial epistemic judgments, the interpretation being close to 'the resistance of ... leads us to conclude that the domain is...'. On the other hand, particularly because the example is accompanied by an endnote making reference to another study, the verb could also be employed to refer to evidentiary justification deriving from other work, the hedge toning down commitment to what is reported from another source. From this perspective, *suggest* might also be seen as an epistemic evidential verb. Similar problems are also readily observable with a number of other cases, the judgment-evidential distinction not being altogether sustainable as concerns my RA data.<sup>30</sup>

Granted that the model introduced by Hyland is not directly applicable to the present data, I have chosen to examine the incidence of epistemic full verbs by assigning them into distinct lexical sets established on grounds of the basic meanings shared by the different verbs, the main categories to be dealt with here being termed *nonfactive reporting verbs*<sup>31</sup> (e.g. *propose, imply*), *tentative cognition verbs* (e.g. *assume, speculate*), and *tentative linking verbs* (e.g. *appear, tend*). In authentic language use, the meaning distinctions between the different categories may naturally not always be as evident as in the abstract, but it is nevertheless reasonable to assume that by viewing groups of verbs differentiated with an eye on their basic meaning components, we may also distinguish some of the possible general differences in the incidence and functions of these groups in the disciplines examined. Some full verbs with epistemic potential (e.g. *trend, attempt*) which do not fall in with any of the three categories mentioned were also included in the category of 'Other'. Altogether, the three subcategories of full verbs include 54 different items with a total of 961 occurrences. As seen earlier in this chapter, noticeable disciplinary differences were detected in the overall incidence of full verbs as hedges in the RA corpus (7.46 per 1,000 words in economics, 4.99 in medicine, and 3.90 in technology). In order to seek out possible further differences, let us now take a look at each of the verb categories in more detail.

**a. Nonfactive reporting verbs.** The category of nonfactive reporting verbs includes many of the "performative verbs" mentioned by Fraser (1975)<sup>32</sup>, Perkins (1983: 94-5) and Hyland (1998: 120), so termed because they in fact "perform, rather than describe, the acts they label" (Hyland, *ibid.*). Although verbs such as the above may often be interpreted performatively, they can also be found in contexts (cf. 30, 31, and 32 below) other than those traditionally understood as allowing a performative interpretation (see Austin 1962), as Hyland also points out (1998: 122). However,

what such verbs have in common in my corpus is that they can all be seen as tentative devices useful in constructing reports of research by other scholars<sup>33</sup> (30) or in tentatively describing the authors' own work (31, 32, 33).<sup>34</sup> As the examples below show, although I have chosen to term these devices *reporting verbs* due to their shared meaning, they do in fact also commonly occur in constructions not typically understood as reporting structures, being frequently found in RAs with non-human subjects and the like:<sup>35</sup>

- (30) Konner (1982) *argues* that biological differences cause men to be more aggressive in nature, and that this aggression is further learned and reinforced socially; on the other hand, women tend to evolve behavior patterns that emphasize sensitivity, communication skills, community, inclusion, and relationships. (ECO1, A, 11 [Introduction])<sup>36</sup>
- (31) In contrast, the competitive theory *predicts* relatively elastic firm demand and higher cross-elasticities, *implying* less stable shares. (ECO1, E, 123 [Methods])
- (32) While this one data set does not prove that accelerating cracking rates will always occur in 7E nozzles, it does *suggest* that such crack behavior cannot be ruled out. (TEC1, A, 214 [Results])
- (33) Since chronic TNF effects do not appear to discriminate between Th1 and Th2 effector cells, we *propose* that repeated TNF injections suppress Th1 responses in adult NOD mice, and Th2 responses in adult NZB/W F1 mice to an extent sufficient to suppress disease activity. (MED1, C, 1582 [Discussion])

Altogether 16 different full verbs, with a total of 318 occurrences, belonging to this category<sup>37</sup> were identified as hedges in the RAs. *Suggest*, *imply*, and *predict* made up the top three in terms of frequency in all disciplines, *suggest* being by far the commonest in the data considered overall (n=148), followed by *imply* (n=45) and *predict* (n=44).<sup>38</sup> The relative incidence of hedges of this type was highest in the RAs on economics (2.89 per 1,000 words; n=183), whereas incidence was noticeably lower in the medical RAs (1.53 per 1,000 words; n=74) and in technology RAs (0.96 per 1,000 words; n=61). Further disciplinary differences were also detected in the *variety* of verbs employed. While 14 out of the 16 verbs were found as hedges in economics, only nine different items were present in medicine and seven in technology. Thus, disciplinary variation in hedging did not only involve the frequency of hedges but also extended to variety in the items employed. In what follows it is thus of interest to see whether similar tendencies also apply to hedges of other kinds.

**b. Tentative cognition verbs.** The second category of verbs, *tentative cognition verbs* (e.g. *assume, speculate*), is different from the category of nonfactive reporting verbs in that all members of this category refer to the mental status or mental processes of those whose views are reported rather than to linguistic activity. These verbs, like those included in the previous category, have been dealt with in various ways in literature. In Fraser's (1975) work on performatives, items of this kind are described as verbs performing acts of evaluating, expressing "the speaker's assessment of the truth of the proposition expressed, and the basis for this judgment" (p. 191), a description which illustrates the hedging potential of such verbs.<sup>39</sup> Items of this kind have also been included in categories such as verbs of thinking (Quirk et al. 1985: 1025) and 'private' factual verbs that express "intellectual states such as belief" (op. cit.: 1181), "cognition verbs" (Declerck 1991: 475) and "mental state predicates"<sup>40</sup> (Nuyts 1993: 272). What makes these verbs useful as hedges is the idea that the information they introduce is one way or another based on subjective cognitive activity rather than uncontroversial empirical evidence. In other words, the information introduced with the help of these verbs may for instance be supposedly (e.g. *assume, think*), but not categorically, correct, or the information may have been derived by estimates, often involving researchers' subjective cognitive efforts (e.g. *estimate, evaluate*), rather than by objectively verified measurements. What with the meaning component that the present category is based on, the most suitable term for this category in my opinion is *tentative cognition verbs*, which, apart from distinguishing the present items from non-tentative cognition verbs such as for instance *know*, extends to not only verbs indicating mental state but also those expressing mental activity.

Altogether 35 different<sup>41</sup> tentative cognition verbs were identified in the RA corpus,<sup>42</sup> amounting to a total of 489 instances of hedging. In each discipline, the verb *expect* (91 overall occurrences) was the most frequent of the verbs, being a useful way of marking the accompanying information as supposed rather than actually empirically observed. *Estimate* and *evaluate* also figured in the top five in all disciplines. The examples below illustrate some typical cases of this category of hedges:

- (34) I *assume* that it [the cigarette TV advertising ban] substantially reduced the efficacy of cigarette advertising, whatever its effects on competition, and test for these effects by comparing industry performance measures before and after the ban. (ECO1, E: 119 [Introduction])
- (35) The amount of person-time patients were exposed to episodes of anger was *estimated* by multiplying the reported usual annual frequency of exposure by the duration of its



*hypothesized* physiological effect (2 hours) (MED1, G, “Statistical Analysis”, paragraph 2 [Methods])

- (36) The *estimated* position of the silicon channel is between 100 and 200 nm below the GaAs surface. (TEC1, I, 816 [Results])
- (37) Murphy and Brown have *speculated* that the more superficial epicardial course of sympathetic postganglionic fibers, in contrast to the more subendocardial location of parasympathetic fibers, might increase the susceptibility of the sympathetic nerves to injury from topical cooling during cardiac surgery. [notes omitted] (MED1, D, 1362 [Discussion])

As might be expected on the basis of the findings presented earlier, economics was again the discipline with the highest relative number of hedges of this type, with 3.46 items per 1,000 words (n=219), as opposed to 2.63 in medicine (n=127) and 2.25 in technology (n=143). Furthermore, the variety of devices employed was also widest in the economics RAs, with 29 of the 35 items present, whereas both medicine and technology exhibited only 20 different devices each.

**c. Tentative linking verbs.** The third category of full verbs comprises items like *appear*, used in much the same way as the previous two verb types discussed insofar as they express tentativeness concerning either the ideas put forth by the author or those expressed in the sources referred to.<sup>43</sup> Such verbs have also been described as ‘copular verbs of seeming’ (cf. Quirk et al. 1985: 1174) and are equally referred to as “semi-auxiliaries” by Declerck (1991: 203). Nonetheless, to avoid to potential terminological confusion<sup>44</sup>, the term *tentative linking verb* will be employed here to cover full verbs like *appear* and other such items found in hedging use, as in the following examples from the RA corpus:

- (38) Furthermore, experimental studies have shown that compared with less hostile subjects, people with higher levels of hostility *tend* to exhibit greater hemodynamic reactivity in response to mental stress tasks [...]. (MED1, G, Introduction, paragraph 2 [Introduction])
- (39) It also *appears* that the truncation errors have an impact on the performance of the subgrid scale model. (TEC1, D, 318 [Methods])
- (40) With regard to the role employees are expected to play in quality management, reactors show the most empowerment of employees while defenders *seem* the least inclined to pass

the quality responsibility directly to the employees. (ECO1, I, “Results”, paragraph 10 [Results])

- (41) Older men who have poor cognitive function, especially those in their eighties, have a significantly greater mortality risk than cognitively intact men in the same age range. This differential mortality *appears* to be associated with the level of cognitive impairment [...]. (MED1, I, 1197 [Discussion])

In each of the examples, the tentative linking verbs are employed to reduce assertiveness, implying limits as to the accuracy and applicability of the information presented in much the same way as seen in connection with the other full verbs.

While there are certain other tentative linking verbs besides *appear*, *seem*, and *tend* (e.g. *look*) that one might use as hedges, these three verbs were the only ones found as hedges in the RA corpus, occurring altogether 154 times. Not surprisingly, such hedges were most commonly used in the economics RAs with a relative incidence of 1.11 per 1,000 words (n=70). In medicine, the incidence was 0.83 per 1,000 words (n=40), and the ratio for technology was 0.69 per 1,000 words (n=44). Although all three verbs were present in each discipline, an interesting difference in the frequencies of the verbs *appear* and *seem* was detected in the data. While it is in principle possible to use the two verbs more or less interchangeably, they are not absolutely similar in stylistic terms. As pointed out in some dictionaries and style guides<sup>45</sup>, *appear* is more often used in formal contexts than *seem*. Granted that RAs apparently represent a relatively formal kind of discourse, one would expect *appear* to be the more frequent of the two verbs in the RA corpus, which indeed was the case in medicine and technology, *appear* outnumbering *seem* by 24 occurrences against 6 in the former discipline and by 29 against 7 in the latter. In economics, on the other hand, the situation was reversed, *seem* being more common (n=25) than *appear* (n=17). If we combine this with the result that the economics RAs also exhibited a wider array of full verbs as hedges (see previous sections) than the other two disciplines, one might speculate that, in comparison with RAs on medicine and technology, economics RAs may be somewhat more flexible and less formal in their mode of expression, at least as far as hedging is concerned. Such a possibility of stylistic variation between disciplines carries noteworthy implications from the perspectives of both research and teaching, issues which will be addressed further in Chapter 7.

Having presented the results concerning full verbs in hedging use, let us conclude this section by considering certain potential problems involved in the analysis of the above categories and by comparing the results with those from previous work. In the analysis of the modal auxiliaries, certain difficulties of interpretation were encountered due to the indeterminacy of the category, but with the full verbs, the difficulties were few. It is true that certain of the full verbs treated (e.g. *believe, consider, appear*) may have both modal and non-modal meanings, but the epistemic uses can be distinguished from the other meanings without difficulty. Nevertheless, it must be pointed out that there may be contexts in which the hedging interpretation of the verbs is perhaps not evident. One such case is negation, it being obvious that in examples such as

I didn't assume that he knew me. (Quirk et al. 1985: 1034)

the verb *assume* cannot be seen as a hedge, because the tentativeness involved is specifically denied by negation.

However, negation does not automatically rule out the hedging use of all full verbs dealt with here. As pointed out in various sources, including Perkins (1983) and Quirk et al. (1985), the phenomenon of *transferred negation*<sup>46</sup> applies to many of the verbs dealt with here, specifically to certain tentative cognition verbs and tentative linking verbs (e.g. *believe, imagine, reckon, appear, seem*).<sup>47</sup> If we consider a sentence such as

I don't think you're up to it. (Perkins 1983: 98)

we can readily see that negation may at times be linked to a verb involving epistemic meaning although it is in fact the complement clause that is negated. Despite the negation, the verb *think* in the example can be interpreted epistemically and, in view of the tentativeness involved, as a hedge, the approximate meaning of the utterance being 'it is probable (but not absolutely certain) that you are not up to it'. Even though Quirk & al. (1985: 1033-1035) are of the opinion that transferred negation is especially characteristic of informal style, it also appeared occasionally in the RAs included in the present corpus. Naturally, in the case of those verbs not allowing transferred negation, the negated occurrences of epistemic full verbs were discounted from the present analysis because of the loss of epistemic potential brought on by negation.

There have been few investigations providing numerical results concerning hedging by means of full verbs, Hyland being to my knowledge the only scholar providing more thorough

information about the number of such hedges in RAs. In Hyland's (1998) corpus of biology articles, the incidence of hedges in the form of full verbs was 3.99 per 1,000 words (p. 126). This is very close to the incidence of such hedges in the technology RAs included in my corpus (3.90 per 1,000 words). My results concerning medicine were quite close to Hyland's in the use of the modal auxiliaries as hedges, but the category of full verbs figured somewhat more commonly in my medical RA data than in Hyland's RA data on biology, the relative incidence in the medical RAs being 4.99 per 1,000 words. Turning to the field of economics, the incidence of this hedging category was almost doubled in my RA data (7.46 per 1,000 words) in comparison with Hyland's corpus. To conclude, then, the present results also provide evidence as to differences in the incidence of hedges between the disciplines examined. Apart from the higher number of hedges in economics as opposed to medicine and technology (as well as biology, cf. Hyland 1998), the number of different devices was also widest in the economics RAs, with 46 of the 54 different full verbs treated present. In the other two disciplines, variety was noticeably narrower, with 32 of the devices found in medicine and 30 in technology.

#### 4.2.3 Adverbs

In addition to modal auxiliaries and full verbs, there are various other ways of expressing modality in English, the kind of epistemic meaning associated with hedging also frequently being expressed by adverbs. As seen at the beginning of this chapter, the general category of adverbs<sup>48</sup> was one of the more frequently identified types of hedging in my RA corpus, being in fact the most common category of hedges in technology, the third most common in medicine, and the fourth most common in economics. In Hyland's (1998) RA data on biology, too, adverbs were found to be a common means of hedging.<sup>49</sup> In my own RA corpus, 61 different adverbs—the nature of which will be discussed below—were identified as hedges, with a total of 779 occurrences, the RAs on technology containing the highest relative number of adverbs as hedges, followed by economics and medicine (see section 4.1).

There are a number of adverbs that may be employed to produce the kinds of meaning linked to hedging, such devices having been discussed in various ways in literature.<sup>50</sup> Perkins (1983: 89 ff.), for example, lists several modal adverbs—characterized in terms of their syntactic properties and their meaning as “attitudinal disjuncts” by Greenbaum (1969: 94 ff.)—that can be used to express epistemic modality (e.g. *likely*<sup>51</sup>, *maybe*, *possibly*).<sup>52</sup> Apart from the adverbs that have traditionally been treated as *modal*, however, hedging has also been assumed to be realized

by other kinds of adverbs indicating restricted truthfulness or limited exactitude. For example, Hyland (1998: 134 ff.) deals with a variety of adverbs used as hedges in RAs, basing his discussion on the type of division of adverbs exemplified by Greenbaum (1969) as well as for instance by Quirk et al. (1985) and Declerck (1991). In his analysis, Hyland on the one hand deals with adjuncts functioning as *downtoners* (e.g. *usually, slightly, occasionally, almost*), that is, adverbs lowering the force of the verb they modify. On the other hand, he distinguishes between *style* and *content disjuncts*, the former (e.g. *generally*)<sup>53</sup> conveying that “a generalisation is being made” (op. cit.: 136) and the latter (e.g. *likely, apparently, potentially*) conveying “comment on the truth-value of what is said” (ibid.). However, it again seems that in the practical analysis of my own data, attempts to establish such categories might be difficult due to the multifunctional nature of even one specific hedge, because it often appears problematic to determine whether a given adverb actually can be taken as an adjunct functioning as a downtoner or a style or content disjunct. As a matter of fact, it seems that divisions into categories originally established with an eye on the syntactic properties of adverbs (cf. Greenbaum 1969, Quirk et al. 1985) are not free of problems as concerns hedging. As established above, hedges have been perceived as a multifunctional phenomenon. If we subject hedging to categorizations originally established on the basis of syntactic features and assumed to fulfill certain predetermined functions, the picture of hedging that emerges might not be as varied as the phenomenon has been presumed to be. To my mind, although a consideration of the syntactic properties of a given adverb may be useful in determining how a given hedge affects the information it accompanies and in distinguishing the intended meaning of specific adverbs with both epistemic and non-epistemic uses<sup>54</sup>, it appears that the hedging potential of adverbs is primarily a question of their basic meaning components rather than of whether they function syntactically as for instance adjuncts or disjuncts. In brief, it seems that a thorough analysis of the syntactic properties of adverbs with hedging potential and a respective classification is not essential, such taxonomies in fact possibly also giving rise to unnecessary divisions between elements whose basic features—in terms of hedging—are similar.<sup>55</sup>

In consequence, adverbs found in hedging use in the corpus are here categorized according to their basic meaning potential instead of their syntactic aspects. The kinds of modal adverb cited from Perkins' (1983) work above form the first subcategory of adverbs to be dealt with here, the term *probability adverbs* being adopted to refer to this group (the term originates from Declerck 1991: 233). In addition to such obviously modal items, there are also certain other kinds of adverb that may be seen to express tentativeness regarding what is being said by virtue of indicating that

there may be a certain degree of indefiniteness as to the precision or applicability of the information discussed. Three further categories of adverbs were therefore included in the present analysis. The second subcategory of adverbs distinguished includes *adverbs of indefinite frequency* (e.g. *usually, often, seldom*), devices that may be employed for example when the language user—for one reason or another—does not wish to indicate the precise extent to which the information presented applies. The third subcategory, *adverbs of indefinite degree*, contains items that can also be used to introduce a certain degree of indefiniteness to the views offered, *quite, relatively, and slightly* being typical examples of such adverbs. The fourth subcategory, *approximative adverbs*, is made up of devices indicating the approximative nature of the information presented (e.g. *about, nearly, roughly*).<sup>56</sup>

**a. Probability adverbs.** While a variety of adverbs has been linked to modality (see Perkins 1983), the emphasis in this section is on those items that indicate tentative epistemic modality. Of interest as regards hedging are evidently those adverbs that “express some degree of doubt” or “state the sense in which the speaker judges what he says to be true or false” (Quirk et al. 1985: 620-621), their typical syntactic status being that of a disjunct.<sup>57</sup> What these adverbs have in common in terms of hedging is that they can all be used to express degrees of probability between the absolutes of ‘true’ and ‘false’, the items being useful in drawing attention to the idea that what is stated is *apparently*, not decisively, the case (see 42 below), or that the information presented *potentially* (43), *probably* (44), *likely* (44), or *possibly* (45) applies, but conclusive statements cannot be made.

Altogether 13 probability adverbs with a total of 100 occurrences in hedging use were identified in the RA corpus<sup>58</sup>, *probably* (n=23), *perhaps* (n=21), and *likely* (n=17) being the most common ones overall. The contexts of use were not always altogether dissimilar from those of the modal auxiliaries and full verbs:

- (42) There is no theoretical analysis available to explain why aliasing errors are destructive for some forms of nonlinear terms but are *apparently* harmless for others. (TEC1, D, 311 [Introduction])
- (43) The HMDA and the census provide data on a large number of variables that are *potentially* important to the mortgage-lending process. (ECO1, G, 85 [Methods])
- (44) Note that the highest second critical speed found from those tested cases is about 5.0 m/s (No. 6 at a low pH value, 4.62). This means, for those major industrial applications

such as metal rolling, in reality [*sic*] most O/W emulsions are *probably* working in their high speed regions where the two-phase entraining effect appears to be the dominant factor to the lubricant film formation, and most *likely* the phase inversion oil pool formation is not a real lubrication mechanism. (TEC1, J, 318 [Results])

- (45) Because patients with lower educational attainment tend to be more hostile than patients with higher levels of educational attainment, they may also exhibit greater hemodynamic and *possibly* hemostatic reactivity in response to an episode of anger compared with more educated patients. (MED1, G, “Education, Hostility, and Reactivity”, paragraph 3 [Discussion])

Only minor disciplinary differences were detected in the frequency of hedging with the help of probability adverbs, the relative incidence per 1,000 words amounting to 0.68 in economics (n=43), 0.46 in medicine (n=22) and to 0.55 in technology (n=35). Apart from these narrow differences in incidence, some hints of disciplinary variation were found in the variety of devices used. The widest choice of adverbs was again seen in economics (12 out of 13 present), while in medicine and technology, a narrower selection was employed (6 and 8, respectively).

**b. Adverbs of indefinite frequency.** The second subcategory treated, adverbs of indefinite frequency, includes items that grammarians typically describe as indefinite (time-)frequency adjuncts (see e.g. Greenbaum 1969, Quirk et al. 1985, Declerck 1991). Due to their inherent indefiniteness, they may also be seen as useful for hedging purposes, allowing language users for example to point out that what is stated *usually* applies, is *occasionally* the case, or occurs *rarely*—the choice of an indefinite adverb allowing the language user not to commit him- or herself to categorical assertions or to exact figures<sup>59</sup> for instance when they cannot be obtained, if they are not categorically correct, or when numerical precision is not deemed necessary.<sup>60</sup>

The hedging use of items like adverbs of indefinite frequency has been seen as typical particularly in the language of science. Salager-Meyer (1994: 154) is in fact of the opinion that such devices—which she includes in her category of “approximators”—belong to “the hedging category which most closely reflect [*sic*] what we could call the ‘institutionalized’ language of science.” This, then, suggests that hedges of the present kind may be particularly frequent in RAs, obviously one of the “institutionalized” genres of scientific discourse. My RA corpus does indeed include various adverbs of indefinite frequency that can be seen as hedges, with altogether 11 different adverbs<sup>61</sup> and 205 occurrences found in the RA data. The most commonly employed devices in the RAs were *often* (n=46), *typically* (n=44), and *generally* (n=39). The items were quite commonly used where reference was made to numerical data not explicitly cited, or to

indicate that what is said is *frequently* or *often* so, but not invariably, it being thus suggested that the ideas reported might not be shared by everyone:

- (46) Several studies (Hisrich and Brush 1983, Neider 1987, Scott 1986, Watkins and Watkins 1983) found that women entrepreneurs were *generally* married and between the ages of 30 and 45, *typically* had backgrounds in the liberal arts, and had previous work experience in a variety of areas, such as teaching, retail sales, and office administration. (ECO1, A, 10 [Introduction])
- (47) The turbulence in a firm's environment is *frequently* conceived in terms of three dimensions: (1) dynamism, the degree of unpredictable change in the environment; (2) hostility, the degree to which the environment is threatening to firm survival; and (3) heterogeneity, the degree of diversity in the firm's operating or task environment. (ECO1, H, 50 [Methods])
- (48) The 6-10 in. (150-250 mm) of total cracking reported on worst-case vanes for both nozzle designs *typically* comprised one or two long cracks, perhaps 3-5 in. (75-125 mm) each, and *sometimes* one or two shorter cracks of 1-2 in. (25-50 mm) each. (TEC1, A, 212 [Results])
- (49) Some support was found for the notion that new onset of sleep problems, a symptom *often* associated with PTSD and intrusive thoughts, could act in this manner. (MED1, E, 138 [Discussion])

Some disciplinary variation could be detected in the hedging use of this subcategory as well, the relative incidence per 1,000 words being 1.58 in economics (n=100), slightly lower, 1.32, in technology (n=84), but noticeably so in medicine, 0.43 (n=21). As to variety in the use of devices, all but one of the eleven items were present in economics and eight in both medicine and technology. Accordingly, then, the most important finding emerging from this category is the relatively low incidence of this hedge type in medicine in comparison with economics and technology—a finding slightly at odds with Salager-Meyer's (1994) comments in her work on hedging in medical RAs.

**c. Adverbs of indefinite degree.** The third subcategory of adverbs, adverbs of indefinite degree (e.g. *quite*, *somewhat*, *greatly*, *significantly*), includes items syntactically described as subjuncts by Quirk et al. (1985: 567). In Quirk et al.'s subcategorization, some adverbs of indefinite degree are treated as a subtype of *downtoners*, that is *expression diminishers* (e.g. *somewhat*), which “seek to express only part of the potential force of the item concerned” (op. cit.: 598).<sup>62</sup> Some adverbs expressing indefinite degree (e.g. *greatly*) are described as subjuncts functioning as



“amplifiers” by Quirk et al. (op. cit.: 590-591), the specific subtype being that of “boosters.” Such items “denote a high degree”, but are in my view nonetheless indefinite in meaning in much the same way as expression diminishers, because they leave open the *exact* degree to which the information presented applies. In Salager-Meyer’s (1994: 154) work, on the other hand, hedges subcategorized as adverbs of indefinite degree here are treated as “approximators”,<sup>63</sup> such hedging phenomena in Salager-Meyer’s opinion also reflecting the “‘institutionalized’ language of science.”

It is evident that adverbs of indefinite degree are a useful means of indicating epistemic qualifications, and they thus make it possible to render one’s statements less than absolute. Accordingly, for instance, instead of categorically claiming that a given procedure provides good results, one may employ a hedge to tone down the force of the evaluative term and describe the results as *relatively* good, *quite* good, *fairly* good, and so on. Similarly, adverbs of this kind may for example be used in connection with adverbs and adjectives of indefinite frequency so that a given phenomenon may be said to occur *quite often* or its incidence may be described as *relatively common*, the addition of an adverb of indefinite degree enhancing the tentativeness involved. Furthermore, when exact figures are unobtainable or unnecessary, one may resort to adverbs of indefinite degree and for instance say that the incidence of a given phenomenon increased *somewhat*, *substantially*, *markedly*, or *significantly*.<sup>64</sup> Such hedging results in rather indefinite quantifications by which authors may give roundabout indications of the degree to which the information applies, providing the possibility not to commit themselves to precise figures.

Altogether 26 different adverbs of indefinite degree with a total of 282 occurrences were found in the RA data<sup>65</sup>, *relatively* (n=73), *slightly* (n=36), and *significantly* (n=33) being the commonest cases. As the following indicate, the items were found in a variety of surroundings in the RA data:

- (50) Several previous studies reported that the skew-symmetric form gives *fairly* good results even in the presence of aliasing errors. [endnotes omitted] (TEC1, D, 310 [Introduction])
- (51) When the true mode of transmission is unknown, as is the case for BP illness, misspecification of the analytic model as dominant (when the true mode of transmission is recessive) *markedly* reduces power to detect linkage. (MED1, A, 29 [Methods])
- (52) The Mab 4 binds to all other fragments that contain aa 141-172 with equal, *relatively* high affinity. (MED1, B, 1109 [Results])

- (53) Three aspects of this study that may *somewhat* limit its contributions, also suggest opportunities for future channels research. (ECO1, F, 327 [Discussion])<sup>66</sup>

It is of interest to see that the highest degree of hedging of this kind was this time found in the RAs on technology, with 2.22 occurrences per 1,000 words (n=141). In economics, the incidence was somewhat lower (1.50 per 1,000 words, n=95), and noticeably lower in medicine (0.93 per 1,000 words, n=45). Furthermore, it is also interesting to see that although variety in the use of hedges was widest in economics as concerns all of the categories studied above, this time the widest array of hedges (20 out of 26) was found in the medical RAs despite the low relative incidence of this hedge type in the discipline. The technology RAs also exhibited quite a wide selection of hedges of this kind (18), but only 13 of the 26 adverbs of indefinite degree were found as hedges in economics.

**d. Approximative adverbs.** The last category of adverbs distinguished consists of approximative items such as *almost*, *approximately*, *nearly*, and *virtually*, the kinds of expression also included in the items that Salager-Meyer (1994: 154) considers typical of the institutionalized language of science. Two main uses for such items are typically cited in literature. On the one hand, as Hyland (1998: 135) points out, such adverbs may be used to hedge the effect of the predicate insofar as they reduce the force of verbs. When combined with verbs, such devices function grammatically as subjuncts, more specifically as approximators, a subtype of downtoners, to “express an approximation to the force of the verb, while indicating that the verb concerned expresses more than is relevant” (Quirk et al. 1985: 597), as in

I *almost* resigned. (ibid.)

On the other hand, approximative adverbs are often found as modifiers of numerical expressions (Quirk et al. 1985: 449), such hedging having been associated with “the manipulation of precision in quantification” (Hyland 1998: 139) or with vagueness (Channell 1994, 1999) and imprecision (Dubois 1987). Hence, instead of providing exact numerical data, hedges in the form of approximative adverbs may be used to give tentative approximations, as in *about 50 percent* or *nearly 500 patients*. Apart from these uses, there are also some other ways in which approximative adverbs can be employed, for instance to premodify pronouns (e.g. *almost everyone*) and predeterminers (e.g. *virtually all informants*), cases equally to do with quantification.

Altogether 11 different approximative adverbs were found in the RA data, amounting to 192 occurrences as hedges.<sup>67</sup> The most commonly used devices were *about* (n=73), *approximately* (n=35), and *nearly* (n=22). Although it has been suggested that adverbs of this kind may often be used to hedge the strength of the predicate, in the RA data this use was relatively rare. Instead, the adverbs more characteristically occurred in connection with quantifications, predeterminers equally to do with amount, and the like:

- (54) Metal semiconductor FET gates begin to show leakage under a forward bias of 0.7 V while JFETs do not show leakage until *approximately* 1 V. (TEC1, I, 809 [Introduction])
- (55) *Almost* all family members had a modified Schedule for Affective Disorders and Schizophrenia—Lifetime Version semistructured interview. (MED1, A, 28 [Methods])
- (56) During treatment with hydroxyurea and erythropoietin, as compared with hydroxyurea, at 40 percent oxygen saturation there was a further decrease in the polymerization tendency in the F cells of *about* 16 percent (for patients 1, 2, and 3). (MED1, J, 78 [Results])
- (57) Finally, new brand entry *virtually* ceased during the first four years after the ban [...]. (ECO1, E, 132 [Discussion])

In examples (54), (55), and (56), the adverbs may be viewed as hedges by which writers “use an acceptable degree of imprecision to specify the accuracy with which information is presented” (Hyland 1998: 140), the hedges indicating the approximate nature of the quantifications made. Such hedging appeared especially commonly in Results sections, but was not uncommon in other parts of the RAs either. In the last example, an approximative adverb is found as a hedge affecting the predicate of a statement summarizing some of the findings, the hedge implying that the conclusion offered is approximate and is thus not to be taken as an absolute, the statement not being in total correspondence with the precise state of affairs observed.

In the case of approximative adverbs, too, the results were different from those involving certain other hedge categories. The RAs on technology were again the most heavily hedged ones with an incidence of 1.48 per 1,000 words (n=94), as opposed to 0.96 (n=61) in economics and 0.79 (n=38) in medicine. As to variety in the use of such hedges, technology was also the discipline with the widest selection of approximative adverbs in hedging use, with ten out of the eleven adverbs present. Variety was also quite wide in economics, with nine different devices identified, but considerably narrower in medicine, where only five of the adverbs were found.

To sum up, some noticeable disciplinary differences were detected in the use of the four groups of adverbs as hedges in RAs, as regards either relative incidence or variety in the choice of devices employed, or both. In the case of the verbal categories examined above, hedging was quite common in the RAs on economics, whereas especially the RAs on technology contained noticeably fewer hedges. As concerns the use of hedges in the form of adverbs, however, my results indicate that this general hedge type was most commonly found in the RAs on technology (5.57 per 1,000 words), followed by economics (4.72), whereas in my data medicine was the discipline with the lowest number of such hedges (2.61), less than half the number seen in technology. This result is particularly due to the incidence of the kinds of device (ones expressing frequency, degree, approximation) typically linked to quantifications in technology. As concerns variety in the types of adverb used as hedges, the differences were less pronounced. The RAs on technology included 44 out of the 61 devices identified, as opposed to 43 items in medicine and 40 in economics. Granted these findings, it is of interest to next turn to a consideration of different groups of adjectives,<sup>68</sup> whose meaning potential is in many cases quite similar to that of the adverbs dealt with.

#### 4.2.4 Adjectives

As seen at the outset of this chapter, hedges in the form of modal auxiliaries, full verbs, and adverbs covered quite a large share of all hedges identified in the RA corpus, whereas hedging in the form of adjectives was not always quite as common in the RAs, especially in the field of economics and technology. Nevertheless, the data contained a number of adjectives that involve the kind of meaning that may be taken to constitute hedging, many adjectives for instance marking the information presented as uncertain, tentative, or not quite precise, in much the same way as the items—especially adverbs—discussed above.

Adjectives found in hedging use were grouped according to principles identical to those applied in examining adverbs, that is, adjectives involving epistemic potential were not limited to the kinds of modal adjective cited by for instance Perkins (1983: 66 ff.), but various other items were also considered. The first subtype, *probability adjectives*, includes the kinds of device most typically mentioned in connection with epistemic modality (e.g. *possible*, *probable*, *likely*). As in the case of adverbs, the second subtype includes items to do with indefinite frequency (e.g. *usual*,

*common*), the devices in the third subgroup express indefinite degree (e.g. *slight, fair, considerable*), and those in the fourth subcategory have to do with approximation (e.g. *approximate, virtual*). Altogether 57 different adjectives (422 occurrences) were included in the four subcategories. In addition to these subtypes, certain other adjectives (e.g. *initial, preliminary*), found in what may be deemed as hedging uses but not similar to the items included in any of the four other subgroups, were included in the category of ‘Other’ hedges.

**a. Probability adjectives.** This subcategory includes adjectives that are most typically seen to involve epistemic modality, such items being closely related to many of the probability adverbs treated above. For instance, some of the probability adverbs dealt with can be paraphrased with impersonal constructions including corresponding adjectives (e.g. *it be [adj.] that*, as in *it is possible that* and *it is likely that*), but such adjectives are naturally also used in other surroundings. Further examples of adjectives with adverb counterparts expressing epistemic possibility are *tentative* and *theoretical*, the RA corpus also containing some equally tentative adjectives without any obvious adverb equivalent (e.g. *predictive*). Items of these kinds can be used to express different degrees of probability concerning the certainty or accuracy of what is being said,<sup>69</sup> and they thus constitute another typical group of hedging devices.<sup>70</sup> This view is also supported by both Holmes (1988: 38-39) and Hyland (1994: 249), who suggest that adjectives with hedging potential occur rather frequently in academic and scientific writing, even though, as Hyland points out, many style guides meant for writers often present quite limited accounts of adjectives as expressions of tentativeness and hedging.

Altogether 19 probability adjectives, with a total of 231 occurrences, were identified as hedges in the RA corpus.<sup>71</sup> The most common items were *likely* (n=67), *possible* (n=51), and *potential* (n=39). The contexts in which probability adjectives were found as hedges were quite similar to those of adverbs,

- (58) One of our goals is exploratory; we seek to investigate *possible* relationships that can be built upon in future research. (ECO1, D “Introduction”, paragraph 9 [Introduction])
- (59) Because of the *potential* effects of myocardial ischemia on HRV, hourly HRV measurements in which a myocardial ischemic episode occurred, as detected by shifts of the ST segment, were omitted from analysis. (MED1, D, 1358 [Methods])

- (60) This might be true if mailings have not been effectively targeted, which may be *likely* among small businesses that may not have the resources for efficient mailing list management. (ECO1, A, 17 [Results])
- (61) These associations among education, hostility, and cardiovascular reactivity present a *possible* explanation for our finding of an increased risk of triggering of MI onset by episodes of anger among patients with lower educational attainment. (MED1, G, “Education, Hostility, and Reactivity”, paragraph 3 [Discussion])

the devices implying that the issues dealt with may not exist in the first place (58, 59) or what is said may not be categorically correct (60, 61).

Relatively clear disciplinary differences could be detected in the use of this type of hedging in the RA corpus, the highest relative incidence being found in economics, where 2.05 such hedges occurred per 1,000 words (n=130). In medicine, the number was somewhat lower, 1.35 per 1,000 words (n=65), and markedly so in technology, with only 0.57 hedges of this kind per 1,000 words (n=36). Interestingly, the differences were more radical in the case of adjectives than with the corresponding adverbs dealt with previously. Despite the variation in incidence, however, the number of different devices found was almost the same across the disciplines, with 13 of the 19 items present in economics as well as medicine and 12 in technology.

**b. Adjectives of indefinite frequency.** The second subtype of adjectives (e.g. *common*, *normal*, *usual*) includes items used in ways similar to the adverbs of indefinite frequency considered above. Hence, such adjectives were often found as tentative quantifications where numerical exactitude is not necessary or possible or as indications that what is said is based on the most characteristic features of a given phenomenon, thus simultaneously suggesting that what is said may not capture the full picture of the phenomenon insofar as it may not necessarily apply to each and every case. The RA data included 12 such devices<sup>72</sup> with 67 occurrences, *typical* (n=28), *common* (n=15), and *usual* (n=11) being the most commonly employed items. The following are typical uses found in the RA data, where the adjectives may be taken as hedges marking the information they accompany as not invariably applicable:

- (62) It is well known that posterior subcapsular cataracts are *common* in patients with uveitis and are secondary not only to long-standing inflammation, but also to long-term corticosteroid therapy. (MED1, H, 197 [Introduction])

- (63) We used the *usual* frequency of exposure to episodes of anger during the year prior to the MI to estimate its expected frequency in an average 2-hour period in this patient population. (MED1, G, “Study Design”, paragraph 2 [Methods])
- (64) *Typical* cracking data for a 7B nozzle are shown in Fig. 13(b), which is similar to that of the 7E plot except that there are 48 vanes. (TEC1, A, 212 [Results])
- (65) As an example, Fig. 13(a) and (b) show system diagrams for a *typical* 16 subarray transmit mode phased array antenna requiring 16 independent 4-bit time delay wideband channels to drive the subarrays, and 4-bit narrowbanded  $0 - 2\pi$  control phase shifters provided by electronic devices at the antenna element level. (TEC1, H, 1447 [Discussion])

It is interesting to see that while adverbs of indefinite frequency (see previous section) were most commonly employed as hedges in the economics RAs, adjectives of indefinite frequency were most commonly identified as hedges in the RA data on technology, with a relative incidence of 0.60 per 1,000 words (n=38). In the other two disciplines, the number of such hedges was about half of that seen in technology, with 0.27 per 1,000 words in medicine (n=13) and 0.25 in economics (n=16). In the field of medicine, the result is quite similar to that concerning the hedging use of the corresponding adverbs, whereas in the other disciplines the number of these adjectival hedges is noticeably lower. As to variety in the devices used, eight different items were found in economics and technology, but only four in medicine.

**c. Adjectives of indefinite degree.** 22 different adjectives of indefinite degree were identified as hedges in the RA data<sup>73</sup>, amounting to 104 occurrences. *Significant*<sup>74</sup> (n=26), *slight* (n=11), and *substantial* (n=10) were the most commonly employed devices in the RAs. This subtype of adjectives, too, occurred in the data in much the same way as the corresponding category of adverbs, being commonly used to reduce the definiteness of what is said or to avoid commitment to precise figures. For instance, then, instead of saying that a given procedure invariably has a good effect or in the place of citing exact figures, one may choose to hedge by means of adjectives of indefinite degree and describe the effect as *modest*, *noticeable*, *considerable*, and so on, the hedges allowing authors to invest the information presented with the degree of certainty or exactitude deemed justified:

- (66) *Significant* amounts of cracking occur parallel to, but not in, the fillet near the leading edge of the pressure side. (TEC1, A, 208 [Introduction])

- (67) However, mortgage lending exhibits *substantial* year-to-year variation. This suggests using several years of data to average out these differences. (ECO1, G, 84 [Methods])
- (68) When comparing the strain response of these sensors to an accepted micromechanical prediction for an upper bound on composite stiffness (i.e., concentric cylinders model), *reasonable* agreement is observed. (TEC1, F, 19 [Results])
- (69) In patients treated with hydroxyurea alone, there is a *marked* increase in filterability accompanying both the immediate phase of decreased numbers of dense cells and the more gradual phase of increase in fetal-hemoglobin levels. (MED1, J, 79 [Discussion])

As with the previous subcategory of adjectives, adjectives of indefinite degree were most commonly found as hedges in the RAs on technology, where their relative incidence was 1.09 per 1,000 words (n=69). In medicine, 0.54 such hedges occurred per 1,000 words (n=26), whereas in economics, the incidence of this hedge type was very low indeed, only 0.14 per 1,000 words (n=9). Furthermore, the technology articles exhibited a considerably wider range of such items (18 out of 22) than medicine and economics (9 and 4, respectively).

**d. Approximative adjectives.** The number of approximative adjectives was low in the RA data, with only four different items (*approximate*, *close*, *gross*, and *virtual*) and 20 occurrences identified as hedges. As in the case of adverbs, the adjectives were commonly used to manipulate precision in quantification (cf. Hyland 1998: 139),

- (70) In this low speed region, the oil pool is formed in the inlet zone, so that the film thickness is primarily dominated by the oil phase and the film thickness curve is usually quite *close to* that of the neat oil. (TEC1, J, 315 [Results])
- (71) Patient 4, who had sickle  $\beta^0$ -thalassemia and required periodic blood transfusions because of symptomatic bone pain when his hemoglobin level dropped below 7.0 g per deciliter (4.3 mmol per liter), had an *approximate* doubling of his fetal-hemoglobin levels during the four months of initial therapy with hydroxyurea (Fig. 3A). (MED1, J, 76 [Results])

such hedging allowing the RA authors to draw attention to the approximate nature of the information presented.

The relative incidence of approximative adjectives was highest in technology (0.22 per 1,000 words; n=14), followed by medicine (0.06; 3), and economics (0.05; 3). Out of the four items identified, two were present in economics and technology each and only one in medicine. However, granted the low overall incidence of such hedges, there is little that one can say about



disciplinary variation, although it is of interest to note that the results are relatively speaking quite similar to those seen in the case of approximative adverbs. Viewing the results regarding approximative adverbs and adjectives in combination does in fact suggest that such approximative devices may be more commonly employed as hedges in RAs on technology than in those on economics and medicine.

\* \* \*

The four categories of adjectives studied again manifested some disciplinary differences in the ways in which RAs may be hedged. As concerns the degree of hedging, probability adjectives followed the same trends that were observed in connection with some of the other hedges insofar as economics was the most heavily hedged discipline and technology the discipline with the fewest hedges. As to the other subcategories, the incidence of adjectives was too low in the case of the last subtype as to allow any generalizations relating to the extent of hedging, but the results on adjectives of indefinite frequency and degree seem to suggest that such hedge types may be noticeably more frequent in technology than in the other two disciplines. Variety in the items used as hedges was quite similar across the disciplines as far as probability adjectives are concerned. On the other hand, a noticeably large selection of adjectives of indefinite degree were detected in technology (18) compared with the other two disciplines (9 and 4), a relatively wide array of adjectives of indefinite frequency being also found in economics and technology (8) as opposed to medicine (4). In consequence, out of the 57 different adjectives identified in the RA data, 27 were found in economics and medicine each, but in technology the array was wider, with 40 different items identified.

#### 4.2.5 Nouns

In the previous sections, I have discussed the hedging use of a variety of verbs, adverbs, and adjectives in the RA data. As Perkins (1983: 86 ff.) illustrates, many kinds of nominal expression can equally be associated with modality in English, there being a number of nouns with an epistemic meaning and, accordingly, hedging potential. This potential, Holmes (1988: 35-37) and Hyland (1994: 249) suggest, is mentioned rather rarely in style manuals. The last lexical category of hedging devices dealt with is made up of nouns that resemble many of the items discussed above in that they are all characterized by a component of tentative or indefinite meaning that

makes them useful for hedging purposes. As a matter of fact, many of these nouns are derived from the full verbs and the adjectives discussed above.

The nouns identified in the data are subcategorized into three general types. Many nouns of the first type, termed *nonfactive assertive nouns* here (e.g. *allegation, contention, proposal, suggestion*)<sup>75</sup>, share similarities with the nonfactive reporting verbs dealt with earlier in that they can be used to convey different degrees of tentativeness in reporting either one's own views and findings and/or those of others.<sup>76</sup> The second subcategory of nouns, *tentative cognition nouns* (e.g. *assumption, belief, estimation, guess, hypothesis, supposition*), includes items which resemble the tentative cognition verbs dealt with above in that they often indicate that what is being said is not to be taken categorically, but that it is based on the rationale, subjective views, or limited knowledge of the authors and/or another source.<sup>77</sup> The third subclass of nouns to be discussed, referred to as *nouns of tentative likelihood* here (e.g. *likelihood, possibility, prospect, tendency*), is made up of expressions implying that the information put forth does not apply invariably, that is, of devices indicating degrees of probability, or indefinite frequency or degree in the same way as several of the items treated earlier.

**a. Nonfactive assertive nouns.** Thirteen different nouns of this subtype were identified as hedges in the RA data, amounting to 118 occurrences.<sup>78</sup> The items most commonly employed as hedges were *prediction* (n=39) and *implication* (n=27), which figured in the top three in all disciplines. As can be seen from the examples below, the items are a fruitful way of signaling that what is said in RAs may for instance be a mere *claim*, not an empirically validated fact, that the issues dealt with are likely, but not absolutely certain to provide useful information, that the information presented is predictive by nature, or that the analytical model suggested is only putative, not as revealing and absolute as it could be:

- (72) The studies employing survey data usually fail to find evidence supporting the *claim* of redlining, while those studies using HMDA data usually do. (ECO1, G, 83 [Introduction])
- (73) In order to investigate the *proposition* that perceptions of the current practice of quality management in the company will differ by strategic type, analysis of variance and mean comparisons were performed on each quality dimension by strategic type, with and without controlling for company type, size, and position in the company held by the respondent. (ECO1, I, "Data Collection Technique", paragraph 4 [Methods])

- (74) These trends are illustrated in Fig. 15, which shows the *predictions* of the algorithm for four hypothetical engines, which see only normal start-shutdown cycles and which maintain constant ratios of fired hours per fired start. (TEC1, A, 213 [Results])
- (75) Our MABs may help to distinguish between these two alternatives because antibody-mediated inhibition may be achieved without removing sections of the protein. Such analysis could provide *clues* to the function of the HHCC domain, which studies to date have failed to reveal. (MED1, B, 1113 [Discussion])

The results concerning this noun type were similar to those regarding nonfactive reporting verbs in that economics was the field most heavily hedged by means of the nouns (1.12 per 1,000 words; n=71). In medicine (0.35; 17) and technology (0.47; 30), the relative shares were noticeably lower. The widest variety of nouns was also found in economics, where 10 out of 13 items were present, as opposed to six in each of the other disciplines, another result similar to the findings regarding nonfactive reporting verbs.

**b. Tentative cognition nouns.** Altogether 369 occurrences of 28 different tentative cognition nouns were identified as hedges in the RA data<sup>79</sup>, most of the nouns being very similar in meaning (e.g. *assumption, belief, inference*) to the tentative cognition verbs dealt with earlier.<sup>80</sup> This group of nouns also includes devices at times used in meanings that cannot be associated with hedging. For example, the nouns *notion* and *concept* are often used neutrally to refer to a standard term within a scientific discipline (e.g. the *concept/notion of linguistic competence*), but they may also be taken as hedges when used tentatively to refer to a vague idea, an impression, a belief, that is, a putative construct of thought or imagination. In the RA data, the different uses could be distinguished from one another with the help of the wider context.

The tentative cognition nouns most frequently employed as hedges in the RAs were *hypothesis* (n=85), *theory*<sup>81</sup> (n=59), and *estimate/estimation*<sup>82</sup> (n=52). The following exemplify the surroundings in which nouns of this kind were commonly found as hedges in the RA corpus, each case hinting that what one is dealing with are not unquestionable truths, but rather mental constructs or approximate characterizations of the matter at hand:

- (76) The provisions also reflect the *belief* that (1) the detrimental effects of epoxy coating on bond will decrease with increased cover and bar spacing and (2) the detrimental effects of epoxy-coating and bar position are not fully additive for top bars [...]. (TEC1, C, 59 [Introduction])

- (77) *Estimates* of absolute numbers of the lymphocyte or mononuclear cell populations positive for the respective surface markers were determined by multiplying peripheral lymphocyte or mononuclear cell counts by percentage positive cells for each surface marker [endnote omitted]. (MED1, E, 131 [Methods])
- (78) A comparison of the data shown above with experiments reported previously [endnote omitted], suggested that the effects of short and long-term TNF exposure were fundamentally different. Accordingly, this *notion* was tested *in vitro* by comparing the responses of T cells to TNF for different periods of time. (MED1, C, 1578 [Results])
- (79) This implies several simple but powerful *ideas* for making vertical systems work. (ECO1, F, 235 [Discussion])

This subcategory of nominal hedges, too, was most frequently present in the economics RAs, with a relative incidence of 3.59 per 1,000 words (n=227), which is in fact more than twice the incidence in either of the other disciplines. Technology was the second most commonly hedged discipline as concerns nouns of this type, with a relative incidence of 1.51 per 1,000 words (n=96). In medicine, the occurrence was 0.95 per 1,000 words (n=46). In comparison with the corresponding subcategory of verbs, the result concerning economics is similar (3.59 vs. 3.46 per 1,000 words). In the other disciplines, the nouns were less frequent than the corresponding verbs. Moreover, the finding that the relative figures regarding the nouns were higher in technology than in medicine was dissimilar from the results on tentative cognition verbs. As to variety in the hedging devices used, the widest array was found in economics and technology, with 20 of the 28 devices present in each discipline. In medicine, variety was remarkably narrower, with only 10 of the devices identified.

**c. Nouns of tentative likelihood.** The last subcategory of nouns covers various devices similar to the probability adverbs and adjectives examined above (e.g. *likelihood*, *potential*, *possibility*) and items indicating that although what is said is likely to apply, this may not be invariably or necessarily so (e.g. *trend*, *tendency*). 15 different devices (altogether 154 occurrences) belonging to this category were identified in the RAs<sup>83</sup>, *trend* (n=41), *probability* (n=34), and *possibility* (n=27) being the commonest ones in the data. The variety of such devices found in the data is apparently considerably wider than in Hyland's (1998) discussion of the surface features of hedges in RAs, where *possibility* was in fact the only example cited in discussing the hedging use of nouns. My corpus exhibited a variety of nouns that can be regarded as hedges in that they indicate that the procedures employed and results thus obtained only involve probabilities, that

what will be dealt with in the research to be reported are tendencies, not invariably applicable truths, that the findings obtained with the help of the methods used are noncategorical by nature, or to suggest that the reasons offered to account for the results obtained are only putative, not empirically proven:

- (80) Using *probability* models similar to those employed in speech recognition it is possible to estimate the *probability* that a given byte string occurs in several viruses by chance [...]. (TEC1, B, 189 [Introduction])
- (81) The median corpuscular hemoglobin concentration (MCHC) was determined from these gradients and used to calculate the *tendency* toward intracellular polymerization of hemoglobin S for cells with a density less than 23.0 mmol per liter. (MED1, J, 74 [Methods])
- (82) Other ongoing investigations are studying the distributions of cracking on all vanes in an effort to generate a probabilistic description of cracking and, ultimately, a probabilistic life model, which may be used to estimate the *likelihood* that a nozzle has developed a certain amount of cracking. (TEC1, A, 214 [Results])
- (83) Another *possibility* [that may explain the results obtained] is related to the personality traits of many women entrepreneurs, such as risk taking, autonomy, cognitive structure, innovation, creativity, competence, and leadership. (ECO1, A, 23 [Discussion])

Results similar to those seen in connection with probability adverbs and adjectives also emerged from this subcategory of nouns, economics being the most heavily hedged discipline (1.36 such hedges per 1,000 words; n=86). The other two disciplines contained somewhat fewer hedges, with a relative incidence of 0.79 per 1,000 words in medicine (n=38) and 0.47 in technology (n=30). When it comes to variety in the devices employed, no greater disciplinary differences were detected. The economics RAs involved a mildly wider choice of items (11 out of 15), but a relatively wide selection was also seen in the other two disciplines (9 out of 15 in each).

\* \* \*

The results on the hedging use of nouns also illustrated some disciplinary differences in the RA data, economics once again emerging as the field of specialization with the highest relative degree of hedging. As to the variety of devices used, economics was equally the discipline with the widest choice of nominal hedges, involving 41 of the 56 different nouns identified in the RA

corpus. The second widest selection was found in technology (35), medicine being the field of study with the lowest degree of variety (25).

Combined with the overall results from the other main categories of lexical phenomena (cf. section 4.1), the present findings quite clearly indicate that the economics RAs examined were hedged considerably more heavily (25.94 lexical hedges per 1,000 words; n=1642) than those from medicine (15.32; n=740) and technology (16.36; n=1039). As concerns variety in the devices used, out of the 236 different lexical hedging devices identified, 161 occurred in economics, 134 in medicine, and 156 in technology, the differences detected in analyzing the various subgroups of hedges being evened out somewhat in the overall figures, especially as concerns economics and technology.

#### 4.2.6 Clausal Elements

Apart from the lexical devices discussed, the RA data contained a number of other linguistic expressions which signal that what is said is not necessarily altogether accurate or absolute. In the RAs examined, such indications were relatively often realized by clausal elements of various kinds. In Hyland's (1998: 141 ff.) work on RAs, clausal hedging phenomena are treated under the heading of "non-lexical hedges." Hyland divides such hedges into three subtypes with regard to the origin of the tentativeness involved. Thus, Hyland says, non-lexical hedges may be employed where the authors refer to

- 1) "limited knowledge" and in so doing "fix their work in an evidential context of uncertainty" (e.g. "We do not know whether") (op. cit.: 142),
- 2) the limitations of a specific model, theory, or method employed, "which may compromise the accuracy of their results" (e.g. "In the context of the proposed model") (op. cit.: 143), or to
- 3) "doubts surrounding the experimental conditions" as far as the accuracy of the results obtained is concerned (e.g. "We have not been able to determine precisely whether") (op. cit.: 147).

Although Hyland is of the opinion that such a content-based differentiation is feasible, as far as my data is concerned, it is questionable whether the three-fold division is sustainable in practice, granted the multifunctional nature of hedging phenomena. According to Hyland, for instance, non-lexical hedges involving the verb *know* are typically used to refer to limited knowledge,

whereas in my opinion such devices may under some circumstances equally be understood to simultaneously refer to the limitations of a model, theory, or method as well as to experimental limitations relating to research results. For example, in pointing out that

- (84) In interpreting these results, it must be kept in mind that our sample was not representative of all US firms. [...] Whether these results would generalize to a broader population is *not known*. (ECO1, D, “Recommendations for Further Work”, paragraph 1 [Discussion])

the authors of (84) may be seen to refer to limited knowledge with the help of the construction involving *know*. However, at the same time, in pointing toward restriction concerning the research model when it comes to the study population, this instance of hedging could equally be viewed as a reference to the limitations of the model employed. What is more, the tentativeness involved may also be taken to make reference to doubts to do with experimental conditions, because the hedge in question occurs in the proximity of comments relating to the wider applicability of the experimental results. Thus, even one specific hedge could well be taken to fulfill each of the functions on which Hyland’s division is founded. In brief, while illustrative of the different motivations and objectives of hedging by means of non-lexical elements, the kind of subcategorization proposed by Hyland (1998) is not rid of problems due to the polypragmatic potential of hedging phenomena. Therefore, the kind of analysis employed by Hyland will not be adopted here. Instead, clausal elements found in hedging use will be dealt with as one broad category, examples being provided of the common forms of such hedging and the typical contexts in which they were identified in the RAs.

A fairly common clausal hedging phenomenon in the data were *if*-clauses, accounting for about one fifth of the clausal hedges identified. As is evident from for instance Quirk et al.’s (1985: e.g. 1087 ff.) work, *if*-clauses may be found in a variety of uses, some of which can be associated with tentativeness, whereas others cannot.<sup>84</sup> *If*-clauses with hedging potential were used in various ways in the RAs examined, for instance so as to qualify commitment to the views of others (85), the validity of methods employed (86), or the various explanations for the results obtained (87, 88):

- (85) From a public policy viewpoint, these findings [by other scholars], *if valid*, would indicate a need for additional regulation to ensure social equality. (ECO1, G, 81 [Introduction])

- (86) Broader definitions (including UP diagnoses) are useful because they allow for more ill persons to be included in the linkage analysis, yielding increased power to detect linkage *if the affection status model is correct*. (MED1, A, 29 [Methods])
- (87) The third alternative is that this result is induced by a data problem in this period. [...] *If this is the case*, it would explain why many earlier studies that used reported data found evidence to support allegations of redlining. (ECO1, G, 89 [Results])
- (88) Although IL-10 has effects on multiple cell types, one possible explanation for these findings is that local overexpression of IL-10 suppresses TNF expression and the suppressive effects of endogenous TNF exposure on autoreactive T cells in the islets [...]. *If this were so*, one would predict that blocking TNF production by other means should aggravate autoimmunity in NOD mice also. (MED1, C, 1582 [Discussion])

However, many other kinds of clausal element were also found as hedges in the RA corpus. As the following illustrate, a number of entire sentences explaining the uncertainties involved in the information put forth were found in the RA data, it at times being difficult to put one's finger on any specific parts of the sentences that produce the hedging effect:<sup>85</sup>

- (89) The thrust of this study is exploratory and descriptive and should be considered preliminary to the subsequent inductive development of a more general growth management theory. (ECO1, H, 50 [Introduction])
- (90) Although we believe these compensation effectiveness measures are appropriate, they have some limitations which should be discussed. (ECO1, D, "Appropriateness of Effectiveness Measures", paragraph 1 [Methods])
- (91) The limited nozzle data available do not give a conclusive answer, and the complicated mechanics and materials issues involved in this long-life thermal fatigue problem do not admit an obvious theoretical explanation. (TEC1, A, 214 [Results])
- (92) While the findings of this study suggest a pattern, they are far from conclusive and represent an area ripe for further investigation. (ECO1, A, 24 [Discussion])

As for instance (89) shows, entire sentences may be taken to be hedges in so far as they underline the limits of the research to be reported, the intention apparently being to emphasize the noncategorical nature of the information to be reported. In the second extract, attention is drawn to factors that may be *potential* problems in terms of methodology—although the authors are relatively certain that they are not. In the following two examples, the authors can be taken to hedge their findings and their implications in drawing attention to the experimental limitations



involved and to the pioneering nature of their work, thus making it clear to the reader that the information put forth is not to be taken categorically.

As seen at the outset of this chapter, clausal hedging devices were the sixth most commonly employed of the eight main categories established in each discipline, supporting Hyland's (1998) view that hedging is realized by means of lexical devices more commonly than by for instance clausal elements. In comparison with Hyland's finding that non-lexical hedges made up 15% of the hedges in his data, clausal elements were used more rarely in my RA data, accounting for 5.2 (technology) to 7.2 (economics) percent of all hedges identified in the three disciplines. The relative incidence of this hedge category was highest in economics, with 2.21 occurrences per 1,000 words (n=140), as opposed to 1.39 (n=67) in medicine, and 1.13 (n=72) in technology. Hence, the results are again in line with the earlier observation that hedges figure more commonly in economics than in the other two disciplines studied.

#### 4.2.7 Questions

Apart from clausal elements such as the ones discussed above, interrogative constructions may also be used to underline the noncategorical nature of the issues under scrutiny in that they possess potential to for instance "signal an important unresolved issue [...] or to withhold commitment from a claim" (Hyland 1998: 143). In Hyland's (1998) work questions were treated as one form of non-lexical hedging used to refer to limited knowledge in much the same way as clausal elements referring to knowledge limitations. As noted above, however, Hyland's content-based typology of non-lexical hedges may not capture the full, multifunctional picture of hedging, and is therefore not adopted here. Furthermore, granted that in this study the interest lies in possible disciplinary differences and in variation between professional and popular science, it is also of interest to distinguish between hedges in the form of questions and other clausal hedging devices so as not to exclude the possibility of variation between these forms of hedging.

As pointed out earlier, the RA data contained few questions of any type, and even those found in the corpus could not always be seen as hedges. For instance, in certain RAs, the Methods section introduced some of the questions to which informants had been asked to respond:

- (93) Then they were asked, "How much *would you* (dealer) have changed your decision?" (ECO1, F, 230 [Methods])

On the other hand, some other questions could be taken to introduce a note of tentativeness when presenting results:

- (94) Is this just an anomaly associated with our particular sample, or a phenomenon unique to the fast-food industry? (ECO1, B, 789 [Results])
- (95) But which functional form is more nearly correct, particularly at longer or shorter lives? (TEC1, A, 214 [Results])

The authors' response to both (94) and (95) is that their data does not allow them to present a categorical answer. Thus, the questions may be seen a means by which the authors wish to engage the readers and thus draw their attention to the uncertainties concerning their results.

Hedges realized as questions were scant in the RA corpus, with only five occurrences in economics (0.08 per 1,000 words), one in medicine (0.02), and four in technology (0.06), which leaves us little to say about disciplinary variation. While the low figures were to be expected in view of earlier comments, it will be interesting to see to what degree hedges of this kind occur in popular science.

#### 4.2.8 Other Hedges

To account for hedging phenomena that do not fall in with the categories established above, a supplementary category of 'Other Hedges' was established. The shares of this group out of the total number of hedges differed to some degree between disciplines. In economics, the share of this category was 7.9% (2.43 per 1,000 words, n=154) of the total. In the other two disciplines, the shares were noticeably higher, 24.1% in medicine (5.32 per 1,000 words, n=257) and 19.7% in technology (4.30 per 1,000 words, n=273). The hedges included in this category are of various kinds, many of them phrasal devices, or lexical items with meanings other than those of the hedges included in the lexical categories established previously. In the RA data, the most frequent type of hedges included in the final category were items that express or are linked to quantifications, that is, devices which indicate that the quantifications presented are only approximate,<sup>86</sup> tentative, not quite conclusive, and so on. Many of these items are also mentioned in Dubois' (1987) study of numerical imprecision in biomedical slide talks<sup>87</sup> and in Channell's (1994, 1999) work on vagueness. As we have already seen, there may be various reasons for the use of elements like this, such as the omission of numerical data where it cannot be obtained, or

the avoidance of exact figures where they are not regarded as necessary, or when absolutely accurate numbers are not available:

- (96) While *most of* the work to date for control of flexible-link robotic systems has used conventional control techniques, there has been recent interest in the literature in the use of intelligent control methodologies. (TEC1, G, 393 [Introduction])
- (97) High-potassium, cold cardioplegia was administered after aortic cross-clamping during systemic hypothermia (venous temperature of approximately 25-28°C). (MED1, D, 1357 [Methods])
- (98) An increase in the minimum wage could lead to an increase in full-time employment relative to part-time employment for *at least* two reasons. (ECO1, B, 784 [Results])
- (99) *Some* support was found for the notion that new onset of sleep problems, a symptom often associated with PTSD and intrusive thoughts, could act in this manner. (MED1, E, 138 [Discussion])

In (96), *most of* can be seen as a suitably vague way of referring to previous work, it not being essential to provide numerical data as to the number of studies where the approach mentioned has been adopted, the hedge also signaling that the methodology in question has by no means been taken up in *all* earlier work. The hedge may thus be taken to reduce the boldness of the authors' assertion. As cases like "25-28" in (97) show, numerical imprecision was also often indicated by means of ranges. In this instance, it seems that the use of a range derives from the unnecessary of giving the exact figures for each and every case examined, it being sufficient to give a rough idea of when systemic hypothermia was thought to occur. In the following case, *at least* is a useful means of indicating that the explanations put forth may not be the only ones, the hedge leaving open the possibility of further reasons for the results obtained. In the last example, *some* may be taken as an indication that the evidence supporting the authors' findings is not as solid as it could be, which is why the findings summarized are not intended as absolutes. Hedging of the kind seen in these examples was particularly common in the medical RAs, where at least<sup>88</sup> some 77% (4.12 per 1,000 words) of the items included in the final category of hedges had to do with quantification. In the other two disciplines, the percentages were somewhat lower, that is, around 72% (3.09 per 1,000 words) in the technology RAs and approximately 58% (1.41 per 1,000 words) in economics.

The remaining hedges in this category make up a miscellaneous group of items, mainly lexical devices or phrases that cannot be satisfactorily fitted into any of the previous categories. Typical among the rest of the items are cases like the following:

- (100) Second, the fringe color change is always a gradual process, and the optical film thickness can *in principle* be estimated not only by discrete color fringe orders, but by the gradual change in color, intensity, and grey scale as well. (TEC1, J, 312 [Methods])
- (101) A probit analysis of the probability of closure shows that the initial size of the store is a significant *predictor* of closure. (ECO1, B, 778 [Methods])
- (102) Our *preliminary* tests of the effects of competition with Fabs (not included) suggest that both phenomena may be operating, depending on the combinations used (MED1, B, 773 [Discussion])

In (100), the phrase *in principle* indicates that the procedures suggested are theoretically feasible, but simultaneously suggests that this may not always be so in practice. In the following example, *predictor* may equally be seen to produce a hedging effect when reporting results in so far as it implies that store size may be taken as predictive—but nevertheless not invariably so—of the likelihood that a store will be closed due to changes in minimum wage. Finally, in (102), the adjective *preliminary* draws attention to the initial, noncategorical nature of the information presented.

As noted above, the hedges included in the category of ‘Other’ occurred more frequently in medicine and technology than in economics. This result—different from many of the results regarding the categories discussed previously—may apparently have to do with the nature of the devices that make up the majority of the occurrences of the final category, namely hedges to do with quantification. As seen earlier, the incidence of certain lexical hedges linked to quantification was also at times higher in technology and medicine than in economics. This observation and other issues arising from the results presented will be discussed in the following sections, where, apart from the links between the different categories and subtypes of hedging device quantified above, attention will also be given to the incidence of the various hedging phenomena in the different rhetorical sections of the RAs examined. Furthermore, in what follows I will also take a closer look at how the authors of the RAs motivated the use of hedging phenomena in the different sections of their articles.

### 4.3 Distributional Information and Authorial Views on Hedging

As noted previously, hedging has been demonstrated to occur quite frequently in research articles, at least as far as disciplines such as medicine are concerned. However, it should also be borne in mind that hedging may not occur to the same degree throughout RAs, but certain sections may be more heavily hedged than others. Such findings are presented by Salager-Meyer (1994: 149, 156), who says that in her medical RA data Discussion sections were the most heavily hedged ones, followed by Results, Introduction, and Methods sections in decreasing order of frequency. Relatively similar results have also been reported by Hyland (1998: 153) as regards biology RAs.<sup>89</sup> While such findings shed light on the incidence of hedges in the different parts of RAs representing quite closely related fields like medicine and biology, I do not know of many studies where specific attention has been given to the possible differences between more distinct disciplines in the rhetorical distribution of hedges. Therefore, each category and subcategory of hedging devices discussed above was also investigated as concerns incidence in the different sections of the articles from the three disciplines.<sup>90</sup>

A scrutiny of the incidence of hedges in the different RA sections, however, was not entirely straightforward. While the RAs on medicine included in my corpus were all structured according to the basic Introduction-Methods-Results-Discussion (IMRD) structure often seen as characteristic of the RA genre, some problems were encountered in the other two disciplines. As noted earlier, one of the economics RAs examined, for instance, did not manifest the typical IMRD structure. Instead, the actual report of experimental research was preceded by a hefty theoretical discussion unlike anything seen in the other articles. Nevertheless, since the theoretical discussion could be taken as an introduction to the experiment to be reported, it was decided that the lengthy preliminary discussion would be paralleled with the other Introduction sections. Further problems were encountered in three of the RAs on technology, whose overall structure did not really follow the IMRD model. In other words, the RAs either were structured so that for instance the Results and Discussion sections were integrated<sup>91</sup> to such an extent that it was not possible to distinguish between them or their structure could not be analyzed with regard to the IMRD format at all. In the case of these three articles, it was decided that the material is not suitable for cross-disciplinary comparisons as to how hedges are distributed in the rhetorical sections of RAs, and they were thus omitted from the section-by-section analysis. It should also be mentioned that some RAs—especially in medicine—followed the basic IMRD format very closely, even to the degree that the main headings of the articles scrutinized followed this

division. In certain other RAs, on the other hand, the division was not as clear. Sometimes, for instance, the introductory components of the articles were made up of a number of parts such as “Background”, “Review of Previous Work”, and other preliminary elements providing an introduction to the issue to be investigated. Granted such variation in the makeup of the articles, it was not always a straightforward task to try to relate the different parts of even those articles included in the section-by-section analysis to the IMRD pattern, which is why some of the divisions made may not be very neat.

Apart from these difficulties, it should be mentioned that even where the basic IMRD structure could in principle be applied to the RAs without greater problems, some disciplinary differences were detected in the content of the different sections. In medicine, the various sections of the RAs were quite clearly differentiated from each other in terms of content, the Results section for instance first and foremost presenting empirical findings and the Discussion section dealing with the importance, limitations, and implications of the results. In economics and technology, on the other hand, the Results sections also included much of the information given in Discussion sections in disciplines like medicine, the Discussion sections in economics and technology more often being relatively concise conclusions rather than discussions, sometimes more or less mere summaries of the research project reported. Such differences in the content of these sections were also reflected in their length. In the medical RAs, the word counts of the ten Results and Discussion sections examined were practically speaking the same (14,101 vs. 14,114 words), whereas in the economics RAs the ten Results sections amounted to over 18,000 words, as opposed to about 10,500 in the Discussion sections. It was in technology, however, that the difference was most pronounced. In the seven technology RAs included in the section-by-section analysis, Results sections amounted to over 22,000 words, whereas Discussions only included a total of some 4,000 words.

Despite the problems involved in applying the IMRD structure to the data, comparisons of hedging in the various RA sections are likely to yield fruitful information regarding the use of hedging devices in different disciplines. In fact, the caveats presented above provide insights into some of the reasons which could lead to disciplinary differences in the use of hedges in the various RA sections. For instance, as Salager-Meyer (1994) has illustrated, the information included in the Discussion sections of medical RAs is hedged to quite a degree, whereas Results sections are less heavily hedged. Granted the observation that in disciplines such as economics and technology Results sections often include information of the type included in the Discussion section in disciplines like medicine, one might accordingly speculate that this would increase the

amount of hedging in Results sections in economics and technology in comparison with medicine. But whether this is so is yet to be determined. In order to see whether disciplinary differences in the use of hedging phenomena may be detected in the different rhetorical sections, let us now provide a section-by-section breakdown of the results presented above.

In the preceding sections, reporting the incidence of the various hedging phenomena in the RA corpus, numerous examples of hedging have been presented, the discussions of the reasons and effects of hedging having mainly been based on my own analyses of the data, supported by earlier work into hedging. As explained earlier (Ch. 2), information intended to provide additional insight into the rationale underlying the use of hedges was also sought from the authors of the articles examined. Toward this end, a questionnaire concerning the use of hedges in four extracts from the different rhetorical sections of each of the articles were sent to the authors to obtain their views as to which elements they think constitute the kind of meaning taken as hedging in this study and what the reasons for employing such devices are. As the choice of extracts was carried out with an eye on the different rhetorical sections of RAs, it also seems useful to consider the authors' responses at this stage.<sup>92</sup> It should be emphasized that the number of responses obtained from the authors of the RAs was quite low. Six responses were obtained from the authors of the economics RAs, but only two authorial responses were obtained from the fields of medicine and technology each. With altogether ten replies, the response rate was thus about 33%. Despite the low number of responses, however, a number of interesting observations could be made regarding the effects of the nature of the various disciplines on the use of hedges.

#### 4.3.1 Incidence of Hedges in Different RA Sections

As Table 4 shows, the findings regarding the distribution of hedges in the RAs on economics, medicine, and technology are not very far removed from Salager-Meyer's (1994) results on hedging in her medical RA corpus and Hyland's (1998:153) findings concerning the distribution of hedges in his biology RA data.

Table 4. Incidence of Hedges in Different RA Sections

(The figures indicate incidence per 1,000 words, rank order of each section according to number of hedges per 1,000 words in decreasing order of frequency, and percentage of hedges out of the total number in the articles.)

Section	Economics	Medicine	Technology <sup>93</sup>
Abstract	26.01 (4), 1.6% (1,192 words)	20.10 (3), 5.1% (2,687 words)	21.85 (4), 3.6% (1,693 words)
Introduction	32.45 (2), 30.6% (18,275 words)	26.93 (2), 11.3% (4,456 words)	23.52 (2), 18.1% (7,866 words)
Methods	23.41 (5), 18.1% (15,037 words)	14.98 (4), 18.2% (12,947 words)	21.18 (5), 18.6% (8,971 words)
Results	31.86, (3) 29.9% (18,206 words)	14.75 (5), 19.5% (14,101 words)	22.20 (3), 48.8% (22,432 words)
Discussion	36.09 (1), 19.7% (10,584 words)	34.86 (1), 46.2% (14,114 words)	26.45 (1), 10.8% (4159 words)
Total	30.63, 100% (63,294 words)	22.05, 100% (48,305 words)	22.61, 100% (45,121 words)

As we can see, the Discussion section was the one with the highest relative incidence of hedges in each discipline, a finding to be expected on the basis of previous work by Salager-Meyer (1994) and Hyland (1998). However, what is to be noticed is the difference especially between economics and technology in the number of hedges per 1,000 words. As a matter of fact, in the technology RAs, the differences between the various sections in the incidence of hedges per 1,000 words were not particularly wide, the difference between the most and least heavily hedged sections being 5.27 per 1,000 words, whereas in economics and medicine the differences were 12.68 and 20.11, respectively. This implies that hedges may be more evenly distributed in technology RAs than in the other two disciplines.

Turning to the other sections, some differences could be detected between my findings and those of Salager-Meyer (1994) and Hyland (1998). In my data, the second most commonly hedged section in all disciplines was the Introduction, whereas in Salager-Meyer's medical RAs the Results section was hedged slightly more often than the Introduction, and in Hyland's biology corpus the relative incidence of hedges was the same in the Introduction and Results sections. In economics and technology, the relative numbers of hedges in the Introduction and Results sections are quite similar, but in the field of medicine the results are quite distinct from those seen in earlier work. As a matter of fact, in my medical RA data Results was the least heavily hedged section of all. In medicine, then, the findings for the Results section were somewhat unexpected, the number of hedges being even lower than in the Methods section, which is typically thought to be the RA section with the lowest degree of hedging. In economics and technology, on the other



hand, the findings regarding the Results section are in line with earlier views concerning hedges in RAs. As explained above, Results sections in economics and technology may include information of the type more commonly found in Discussions in some other disciplines, which may explain why the difference between Discussion and Results sections is not as great in these two disciplines as in medicine.

As to hedging in the Abstract, the figures for this section are among the lower ones in each discipline, but nevertheless not *the* lowest. This might be taken to indicate that although this section is often presumed to be as concise and economical as possible, authors do deem hedging as necessary in this component of RAs as well. This is indeed quite understandable, granted that RA Abstracts may be seen as a discursual element enhancing the “news value” of the RA (Swales 1990: 179). In other words, the Abstract functions as an invitation for potential readers, where authors presumably wish to provide a concise account of the most important aspects of their work, but nonetheless in a manner that reflects the same requirements imposed upon the authors by the expectations of the scientific community that guide their mode of presentation in the RA itself. In brief, it is particularly in Abstracts that authors hope to make claims to entice potential readers—claims which nevertheless must be toned down where need be for reasons of scientific honesty and caution (cf. Chapter 3).<sup>94</sup>

While the overall results presented may be illustrative of the general incidence of hedging in the RA data, it is also of interest to investigate to what degree the different categories and subcategories of hedges distinguished occur in the different RA sections. Apart from considering each main category of hedges, attention will also be given to certain tendencies emerging from a section-by-section analysis of certain subcategories of hedges. This may be particularly interesting in that by looking into the links between various classes of hedging devices, it may be possible to discern certain patterns in their incidence in the various RA sections.

#### 4.3.2 Hedging in Abstracts

As the results above indicate, the number of hedges in the Abstracts was not very far removed from the overall incidence of hedging devices in the RAs. Such a result would seem to suggest that hedges are employed in Abstracts to a degree not much dissimilar from that seen in RAs overall. Although, as pointed out by Swales (1990: 181), there are considerable space limitations in Abstracts, they do not necessarily affect hedging as much as one might expect, the various hedging phenomena examined figuring quite commonly in Abstracts:

Table 5. Incidence of Hedges in RA Abstracts.

(The figures indicate the number per 1,000 words, respective rank order of the section for each hedge type in comparison with the other sections, and percentage of all hedges in the section.)

Type of Hedge	Economics (1,192 words)	Medicine (2,687 words)	Technology (1,693 words)
Modal Auxs	0.84 (3), 3.2%	4.09 (3), 20.4%	0.59 (5), 2.7%
Full Vbs Total	10.91 (1), 41.9%	5.95 (3), 29.6%	4.73 (2), 21.6%
Adverbs Total	1.68 (5), 6.5%	2.61 (3), 13.0%	8.27 (1), 37.8%
Adjectives Total	2.52 (3), 9.7%	1.12 (5), 5.6%	2.36 (3), 10.8%
Nouns Total	9.23 (1), 35.5%	1.86 (3), 9.3%	1.77 (4), 8.1%
Clausal Elements	-	1.12 (2), 5.6%	1.18 (2), 5.4%
Questions	-	-	-
Other	0.84 (5), 3.2%	3.35 (5), 16.7%	2.95 (5), 13.5%
Total	26.01 (4), 100%	20.10 (3), 100%	21.85 (4), 100%

In fact, as illustrated by Table 5 (and Appendix 3<sup>95</sup>), some categories of hedging devices occurred with the greatest relative frequency in Abstracts in comparison with the other RA sections.

Naturally, the raw number of hedges in Abstracts was very low given the brevity of the section, but the relative figures do show that in relative terms hedges occurred quite frequently in the RA Abstracts. The uses in which hedges were found in Abstracts were similar to those seen in the other sections of the RAs, to be discussed in what follows.

#### 4.3.3 Hedging in Introductions

As seen, Introduction sections were the second most commonly hedged part of the RAs in each discipline, economics being the discipline with the highest relative incidence of hedges, followed by medicine, and technology. As can be seen below, both similarities and differences could be detected between disciplines in their use of the eight main categories of hedging in Introductions:

Table 6. Incidence of Hedges in RA Introductions.

(The figures indicate the number per 1,000 words, respective rank order of the section for each hedge type in comparison with the other sections, and percentage of all hedges in the section.)

Type of Hedge	Economics (18,275 words)	Medicine (4,456 words)	Technology (7,866 words)
Modal Auxs	6.73 (2), 20.7%	4.71 (2), 17.5%	1.53 (4), 6.5%
Full Vbs Total	6.89 (4), 21.2%	6.51 (2), 24.2%	3.05 (5), 13.0%
Adverbs Total	6.24 (1), 19.2%	3.14 (2), 11.7%	7.63 (2), 32.4%
Adjectives Total	3.11 (2), 9.6 %	2.47 (2), 9.2%	2.54 (2), 10.8%
Nouns Total	5.85 (3), 18.0%	2.92 (1), 10.8%	3.18 (1), 13.5%
Clausal Elements	1.37 (4), 4.2%	0.67 (3), 2.5%	0.51 (5), 2.2%
Questions	0.22 (1), 0.7%	-	0.38 (1), 1.6%
Other	2.02 (3), 6.2%	6.51 (2), 24.2%	4.70 (3), 20.0%
Total	32.45 (2), 100%	26.93 (2), 100%	23.52 (2), 100%

As the breakdown of the results illustrates, the incidence of modal auxiliaries as hedges in Introductions differed quite extensively across the disciplines, similar results also applying to the relative frequency of full verbs. As to adverbs, on the other hand, the highest incidence was to be found in technology, followed by economics and medicine. What is also noteworthy about adverbs is their remarkably high share of all hedges in the technology Introductions in comparison with the other disciplines. As the figures for the different subtypes of adverbs examined reveal (see Appendix 3), the prevalence of hedges in the form of adverbs in technology Introductions evidently derives from the widespread use of adverbs to do with frequency, degree, and approximation. As to adjectives, the overall figures show that the share of this hedge category out of the total number of hedges in Introductions was virtually the same (about 10%) in all three disciplines. Worth noticing again, however, is the finding that when the four subtypes of adjectives are examined (see Appendix 3), the ones often linked to quantification amount to a considerably higher relative number (1.77 per 1,000 words) in technology than in economics and medicine (0.60 and 0.44 per 1,000 words, respectively). In economics and medicine, on the other hand, adjectives to do with probability were more commonly found in Introductions than in technology. The incidence of nouns in hedging use was highest in economics, followed by technology and medicine. Clausal hedging devices, too, occurred most commonly in economics Introductions, whereas in medicine and technology the numbers were less than half of that seen in economics. As noted, questions were very rarely used as hedges in the data, but did nevertheless occur in economics and technology Introductions. Interesting differences could be detected in the results on the category of 'Other' hedges, devices included in this group being quite commonly

found in medicine and technology, but to a lesser degree in economics. As seen previously, the greater part of hedges included in ‘Other’ hedges have to do with quantification. If we combine the results on ‘Other’ hedges and those on adverbs and adjectives expressing frequency, degree, and approximation, it is of interest to see that such hedging phenomena occurred more frequently in the technology Introductions (12.02 per 1,000 words; about 51.1% of all hedges in the section) than in economics (7.77; 23.9%) and medicine (10.10; 37.8%). In the light of this result, it would appear that hedging to do with quantification in Introductions is most characteristic of technology RAs in comparison with the other two fields of science. The reason for this apparently stems from the nature of the discipline, hedging typically associated with quantifications perhaps being more common in technology, where calculations and other numerical data may be more frequent than in economics and medicine, an assumption that will be addressed in more detail in Chapter 7.

The reasons the RA authors cited for the use of hedging phenomena in extracts taken from Introduction sections did not differ much from discipline to discipline. In economics, the authors of one article stated that they were motivated to hedge because they are “not so brash as to suggest this single study is the definitive work or that it can possibly answer all the relevant questions”, or because they wished not to “overstate the case.”<sup>96</sup> Similarly, another author of an economics RA explained that hedging was applied because the analysis presented “is not definitive, but only provides some evidence on the hypothesis of interest.” Furthermore, hedges were said to be employed in economics Introductions since the issues introduced are “not empirically proven,” it is unclear whether the phenomena treated truly exist or whether it is indeed possible to investigate the issues under scrutiny, or since there is more than one way of looking at the subject dealt with. In the other two disciplines, authorial responses revealed similar general motivations for hedging in Introductions. In medicine, for instance, the preliminary discussions of the research to be reported were hedged “because the factors described cause the results of the scientific experiment to be imprecise and not possible to interpret with a high level of certainty.” Moreover, in technology RAs, hedging was said to occur “to admit the possibility of an exception to the general rule” discussed as a starting point of the research to be reported.

As Swales (1990: e.g. 140) points out, the structure of RA Introductions can be analyzed with reference to RA authors’ need to ‘create a research space’ (CARS), a task involving three major moves, namely “[e]stablishing a territory”, “establishing a niche”, and “occupying the niche” (op. cit.: 141).<sup>97</sup> In general terms, then, the Introduction section involves presenting the topic to be dealt with by placing it in perspective with regard to the existing research paradigms and previous work, demonstrating that there is a need for work in the area due to for example

gaps, lack of evidence, errors, or shortcomings in previous studies. One of the aims of the Introduction is thus to explain how this need will be addressed by the research at hand. Granted the idea that the mode of presentation in scientific discourse such as RAs is subject to various expectations deriving from the communal nature of scientific knowledge production, as explained in the previous chapter, it seems only natural that when RA authors are establishing a position for their work among that of other scholars, their language use is tempered by elements such as hedges, useful “for diplomatically creating a research space in areas heavily populated by other researchers” (Swales 1990: 175). According to RA authors’ comments, it appears that it is particularly the third step in Swales’ ‘CARS’ model to which hedging is linked in Introductions, as the strategy allows RA authors to introduce their research projects to the scientific community without being too bold as to the importance and definiteness of their work, the limitations of the research projects for instance stemming from the possible unfeasibility of the research procedure or the possibility that the standpoint adopted in the research process may not be the most illuminating one. However, as we have seen above, hedging devices may be found in a variety of contexts in the RAs, not only in preliminary discussions of the authors’ own work in occupying a niche (see e.g. example 34 above), but also in connection with establishing a territory, for instance when giving an overview of previous work (30), as well as in establishing a niche, as when pointing toward a gap, shortcoming or lack of sufficient evidence in previous work (85).<sup>98</sup> In each case, the use of hedges may be seen as a cautionary strategy, allowing the authors to ‘diplomatically’ indicate less than full commitment to what is being said. Despite the different uses of hedges observed in Introductions, however, the responses obtained from the authors of RAs interestingly suggest that they first and foremost see hedging as a strategy that allows them to tone down commitment to aspects relating to the principles and practicalities of their own work when ‘*occupying* a niche’ rather than as a means of toning down commitment in *establishing* a territory or a niche.<sup>99</sup> It should be pointed out, however, that it is not certain whether this is a reflection of authorial views more generally or merely a narrow conception of the matter arising from the relatively low number of responses obtained from the RA authors.

#### 4.3.4 Hedging in Methods

As mentioned previously, according to earlier research, Methods sections in disciplines like medicine (Salager-Meyer 1994) and biology (Hyland 1998) are typically the least heavily hedged parts of RAs, a finding which is in line with general comments concerning Methods sections in

the ‘hard’ sciences. According to Knorr-Cetina’s (1981) study of the transition of research notes into (biochemistry) research articles, the Methods section—despite the possibilities that a number of potential problems may be involved in the methodological choices made and that various alternative methodologies could also be applied instead of the one chosen—is in the nature of

a laconic checklist of steps taken. Rather than reasoned selections in which the doings of the laboratory are inserted and stabilised, we find a catalogue of sequential manipulations stripped of both context and rationale. In place of an account of the social negotiations of particular agents through which the laboratory choices were derived, we find a selective recording of the transient results of those negotiations permeated by technical particularisation. In sum, method is presented as a flow-chart of selections disguised as *non-selections*, for lack of relevant contextualisation. (op. cit.: 115)

In other words, then, Methods sections have been characterized as “highly abstracted reformulations of final outcomes in which an enormous amount is taken for granted” (Swales 1990: 121), an apparent result of this being the relative rarity of devices which draw attention to possible shortcomings, debatable issues, mistakes, and other problems associated with the methods applied (see Swales 1990: 120). This is precisely why hedging might be assumed to be rare in Methods sections. What has not been accounted for to any greater extent, however, is the possibility of disciplinary variation in the amount of hedging in Methods sections, some disciplines perhaps being less abstract in presenting the methods applied. As Swales (op. cit.: 169) points out, some of the tendencies detected in Methods sections in sciences such as medicine and biology might not be applicable to ‘softer’ sciences, the abstract, “bald past tense narrative” (op. cit.: 120) of the life sciences perhaps not being characteristic of Methods sections “in the ‘soft’ social sciences” (ibid.). In my data, hedging phenomena did appear in Methods sections in each discipline examined, but differences could also be detected in the incidence of hedges, such variation probably deriving from the nature of the disciplines:

Table 7. Incidence of Hedges in RA Methods sections.

(The figures indicate the number per 1,000 words, respective rank order of the section for each hedge type in comparison with the other sections, and percentage of all hedges in the section.)

Type of Hedge	Economics (15,037 words)	Medicine (12,947 words)	Technology (8,971 words)
Modal Auxs	3.39 (4), 14.5%	0.85 (5), 5.7%	2.34 (1), 11.1%
Full Vbs Total	5.79 (5), 24.7%	3.40 (5), 22.7%	3.90 (3), 18.4%
Adverbs Total	3.19 (4), 13.6%	2.16 (4), 14.4%	5.02 (5), 23.7%
Adjectives Total	1.60 (5), 6.8%	1.24 (4), 8.2%	2.23 (4), 10.5%
Nouns Total	5.25 (4), 22.4%	1.70 (4), 11.3%	1.78 (3), 8.4%
Clausal Elements	1.40 (3), 6.0%	0.46 (4), 3.1%	1.00 (4), 4.7%
Questions	-	-	-
Other	2.79 (2), 11.9%	5.17 (3), 34.5%	4.90 (1), 23.2%
Total	23.41 (5), 100%	14.98 (4), 100%	21.18 (5), 100%

As we can see, the incidence of most of the hedge types was quite low in the Methods section in comparison with the other sections in each discipline. Interestingly, however, in technology the relative number of modal auxiliaries was at its highest in Methods, and the category of ‘Other’ also occurred quite commonly in each discipline. What is most interesting about these findings, however, are the differences in the overall incidence of hedges. While Methods was among the sections with a lower degree of hedging in all subject fields, there was noticeable variation in the relative incidence of hedges. Some of the variation observed may be explained by the characteristics of the disciplines. On the one hand, medicine, being quite a ‘hard’ science, may not be hedged very extensively exactly because of the kinds of reason cited by Knorr-Cetina (1981) and Swales (1990). Economics, on the other hand, cannot be seen as an equally ‘hard’ science, which is why the Methods sections may be hedged more heavily. In fact, one of the writers of the RAs on economics underlines that the RA Methods section he authored is hedged because “social science theories are frequently imprecise”, which also applies to economics RAs in more general terms, because “social sciences are less precise than topics like physics or mathematics.” As a matter of fact, another RA author goes as far as describing the state of scientific knowledge in economics as “abysmal”, a matter which the author thinks should be communicated clearly when writing about economics. Generally speaking, the primary basis for the use of hedges in economics seemed to be linked to the possible shortcomings or uncertainties involved in the methodological choices made (see e.g. 43 above), a use which, according to Knorr-Cetina’s and Swales’ views, would not be as evident in the ‘hard’ sciences. As one author

suggests, every researcher has to make procedural choices in deciding on the methodology of the research process. It appears, then, that at least in economics the possible problems involved in such choices are quite often signaled to the readership by means of hedges.

While hedged to a noticeably lower degree, reasons similar to those seen in economics were cited for the use of hedges in Methods in medicine. For instance, the motivation for hedging cited by the author of a medical RA was that the research procedure is partially based on “the most likely interpretation of the pattern of illness descent”, a hedge also to do with the uncertainties of the methodological choices made by the authors. In technology, the relative number of hedges was again quite similar to the figures seen in the other sections of the technology RAs, and many of the instances in which hedges occurred were associated with the possible problems inherent in the procedural choices made (as in 39 above) in ways similar to the other two disciplines. However, a difference worth mentioning between technology and the other two disciplines is again the use of hedges to do with quantification. If we combine the results on the adverbs and adjectives often resulting in hedged quantifications with the category of ‘Other’ hedges, also linked to quantification in a number of cases, in the Methods sections of the economics RAs the incidence of such hedges was 6.18 per 1,000 words, which accounts for 26.4% of all hedges found in Methods sections. In medicine, 7.80 hedges of this kind occurred per 1,000 words in Methods, accounting for 52.1% of all hedging. However, as was also the case in Introductions, the incidence of such hedging was highest in technology, with a relative incidence of 11.48 per 1,000 words and a share of 54.2% of all hedges found in Methods. The prevalence of such hedging in technology was also reflected in authorial views concerning the reasons for hedging in Methods. As one author of an RA on technology puts it, “any equation that describes the real world is an approximation of one sort of another”, and in the light of the present results it seems that the existence of such approximations is quite commonly pointed out by hedging devices in Methods sections in medicine and especially in technology. However, it seems that in economics this is not quite as common, apparently because quantifications may not occur in economics to the same degree as in the more empirically oriented ‘hard’ sciences.

#### 4.3.5 Hedging in Results

Earlier work into the occurrence of hedges in RA Results sections has illustrated that this section may contain a fair number of hedging phenomena. In the medical RAs examined by Salager-Meyer (1994: 161), hedging amounted to approximately 3.3% of the total number of words,



Results sections being the second most heavily hedged ones in her data. In Hyland's (1998: 154) study of biology RAs, Results sections were found to include 20.0 hedges per 1,000 words (i.e. 2% of the number of words). In Hyland's data, too, Results was the second most heavily hedged section, although the figures for Introductions were exactly the same. In comparison with the Discussion sections, the incidence of hedging in the Results sections examined by Salager-Meyer and Hyland is noticeably lower. In fact, Salager-Meyer is of the opinion that the incidence of hedges in Results is "low", the reason for which is "the fact that the *Results* section of RP [=RA] consists of a quite straightforward presentation of findings; it presents a clear description of the results, describes the process of manipulating the data obtained during the experimental stage, and makes limited claims about the statistical tests" (1994: 161-162). Hyland, too, points out that hedges do occur most frequently in Discussions, but he does provide motivations for the use of hedges in Results as well. The reasons Hyland suggests appear to be closely linked with Myers' (1989) idea that in scientific discourse hedges occur where new knowledge is presented, the hedging of new knowledge claims being "so common that a sentence that looks like a claim but has no hedging is probably not a statement of new knowledge" (Myers 1989: 13):

The Results section is where new knowledge is presented and relevant features of experimental method discussed, requiring the writer to justify the techniques used and qualify the findings produced. Hedges therefore anticipate reader objections and pre-empt challenges to statements, largely by hedging the claims made for methods and results. (Hyland 1998: 154-155)

In the limited number of responses obtained from RA authors, the motivation for hedging in Results did not always *explicitly* involve the kind of 'protection' in putting forth new information that Myers and Hyland mention. Instead, in economics the strategy was for instance said to derive from the subjective nature of the information presented, from the putative existence of more than one alternative explanation or reason for the findings, the possibility that the findings obtained do not after all apply, or that the results arrived at are not altogether accurate. In medicine, too, the explanations were similar, one author saying that hedging reflects "that we do not know if all the assumptions underlying the experiment are correct." In technology, some of the reasons cited were slightly different. On some occasions, hedges were said to be used where "there was some spread of values" obtained by the researchers, a hedge such as the adverb *typically* being a useful means of indicating that the results obtained did not hold for each and every measurement. However, motivations similar to those cited in the other two disciplines were also stated for hedging when for instance the authors wished to express that "here's a plausible

mechanism, but we can't make any strong assertion until we have some data to back it up." Although, as stated, the motivations for hedging are not always explicitly linked to Hyland's proposal as to the reasons for hedging in Results, the motivations cited by RA authors may nonetheless in a roundabout way be associated with exactly the kind of caution in reporting new findings that Hyland mentions. However, as can be seen below, disciplines may not be quite uniform in the extent to which linguistic strategies with such presumed goals are applied.

In my RA data, there was considerable disciplinary variation in the degree to which Results sections were hedged, some noteworthy differences being detectable in both overall incidence and in the frequencies of the different categories of hedges:

Table 8. Incidence of Hedges in RA Results sections.

(The figures indicate the number per 1,000 words, respective rank order of the section for each hedge type in comparison with the other sections, and percentage of all hedges in the section.)

Type of Hedge	Economics (18,206 words)	Medicine (14,101 words)	Technology (22,432 words)
Modal Auxs	3.68 (3), 11.6%	1.06 (4), 7.2%	2.10 (2), 9.4%
Full Vbs Total	8.35 (3), 26.2%	3.83 (4), 26.0%	3.49 (4), 15.7%
Adverbs Total	4.78 (2), 15.0%	1.91 (5), 13.0%	6.78 (4), 30.5%
Adjectives Total	2.09 (4), 6.6%	1.99 (3), 13.5%	3.17 (1), 14.3%
Nouns Total	7.85 (2), 24.7%	1.42 (5), 9.6%	1.83 (2), 8.2%
Clausal Elements	3.24 (2), 10.2%	0.43 (5), 2.9%	1.03 (3), 4.6%
Questions	0.05 (2), 0.2%	-	0.04 (2), 0.2%
Other	1.81 (4), 5.7%	4.11 (4), 27.9%	3.79 (4), 17.1%
Total	31.86 (3), 100%	14.75 (5), 100%	22.20 (3), 100%

In economics and technology, as seen, Results was the third most heavily hedged section after Discussion and Introduction sections. In medicine, on the other hand, the results were lower than one would expect in view Salager-Meyer's (1994) results. Apart from containing the highest relative overall incidence of hedges in Results, economics was also the discipline with the highest relative incidence for many of the hedge categories. The figures for full verbs and nouns were noticeably high in Results in the area of economics as opposed to the other two disciplines, especially so when it comes to for instance tentative cognition verbs and tentative cognition nouns (see Appendix 3). As to the frequencies of adverbs and adjectives in technology, it seems that the result once again derives from the prevalence of hedges to do with quantification. When we combine the results on the category of 'Other' with those adverbs and adjectives that often occur in connection with or in the place of numerical data, the relative incidence of such hedges comes

up to only 6.70 per 1,000 words in economics (21.0% of all hedges in the Results section) and 6.95 in medicine (47.1%), but is as high as 12.48 in technology (56.2%).

Once again, then, it seems that the various hedging devices are applied differently in ‘softer’ social sciences like economics and somewhat ‘harder’ sciences like medicine and technology. On the one hand, the high incidence of hedges in economics may derive from the information structure of the economics articles, which, as noted, does not follow the IMRD structure as rigidly as in for instance medicine. Instead, in the economics RAs examined, the Results section not only involves straightforward presentations of results, but also often contains simultaneous interpretations of the findings and discussions of their interpretations, which is why certain kinds of hedge perhaps more often seen in Discussion sections in other disciplines were quite frequent in Results sections in economics. This may explain why many devices indicating the subjective, non-categorical nature of the cognitive processes underlying the information put forth (e.g. tentative cognition verbs and nouns) were particularly common in Results in economics. In medicine and technology, more empirically oriented disciplines, on the other hand, hedges typically to do with the presentation of numerical results were more common than in economics, such devices pointing toward the imprecision of the results rather than of the cognitive processes involved in interpreting the findings. Furthermore, differences may exist in the use of hedges even among the more empirically oriented disciplines, as the current results suggest. Whereas the degree of precision and certainty warranted to numerical findings in Results sections in technology RAs might be toned down by hedging quite often, this may not be as common in medicine, where the emphasis is not perhaps as typically on numerical data. In addition, as Salager-Meyer’s work (1994: 162) suggests, results may be presented in a more straightforward manner in medicine, the limited amount of hedging applied perhaps being more often linked to “an evaluation/discussion of the results than to the results per se.”

#### 4.3.6 Hedging in Discussions

In comparison with the RA sections examined above, Discussion sections were the most heavily hedged ones across the disciplines, a finding on a par with earlier work. The reason why hedges occur frequently in this rhetorical section is obviously linked to the kind of information it encompasses. Hyland (1998: 154) summarizes the motivation for hedging in this section by saying that

[i]t is in Discussions that authors make their claims, consider the relevance of results and speculate about what they might mean, going beyond their data to offer the more general interpretations by which they gain their academic credibility. The level of generality, and therefore the density of hedges, is much higher here, as writers explore the ramifications of their results.

While the conclusion that the density is “much higher” in Discussion as opposed to the other sections has been documented to apply to disciplines such as biology (Hyland) and medicine (Salager-Meyer 1994), this, as we saw above, is not perhaps an altogether accurate description of the situation in certain other disciplines, such as technology. Nevertheless, it does seem that the motivations for hedging are fairly similar across the three disciplines, hedges being commonly employed in presenting authorial interpretations of the data and generalizations based on these interpretations. In economics, for instance, one RA author stated that hedging took place where the conclusions drawn were applicable to many, but *not every*, case. Similarly, in medicine, hedging was reported to occur where there is “uncertainty about the meaning of the experimental results”, and the results obtained therefore did not yield sufficient evidence that would have allowed the authors to make definite claims about the issue under scrutiny. In technology, the motivations cited were not very different either, one author explaining that hedging was applied where only limited data existed, but the authors nonetheless “wanted to put out a possible mechanism that could be studied in future work.”

However, as we can see from Table 9, although the motivations for hedging cited by RA authors did not vary much between the three fields of study, disciplinary differences were to be detected not only in the overall incidence of hedges in Discussions, but also in the degrees to which the different categories of hedges were employed.

Table 9. Incidence of Hedges in RA Discussion Sections.

(The figures indicate the number per 1,000 words, respective rank order of the section for each hedge type in comparison with the other sections, and percentage of all hedges in the section.)

Type of Hedge	Economics (10,584 words)	Medicine (14,114 words)	Technology (4,159 words)
Modal Auxs	8.13 (1), 22.5%	7.58 (1), 21.7%	1.92 (3), 7.3%
Full Vbs Total	8.69 (2), 24.1%	6.87 (1), 19.7%	5.29 (1), 20.0%
Adverbs Total	4.44 (3), 12.3%	3.54 (1), 10.2%	7.45 (3), 28.2%
Adjectives Total	3.59 (1), 9.9%	3.05 (1), 8.7%	1.44 (5), 5.5%
Nouns Total	3.97 (5), 11.0%	2.90 (2), 8.3%	1.20 (5), 4.5%
Clausal Elements	3.31 (1), 9.2%	3.47 (1), 10.0%	4.33 (1), 16.4%
Questions	-	0.07 (1), 0.2%	-
Other	3.97 (1), 11.0%	7.37 (1), 21.1%	4.81 (2), 18.2%
Total	36.09 (1), 100%	34.86 (1), 100%	26.45 (1), 100%

The difference in the use of hedges between Discussions and the other rhetorical sections was most prominent in the medical RAs and also quite noticeable in economics, whereas in technology the difference was not as great. In medicine, the difference is probably related to the observation that medical RAs often follow the IMRD pattern quite rigidly, Hyland's ideas about the reasons for the prevalence of hedging Discussion sections being particularly applicable to 'hard' empirical disciplines like medicine and biology. Technology, too, may of course be viewed as a 'hard' empirical science just as medicine, but as the present study suggests, hedging may not be distributed in quite the same way as in medicine. Instead, it seems, the margin between the numbers of hedging in the different rhetorical sections are narrower in technology, for which we can decipher at least two reasons. On the one hand, as explained earlier, applying the IMRD pattern to the technology RAs examined was not a straightforward task, and it seems that in technology, as is also the case in economics, the information included in the different RA sections is not differentiated in content to the same extent as in medicine. In consequence, the 'claims' and 'speculations' concerning results may also occur elsewhere apart from Discussions, which may partially explain the present findings concerning technology. In economics, too, the differences between the sections might be evened out somewhat because of the finding that some of the information typically seen as belonging to Discussions in certain disciplines may also be incorporated into the Results section.

On the other hand, in the case of technology we may again return to the observation that, in comparison with for instance economics, technology is more quantitatively oriented insofar as it for example often relies on methodologies involving measurements and calculations of various

kinds. This is also suggested by the nature of the hedging phenomena identified in the technology Discussions, especially the subcategories of adverbs (see Appendix 3) commonly linked to quantifications being well represented as opposed to their number in the other disciplines. In the Discussion sections, hedges typically to do with quantification (adverbs, adjectives, and “Other” hedges) amounted to 11.54 per 1,000 words in technology, 43.6% of all hedges in the section. The corresponding figures were somewhat lower in medicine (10.77; 30.9%) and especially so in economics (7.37; 20.4%).<sup>100</sup> While quantification-oriented hedging may become less frequent in disciplines like medicine and particularly economics, RA Discussions in these subject areas more often involve hedges to do with ‘making claims’ and ‘speculating’. Hence, instead of the kinds of device useful for hedging numerical data, economics and medicine make more commonly use of ‘speculation-oriented’ items, for instance modal auxiliaries, full verbs, nouns, as well as adverbs and adjectives to do with probability. In technology, however, the extent of such hedging is not as high as in economics and medicine, which illustrates that the kinds of hedge employed in RA Discussions have indeed a lot to do with the nature of the discipline.

\* \* \*

As we have seen above, noteworthy disciplinary variation in the use of hedging phenomena could be detected in the RA data examined in the overall incidence of hedges, the degree to which the different rhetorical sections of RAs were hedged, and in the use of specific types of hedging phenomena. Such results can be explained with reference to the different characteristics of the three subject fields dealt with, and such variation carries important implications for the research and pedagogy of scientific discourse. While some sources have pointed out that there may be noticeable variation between disciplines in the use of hedges, others have also downplayed such differences to a certain degree. The current findings do suggest that considerations of academic hedging in discourse such as RAs should indeed invest thought specifically in the influence of the topic area on the incidence and nature of hedging phenomena. The reasons underlying the disciplinary differences will be discussed in more detail in Chapter 7, which is also where the implications of the present findings will be discussed further. But let us first turn to a consideration of hedging in popular scientific articles, a type of text in many respects different from the RAs examined.

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<sup>1</sup> A table summarizing the results concerning the subtypes of hedges included in the main categories is presented in Appendix 2.

<sup>2</sup> Some of the figures do not add up exactly to the totals due to rounding.

<sup>3</sup> The last class, ‘Other’, constitutes a ragbag category including myriad devices (e.g. certain phrases, numerical hedging other than cases for instance realized by means of approximative adverbs or adjectives, etc.) that cannot be satisfactorily fitted into the other categories established, but are nevertheless similar to items included in one or more of the other categories by meaning and function. Due to its mixed nature, however, this category will occasionally be excluded from numerical comparisons of the different categories of hedges.

<sup>4</sup> On the other hand, the results do differ to some degree from Holmes’ (1988: 27) findings regarding epistemic modality used to express doubt and certainty in the ‘Learned’ sections of the Brown and LOB corpora, where the modal auxiliaries emerged as the category most commonly employed to express doubt and certainty. However, there are some noteworthy differences between Holmes’ and my research, some of the dissimilarity perhaps being attributable to these differences. The most important difference is evidently that I am not interested in expressions of absolute certainty, whereas Holmes’ research is also focused on devices with such a meaning. Furthermore, it is to be noticed that the ‘Learned’ materials of the Brown and LOB corpora—including material from a variety of sources (e.g. subject fields like mathematics, natural sciences, education and texts from different genres such as RAs and textbooks)—are different from my (and Hyland’s) RA data.

<sup>5</sup> For the reason cited in note 3 above, the category of ‘Other’ is excluded from these comparisons.

<sup>6</sup> The result concerning questions is by no means unexpected. Similar results are also reported by Hyland, who says that in his biology RA corpus questions were “a relatively uncommon means of highlighting knowledge limitations” (1998: 143). In fact, one might go as far as saying that formal written discourse such as RAs can be assumed to include very few questions of *any* kind.

<sup>7</sup> This figure is surprisingly similar to Hyland’s results, 85% of the hedges in his biology RA corpus being lexical.

<sup>8</sup> It is to be noticed, however, that the percentages do not involve all instances of lexical hedging identified, a fair number of lexical hedges also being included in the ‘Other’ hedges to be examined after the results regarding all other types of hedging have been presented. It should also be noted that the scope of the term *lexical* is not always straightforward. The term *lexical hedging* is here employed to refer to hedging devices belonging to the categories established with an eye on the traditional word-class division (auxiliaries, full verbs, adverbs, adjectives, nouns).

<sup>9</sup> When it comes to English, Crystal’s (1997: 244) dictionary definition of modality, for instance, apparently supports the idea of the modal auxiliaries as central among the items expressing modality in saying that “[i]n English, modal contrasts are primarily expressed by a subclass of AUXILIARY verbs, e.g. *may, will, can.*” As shown above, as concerns the kind of modality used to express hedging in my RA data, modal auxiliaries are indeed not the most frequent means of doing so. The difference in views such as that expressed by Crystal and that suggested by my results may naturally derive from the way in which the concept of modality is understood. As stated earlier, if we approach hedging by treating it as something akin to epistemic modality (as is the case in this study), in order to provide a representative view of the elements that may be employed as hedges we must also take an inclusive approach as to what types of element are seen to relate to modality.

<sup>10</sup> Since the emphasis in this study is on the phenomenon of hedging, in what follows attention will only be given to those devices that were found as hedges in the data, whereas instances of modal auxiliaries not relevant in view of hedging will not be discussed here. Although it might be interesting for those working on the general features of modality to deliberate over the overall incidence and both the hedging and the non-hedging functions of the modal auxiliaries, the present study will only concentrate on the epistemic cases, the specific focus here being on hedging, not the wider field of modality. Information on the overall incidence of devices such as the modal auxiliaries and the relative shares of their various meanings in different kinds of texts may be found in studies by e.g. Palmer (1979), Coates (1983), and Butler (1990).

<sup>11</sup> These are also the modal auxiliaries that Coates (1983: 131 ff.) describes more closely when discussing epistemic modality.

<sup>12</sup> For precise figures, see Table 3.

<sup>13</sup> The motivation for the tentativeness indicated by the modal auxiliary in examples like (4) is not clear. It would be interesting to examine to what extent hedging of this kind derives from the reluctance of authors to make unqualified statements regarding earlier work and to what degree hedging is motivated by the tentativeness originally expressed in the sources referred to. Such comparisons could perhaps be carried out by a close scrutiny of the sources mentioned in the articles analyzed, but due to the large number of such cases and the unavailability of many of these sources, this aspect of the matter will not be explored further here. Instead, it is assumed that hedging by means of epistemic expressions with reference to previous work indicates that the author of either the article or the source referred to (or perhaps both) does (do) not want to give the information the status of unqualified truth in the eyes of the readership.

<sup>14</sup> If one were to examine isolated sentences or very short extracts of the RA corpus including examples of *may*, one might run away with the idea that mergers are indeed fairly common in the data. However, a number of such

indeterminate cases seemed to resolve when their surroundings were examined more extensively, the interpretations often becoming more straightforward with the help of the co-text.

<sup>15</sup> Coates (1983) has also observed that the use of *might* to express epistemic possibility in the same way as *may* appears to be on the rise, so that at least in some varieties it might be “superseding MAY as the main exponent of Epistemic Possibility” (p. 147). Interestingly, Barber (1993: 275) says that generally speaking the use of *might* is decreasing, and “[f]or many of the younger generation, indeed, auxiliary *might* now hardly exists, either *may* or *could* being used instead.”

<sup>16</sup> The last example might also be taken to involve the kind of merger between the epistemic and hypothetical epistemic meanings discussed by Coates (1983: 163), the former paraphrasable with ‘it is possible that mutations in this gene explain’, the latter with ‘it is possible that mutations in this gene would explain’.

<sup>17</sup> Within a few lines after this example, the authors of the article indeed explain that the interviewer was able to ascertain the closure status of the restaurants with 100% certainty, the information qualified by *might* in fact becoming certain. This is of course something that happens regularly in discourse such as RAs, where one might undertake a research project for instance to investigate the possibility that a given medicine produces a particular effect. Should it be the case that this proves to be invariably so, what may first be described as a hypothetical possibility in an RA transforms into an empirically tested certainty during the course of the report. Thus, what is first hedged may later be discussed without hedging due to empirical validation. In (9), then, we may see *might* as a hedge which reports the researchers’ original tentative idea (store closure explaining non-response) as an unvalidated possibility, the effect of the presumed reason then being validated during the research project.

<sup>18</sup> This result might be taken as indicative of Coates’ (1983: 167) suggestion that *could* may be on the way toward becoming a more common means of expressing tentative epistemic possibility.

<sup>19</sup> For a discussion of these terms, see the subsection on *will* below.

<sup>20</sup> As a matter of fact, Coates (1983) employs the term ‘epistemic’ to refer to such cases not only because of the presumed epistemic meaning involved, but also so as to differentiate such instances from the more clearly deontic uses of *would* and because such general hypothetical cases of the auxiliary resemble other epistemic modals syntactically (p. 213).

<sup>21</sup> Implicitly, this comment may be taken to mean that Coates does not see the hypothetical uses of *would* depending on a condition as tentative.

<sup>22</sup> The use of *would* in connection with items like *seem*, *appear*, and *expect* apparently increases the degree of tentativeness involved. It should be mentioned that when such ‘double’ (in fact sometimes even triple or quadruple) hedges were found, each component of the combination was assigned to its respective lexical category in the analysis.

<sup>23</sup> An example of such a case would be

If he saw a light, it can’t have been the light of the motor cycle. (Palmer 1990: 60)

<sup>24</sup> An example of this use would be

Can they be on holiday? (Palmer 1990: 62)

<sup>25</sup> The temperature at which they are kept can/may influence the quality of these pharmaceutical products.

is an example of such a merger cited by Declerck (1991: 398)

<sup>26</sup> Whether the collocation *can well* would be accepted by all other scholars and native speakers of English is not altogether certain, but the example does provide some justification for viewing certain cases of *can* as epistemic, because at least some linguists seem to be of the opinion that epistemic *can* is possible.

<sup>27</sup> The JDEST corpus, compiled at Jiao Dong University in Shanghai in the mid-1980s, includes data from a variety of disciplines and types of text, such as theses, textbooks, and popular science, which is why, if considered *in toto*, the results emerging from the corpus are not representative of any specific discipline or type of text. Furthermore, like the Brown and LOB corpora, the JDEST corpus includes text extracts, not complete texts. This is why it might not capture the full picture of a phenomenon like hedging, which may be applied differently in the various sections of scientific texts (see e.g. Salager-Meyer 1994, Hyland 1998). As concerns comparisons between my results and those from the JDEST, Brown, and LOB corpora, it should be noticed that the three corpora mentioned involve remarkable internal variation as regards topic areas and types of text, which is why results based on these corpora cannot be used reliably to shed light on the characteristics of RAs. However, these corpora provide interesting points of comparison with the present results.

<sup>28</sup> One of Hyland’s (1998: 121, my italics) examples of epistemic judgment verbs in hedging use is as follows:



We *speculate* that the inhibitor interacts specifically with a protease, the origin of which is still to be determined ...

<sup>29</sup> One example of Hyland's epistemic evidential verbs (1998: 125, my italics) in hedging use is:

This hypothesis *seems* plausible because UV-B-absorbing flavonoids accumulate in leaf epidermal cells, where they may protect the ....

<sup>30</sup> One might naturally try to seek support for the judgment-evidential distinction by requesting information from authors as to the motivation for using such full verbs. This, however, would doubtless be a most time-consuming and laborious undertaking given the high incidence of such verbs.

<sup>31</sup> The term 'reporting verb' may be understood in different ways. In a study of reporting verbs in medical journals, Thomas and Hawes (1994) use the term to refer to a variety of verbs found in reporting structures, including verbs such as *find*, *demonstrate*, *state*, *report*, *think*, and *believe* (op. cit.: 133). In the present study, however, reporting verbs are approached more narrowly, being limited to the kinds of device included in Thomas and Hawes' (op. cit.: 137) subcategory of "discourse verbs", items that are commonly used to refer to "activities that are linguistic in nature and involve interaction through speech or writing" (e.g. *suggest*, *imply*).

<sup>32</sup> Fraser's (1975) taxonomy of performative verbs is one of the best-known classifications involving full verbs pertaining to epistemic modality (see Perkins 1983). Fraser distinguishes eight illocutionary acts that performative verbs can realize and uses these acts as a basis for categorizing the verbs. While of obvious theoretical interest for those interested in the potential meanings of performative verbs, Fraser's taxonomy may be problematic in the analysis of authentic data as concerns hedging. As explained earlier, even one single hedge can be seen to perform more than one function, that is, hedges are polypragmatic. The same applies to the kinds of verb treated by Fraser (1975: 189), who in fact acknowledges that one single utterance often performs several illocutionary acts. If, for instance, we consider the verb *suggest*, in Fraser's taxonomy it can be used to perform both the act of asserting (to convey "the speaker's assessment of how the proposition expressed fits into the conversation, and the speaker's strength of conviction in the truth of the proposition expressed", verbs such as *suggest* being tentative in that they "place certain restrictions on successful performance of the act" involved [op. cit.: 190-191]) and the act of suggesting (to express "the speaker's desire for the hearer to consider the merits of the action expressed in the proposition" [op. cit.: 192]). Drawing a distinction between these two acts typically performed by *suggest* would probably be in many cases impossible in authentic language use, as either or both of the meanings could be intended in a given occurrence of the verb. In the case of *suggest* and, I think, many other similar verbs, distinguishing between the kinds of illocutionary act realized by the verbs would be impossible, the classification suggested by Fraser (1975) and adopted by Perkins (1983: 94-95) not providing a practical basis for classifying full verbs of hedging in a study of authentic language use.

<sup>33</sup> As noted previously, it would be interesting to compare the extent to which hedging in references to other sources reflects tentativeness expressed by the citing author with the degree to which hedging originates from the source cited. However, as explained, this line of study is not adopted here due to the complexities involved.

<sup>34</sup> According to Crompton (1997: 283), reporting verbs such as *suggest*, *argue*, *propose*, and the like can only be seen as hedges "if authors have elected to use them to report their own proposition; thus, for example, 'I suggest that pigs fly' would be regarded as a hedged version of 'Pigs fly', whereas 'Smith suggests that pigs fly' would not." However, I do not share Crompton's view of the matter for various reasons. To begin with, Crompton's view can be challenged by the idea that even though RA authors might not be directly responsible for the accuracy of the information reported, they may nonetheless have an interest in qualifying such information for certain reasons. For instance, if RA authors are doubtful about the accuracy of information cited by other sources, they are quite likely to hedge such information so that the communal expectations of scientific honesty and caution are not overlooked. Furthermore, as Swales (1990: 175) points out, hedges are also a useful means of "diplomatically creating research space", devices such as *suggest*, *argue*, and so on being at the forefront of devices that may be employed to politely hint toward gaps or shortcomings in other researchers' work. In addition, even if it were to prove that in cases such "Smith suggests that pigs fly" the nonfactive reporting verb originates from the source referred to, one might speculate that in employing the same wording as the source, the author in fact adopts the same tentative standpoint as the source and wishes to signal to the readers that what is said is possibly not the final say in the matter. In consequence, the kind of distinction between hedging and non-hedging uses of verbs like *suggest* and *argue* that Crompton establishes will not be adopted here.

<sup>35</sup> In other words, while the items included in this verbs category may occur in different structures, their different uses are after all quite similar in meaning. The verb *suggest*, for example, may be used in slightly different ways

when scholars report their own work, with the scholars themselves in subject position (*On the basis of our results, we would like to suggest that...*) or with a less personal subject (*The present findings suggest that...*). The same also applies when reference is made to the work of other scholars (*Smith suggests that.../Smith's findings suggest that...*). As we have seen above (1.2; see also Lachowicz 1981, Myers 1989), both personal attribution and impersonality have been associated with hedging, and it would be interesting to find out how the choice of a personal or impersonal subject in connection with verbs like *suggest* affects the hedging value of the construction. Be this as it may, what seems clear is that, regardless of the surface structure in which they occur, verbs like *suggest* indicate that what follows is a report of the work of either the author or another scholar. At the same time, the verb indicates that information presented is not to be taken as categorical, that what is being said is a suggestion worth considering but not the final say in the matter.

<sup>36</sup> Although quite assertive by nature, the verb *argue* may well be understood to hedge the information reported from another source in portraying the information as a mere *argument*, something that may or may not be accepted by other scholars.

<sup>37</sup> The following verbs were included in the category of nonfactive reporting verbs: *allege, allude, argue, charge, claim, contend, forecast, implicate, imply, point to(ward), portend, posit, postulate, predict, propose, suggest*. It should be noted that assigning the verbs to the categories established was by no means a straightforward task. In fact, it would also have been quite justified to assign some of the verbs included in the present category to the category of tentative cognition verbs (e.g. *forecast, postulate*). For the problematic verbs, the most typical contexts of occurrence were used as guidelines in determining to which category the verbs would be assigned.

<sup>38</sup> The verb *indicate* was found quite often in the data and is also included in Hyland's (1998) analysis of hedging in RAs, where it is in fact found to be the most frequent full verb employed as a hedge in the RAs examined. However, in view of its occurrences in my corpus, the verb seems most problematic due to its various meanings. Sometimes the item seems to be quite assertive, paraphrasable by verbs like *show*. In other surroundings, it might be seen to take on an epistemically tinted meaning something akin to *imply*. However, even native speaker reactions, to say nothing of dictionary definitions, of the verb are so varied that the decision was taken in this analysis to omit this verb altogether, because determining its meaning even with a reasonable degree of reliability seemed impossible. As to the verbs' hedging uses in Hyland's (1998) data, it is difficult to determine on what grounds the verb was analyzed as an instance of hedging. Looking at my own data, it seems that one reason why the verb might quite often be associated with hedging is its frequent use with impersonal subjects, in passive structures, and in connection with other linguistic choices that render the discourse more distanced and objective. In fact, such impersonalization techniques might in their own right be taken to allow "writers to hedge a responsibility to statements" (Hyland 1998: 122). What I would indeed like to argue is that in my corpus, the verb *indicate* is perhaps not so much the linguistic choice that produces a hedging effect. Instead, the tentative hue of the verb may have more to do with the kinds of structure surrounding the verb than with the meaning potential of the verb itself.

<sup>39</sup> Some of the verbs to do with the kinds of meaning that can be associated with hedging on the basis of Fraser's (1975) work (e.g. *regard*) are listed as "Cognition Verbs" by Thomas and Hawes (1994: 144-145), who state that although nonfactive, the verbs are used in reports when "the expectation is that there will not be any kind of negative evaluation of the reported findings", suggesting that the verbs do not express tentativeness concerning the validity of the information. This finding, based on a rather limited corpus (eleven research articles on medicine), seems to be in contradiction with Fraser's (1975: 191) description of such verbs, according to which *regard* is used in speech acts indicating the sender's assessment of the truth of the proposition expressed. The verb *regard*, especially when used with a first-person subject, could be seen as an item by which language users mark their assessment as subjective, which in turn can be interpreted as an indication that what is being said is based on language users' personal ideas and may therefore not be categorically certain. From this point of view, *regard* can be seen as a device by which we do in fact prepare for potential negative evaluations. I think that the picture of reporting verbs provided by Thomas and Hawes is too narrow, as it seems possible to use a number of full verbs other than the tentativity verbs listed by them to comment on the validity of what is being said, as Fraser (1975), Lysvåg (1975), Perkins (1983), and others imply.

<sup>40</sup> This term might not be the best possible characterization of the items (e.g. *think*), because many of them rather refer to mental activity than mental state (see Leech and Svartvik 1994: 76). Furthermore, the term *predicate* may not be altogether suitable for our purposes because it refers to a syntactic element, the verbs included in this group perhaps also occurring in other syntactic positions than that of the predicate. (It is also of interest to see that the terminology chosen by Nuyts does not follow the distinction between *predicate* and *predicator* suggested in numerous other studies such as Quirk et al. 1985 and Huddleston 1988.)

<sup>41</sup> Verb pairs such as *estimate-reestimate* were listed as one item instead of two.

<sup>42</sup> The 35 tentative cognition verbs are: *anticipate, approximate, (re-)assess, assume, believe, conceive, conceptualize, conclude, consider, deem, (re-)estimate, evaluate, expect, extrapolate, feel, hold (that), hypothesize, imagine, infer, interpret, judge, maintain, perceive, postulate, presume, project, regard (as), see (as), speculate, suppose, suspect, theorize, think, view (as), wish.*

<sup>43</sup> Some tentative linking verbs also share certain grammatical features with some of the verbs described above. Verbs such as *appear* and *seem*, for instance, are similar to tentative cognition verbs like *believe* and *assume* in that they can be used as *parenthetical verbs* (Perkins 1983: 98, for a further discussion of parenthetical verbs see Urmson 1952), as in *This is right, I assume* and *This is right, it seems*. This, however, does not apply to all of the tentative linking verbs examined here (cf. *tend*).

<sup>44</sup> The term *semi-auxiliary* is used to refer to different kinds of phenomena in different studies. Quirk & al. (1985), for example, say that the semi-auxiliaries “consist of a set of verb idioms which express modal or aspectual meaning and which are introduced by one of the primary verbs HAVE and BE” (p. 143), one example being the idiom *be likely to*. Why Declerck (1991: 203) also includes verbs like *appear, seem* and *tend* in the category of semi-auxiliaries is because their syntactic behavior (e.g. when subjected to passivization where accompanied by an infinitive) is similar to the kinds of phenomena mentioned by Quirk et al. In order to avoid confusion, the term semi-auxiliary will not be adopted here to refer to verbs like *appear* and *seem*. Instead, the term *tentative linking verb* (also occasionally used by Declerck 1991) will be adopted here. While obviously expressions of tentativeness and thus potential hedging phenomena, semi-auxiliary constructions such as *be likely to* may be seen to draw their hedging potential from the adjective *likely*, which is why occurrences of this kind will be dealt with below in connection with the hedging use of adjectives, no separate category being set up here to account for uses of this type.

<sup>45</sup> See e.g. *Longman Dictionary of Contemporary English* (1995, s.v. *appear*).

<sup>46</sup> The terms *neg[ative] raising* and *negative transportation* are also at times used to refer to this phenomenon (see Quirk et al. 1985: 1034).

<sup>47</sup> It is Declerck’s (1991: 303) view that transferred negation is almost the rule when the types of verb mentioned here are negated.

<sup>48</sup> The terminology used in treatments of adverbs and other functionally similar elements is quite varied. The distinction between the terms *adverb* and *adverbial* is not always drawn very precisely. In this study, adverbs are treated as lexical units, whereas adverbials are syntactic units, adverbs typically occurring in adverbial function, but there are also other elements apart from adverbs that can be found as adverbials. Adverbials are often subdivided on syntactic grounds. Quirk & al. (1985) suggest a subdivision into *adjuncts, subjuncts, disjuncts*, and *conjuncts*. Other terms are at times used to refer to these classes. Disjuncts, for example, have also been called *sentence adjuncts* and *sentence adverbials* in literature (see e.g. *Collins COBUILD English Grammar* 1990: 418). In this study, the terminology concerning the syntactic function of adverbs follows that of Quirk & al.’s (1985).

<sup>49</sup> It should be noted that direct comparisons between my results and those of Hyland (1998) are not possible in the case of adverbs, because some of the devices listed as adverbs in my study are included among items hedging numerical data in Hyland’s study, it being impossible to extract the exact numbers of the various adverbs included in Hyland’s study.

<sup>50</sup> The literature on adverbs and related phenomena is extensive, the present discussion being by necessity very limited in comparison with work focusing exclusively on adverbs. Apart from lengthy presentations in grammar-books (well over 200 pages in Quirk et al.’s 1985 grammar, for instance), numerous articles (see Allerton and Cruttenden, e.g. 1974) and monographs (e.g. Greenbaum 1969) on adverbs in English have been published.

<sup>51</sup> The word *likely* is peculiar in that it can be used both as an adverb and as an adjective. Distinguishing between the uses involves no greater difficulty, which is why the adverb and adjective uses of the item will be dealt with separately here.

<sup>52</sup> Perkins’ list also includes items that cannot be seen to express tentative epistemic modality (e.g. *clearly*), which were therefore excluded from the present analysis.

<sup>53</sup> How Hyland manages to distinguish between style disjuncts like *generally* and items like *usually* which he sees as adjuncts functioning as downtoners—and whether such a distinction is indeed always feasible given the multifunctional nature of hedges—is not altogether clear.

<sup>54</sup> As Quirk et al. (1985: 621) explain, it may at times be difficult to differentiate whether certain adverbs occur as content disjuncts or viewpoint subjuncts, only the former involving the kind of meaning relating to hedging. One case where such difficulty might arise is for instance the adverb *theoretically*, which was also found in my data. The adverb could be used as a content disjunct to refer to theoretical possibility (*Theoretically, this could mean that we have found a solution.*) or as a viewpoint subjunct paraphrasable by ‘if we consider what we are saying from a theoretical point of view’ (*Theoretically, your proposal is extraordinary.*)(see Quirk et al. 1985: 568). In the

abstract, such cases might at times give rise to ambiguity, but in my data the intended meanings of such occurrences could be ferreted out with the help of the context.

<sup>55</sup> As Greenbaum (1969: e.g. 174 ff.) illustrates, there are also adverbs that can be placed into more than one of the syntactically determined categories (e.g. *rarely* as an adjunct and a disjunct). However, it seems that there is not much of a difference in the meaning of such items even though they might at times behave differently in syntactic terms.

<sup>56</sup> Many of the items in the four subcategories established are included in what Biber et al. (1999: 557 ff.) describe as “epistemic stance adverbs”—a notion which could in fact serve as a cover term for the four types of adverb distinguished.

<sup>57</sup> As noted above, in terms of hedging potential, the syntactic status of the adverbs is of secondary interest, but syntactic considerations may come in handy in dealing with certain problematic cases.

<sup>58</sup> The 13 items are: *apparently, arguably, likely, perhaps, possibly, potentially, presumably, probably, seemingly, supposedly, tentatively, theoretically, unlikely*.

<sup>59</sup> Naturally, some of the adverbs treated here may also be used when for instance describing precise figures presented in a table or the like, especially when providing comparisons of figures obtained (e.g. x occurred more frequently than y). Cases where adverbs are used in descriptions of precise figures cannot obviously be taken to constitute hedging.

<sup>60</sup> It would be interesting to determine the precise motivation underlying the various instances of hedging found in the corpus in the form of expressions of indefinite frequency and the like. However, although such a project could in principle be carried out by obtaining information as to the use of each and every device of this kind from the authors of the articles scrutinized, this would apparently constitute an arduous undertaking indeed given the frequency of such devices.

<sup>61</sup> The 11 items identified are *commonly, frequently, generally, normally, occasionally, often, rarely, seldom, sometimes, typically, and usually*.

<sup>62</sup> The terminology applied to refer to adverbs is quite varied, Hyland (1998: 139) for instance describing as *adjuncts* the same kinds of item included in Quirk et al.’s *subjuncts* occurring as expression diminishers.

<sup>63</sup> The terminology relating to adverbs of this kind and other devices with similar meanings is varied and may sometimes even be somewhat confusing. While Salager-Meyer (1994) uses the term *approximator* to refer to a variety of expressions involving a number of different word classes—including indefinite indications of quantity, degree, frequency, and time—the same term is elsewhere (Quirk et al. 1985, Hyland 1998) employed in a much more restricted sense to refer to a relatively narrow range of adverbs such as *almost* and *virtually*.

<sup>64</sup> The adverb *significantly* cannot be seen as a hedge in all contexts. Particularly in RAs it is commonly used when discussing statistics-based probabilities, as in

Educational attainment *significantly* altered the risk of having an infarction triggered by an outburst of anger. Figure 1 shows that the RR of MI onset decreased consistently with increasing educational attainment (P=.03) [...]. (MED1, G, “Results”, paragraph 3 [Results])

In such instances, the adverb is in fact used with reference to specific predetermined limits as concerns statistical probability values, the adverb indicating that the results obtained conform to the limits of what may be seen as a statistically significant result. Occurrences of this kind were not counted as instances of hedging.

<sup>65</sup> The items distinguished are: *considerably, dramatically, drastically, fairly, greatly, highly, largely, mainly, markedly, moderately, modestly, mostly, partly/partially, predominantly/predominately, primarily, principally, quite, rather, reasonably, relatively, significantly, slightly, somewhat, strongly, substantially, widely*.

<sup>66</sup> The hedge in the last example, *somewhat*, is an interesting case where hedges are embedded within a hedge of another kind. While the entire beginning of the example might be taken as a hedge by which the authors draw attention to the limitations of their study and thus indicate that it may not be categorically correct in every sense, the adverb (as well as the auxiliary *may*) included in the caveat appears to tone down the negative effect involved. If the hedges toning down the caveat were omitted, the effect of the caveat would be much stronger, undermining the authors’ work to a much more considerable extent. The use of *somewhat* (and *may*), however, is a useful means of indicating that the limitations are not very grave, the indeterminacy of the hedge allowing the authors to be safely vague about the putative limitations of their research.

<sup>67</sup> The items identified are: *about, almost, approximately, around, closely, essentially, just, nearly, roughly, some, virtually*.

<sup>68</sup> In view of word-formational characteristics, it would seem more reasonable to deal with adjectives prior to discussing adverbs, many of the latter being formed from adjectives. However, as concerns the present corpus,

adverbs were clearly more commonly employed as tokens of hedging than adjectives (779 vs. 422 occurrences), which is why it was decided that adverbs would precede adjectives in the order of presentation.

<sup>69</sup> Many of the adjectives included in this subcategory are similar to what Biber et al. describe as “stance” markers indicating “degrees of certainty” (1999: 671).

<sup>70</sup> In most cases, the items examined could be interpreted as hedges expressing tentativeness toward the information presented, but some of the adjectives did also occur in meanings that do not support hedging interpretations. All of the different meanings of the adjective *apparent*, for example, could not be interpreted as hedging:

These differences are most *apparent* when peptide-stimulated transgenic T cells become terminally differentiated after culture in vitro. (MED1, C, 1579)

The adjective *theoretical* was another device with both hedging and non-hedging interpretations. For instance, in the expression *theoretical physics*, the word is used to describe the kind of physics dealing with the abstract ideas and principles to do with the discipline, this meaning not being related to epistemic possibility. However, in cases where the adjective is used so as to describe something as “existing only in theory” or being “ideal, hypothetical” (*OED* s.v. *theoretical* A.2.b.), it may be seen as a hedge.

Yet another potential problem applies to the adjective *possible*, which can be used to express both deontic and epistemic possibility. The difference between these meanings has been seen as parallel with the meaning distinction between the auxiliaries *can* and *may* (Perkins 1983: 79). The linguistic context is often enough to distinguish between the deontic and epistemic uses of *possible*, the former meaning typically found in the construction *it be possible (for x) to*, the latter characteristically occurring in the construction *it be possible that*. However, when the adjective is used attributively (Leech and Svartvik 1994: 219) or predicatively (op. cit.: 220), not in the impersonal constructions mentioned, problems of interpretation may emerge. When the status of *possible* was indeterminate in the corpus, the adjective was counted as a hedging device because of the theoretical possibility of interpreting the item epistemically as an indication of tentativeness regarding what is being stated.

<sup>71</sup> The items included in this subcategory are *apparent, apt to, doubtful, hypothetical, improbable, indicative, likely, plausible, possible, potential, predictive, probabilistic, probable, prone to, putative, speculative, suggestive, theoretical, and unlikely*.

<sup>72</sup> The items identified are: *characteristic, common, frequent, general, normal, popular, prevalent, rare, regular, typical, (not) uncommon, and usual*.

<sup>73</sup> The items are: *appreciable, central, considerable, fair, large, little, main, major, marked, moderate, modest, negligible, noticeable, relative, primary, principal, reasonable, relative, significant, slight, small, and substantial*.

<sup>74</sup> Cases where *significant* was used in descriptions of statistical probability, not to indicate indefinite degree, were not counted as hedges.

<sup>75</sup> Most of the nonfactive assertive nouns belong to Perkins’ (1983: 86) category of “[e]pistemic expressions referring to an act.” However, my classification is different at least in the case of the noun *hypothesis*, which Perkins also classifies as an epistemic expression referring to an act. Paradigmatically, *hypothesis* seems to be similar to nouns included in the second subtype of nouns here (e.g. *notion* and *idea*), classified as “[e]xpressions referring to an epistemic state” by Perkins. As noted previously when discussing full verbs, the word *state* may not always be the best possible terminological choice. For example, Perkins includes the noun *thought* in the latter category, although the item rather refers to mental activity than state. Thus, the terminology and classification established by Perkins will not be adopted here.

<sup>76</sup> All of the devices identified (e.g. *clue*) do not have a straightforward verb counterpart, but can be likened to the other devices of the subcategory in view of their meaning.

<sup>77</sup> As was seen in connection with the full verbs, subdivisions according to meaning components are not always unproblematic. The nouns *forecast* and *prediction*, for example, could be assigned to either nonfactive assertive nouns or tentative cognition nouns because they seem to share some meaning characteristics of both groups. In the case of the two nouns mentioned, the present division follows that of the corresponding full verbs.

<sup>78</sup> The following devices were included in this category: *allegation, argument, assertion, charge, claim, clue, contention, implication, indication, postulate, prediction, proposition, suggestion*.

<sup>79</sup> The items are: *approximation, assessment, assumption, belief, concept, conceptualization, conclusion, construct, estimate/-ion, estimator, evaluation, expectation, hope, hypothesis, idea, inference, interpretation, notion, perception, philosophy, premise, scenario, supposition, tenet, theory, thinking/thought, view, viewpoint*.

<sup>80</sup> Some of the nouns included in this category do not have clear verb counterparts included in the tentative cognition verbs (e.g. *construct, idea, notion*). However, such items are obvious candidates for the present category of nouns because they refer to a cognitive state or activity involving a component of tentativeness insofar as the

state or activity involved may be seen as subjective or hypothetical in nature, not one producing unquestionably proven information.

<sup>81</sup> *Theory* is one of the items that cannot be seen to manifest tentativeness in all contexts. Instead of expressing that what is said is but on the level of theory, the item is also often used to refer to the abstract set of rules and principles underlying a specific discipline or some part of it (e.g. *economic theory*), a meaning which obviously is not intended to indicate tentativeness (cf. note 70).

<sup>82</sup> *Estimate* and *estimation* were counted as variants of the same item because in most cases they were interchangeable.

<sup>83</sup> The items identified are: *alternative, appearance, avenue, candidate, chance, inclination, likelihood, opportunity, possibility, potential, probability, promise, sign, tendency, and trend.*

<sup>84</sup> For instance, when an *if*-clause is employed to indicate direct condition of the form ‘if x, then y’, as in *If you give me money, I will go to the store*, the *if*-clause cannot always be perceived as an indication of tentativeness. However, the very same basic pattern may be linked to hedging under other circumstances, as in *If our calculations are correct, this result is quite extraordinary*, where the *if*-clause obviously involves an air of tentativeness because it indicates that there is a possibility that the results obtained are incorrect.

<sup>85</sup> Clausal devices, which do not fall in with any of the previous categories of hedges, were naturally quite often accompanied by hedges of other kinds, such as the verb *suggest* in (92).

<sup>86</sup> Such devices included in “Other Hedges” are dealt with separately from approximative adverbs and adjectives because they are different and more varied in form (e.g. numerical ranges, phrasal elements, etc.).

<sup>87</sup> Given that Dubois’ (1987) study deals with spoken language, probably not as formal as RAs, some of the devices she mentions are more inventive and colorful—as the title of her paper suggests—than the items found in my RA corpus.

<sup>88</sup> It was not always easy to determine whether the items included in the final category could be taken to hedge quantifications. For instance, it was sometimes difficult to decide whether the word *some* used as a predeterminer could be taken to indicate quantification or to merely make vague reference to some person(s) or thing(s) in the same way as the word *certain* is often employed. The percentages regarding hedges to do with quantification only involve the straightforward cases found in the data.

<sup>89</sup> In Hyland’s (1998) data, Results and Introductions sections were in fact found to be hedged to the same degree.

<sup>90</sup> It should be mentioned that one distinctive section of RAs is not dealt with by Salager-Meyer (1994) and Hyland (1998) in their analyses of hedging in different RA sections, namely the Abstract. As can be seen below, in addition to the Introduction, Methods, Results, and Discussion sections, the Abstracts of RAs are distinguished as a section of their own here. The incidence of hedging in Abstracts has not been studied very extensively, Abstracts in fact being described as something of a “neglected field” by Swales (1990: 181) and as “a rather neglected social artefact of disciplinary life” by Hyland (2000: 83). To my knowledge, Rounds’ (1982) unpublished study is the only one specifically addressing hedging in Abstracts. As Swales (1985: 179-180) points out, despite comments to the effect that Abstracts may be quite concise and economical in their mode of presentation (cf. Graetz 1985), Rounds found surprisingly many cases of hedging in Abstracts, although “space constraints seem in general to restrict the kind of modulation [in Abstracts] that is likely to be found in the research article itself” (Swales 1990: 181). Thus, in including Abstracts in the section-by-section analysis as a section of their own, we can also seek information as to whether space constraints might indeed reduce the incidence of hedges or whether they for instance reflect the degree of hedging found in RAs overall. The latter idea is not altogether far-fetched, if it is indeed the case that “most abstracts reflect the IMRD pattern of the RA itself, allotting a sentence or two for each section” (Swales 1990: 181). As Hyland (2000: 67) suggests, a rigid application of the IMRD structure when scrutinizing abstracts may not be without problems in all disciplines, but as Hyland says, the IMRD model “offers a fairly robust [...] classification for cross-disciplinary comparison” (ibid.).

<sup>91</sup> Swales (1990) also hints toward such problems. According to him the “present state of knowledge about the last two elements in the IMRD pattern is, regrettably, largely restricted to an exploratory rather than hypothesis-testing stage” (p. 170).

<sup>92</sup> The extracts that the authors were asked to comment on were taken from RA Introduction, Methods, Results, and Discussion sections where such a division was feasible. Since Abstracts may be taken to *broadly* (cf. note 90) reflect the information included in each of these sections (Swales 1990: 181), information regarding Abstracts was not requested from RA authors.

<sup>93</sup> As explained, only seven of the ten technology articles included in the study were chosen for section-by-section analysis.

<sup>94</sup> Hyland (2000: 63) explains that

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[a]fter the title, the abstract is generally the readers' first encounter with [an RA], and is often the point at which they decide whether to continue reading and give the accompanying article further attention, or to ignore it. The research and the writer are therefore under close scrutiny in abstracts and, because of this, writers have carefully, and increasingly, tended to foreground their main claims and present themselves as competent community members.

<sup>95</sup> For reasons of readability, the sectional breakdown of the figures regarding the various subcategories of hedges distinguished is presented in Appendix 3.

<sup>96</sup> Since some of the authors wished their responses to be treated confidentially, it was decided that *all* results of the questionnaire would be reported anonymously.

<sup>97</sup> Crookes (1986) illustrates some of the problems involved in Swales' original (1981) move-based analysis of RA Introductions. In addition, Crookes also points to possible disciplinary variation in the structure of RA Introductions.

<sup>98</sup> As will be pointed out later on (7.1.2), there may be disciplinary differences in the degree to which previous work is discussed and commented on. In the present RA data, the data on economics seems to include the lengthiest considerations of previous studies and their possible problems.

<sup>99</sup> Again, it should be emphasized that applying genre analytic constructs such as the CARS model of RA Introductions established by Swales (1990) to actual data might prove problematic, because it seems that in authentic language use the different stages of the model and the rhetorical "moves" involved are perhaps not as easily identified as in the examples Swales provides. The most fruitful aspect of the CARS model to my mind is the way it distinguishes the various strategies and principles that RA authors may draw on in setting the stage for their own work. In practice, however, differentiating the various 'moves' and 'steps' of the model may be difficult, because they may be intertwined to some degree.

<sup>100</sup> As mentioned (4.3.6), the idea that hedging to do with quantification may be particularly common in technology could also be used as a partial explanation for the observation that the differences between different RA sections were narrower in technology than in the other two disciplines. The rationale behind such an idea is that the possible problems to do with the various measuring techniques and principles of calculation employed by scholars may need to be discussed quite thoroughly at the various stages of technology RAs, Introductions for instance perhaps dealing with the shortcomings relating to the quantitative techniques used in other studies, Methods sections discussing the possible difficulties to do with the researchers' own quantitative apparatus, Results sections pointing to the perceived or theoretical errors or shortcomings in the data obtained, and Discussion sections being associated with the potentially limited applicability of the findings founded on numerical data.

## 5. Hedging in Popular Scientific Discourse

In addition to communication between experts of a given field, the domain of scientifically oriented discourse also extends to more popularized forms of scientific reporting. The status of scientific popularization has been viewed in different ways within the academic world, in both negative and positive terms. As Whitley explains, popularization has often been held as

a low status activity, unrelated to research work, which scientists are often unwilling to do and for which they are ill-equipped [...]. Essentially, popularisation is not viewed as part of the knowledge production and validation process but as something external to research which can be left to non-scientists, failed scientists or ex-scientists as part of the general public relations effort of the research enterprise. (1985: 3)

Moreover, as Green (1985: 139) says, there has long existed a myth according to which popularization is a form of “pollution”, a procedure by which knowledge yielded by “Science” is repackaged so that it can be understood by non-scientists, the result being that scientific ‘truths’ become distorted and degraded.

Such a negative conception of popularization, however, is no longer universally subscribed to within the academic world. According to Whitley (1985: 3-4), attitudes have changed considerably over the years as it has been realized that popularization is not entirely isolated from the research process, but may be a useful means of communication not only between scientists and laypeople but also between scholars from the increasingly specialized fields of science. For instance, popularization may be “a key skill in gaining scientific prestige” for scientists because it allows them “to convince scientists and others outside one’s immediate problem area of the importance and worth of one’s strategy and results” (Bunders and Whitley 1985: 63) and to gain social support for a particular position or approach (Whitley 1985: 9). In addition, being able to translate one’s scientific work into a more popularized format may be of the essence so that scholars can “gain assistance from other specialists to resolve major problems” (Bunders and Whitley 1985: 64). What is more, the capability to popularize one’s scholarly work may equally be of the utmost importance in obtaining research resources, as non-specialists may in fact have a hand in the allocation of funding and other resources for the specialists of a particular field. Therefore, non-specialists cannot always be regarded as “passive recipients of scientific knowledge in the contemporary, differentiated sciences but can be significant actors in intellectual development so that popularisation often has a direct impact upon what research is done, how it is done and how it is interpreted” (Whitley 1985: 9). Accordingly, popularization has become more



appealing for scholars from different areas of specialization, popularized accounts of scientific work therefore also having been described in less pessimistic terms. In Biezunski's (1985: 183) view, for instance, popularization may be perceived as "a positive means of transmitting knowledge from those knowing something to those knowing less."

Granted the changes in attitudes regarding popularization in the sciences, the need for information on the processes of popularization has increased. Calls for attention into the characteristics of popularization have indeed been put forth for quite a while now. For example, in 1957, Flood pointed out that "[i]t is strange that, in spite of the importance of popular science, little study seems to have been made of the techniques of presenting it" (p. 3). Comments to the same effect have also been presented by other scholars. Some thirty years ago, Pradal (1970: 15) put forth the opinion that scientific popularization is "vegetating in an artisanal phase" and that popularizers of science—be they scientists or non-scientist 'middlemen'—should receive guidance so as to make popularization more operational. Appeals for studies into the nature of popularization have also been made by for instance McElheny (1985: 277), who says that "popular communication of technical matters proceeds largely on faith" and by Porter (1992: 1), according to whom popularization in the field of medicine has "remained in the shadows" while scholars investigating medical communication have typically concentrated on learned medicine.

All in all, although the emphasis in the research and pedagogy of scientific communication has traditionally been on expert-to-expert discourse, the appreciation of information pertaining to popularization seems to be on the rise. What exactly is perceived as belonging to the sphere of popularization is not always delineated in any uniform way. Generally speaking, popularization entails the accommodation of information originally intended for a higher level of specialization and may be taken to encompass different degrees, the characteristic shared by all forms of popularization being that they all have to do with the "transmission of intellectual products from the context of their production to other contexts"<sup>1</sup> (Whitley 1985: 12). The exact scope of scientific popularization has been understood in different ways, some conceptions displaying popularization as the dissemination of information from specialists to laypeople. On the other hand, given the heterogeneity and complexity of the scientific world, it is also possible to describe popularization in more inclusive terms as equally comprising "intra-scientific communication across organisational boundaries", the dissemination of knowledge to fellow scientists "who may share some educational experiences but are using different technical procedures or forms of representation to explore different problems" (Whitley 1985: 13). In its widest sense, then,

popularization may be extended to cover all scientific communication “beyond a researcher’s immediate circle” (McElheny 1985: 279).

Given the above, it seems to me that scientific popularization can be taken to include various levels of technicality dependent on the presumed audience’s degree of background knowledge, beginning from *intra*-scientific communication between different groups of experts within the same broad discipline, as is for instance the case with articles in journals such as *Physical Review* (see McElheny 1985: 279).<sup>2</sup> In addition, *inter*-scientific communication between scholars representing different disciplines (e.g. articles in *Science* or *Nature*, cf. McElheny, *ibid.*) may also be seen as a form of ‘high-level’ popularization. Below such relatively ‘high-tech’ levels of specialization, popularization can equally be seen to include various other kinds of discourse, for instance pedagogically oriented materials for the initiation of experts-to-be (see e.g. McElheny, *ibid.*, Yearley 1985: 79) or those found in reference works for professionals within a given field (e.g. health-care manuals for careworkers, operating or repair manuals for technical personnel), where some of the information obtained by highly trained experts within the field is left out, the remaining information relating to the practical applications of specialist knowledge. Perhaps most typically recognized as belonging to the sphere of popularization, however, are materials introducing specialist matters to wider publics whose members can for the most part be seen as laypeople when it comes to earlier knowledge pertaining to the field discussed. Such popularizations may assume a variety of forms, including for instance television programs, school textbooks, and magazine or newspaper articles.

Given the different kinds of scientific popularization, it seems clear that popular science cannot be studied as a homogeneous entity. Instead, one has to take into account the various degrees of popularization, in part determined according to the assumed background knowledge of the audience. Furthermore, scientific popularization may take various forms depending on the medium, such as brief commentaries in magazines and newspapers, entries in encyclopedias and other reference works, extensive feature articles in general magazines and popular scientific publications, book-length discussions meant for lay publics, and so on. In addition, popular science is not distributed solely through printed media, but may also be disseminated for example via public lectures, radio, television, or nowadays also often through the Internet, the medium chosen probably also having an effect on the form of the message.

In the present study, a decision was made to concentrate on a written form of popularization, popular scientific articles written in such a way as to be informative from the point of view of the interested layperson and conceivably not requiring formal training to understand

what is reported. While scientific articles popularized for the information of lay audiences are clearly separate from professional articles, it should also be kept in mind that there are different kinds of popular scientific articles. Whereas the more extensive popular scientific articles in publications such as *Scientific American* are generally<sup>3</sup> authored by established specialists in the fields dealt with, an increasing number of non-scientist “middlemen” (Pradal 1970: 15) are also active in the field of popularization. Especially newspaper articles and the “Science” columns of widely distributed general-interest magazines such as *Time* and *Newsweek* are almost always authored by science journalists, who evidently are not active scholars within the fields of specialization treated.<sup>4</sup> As Dubois (1986: 252) points out in her discussion of the popularization of medical research articles, this kind of popularization can be seen as ‘extreme’ in comparison with research articles, the result of such accommodation being for instance the removal of technical terminology and the loss of qualification. Moreover, the organization of the original RAs is changed considerably during the popularization process so that the end result is closer to journalistic genres. In consequence, main conclusions are typically placed at the beginning of the popularized article, whereas condensed methodological considerations, possibly reduced even further by newspaper editors, are placed at the end (see also Swales 1990: 125).<sup>5</sup>

It has been argued that popularized publications solely devoted to matters of science, for example *Scientific American*, in some ways resemble the most journalistic types of popular science, such as science columns in general magazines and newspapers. For instance, results similar to Dubois’ study of the most ‘extreme’ type of popularization have been presented by Fahnestock (1986/1998), who has examined “the fate of scientific observations as they pass from original research reports intended for scientific peers into popular accounts aimed at a general audience” (1986: 275).<sup>6</sup> Apart from illustrating for example how linguistic choices in popularizations become less specialized and how a wish to capture the interest of the reader becomes manifest in popularized scientific articles, Fahnestock has also reflected on the generic features of expert-to-expert articles and popular scientific articles, pointing out that when the audience of scientific reporting changes from specialists to less informed readers, there equally occurs a change in genre.<sup>7</sup> These observations are in agreement with general ideas regarding the relationship between professional and popular representations of science. Cloître and Shinn, for example, remark that

specialist texts largely revolve around tightly reasoned discussions of experimental limit conditions, instrument precision and the relevance of results. Scientific popularization, on the other hand, operates as a conduit for informing scientists and non-scientists of recent

discoveries and advances, and as a platform for viewing scientific events against a backdrop of non-scientific interests and concerns. (1985: 58)

Despite a certain resemblance to the most journalistic kinds of scientific popularization, articles in publications like *Scientific American* are different from those found in newspapers and magazines like *Time* and *Newsweek*. In his research into written scientific discourse on biology, Myers (see 1989, 1990) points out that “[t]he articles in *Scientific American* [...] are closer in form to scientific articles than are the reports in the science sections of the *New York Times* or the *Guardian* [...], or in *Time* or *Newsweek*” (1990: 185). There may be various reasons for such differences. For instance, in addition to making things understandable for an average newspaper or magazine reader, the efforts of journalists writing on scientific topics for general magazines and newspapers may also be guided by the need to make their contributions appealing in comparison with articles on non-scientific topics. In newspapers, for example, it may be necessary for the authors of articles on scientific issues to “compete for the readers’ attention with daily headlines, football scores, and pictures of celebrities” (Myers, *ibid.*). Another noteworthy difference between the kinds of article seen in popular scientific magazines like *SA* and the most journalistic kinds of scientific popularization concerns the status of the authors. While the journalists reporting for publications like *Time* and *Newsweek* are not normally actively engaged in research regarding the fields dealt with, the majority of those publishing lengthier articles in *Scientific American* are recognized experts on the topics examined. The difference in the status of the authors between these kinds of article may also be reflected in the manner of presentation (see e.g. Peters 1995: 44-5). As suggested above, articles in publications like *SA* resemble RAs to a greater degree than the most journalistic kinds of popularization. Whereas specialist authors, familiar with the more technical kinds of scientific discourse, may prefer a more scholarly mode of presentation even in popularizations, journalists, on the other hand, may be more likely to approach popularization tasks in much the same way as they would deal with any news item.<sup>8</sup> In sum, in constructing popularizations, journalists may be assumed to make use of their training and experience in the area of journalistic discourse, whereas scholars popularizing matters belonging to their field of expertise are likely to produce discourse that is more closely linked to the conventions of specialist-to-specialist discourse that scientists are accustomed to in their profession.

Hence, popularization may be seen to differ not only according to the audience’s presumed background knowledge but also according to the status of the author. So as to avoid potential variation in the popularizations to be examined, my investigation only deals with popular

scientific articles by authors specializing in the areas considered. In consequence, all of the popular scientific material examined here has been published in *Scientific American*, a well-known and widely distributed popular scientific magazine<sup>9</sup> where the great majority of feature articles are authored by established specialists.<sup>10</sup> Through such a choice, my intention here is to contrast the use of hedges in RAs and popular scientific writing by specialists within selected fields of expertise, the *SA* articles concerning topic areas that the same authors could also in principle have dealt with in RAs.<sup>11</sup>

Although previous work on the discursual characteristics of popular science has been rather limited, some comments on the differences between RAs and popularizations on similar topics have been presented, as for instance Fahnestock's (1986/1998) findings referred to above illustrate. Further ideas on such differences have been presented by Myers (1989, 1990), who says that expert-to-expert RAs can be seen as discourse aimed at the esoteric audience of scientific peers, whereas scientific popularizations belong to the sphere of discourse intended for an exoteric audience of laypeople.<sup>12</sup> Although RAs and respective popularizations may exhibit a certain degree of similarity as far as topics treated go,<sup>13</sup> Myers' work suggests that the differences in the makeup of the audiences of RAs and popularizations entail differences in the form of presentation.<sup>14</sup> According to Myers (1990: 142), a scrutiny of the textual features of professional scientific articles reveals that they create a *narrative of science*, "they follow the argument of the scientist, arrange time into a parallel series of simultaneous events all supporting their claim, and emphasize in their syntax and vocabulary the conceptual structure of the discipline." Popularized articles on related issues, in turn, "present a sequential *narrative of nature* in which the plant or animal [or another object of study], not the scientific activity, is the subject, the narrative is chronological, and the syntax and vocabulary emphasize the externality of nature to scientific practices" (ibid.). Given such basic differences between RAs and popular science, it is also to be expected that many other kinds of distinction between these kinds of communication may be identified, the strategy of hedging being one of them.

The role of hedging in the less specialized forms of scientific discourse has not been studied very extensively in previous literature. As mentioned earlier (Preface; 2.1), in the few studies commenting on the use of hedges in scientific popularization, conflicting views have been presented. On the one hand, it has been assumed that hedging, while often necessary in expert-to-expert discourse, is rare in popularized forms of scientific discourse. On the other hand, it has also been claimed that hedges in fact occur quite frequently in popularizations. Let us now look into the rationale underlying these two conceptions in more detail.

## 5.1 Reasons Presumed to Discourage the Use of Hedging in Scientific Popularizations

The conception that hedging is rather infrequent in scientific popularizations, including the kinds of popular scientific article chosen for scrutiny in this study, can be discerned in the work of a number of scholars.<sup>15</sup> The rationale underlying this view, although not always put into so many words, is obviously associated with the way in which the communicative context of popularizations has been understood. It is generally assumed that specialist-to-specialist discourse such as RAs is a type of communication where it is of the utmost importance to take into account matters such as the readership's expertise in the area dealt with, the necessity of offering one's work for validation before the scientific community in a form that may be presumed to prompt a sympathetic response, and the need to provide for the possibility that one's ideas are not accepted or are proven wrong. Communication between scientist and layperson, on the other hand, has been portrayed in considerably different terms. In Cloître and Shinn's (1985: 58) words, "popularizing offers a cognitive space where, as yet fragile and unstructured projects, can be reflected on, free from the epistemological constraints that characterize other expository modes to differing degrees, and free from an acute risk of professional embarrassment." Another depiction that illustrates the kinds of approach underlying comments regarding the paucity of hedges in popular science has been presented by the well-known rhetoricians Perelman and Olbrechts-Tyteca, who say that popularization

aims at the public at large for the purpose of acquainting it, in nontechnical language, with certain interesting results, without enabling it, however, to use the methods which made it possible to reach these results, or, *a fortiori*, to attempt to criticize them. The results are presented, so to speak, independently of the science that produced them: they have acquired the status of truths, of facts. (1969: 100)

Whereas scientific discourse representing the highest levels of technicality, particularly RAs, is presumed to be characterized by a close association with the work carried out during the scientific experiments, that is, the form of presentation at least in theory follows the idealized scientific procedure, the same is not true of popularizations. What takes center stage in popularization efforts are results, whereas the experimental procedures carried out and their complexities are not given similar attention as in RAs. Perelman and Olbrechts-Tyteca's characterization of popular science, then, might be used as a basis for arguing that hedging is not necessary in popularizations. First, if popularizations are perceived to present the results of scientific work as

facts or truths, it is reasonable to assume that hedges are not common in scientific popularizations, as hedging in fact expresses that what is said may *not* be categorically accurate. Furthermore, Perelman and Olbrechts-Tyteca are of the opinion that popularizations do not aim at enabling the audience to follow the procedures by which the information presented has been obtained, a view implying that the complexities and problems encountered during scientific work are smoothed over, hedges linked to such issues in RAs not being necessary in communication with laypeople. Instead, popularizations can be thought to involve a more factual mode of presentation without the epistemic qualification to be expected in communication between scientific peers.

The alleged scantiness of hedges similar to those seen in RAs in popular science may also be motivated from a slightly different perspective, to do with the assumed background knowledge of the audience. As Perelman and Olbrechts-Tyteca (*ibid.*) say, the lack of audience criticism is another characteristic of popularizations. This view is presumably based on the idea that the average audience of popularizations is not expected to consist of specialists in the field dealt with and, accordingly, the typical reader's knowledge is seen as insufficient for him or her to be opposed to or hold alternative views of the information presented. In essence, then, it could be argued that when specialists construct popularized accounts of their work, the audience is not seen as one that would be able to provide feedback on what is being said or to criticize the views of the specialist author in the way expected of the readers of RAs. While the audience's approval of what is stated in RAs is central to the construction of scientific knowledge, the same cannot be said about the situation of popularizations. Instead, previous work seems to presuppose that in popularizations, specialist authors may put forth information in an *ex cathedra* manner without hedging, the communication situation apparently often being approached as one where unquestionable scientific truths are handed down to laypeople by authoritative scientific experts.

Views similar to those presented by Perelman and Olbrechts-Tyteca (1969) as well as Cloître and Shinn (1985) are also to be detected in research with a closer eye on the question of hedging. According to Fahnestock's (1986/1998) analysis of professional and popular scientific discourse, original scientific RAs may be seen to belong primarily to the Aristotelian genre of *forensic* discourse, being first and foremost "concerned with establishing the validity of the observations they report" and "devoted only to arguing for the occurrence of a past fact" (Fahnestock 1998: 333). Popularized reports of scientific work, on the other hand, may be regarded as *epideictic*, the main purpose of such discourse being to "celebrate rather than validate" (*ibid.*) the information presented. Fahnestock's analysis of original research reports and respective popularizations illustrates that while original research reports might be quite carefully

hedged, indicating “the author’s awareness of the criticism and refutation that an expert audience could raise against his inferences” (1998: 338), hedging devices were often omitted from respective popularized accounts because hedging would be perceived as too uncertain. Therefore, Fahnestock says, “[s]cience accommodations emphasize the uniqueness, rarity, originality of observations, removing hedges and qualifications and thus conferring greater certainty on the reported facts” (1986: 275).

The assumption that hedging is not central to popular scientific articles is also adopted by Myers (1989), who deals with hedging as a politeness phenomenon. While Myers acknowledges the face protection value of hedges in RAs (see Ch. 3), he seems to take it for granted that hedging is unnecessary in popularized articles like those found in *SA*, because “there is no longer a need to make or deny claims” (Myers 1989: 28). The implicit reason for this seems to be the afore-mentioned idea that the lay audience is not thought to have sufficient knowledge about the matters dealt with to be able to hold their own, potentially opposing, views. On the basis of Myers’ discussions of popular science, too, one might argue that what the lay audience is looking for are reports of firm factual results, not descriptions of speculative findings.<sup>16</sup> One could thus presume that scholars reading RAs and popularization readerships have different expectations as to the manner of scientific reporting. Accordingly, it may be postulated that “the different styles of research articles and popularizations construct different views of science. Scientists see their work as much more tentative and mediated than does the public. [...] [In reports for the wider public, t]here is no room for results that lie between total certainty or error” (Myers 1994: 188-9). In view of Myers’ work, then, the kind of protection offered by hedges in RAs might be regarded as unnecessary in popularizations, information on scientific matters instead being presented in a way resembling the uncontroversial “type 4” statements described by Latour and Woolgar (1979: 77).<sup>17</sup>

It seems clear that scientific specialist-to-specialist communication like RAs differs from scientific popularization to a considerable degree as regards the relationship of author and audience, the difference in the background knowledge of the different kinds of readership also probably having an effect on the degree of certainty that can be warranted to observations regarding scientific issues. Thus, at first sight it seems reasonable to assume that the kind of hedging typically found in RAs is not as characteristic of popular scientific articles. However, the problem in stating that hedges may be removed from popularizations is that no attention is given to the possibility that hedging phenomena might also be applied in popular science, but in ways dissimilar from those seen in RAs. As Myers (1992: 11) says, although the kinds of negative



politeness hedge seen in RAs do not occur in science textbooks, certain hedges may sometimes be present in the latter genre in some other function. In my opinion, the possibility that such functional dissimilarities could also apply in the case of popular scientific articles has not received sufficient attention in literature. Instead, it seems that studies stating that hedges may often be omitted from popular science base their views on the presumption that hedges only have the functions that they have been taken to involve in professional peer communication like RAs. This, however, is to my mind an oversimplified way of looking at a polypragmatic phenomenon like hedging. In putting forth opinions about the use or non-use of a strategy like hedging with an eye on its functions in communication between scientific peers, the potential of the phenomenon is restricted to one type of communication situation only. In my view, earlier studies addressing the issue of hedging in popular science have often been rather limited in their scope, one of the most obvious shortcomings being the lack of more extensive analyses of authentic data representing popular scientific discourse. In addition, when comparisons of professional and popular accounts of scientific issues have been carried out (e.g. Fahnestock 1986/1998), attention has been given to the differences in hedging between isolated statements, it being thus supposed that since hedges present in RAs are absent from respective statements in popular science, this automatically means that hedges are absent from all other parts of popularizations as well. However, a phenomenon like hedging may occur quite differently in different kinds of discourse, it being possible that in popular science hedges are found in different kinds of context and function than in RAs.

## 5.2 Reasons Presumed to Encourage the Use of Hedging in Scientific Popularizations

Not all scholars would share the view that hedges are scanty in communication such as scientific popularization. Crystal (1988: 47) thinks that hedging devices are common in popularizations and Varantola (1987: 37) has observed that hedges may be used to a greater degree in popular science than in scientific discourse between experts. Furthermore, in work on metadiscourse, Crismore (1989) has noticed that hedging devices do occur in special-subject discourse meant for the wider public. Moreover, Crismore and Farnsworth (1990: 129) disagree with Fahnestock (1986) and say that hedging may be quite frequent in popularizations. Further support for the possibility that hedges may occur quite often in popular science is provided in a fairly recent study by Grabe and Kaplan (1997).<sup>18</sup> In an earlier study of hedging in specialized and popular medical articles, I also found that hedging devices are indeed quite common in medical reports popularized by scientists

(Varttala 1999). Such observations give rise to some doubts regarding the assumption that hedges might not occur frequently in scientific popularizations. Let us now take a closer look at some of the reasons why hedges might in fact figure relatively often in popular science such as the SA articles investigated here. It should be re-emphasized that, in practice, drawing a distinction between the various interpretations of hedging presented may be very difficult indeed. Moreover, determining *all* potential functions that the authors and readers of popularizations may think hedging to have might also be more or less impossible. In this work, however, the central issue is to establish some of the various ways in which hedges might *in principle* be understood in popular science, the interpretations presented providing clues as to why hedges might after all come up quite commonly in the kind of popularization examined.

While an air of exhaustiveness, precision, and objectivity may generally be desirable in discourse like RAs, it has been suggested that when science is popularized, the level of formality and technical precision decreases (e.g. Whitley 1985: 14-16). It may be true, as Whitley (*ibid.*) presumes, that during the process of popularization, the arguments made often lose some of the tentativeness seen at the higher levels of specialization, which is why hedges might be thought to be rare in popularizations. However, the decrease in the level of formality and precision presumed to occur during the popularization process may also end up in an increase in linguistic phenomena commonly cited as typical hedges, the function of hedging in this context being different than in discourse like RAs. In a comparison of two RAs and respective popular scientific articles published in SA, Varantola (1987: 37) found that the popularizations were less exact, the result being that “numerical hedging was the rule and verbal hedging became more common.”<sup>19</sup> A similar observation as concerns numerical data in popularizations has been made by Dubois in a study of biomedical slide talks, which she describes as “popularization [...] at the highest level: to fellow scientists practicing another specialty” (1987: 540).

The reason underlying such hedging may be that in scientific popularizations, it is for example not always necessary to provide numerical data, explain the formulae used to acquire results, or present the results obtained as precisely as in original research papers. This is a reflection of the tendency of the more popular texts to concentrate on the general results and implications of research, not on all aspects of the processes by which they were arrived at. Hence, while an RA on the relationship between age, gender, and cognitive performance in very old people reports some of its results as follows,

- (1) Overall 6-month mortality rates were 19.4 percent for men (n=86) compared with 12.2% for women (n=177,  $P < 0.001$ ). This gender difference was most striking in the oldest age stratum (27.6% vs. 13.8%,  $P < 0.005$ ). (MED1, I, 1195)

one would not necessarily expect similar exactitude if the same study were to be accommodated for a wider audience. As can be seen below, numerical data does definitely occur in the articles chosen from SA, but is often reported in visibly less precise terms than in RAs:

- (2) Even the twins of persons with this disease acquire it only *about* 50 percent of the time. Systemic lupus erythematosus has also been associated with certain HLA types, although here the concordance rate in twins is only 25 percent. Some HLA types predispose to several autoimmune diseases, explaining why those with myasthenia gravis, for instance, have a 30 percent chance of acquiring Graves' disease as well. (MED2, G, 78)

This trend might be argued to partially explain why certain kinds of hedge could occur relatively often in popular scientific articles. Instead of attempting to convey a portrayal of the methods and results of the research being reported at the highest level of precision possible, the authors of popular scientific articles may put forth references to scientific information in rather generalizing statements with a relatively low degree of precision. This is evidently because the lay audience is not presumed to need or to be interested in as exact information as is provided for specialists—according to Crystal (1988: 47), the authors of popularizations know that “the audience only needs the ‘half-truth’.” In addition to rounding and the like (cf. Dubois 1987), among items that can be used toward such imprecision in popular science are for example approximative devices like *about*, *approximately*, and *on the order of*, as well as items indicating imprecise frequency or number, such as *often*, *frequent*, and *many*. Devices of these kinds might naturally also be used in RAs when absolute exactitude is not of the essence,<sup>20</sup> but this is not perhaps possible as often as in more popularized scientific discourse. Furthermore, as seen in Chapter 3, such items may also be found in RAs where exactitude is *expected* by the scientific community, as in reporting experimental results. For example, if, for one reason or another, the author cannot present his or her findings in absolute terms on such occasions, he or she can hedge to “convey the sense in which an idea may be held to be true” (Hyland 1998: 165).<sup>21</sup> Such hedging in RAs therefore in a sense functions as a strategy by which the author plays down the threat that might arise if authors did not accurately “qualify predicate intensity or the validity of the state of affairs expressed” (op. cit.: 166) in instances where accuracy is essential. Here in fact lies a notable difference between RAs and popular science. Whereas in RAs such devices may commonly be used as a protective

strategy,<sup>22</sup> in popular scientific articles such protection would often be unnecessary, because the audience may not be equally capable of or interested in questioning the information presented or willing to contemplate its validity in the first place. Omitting hedges in the context of RAs might result in the kind of imprecision not accepted by the scientific community and thus threaten the author's credibility in the eyes of the scientific community. In popular science, on the other hand, even when dealing with very precise information that might appear without hedges in RAs, authors may very well choose to use hedging devices so as to avoid unnecessarily precise information without any real threat to their reputation. Accordingly, the use of hedging phenomena can be viewed as a way to make the discourse suitable for the needs and interests of the lay audience. From this perspective, hedging could thus also be approached as a *textual* tool lowering the level of precision when exactitude is not taken to be absolutely necessary, the term *textual* in my opinion being suitable insofar as hedging on such occasions can be seen as a strategy that allows "the discourse to cohere [...] with its context of situation" (Halliday and Hasan 1989: 45).<sup>23</sup>

In addition to the idea of hedges as devices increasing imprecision in textually accommodating scientific discourse for the laity, hedges in popular scientific articles may be approached from other perspectives. As Fahnestock (1986: 278-279) contends in her comparison of RAs and respective popularizations, the latter have to be more explicit when they describe matters of expertise, because the authors cannot be certain that the readers understand whether the information presented is important or unimportant, or whether or not it is correct. As a result, I think, the authors of popular scientific articles may be presumed to adopt strategies helpful in providing the readership with a clear and precise picture of the information in situations where a possibility of misconception may lurk. For example, by using certain tentative full verbs (e.g. *suggest, speculate*), adverbs and adjectives (e.g. *possibly, likely, probable*) or nouns (e.g. *assumption, thesis*), writers can signal to the readers that the information reported should perhaps not be regarded as categorically certain, but may be subject to some degree of doubt. It is to be noticed here that while similar devices may frequently occur in RAs, the differences in the makeup of the communication situations again call for somewhat different interpretations in the two contexts. In view of my earlier account of hedging in RAs (Ch. 3), such devices might for example be perceived as a way of protecting oneself in case one's own ideas presented in RAs are proven wrong, but such interpretations may not always be applicable in popular scientific discourse. Instead, one interpretation of hedging in popular science has to do with the assumption that a certain degree of caution is occasionally in place in articles like those found in SA, so that

extreme statements resulting in false expectations or unnecessarily grim outlooks are avoided. This could be particularly important when delicate issues of potential personal interest to the readers are dealt with. Prince et al. (1982: 96), for example, point out that when medical professionals communicate with laypeople,<sup>24</sup> the former may be regarded “as omniscient, and omniscient in areas of life-and-death importance.” As a matter of fact, this interpretation hints toward possible variation in hedging between different disciplines, some areas of science more often involving “life-and-death” issues and thus also perhaps being more heavily hedged for reasons of caution. This could thus be one reason for the use of the hedges *believe* and *suggest* in

(3)

- (3) For instance, antioxidants in food are *believed* to neutralize free radicals. Other chemicals in healthful foods, it has been *suggested*, block the signals that such steroids as estrogen send—signals that cause cells in the breast and elsewhere to proliferate. (MED2, H, paragraph 15)

In my opinion, hedging of this type, too, can be associated with the textual function of language insofar as the writers use hedges to modify their accounts according to the context, so that the information may be assumed to better conform to the readers’ apparently limited background knowledge and to secure that the value of the information reported is not misinterpreted.

To describe hedging in this way, however, is not to say that it is always possible for authors to present information to lay readers without any concern for negative feedback. Indeed, it seems that it is not altogether uncommon in articles like those in *SA* to present different kinds of recommendation or prediction linked to the issues scrutinized. If such information is hedged, this might also be interpreted in the sense described above, namely as a means of securing that the readers do not run away with the idea that what is stated is the final say in the matter. However, some examples of hedging, such those seen in (4) and (5),

- (4) [...] [T]he number of investigators focusing on beta-amyloidosis and the current pace of discovery make it *likely* that inhibitors of one or more crucial steps in the development of the disease will emerge in the next few years. (MED2, F, 47)
- (5) For instance, a glutamate antagonist *may* prove safe for *almost* anyone and *might* be given by an emergency medical technician in the field. (MED2, J, 43)

might also be interpreted as something of a protective strategy. Should the predictions presented later prove to be incorrect, the hedges can be viewed as a way of reducing authorial responsibility toward what is being stated. This interpretation is also interesting from the viewpoint of theories of politeness. As seen previously (Ch. 3), due to the institutional nature of discourse like RAs, describing hedging as a politeness feature in RAs on the basis of the theory originally presented by Brown and Levinson (1978/1987) is problematic. It is to be noticed, however, that when we move into the context of popular science the situation changes, the conventions of the scientific community apparently no longer playing such a prominent role in the construction of discourse. Instead, in popular science, the discourse moves more toward the context of everyday language use, which makes such discourse more amenable to analyses based on conceptions of politeness originating from Brown and Levinson's work. Therefore, one possibility to describe hedges such as those in (4) and (5) might be to view them as negative politeness phenomena protecting the author's negative face in leaving open an escape route in case the predictions or recommendations, potentially of significant practical importance for the lay audience, do not materialize or prove correct at later stages.

Despite differences in their communicative situations, RAs and popular scientific articles may also share certain features concerning hedging. In the data analyzed, this seems to apply to cases where references to sources other than the authors are made. Although Myers (1989: 28) is of the opinion that the authors of popular scientific articles write with an eye on lay readers, not their scientific peers, it seems to me that this may not be invariably so. As seen in Chapter 3, in RAs hedging may be thought to function as a strategy by which authors, when referring to information derived from other scholars' work, can sensitively suggest that what the other scholars have stated may be subject to some degree of doubt. Given this potential function, hedging can be regarded as a strategy by which authors may politely disagree with other scholars. Whether or not this can be described as negative politeness *à la* Brown and Levinson is dependent on whether or not such sensitivity is seen to be associated with the social relationship between the author and the source or whether it is assumed to arise from the communally accepted conventions of academia. Be this as it may, a further possibility of interpreting hedges such as those in (6) and (7) in popular scientific articles

- (6) Some researchers *believe* a neural network consisting of many interconnected decision-making cells can be trained to interpret these inputs better than the algorithmically based networks now in use. (TEC2, F, 44)

- (7) Most recently, various regions of chromosome 18 and a site on chromosome 21 have been *suggested* to participate in vulnerability to bipolar illness [...]. (MED2, E, paragraph 14)

is to see them as a way of delicately pointing out the inconclusive nature of information derived from other sources. As Myers (*ibid.*) points out, even though popular scientific articles are aimed at a lay audience, other researchers, possibly including those whose research is being reported, are also likely to read such articles. Thus, in my view, one possibility is that in popular scientific articles hedging devices in connection with references to other sources could also be a reflection of the same kind of sensitivity seen in similar contexts in RAs. From this viewpoint, certain hedges would then in fact be used in much the same way in both RAs and popularizations, their presence possibly not being dependent on the presumed author-audience relationship as such, but having to do with the mentality that scholars are expected to assume when citing information from other scholars. In popular scientific discourse, too, there are still difficulties in determining whether this could be seen as politeness as described by Brown and Levinson. While hedging of this type could from one perspective be taken as a social issue between author and source, it is equally reasonable to suggest that such hedging is founded on the communal conventions of academic peer discourse in RAs and popularizations alike, a straightforward politeness interpretation thus not being evident in either type of article.

The interpretations discussed in this section provide some insight into the reasons why hedges might after all be employed in the kind of discourse represented by *SA* articles in this study. However, yet another kind of motivation for hedging in the communicative context of popularizations can be postulated by returning to the interpersonal potential that hedging devices might have in different contexts. As stated, many of the problems of analyzing hedging with reference to politeness theories in RAs are no longer a major issue in the communicative context of popular scientific articles. Thus, a further motivation of hedging can be deciphered by referring to an interesting and largely unexplored possibility to do with Brown and Levinson's (1978/1987) idea that hedging phenomena may also be interpreted as interpersonal devices other than negative politeness markers (see Chapter 1).

This possibility (to be discussed in more detail in Ch. 7), can be linked to Brown and Levinson's (1978/1987) concept of positive politeness. Brown and Levinson present three main mechanisms that can be applied to indicate positive politeness, "to imply common ground or sharing of wants to a limited extent even between strangers who perceive themselves, for the purposes of the interaction, as somehow similar" (Brown and Levinson 1987: 103). The use of

hedges in the kind of popular science studied can in my opinion be associated with at least one of the three mechanisms, namely the use of “in-group markers” (op. cit.: 107). By employing devices that are typically associated with the style of scholarly peer communication, the authors of the SA articles could be thought to emphasize closeness between author and reader and thus enhance the audience’s self-image. As we have seen, hedging may be perceived as a procedure typical of discourse between the members of the esoteric group of researchers. Hence, it can accordingly be hypothesized that the use of such “in-group markers” (Brown and Levinson, *ibid.*) can also be useful in claiming common ground between knowledgeable senders and lay addressees and in this manner expressing positive politeness toward the exoteric lay audience.<sup>25</sup> By hedging, the authors of popular scientific articles can give the readership the impression that their style of presentation is molded by the presence of the audience, the readers thus being assigned a seemingly active role in the communication, although the opposite may indeed be the case.<sup>26</sup> The idea that hedging may also work toward positive politeness is in fact an explanation that might extend to a number of hedges in popular science if, as Brown and Levinson (op. cit.: 101-102) propose, positive politeness devices may be used to quite an extent to indicate that even though the sender may not be altogether sincere in expressing similarity and solidarity with the addressees, the sender definitely wishes not to violate the addressees’ positive face.

As the interpretations above illustrate, it is possible to find a number of viewpoints from which the incidence of hedges in the context of popular scientific articles may at least in theory be motivated. It should be added that these are not the only possible interpretations that might exist and in specific cases it may be impossible to determine what the intended function of a particular hedge is. Presumably, authors could have a variety of reason(s) in mind in applying hedging, it being assumed here that, should hedges occur in popular scientific articles, hedging is a strategy that authors apply consciously in such texts as well. Granted the scholarly background of the specialist authors of the kinds of popular scientific article examined here, it might of course be speculated that hedging, typical of specialist discourse of the highest levels of specialization, might at times occur in popularizations by experts simply because the authors are in the habit of applying this strategy quite frequently in communication with fellow scientists. If this were to be the case, hedging might be a feature carried over from the kind of discourse that the expert authors are more familiar with. As explained, hedging similar to the types employed in the research articles may for instance occur when the authors of popularizations make reference to work carried out by fellow scholars. As concerns possible hedging in other contexts, one might also assume that some of the devices found in popular science could indeed be traces left over



from the more scholarly discourse found in RAs, but it is unlikely that this would account for all hedges in popular science. On the one hand, as we have already seen, some examples of hedging might be unlikely to occur in RAs (see e.g. example 2 above), such hedging being more characteristic of popularization such as the SA articles. On the other hand, it is probable that popularizations written by scholars are also edited quite heavily by professional journalists prior to publication, hedges regarded as unnecessary in popular science in all likelihood being removed during the editorial process. For instance, as Aaltio-Kossmann (1990: 93) implies in an investigation of the process of scientific popularization in Finnish, the editorial policies of popular scientific publications distance the style of presentation from the style seen in scholarly work to a considerable degree, which presumably also extends to phenomena such as hedges.<sup>27</sup> Thus, hedges possibly found in popularizations such as the SA articles investigated can in many cases be assumed to be included in the communicative context of the popular scientific articles to achieve certain context-specific pragmatic ends, some of which have been suggested above.

\* \* \*

What has been said above about the possible status of hedges in popular science has proceeded largely at the level of theory, with few practical examples derived from actual data. This, as I have underlined, is also one of the main problems in earlier studies commenting on hedging in popular science. In order to avoid the pitfalls of letting theories overrun what actually takes place in authentic language use, let us now turn toward an analysis of hedging in the popular scientific articles chosen for scrutiny and see how the data relates to what has been said above.

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<sup>1</sup> Broadly speaking, of course, more or less all scientific communication aims at transmitting information derived by one scientist or a group of scholars to other contexts. What Whitley apparently refers to by this characterization of popularization is the transmission of information to those not working within the same narrow subject area as the scholars reporting their research.

<sup>2</sup> If we regard intra-scientific communication between experts representing the different fields of inquiry within the same broad discipline as a form of popularization, the question then arises whether or not research articles in journals for the perusal of more or less everyone within a specific discipline (e.g. *The New England Journal of Medicine*) should also be seen as a form of popularization, as such publications provide scholars with a means of communicating with an audience considerably wider than their most immediate colleagues within a specific area of specialization. However, we might also argue that such RAs are not clear-cut cases of popularization, because the nature of the research reported is such that it may be supposed to be of interest to more or less everyone within the broad disciplinary community, not only to specialists in a narrow areas of specialization. Furthermore, it may be asked whether such RAs would be any different if they were to be published in journals for a more specific group of specialists, i.e. whether they truly involve a process of popularization from a higher level of specialization. One might argue that such RAs are not straightforward popularizations in the latter sense, but are in the majority of cases accounts originally published in a widely circulated journal covering a variety of topic areas due to the general applicability and importance of the research reported. Therefore, RAs in widely distributed

journals that more or less any member of a specific scientific discipline may consult (e.g. the *NEJM*) will not be distinguished from those concentrating on a narrower area of specialization (e.g. *Anesthesiology*).

Incidentally, if we consider other kinds of material published in scientific journals, one might argue that the same journals publishing original RAs also include texts which have in a sense been popularized in that they involve a certain degree of selection and explication by the author. This is the case with for instance review articles, where an expert within a rather narrow area of specialization has taken on the task of providing a summary of existing work on a specific topic. In producing a review article, a scholar evidently has to choose the material to be reported, summarize it, and attempt to provide a coherent overview of the topic, the intention thus being to “collect, select, order, and interpret the huge outpouring of scientific reports, putting relevant findings and generalizations in a form useful to researchers outside the immediate group working on a problem” (Myers 1991: 45).

<sup>3</sup> Some *Scientific American* feature articles are also occasionally written by staff writers, not scholars, but the great majority of the more extensive *SA* articles are authored by established specialists in the areas reported on. The articles scrutinized in this study are all by specialists, not staff writers.

<sup>4</sup> In certain publications resembling *Scientific American* (e.g. *Discover*), articles are also quite often authored by ‘middlemen’ who are highly trained professionals, but not in the fields reported on. Thus, a popular scientific article on, say, medicine may in fact be written by a professor of English.

<sup>5</sup> McElheny (1985: 281) presents a list of seven “media of popular or near-popular exposition of technical subjects.” In this classification, *Scientific American* would apparently be included in the third category, popular publications by organizations other than professional scientific organizations. McElheny cites *Discover* and the weekly *Science News* as examples of this group. As noted above, *SA* is different from for example *Discover* in that the articles examined are in most cases authored by specialists in the field treated.

<sup>6</sup> It should be pointed out that Fahnestock’s (1986/1998) article is focused on the effects of the change of audience. Fahnestock does not discuss in any greater detail the status of the authors whose work she has examined. In the case of the research reports for scientific peers she studied, the authors are evidently specialists in the field. In the case of the popularizations, however, the status of the *Science82*, *Science83*, *Science84*, and *Science85* authors is not considered. As far as I know, the articles in these publications (by the American Association for the Advancement of Science) are by ‘middlemen’ rather than by scholars. Nonetheless, when it comes to the role of the readers, the situation in *Scientific American* is similar. In addition, both the popular publications examined by Fahnestock and *Scientific American* are entirely devoted to scientific issues, which distinguishes them for instance from *Time* and *Newsweek*. However, we must bear in mind that there may be a certain difference between the popularizations studied by Fahnestock and the ones examined in this study because of the difference in the status of the authors.

<sup>7</sup> Fahnestock’s comments on the generic features of popular scientific articles will be discussed further in the following section.

<sup>8</sup> Naturally, it is probably often the case that in producing popularized accounts of scientific matters, journalists resort to the assistance of specialists in the area dealt with. It may also be the case that for instance a popular scientific article is the result of cooperation between a specialist and a journalist. While cooperation between specialists and non-specialist popularizers may be a fruitful way of producing accounts of scientific issues for the wider public, scholars and journalists do not always agree on all aspects of popularization. Peters (1995: 44-5) suggests a number of differences between specialists’ and journalists’ approaches to scientific popularizations. For instance, journalists appear to accept the entertaining function of mass media more readily than specialists, experts and journalists have different preferences in their style of presentation, and journalists tend to presume that it is acceptable for scientists to violate the norms of science when dealing with publications intended for the public at large. Aaltio-Kossmann (1990) also illustrates that the views of a specialist and a journalist on how to prepare a popular scientific article may not coincide. In a study concerning the construction of a popular scientific article on superconductors in Finnish, Aaltio-Kossmann (p. 93) reports the original specialist author’s disappointment regarding the modifications made to his contribution, the author’s view being that “the final text did not feel like his own. The editing journalist [...] had modified the original text to such an extent that for a moment the author wondered whether to publish this article under his own name at all.”

<sup>9</sup> According to Fahnestock (1998: 331), the distribution of *SA* was quite extensive (some 425,000) as early as 1970, growing rapidly through the 70s and early 80 to about 710,000 by 1984. Now that *SA* is also available on the Internet, one can only guess at the number of people reading its articles.

<sup>10</sup> Admittedly, as exemplified above (see also Aaltio-Kossmann 1990), although the popular scientific articles examined are stated to be by specialists, it is also possible that non-specialist journalists play a role in their construction. Hence, the form popular science takes may not always be dependent on the specialist author’s views, but may also be determined by the editorial policies of the publication and editing journalists’ conceptions of

effective popularization. As noted earlier, it may also be the case that RA authors have to modify their texts to some degree according to referees' and editors' recommendations. This is also why a study of authentic material in analyses of scientific writing may turn out to be valuable, as a scrutiny of published texts may not only uncover information regarding the choices of the author but also give pointers toward the general editorial principles of the kinds of publication dealt with, probably of interest for those wishing to contribute to such publications.

<sup>11</sup> As pointed out in Chapter 2, the topics treated in RAs and popular scientific articles may be different in scope. Originally, my intention was to collect a corpus of articles where each popular scientific article would have been paired with a research article on a topic as similar as possible. Due to the differences in the scope of the article types, however, this did not prove feasible and no attempt was made to gather even closely related pairs of articles, as the relationship of the pairs would have been very loose and such pairing artificial. Consequently, the popular scientific articles and RAs dealt with concern the same broad fields of science, but no pairing according to topic is made. Instead, the articles were chosen so that a variety of subject areas within the three disciplines examined were included in the corpus.

<sup>12</sup> The terms *esoteric* and *exoteric* are derived from the work of Ludwik Fleck (1935/1979).

<sup>13</sup> As indicated previously, there may be certain differences in the scope of the topics treated in RAs and popularizations, RAs typically being more specific and narrow in their scope.

<sup>14</sup> It is worth noticing that Myers (unlike Fahnestock) comments on popularizations authored by specialists.

<sup>15</sup> Fahnestock's and Myers' idea that hedges are omitted from popularized reports of scientific information is echoed by for instance Hyland (1998: 57 ff.), according to whom the kind of unhedged certainty expressed by Latour and Woolgar's (1979: 77, see also note 17 below) type 4 statements "are the stock-in-trade of the science textbook and popular account but generally only seem to occur in RAs as contextualising material." In removing hedges, then, "the textbook writer seeks to present what is taken-for-granted as fact", whereas the popularizer engaged in nonpedagogical accommodation for a lay audience "attempts to add to the significance of the subject" (Hyland 1998: 59).

<sup>16</sup> In her study of the process of popularization for newspapers, Dubois (1986: 251) also points out that scientific popularizations by journalists may unintentionally end up warranting scientific information the status of fact in the eyes of the readership because reports of scientific work are approached in the same way as other news items, as physical events which have irreversibly taken place.

<sup>17</sup> According to Latour and Woolgar (1979: 77), type 4 statements are characteristic of scientific teaching texts, the knowledge to be acquired being stated in uncontroversial terms, which implies that hedges do not occur in teaching materials either. This idea has been put forth in more explicit terms by for instance Myers (1992: 11), who states that claims that are hedged in RAs for reasons of politeness may be presented without hedging in science textbooks. Myers points out that textbooks may contain some hedges, but they are used to indicate uncertainty, not politeness in the same way as in RAs.

<sup>18</sup> It should be noted that Grabe and Kaplan's study is an exploration of hedging in a mixture of texts representing a variety of topic areas, genres and sender-addressee relationships. Among other types of text, the study includes data from professional science publishing and popular science. The results of the study may not be applicable to any distinct types of special-subject discourse because of an apparent disregard for considerations of genre in the selection of research data. Furthermore, the findings are based on a very limited corpus, the five types of text dealt with constituting a corpus of 24,000 words.

<sup>19</sup> By "numerical hedging" Varantola apparently refers to a tendency to give suitably rounded approximations where numerical data is concerned, not to quote exact figures.

<sup>20</sup> In the RA data examined, a number of examples of such imprecision were encountered in contexts where the information reported apparently was not essential to the research. In an RA on computer viruses, for instance, the authors state that

There are *about 6000* computer viruses in existence, of which *many* are simple modifications of predecessors. (TEC1, B, 190)

The numerical imprecision in the excerpt is very similar to that seen in many of the popularizations, the difference being that in RAs such inexactitude may only be possible at certain stages, as in presenting contextualizing information in introductory sections (as is the case here) or in making generalizations in discussing the outcome of the study after exact data has been given in the section(s) on results. In the popularizations examined, on the other hand, giving approximate information often seemed to be quite common throughout the articles.

<sup>21</sup> Admittedly, it is not always easy to say when exactitude would be essential in an RA and when not, but in certain cases such a distinction appears feasible.

<sup>22</sup> As explained in Chapter 3, it is debatable whether such protection can be regarded as politeness as defined by e.g. Brown and Levinson (1978/1987), given the institutional context of RAs.

<sup>23</sup> As noted earlier (e.g. Ch. 1, note 21), hedging has not normally been linked to the textual function of language. As a matter of fact, in much of earlier (and also in quite recent, e.g. Bloor and Bloor 1995) work, the concept of textual function has mostly been taken to relate to issues to do with coherence between one part of discourse *vis-à-vis* the other parts and the general information structure of discourse (e.g. its thematic structure). As Halliday and Hasan (1989: 23, 45) point out, the metafunctions assigned to language in systemic theory are based on the idea that utterances and parts of them do not realize only one function at a time, but are multifunctional, subject to reinterpretation depending on the context. In my opinion, then, while hedging in the context of RAs might in the view of some analysts relate to requirements deriving from the social context and thus be seen as something akin to interpersonal politeness, it seems that in the kinds of popular scientific article investigated hedging is not always so much an interpersonal means toward “conducting social business” (Widdowson 1984: 71) as it is a matter of *textually* adjusting “propositions so that they fit into the changing situation of shared knowledge” (Widdowson, *ibid.*). This is why I find it reasonable to describe hedging in some instances—as in certain contexts in the popular scientific articles—as a textual phenomenon, although the strategy may not fall in with what is most typically dealt with when discussing the textual features of discourse.

<sup>24</sup> Prince et al.’s discussion revolves around spoken discourse, but to my mind this particular point can also be extended to other kinds of popularized communication.

<sup>25</sup> Some of the popular scientific articles also put forth suggestions for further research rather similar to those seen in the research articles, although the assumed lay readership is probably incapable of following up such suggestions. These suggestions, too, could be seen as in-group markers implying common ground between sender and addressee and thus expressing positive politeness.

<sup>26</sup> Hübler (1983: 157) suggests that positive politeness devices can also be used to boost the sender’s image. However, it seems that there is no apparent need to enhance the author’s image in research articles, because the authors of RAs are normally expected to belong to the esoteric group of researchers. Each of the popular scientific articles, however, included a short biographical note presenting the writers, their educational background, and professional affiliations. These sections could perhaps be taken to boost the positive face of the authors in that they confirm the authors’ status as experts in the fields dealt with, thus lending more credibility to what is said in the eyes of the non-expert audience.

<sup>27</sup> Interestingly, one of the authors of the popular scientific articles emphasized that the final wordings of the articles published in *SA* are not always actually those of the authors whose names appear on the first page. Instead, before being put into print the manuscripts may be revised to quite a degree “to make them more appealing to a general audience.” As a matter of fact, then, we may question whether the decision to use hedges is invariably that of the authors or that of an editor. Certain other authors also indicated that their formulations had been influenced by the editorial guidelines of *SA*, but only one of the authors responding to my questionnaire said that some of the wordings were by the editors rather than by the author.

## 6. Hedging in a Corpus of Popular Scientific Articles on Economics, Medicine, and Technology

Having discussed the possible roles of hedging in popular scientific discourse, let us now turn to actual results concerning hedging in authentic popular scientific articles drawn from *Scientific American* (SA). To allow comparisons with the RA data, the various hedging phenomena were classified in the same way as in Chapter 4. As to the other aspects studied, it should be pointed out that whereas most of the RAs were analyzed according to the traditional IMRD structure, the popular scientific articles could not truly be said to follow a conventional format anything akin to the IMRD structure. Instead, the articles were broadly divided into three sections, “Introduction”, “Main Body”, and “Conclusion” (for further comments, see 6.3 below), which is why straightforward comparisons of the distribution of hedges in the two types of article were not feasible. In what follows, attention will first be given to the overall incidence of hedges in the popular scientific articles from the three topic areas, after which I will deal with each category of hedges in more detail, to be followed by a discussion of the distribution of hedging phenomena in the articles and the reasons that authors cited for the use of hedges in the different parts of the articles.

### 6.1 Overall Incidence of Categories of Hedges in the Popular Scientific Articles

As seen in Table 10 below, the popular scientific articles from the three fields investigated were not altogether uniform when it comes to the frequency of different hedging phenomena:<sup>1</sup>

Table 10. Relative frequencies (n/1,000 words) and raw numbers of hedging devices in a corpus of popular scientific articles on economics, medicine, and technology.

	Economics	Medicine	Technology
Modal auxiliaries	4.37 (173)	6.65 (311)	4.08 (156)
Full verbs	4.06 (161)	4.70 (220)	3.06 (117)
Adverbs	5.96 (236)	8.47 (396)	7.16 (274)
Adjectives	1.69 (67)	1.69 (79)	1.80 (69)
Nouns	3.41 (135)	2.14 (100)	1.93 (74)
Clausal elements	1.16 (46)	2.63 (123)	0.78 (30)
Questions	0.10 (4)	0.13 (6)	0.34 (13)
Other	7.32 (290)	12.06 (564)	11.74 (449)
<b>Total</b>	<b>28.06 (1112)</b>	<b>38.46 (1799)</b>	<b>30.90 (1182)</b>

The overall results concerning the data from *SA* are in some respects noticeably different from the results concerning the *RAs* examined. In the *RAs*, hedges were most commonly identified in the data on economics, whereas in the popular scientific data the articles on economics were the least heavily hedged ones, hedges being slightly less common than in the economics *RAs*. In the other two disciplines, on the other hand, hedging was more common in the popular scientific articles than in the *RAs*, particularly so in medicine.

As regards the relative shares of the major categories of hedges distinguished, the results on popular scientific articles also differ from those on the *RAs* to some degree. Apart from the category of “Other” hedges<sup>2</sup>, full verbs were a well represented means of hedging in the *RA* corpus, but in the popular scientific articles hedging was most commonly realized by means of adverbs in each discipline. The modal auxiliaries were the second most common hedge type, whereas full verbs only occupied the third place in descending order of frequency, as can be seen below:

Table 11. Categories of hedges in descending order of frequency in the popular scientific articles. (The figures indicate frequency per 1,000 words and the percentage of each category out of the total in each discipline)

Economics	Medicine	Technology
1. Adverbs (5.96; 21.2%)	1. Adverbs (8.47; 22.0%)	1. Adverbs (7.16; 23.2%)
2. Modal auxiliaries (4.37; 15.6%)	2. Modal auxiliaries (6.65; 17.3%)	2. Modal auxiliaries (4.08; 13.2%)
3. Full verbs (4.06; 14.5%)	3. Full verbs (4.70; 12.2%)	3. Full verbs (3.06; 9.9%)
4. Nouns (3.41; 12.1%)	4. Clausal elements (2.63; 6.8%)	4. Nouns (1.93; 6.3%)
5. Adjectives (1.69; 6.0%)	5. Nouns (2.14; 5.6%)	5. Adjectives (1.80; 5.8%)
6. Clausal elements (1.16; 4.1%)	6. Adjectives (1.69; 4.4%)	6. Clausal elements (0.78; 2.5%)
7. Questions (0.10; 0.4%)	7. Questions (0.13; 0.3%)	7. Questions (0.34; 1.1%)
[Other 7.32; 26.1%]	[Other 12.06; 31.4%]	[Other 11.74; 38.0%]
(Total 28.06; 100%)	(Total 38.46; 100%)	(Total 30.90; 100%)

In the RAs examined, lexical hedging phenomena in the form of modal auxiliaries, full verbs, adverbs, adjectives, and nouns were found to account for quite a high share of the total number of hedges, but in the popular scientific articles the shares were somewhat lower. In the SA articles, too, the highest share of hedges included in the five major lexical categories occurred in the data on economics (69.4%), but the share was noticeably lower (by some 15 percentage points) than in the RAs. Similar differences were also to be detected in medicine and technology, the five lexical categories amounting to 61.5% of the overall incidence of hedges in the popular scientific articles on medicine and to 58.4% in those on technology. In contrast, especially hedges assigned to the category of “Other”—some of them also lexical—were considerably more frequent in the data from SA than in the RAs.<sup>3</sup> In order to gain more information about the ways in which hedging is applied in the data from SA, let us next proceed to a closer consideration of the various hedge types distinguished.

## 6.2 Categories of Hedges in the Popular Scientific Articles

In what follows, the different categories and subcategories of hedges established will be dealt with in more detail as concerns their frequency and the contexts in which they occurred in the SA articles. The order of presentation will for the most part be the same as in the case of the RAs, which is intended to facilitate comparisons of the incidence of hedging in the two types of article treated. As many of the intricacies and problems involved in the analysis of the different kinds of hedge have already been dealt with at some length in Chapter 4, no specific attention will be given to these issues in the present discussion.

### 6.2.1 Modal Auxiliaries

The popular scientific articles included seven different modal auxiliaries deemed as hedges, amounting to 640 occurrences of hedging. The items identified were *can*, *could*, *may*, *might*, *must*, *should*, and *would*. The highest concentration of modal auxiliaries (6.65 per 1,000 words) in hedging use was found in the popular scientific articles on medicine, followed by economics (4.37) and technology (4.08). In the case of medicine and technology, hedging of this kind was considerably more common than in the RA data, whereas in economics the relative frequency of such hedges was slightly lower in the popular scientific articles than in the RAs, a finding which once again points toward disciplinary differences in the use of hedges. As was the case in the RAs, *may*, *might*, and *could* were the most commonly employed hedges in the form of modal auxiliaries, which is why the following consideration of the individual modal auxiliaries will begin from these three items.

**a. *May*.** In each discipline, *may* was the modal auxiliary most commonly used as a hedge, with a total of 275 occurrences. Its share of all hedges realized as modal auxiliaries was not quite as high as in the RA corpus, but it nevertheless accounted for over one third of all modal auxiliaries counted as hedges (see Table 12 at the end of this section). As one might expect on the basis of the overall results concerning modal auxiliaries, the highest relative frequency of *may* as a hedge was found in the popular scientific articles on medicine (3.21 per 1,000 words; n=150), whereas in economics and technology, incidence was noticeably lower (1.62; 64 and 1.59; 61, respectively). The following are typical cases found in the data:



- (1) Radically different approaches *may* be needed in the long run, but breakthroughs are not necessary, because late 20th-century engineering capabilities can deliver substantial environmental and economic benefits over the next decade. (TEC2, C, 30 [Introduction])
- (2) The potential decline in profit *may* explain why many other exchanges still resist electronic trading. (ECO2, G, 96 [Main Body])
- (3) The first days after the onset of a stroke *may* be a time of critical regrowth, when somewhat damaged neurons start to regenerate injured parts, and other neurons form new connections to compensate for ones that have been lost. (MED2, J, 43 [Conclusion])

**b. *Might*.** *Might* was the second most common modal auxiliary found as a hedge in the popular scientific data with a total of 124 occurrences, being the second most frequent in medicine and technology and the third most common in economics. The concentration of the item was highest in medicine (1.30 per 1,000 words; n=61), followed by technology (1.02; 39) and economics (0.61; 24), the figures again illustrating disciplinary variation especially between medicine and economics. As the following examples indicate, *might* was often used in ways similar to *may*, the meaning in many cases appearing a touch more tentative than that of *may*. Occasionally, as in (6), the item was also used as what appears to be a past form of *may*.

- (4) The affected population may turn out to be far larger if, as some workers suspect, autoimmunity plays an important secondary role in atherosclerosis, the cause of half the deaths in the Western world. Yet, if true, it *might* be good news, for science is making great strides in understanding autoimmunity. (MED2, G, 75 [Introduction])
- (5) This view implied that most of the lost *T* cells disappeared via a mechanism other than wild HIV proliferation, which in turn meant that drugs able to block viral reproduction *might* not interfere much with disease progression until shortly before AIDS set in. (MED2, A, “Data’s Message: Stop Viral Growth”, paragraph 3 [Main Body])
- (6) True, a country “exporting” some of its carrying capacity in return for imported products *might* have increased its throughput even more if it had made those products domestically. (ECO2, B, 29 [Conclusion])

**c. *Could*.** The third most common of the modal auxiliaries in hedging use in the popular scientific data was *could*, amounting to 91 occurrences overall. Out of the three topic areas, *could* was the third most common in medicine (0.86 per 1,000 words; n=40) and technology (0.76; 29) and the

fourth most common in economics (0.56; 22). Thus, as in the RA data, the disciplinary differences detected in the case of *may* and *might* were not quite as pronounced with *could*.

The examples below illustrate some typical occurrences of *could* in the popular scientific articles. On most occasions, the item was used in surroundings similar to those in which *may* and *might* were found, *could*, however, being typically more tentative in tone than especially *may*:

- (7) Later this year two drugs being tested in large clinical trials *could* be approved for sale as new missiles in the fight against the flu. (MED2, B, Introduction, paragraph 5 [Introduction])
- (8) Bypassing the handling of money in paper or metallic form *could* generate significant savings. (TEC2, E, “The Big Picture”, paragraph 3 [Main Body])
- (9) In fact, slowing the rate of progress in semiconductors *could* have unexpected advantages, such as giving computer architectures and software time to begin assimilating the great leaps in chip performance. (ECO2, E, “Big Plants, Little Variety”, paragraph 5 [Conclusion])

**d. Other Modal Auxiliaries.** As in the popular scientific data, the results concerning hedging in the RA data demonstrated that *may*, *might*, and *could* accounted for a considerable share of hedging in the form of modal auxiliaries. The share of the three items was highest in the SA articles on technology, amounting to 82.7% of hedges realized as modal auxiliaries. The ratio of the three devices was also high in medicine, 80.7%, but somewhat lower in economics, 63.6%. As to other modal auxiliaries, *can*, *should*, *would*, and *must* were also identified in hedging use, but their incidence was not as high as that of the other three items. The relatively low number of occurrences also undoubtedly limits the generalizability of the findings concerning these latter. The remaining auxiliaries will again be discussed in decreasing order of frequency.

**Can.** As seen previously, in contrast to what has sometimes been said about the use of *can*, the item occurred in the RA data in contexts where it could be interpreted to function epistemically as a hedge. This was also the case in the popular scientific articles, where a total of 73 occurrences of *can* were found in uses where a hedging interpretation was possible, as in the following:

- (10) The benign competitors *can* be important allies in the fight against antibiotic-resistant pathogens. (MED2, C, Introduction [Introduction]).

- (11) First, safety requirements must be chosen carefully to reflect the nature of the application. These requirements *can* vary dramatically from one application to another. (TEC2, H, 40 [Main Body])
- (12) Even in the semiconductor industry, maturity *can* be a splendid asset. (ECO2, E, “Big Plants, Little Variety”, paragraph 5 [Conclusion])

Worth noticing in the case of the popular scientific articles is the relatively high incidence of *can* in comparison with the RA data, *can* in fact being the fourth most frequent of the modal auxiliaries in hedging use in the popular scientific data considered overall, more frequent than items such as *should* and *would*. The highest concentration of these cases was found in the data on economics, where 0.93 such uses were found per 1,000 words (n=37), *can* in fact being the second most common modal auxiliary found as a hedge. The number of such uses was also relatively high in medicine, with 0.68 occurrences per 1,000 words (n=32), but noticeably lower in technology (0.10; 4).

***Should.*** The popular scientific articles included altogether 45 occurrences of *should* deemed as hedges. The following are typical examples:

- (13) The scientific and engineering knowledge gained from ITER *should* lead to the demonstration of a fusion reactor power station, perhaps within the next three decades. (TEC1, B, 75 [Introduction])
- (14) This analysis carries two clear empirical implications. First, if growing international trade is the main force driving increased wage inequality, the ratio of skilled to unskilled employment *should* decline in most U.S. industries. Second, employment *should* increase more rapidly in skill-intensive industries than in those that employ more unskilled labor. (ECO2, F, 26 [Main Body])
- (15) Patients who could safely be treated with both approaches *should* reap an added benefit: one of us (Zivin) has shown in animals that the combination of a glutamate antagonist and tPA reduces neurological injury more than would either drug alone. (MED2, J, 43 [Conclusion])

The highest relative number of *should* in hedging use occurred in the data on technology, with 0.50 cases per 1,000 words (n=19), followed by medicine (0.36; 18), and economics (0.20; 8).

**Would.** A total of 22 occurrences of *would* were found in hedging function in the SA data, often accompanied by another tentative item (17) or embedded in surroundings otherwise emphasizing the hypothetical nature of the information presented:

- (16) In all probability, many other biochemical and structural changes accompany this phase, including a loss of synapses and a resultant decline in the cortical levels of acetylcholine and some other neurotransmitters. Some of the affected neurons *would* produce the masses of paired helical filaments that constitute the neurofibrillary tangles. (MED2, F, 47 [Main Body])
- (17) For intense magnetic fields, it *would* seem, not even the sky is the limit. (TEC1, A, 40 [Conclusion])

As in the RA data, the incidence of *would* as a hedge was highest in economics (0.33 per 1,000 words; n=13), followed by medicine (0.11; 5) and technology (0.10; 4).

**Must.** The last modal auxiliary interpreted as a hedge in the corpus of popular scientific articles was *must*, which occurred only ten times in the data and was only present in two topic areas, economics and medicine. Five occurrences were identified in each field, amounting to 0.13 per 1,000 words in economics and 0.11 in medicine. As the examples below illustrate, the auxiliary was taken as a hedge where it could be seen to indicate that the accompanying information is based on “confident inference” (Coates 1983: 31) or is taken as an “epistemic necessity” (Quirk et al. 1985: 224), implying that although most likely, what is stated may not be absolutely accurate:

- (18) If we see the economy as a subsystem of a finite, nongrowing ecosystem, then there *must* be a maximal scale for its throughput of matter and energy. (ECO2, B, 29 [Main Body])
- (19) This paradoxical effect of salicylate suggests that salicylates interfere with the action of pertussis toxin near the site of its interaction with the G protein; they too *must* interact with the G protein in the cell membrane. (MED2, I, 64 [Main Body])

\* \* \*

To sum up, it can be said that disciplinary variation could be detected in the popular scientific articles examined as concerns the hedging use of modal auxiliaries, medicine being noticeably more heavily hedged than the other two subject areas examined. Furthermore, when considered

together with the results on the RAs, the findings emerging from the popular scientific articles also hint toward disciplinary variation. Whereas in economics hedging in the form of modal auxiliaries was somewhat more common in the RAs than in the popular scientific articles, the situation was reversed in the other two disciplines, where hedges realized as modal auxiliaries figured considerably more frequently in the popular scientific data. Moreover, as the percentages indicated in Table 12 below show, the preponderance of *may* seen in RAs was not quite as obvious in the popular scientific articles, although even there *may* was the most commonly used of all lexical hedges:

Table 12. The relative shares of the modal auxiliaries identified as hedges in the popular scientific articles.

(The figures indicate frequency per 1,000 words and percentage out of all modal auxiliaries found as hedges in the discipline.)

	Economics	Medicine	Technology
<i>may</i>	1.62 (37.0%)	3.21 (48.2%)	1.59 (39.1%)
<i>might</i>	0.61 (13.9%)	1.30 (19.6%)	1.02 (25.0%)
<i>could</i>	0.56 (12.7%)	0.86 (12.9%)	0.76 (18.6%)
<i>can</i>	0.93 (21.4%)	0.68 (10.3%)	0.10 (2.6%)
<i>should</i>	0.20 (4.6%)	0.38 (5.8%)	0.50 (12.2%)
<i>would</i>	0.33 (7.5%)	0.11 (1.6%)	0.10 (2.6%)
<i>must</i>	0.13 (2.9%)	0.11 (1.6%)	—
<b>Total</b>	<b>4.37 (100%)</b>	<b>6.65 (100%)</b>	<b>4.08 (100%)</b>

Thus, on the one hand, the findings regarding the modal auxiliaries suggest that, despite earlier views to the contrary, hedges may figure quite commonly in popular scientific articles. On the other hand, it also seems that there may be a certain degree of disciplinary variation in the use of hedges in discourse such as the *SA* articles examined. Granted these results, it is interesting to proceed to hedges of other types to see whether or not similar tendencies apply to them as well.

### 6.2.2 Full verbs

Altogether 55 different full verbs belonging to the categories of nonfactive reporting verbs, tentative cognition verbs, and tentative linking verbs were found as hedges in the popular

scientific articles, amounting to 498 occurrences. In comparison with the results regarding the RA corpus, the frequency of such hedging was noticeably lower in the popular scientific articles on economics (4.06 vs. 7.46 per 1,000 words). In medicine (4.70 vs. 4.99) and technology (3.06 vs. 3.90), too, the incidence of such hedging was lower than in the RAs, but the differences were not as evident as in economics. To see whether these differences between topic areas and levels of expertise derive from a specific group of verbs or whether the difference applies to each type of verb distinguished, let us now look at each subcategory of full verbs in more detail.

**a. Nonfactive reporting verbs.** The popular scientific data yielded 12 different<sup>4</sup> nonfactive reporting verbs interpreted as hedges, with a total incidence of 138. *Suggest* was by far the most frequent item (n=66) in each subject area in the popular scientific articles as well. Among the most frequent items in the data were also *propose* (n=21) and *imply* (n=16). The following represent typical occurrences of this verb category in hedging use, the hedges indicating that information derived from other sources or based on the authors' own views may not be absolute:

- (20) In 1990 such expenditures equaled \$666 billion, or 12.2 percent of the GNP; projections *suggest* that in 1992 the country will spend more than \$800 billion on medical care, or 13.4 percent of the GNP. (ECO2, D, 22 [Introduction])
- (21) Again, carbon-fiber composite tiles bonded to a cooled heat sink have been *proposed* for the divertor, but much research and development remains. (TEC2, B, 80 [Main Body])
- (22) If the effects in human beings resemble those of the animals, the findings *imply* that abuse or neglect may produce permanent changes in the developing brain—changes that chronically boost the output of, and responsiveness to, CRF, and therefore increase the victims' lifelong vulnerability to depression. (MED2, E, "Support for a Model", paragraph 6 [Conclusion])

The incidence of this subtype of full verbs in hedging use was highest in the data on medicine (1.45 per 1,000 words; n=68), followed by economics (0.96; 38) and technology (0.78; 30). In comparison with the RA data, the relative figures were lower in the popular scientific articles for each discipline, especially so in economics. Furthermore, the variety of items employed was also narrower in medicine (eight) and particularly in economics (seven), whereas in technology the variety was wider by one item (eight). As the results show, there was noticeable variation between disciplines in the incidence of such hedges, medicine emerging as the subject area with the highest number of such hedges, a finding on a par with the results on the modal auxiliaries.

**b. Tentative cognition verbs.** Altogether 38 different<sup>5</sup> tentative cognition verbs, with a total of 229 occurrences, were found as hedges in the SA articles. The verb *estimate* was the one employed most commonly in each topic area, with 38 occurrences overall in the popular scientific data, *believe* (n=27) and *expect* (n=20) occupying respectively the second and third places in terms of frequency. As we can see from the examples below, the verbs again occurred as hedges when the authors put forth information obtained from other sources (23) or when they expressed their own opinions about issues whose accuracy could not be presented categorically:

- (23) Asthma alone accounted for an *estimated* \$3.6 billion in direct medical expenditures in 1990 and for nearly 1 percent of all health care costs. (MED2, D, 85 [Introduction])
- (24) Thus, we *expect* networks to lead to less vertical integration—more buying rather than making—and to the proliferation of smaller firms. (ECO2, G, 96 [Main Body])
- (25) We *believe* the variety of applications of microlasers will be exceedingly wide, but at this point it is only a belief. (TEC2, G, 62 [Conclusion])

Hedges belonging to this subtype of verbs were most commonly employed in the field of economics (2.20 per 1,000 words; n=87), whereas in this case the figures were slightly lower for medicine (1.80; 84), and technology (1.52; 58). In comparison with the RA data, incidence was lower in the popular scientific data, most noticeably in economics. On the other hand, overall, the selection of hedges of this type was slightly wider in the popular scientific articles than in the RAs (38 vs. 35). As to the individual disciplines, in economics variety was slightly narrower than in the RAs (24 vs. 29), but somewhat wider in medicine (23 vs. 20) and technology (25 vs. 20).

**c. Tentative linking verbs.** The popular scientific articles included five different tentative linking verbs in hedging use, namely *seem* (n=69), *appear* (n=36), *tend* (n=25), *sound* (n=1), and *look* (n=1). Altogether, these five verbs constituted 133 instances of hedging, typically where the authors made statements about matters where full certainty might not exist:

- (26) The theory has strong parallels with modern nonlinear physics [...], it requires new and challenging mathematical techniques and it *appears* to be the appropriate theory for understanding modern high-technology economics. (ECO2, A, 92 [Introduction])

- (27) The costs per transaction of stored-value cards *tend* to be lower than those for credit cards and cash, but initial capital costs *tend* to be higher. (TEC2, E, “The Big Picture”, paragraph 4 [Main Body])
- (28) But individuals who have both a family history of the condition and a traumatic childhood *seem* to be unusually prone to the condition. (MED2, E, “Support for a Model”, paragraph 8 [Conclusion])

Contrary to the previous category, hedging of this type was most common in the popular scientific articles on medicine (1.45 per 1,000 words; n=68), second most common in economics (0.91; 36), and third most common in technology (0.76; 29). In medicine and technology, the relative incidence was somewhat higher than in the RA data, whereas in economics the frequency of such hedges was lower than in the RAs. As concerns variety in the use of hedges, the three devices constituting all cases of such hedging in the RAs (*appear*, *seem*, *tend*) were also present in economics and medicine, and in technology both *sound* and *look* were additionally each employed once.

As explained in Chapter 4, an interesting disciplinary difference concerning the use of the verbs *appear* and *seem* was detected in the RA data insofar as *appear*, the more formal one, was used more commonly in medicine and technology than *seem*, whereas the situation was reversed in the RAs on economics. In the popular scientific data, it was *seem* that outnumbered *appear* in all subject areas. There was not all that much variation between the fields of study as regards the ratios of *appear* vs. *seem*, the figures being 9:15 in economics, 20:41 in medicine, and 7:13 in technology. What the findings imply, however, is that especially in medicine and technology we can detect a certain decrease in the level of formality when we move from RAs to texts aimed at an audience with a lower level of expertise.

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As we have seen above, in the majority of cases, the relative number of hedges in the form of the three subtypes of full verb was lower in the popular scientific data than in the RAs examined. Moreover, disciplinary variation was detected between the subject areas in the SA data, nonfactive reporting verbs and tentative linking verbs appearing most often in medicine, whereas tentative cognition verbs were most commonly found in economics. Turning to the combined results regarding the three groups of verbs, while economics was by far the field of expertise with the highest overall incidence of full verbs used as hedges in the RA corpus, in the popular scientific



articles medicine emerged as the topic area with the highest degree of such hedging, a finding akin to the results concerning the modal auxiliaries. On the other hand, in both the RAs and the SA articles technology was the discipline with the lowest number of hedges belonging to each subtype of verbs, yet another finding similar to the overall results on the modal auxiliaries. As concerns the choice of hedges employed, it is of interest to see that although the lowest overall degree of hedging by means of full verbs occurred in the popular scientific articles on technology, the widest array of different items was found in this topic area. Even though hedges of this type were less common than in the RAs on technology, the choice of hedges was noticeably wider than in the RAs (38 vs. 30). In medicine, the variety of hedges used was quite similar to the RAs (34 vs. 32). As might be expected on the basis of the relative number of hedges in the SA articles on economics, the selection of devices was also remarkably lower than in the RA data (34 vs. 46).

### 6.2.3 Adverbs

The data drawn from *Scientific American* included a selection of 60 adverbs that were interpreted as hedges, amounting to altogether 906 instances of hedging. The array of items identified was thus just about as wide as in the RA data (61).

**a. Probability adverbs.** The data from SA included 12 different<sup>6</sup> probability adverbs found in hedging use, with *perhaps* (n=53), *probably* (39), and *potentially* (19) as the commonest ones. Altogether, items belonging to this group occurred 149 times as hedges in the SA articles, involving a certain reservation concerning the accuracy of what is said:

- (29) While such alternatives are being studied and tested, however, gasoline and diesel cars and trucks will most *likely* dominate the roads for decades to come. (TEC2, C, 30 [Introduction])
- (30) Once again, government plans would appear to be more expensive than private initiatives, *presumably* because government is less efficient, thereby providing a rationale for cutting public budgets and for underfunding. (ECO2, D, 26 [Main Body])
- (31) Third, one could retard the apparent maturation of amyloid beta-protein deposits into neuritic plaques, *perhaps* by interfering with the formation of the amyloid filaments that seems to accompany this change. (MED2, F, 47 [Conclusion])

Hedging of this type, too, was most common in the popular scientific articles on medicine (2.12 per 1,000 words; n=99), followed by technology (0.94; 36) and economics (0.35; 14). In both medicine and technology, then, the incidence of such hedges was higher than in the RA data, but somewhat lower in economics. Furthermore, the differences between the three subject fields were clearly more pronounced in the popular scientific data than in the RAs. As concerns variety in items used, medicine was also the topic area with the widest selection of devices (nine), followed by economics (seven) and technology (five). Thus, in medicine the choice was wider than in the RAs (six), but in economics and technology the selection was narrower than in the RAs (12 and 8, respectively).

**b. Adverbs of indefinite frequency.** 13 different<sup>7</sup> adverbs of indefinite frequency were identified as hedges in the popular scientific articles, with a total of 265 occurrences. The most frequent items were *often* (n=85), *sometimes* (40), and *typically* as well as *usually* (32 occurrences each). As the examples below illustrate, such hedging was commonly used to avoid making categorical assertions or providing precise quantifications:

- (32) In permanent magnets, on the other hand, the electron spins are aligned—*typically* 1 to 10 percent of them—within small regions called magnetic domains. (TEC2, A, 36 [Introduction])
- (33) This is not a significant cause of cancer in the general population, however, and radon levels are *usually* lowered by improving the ventilation of a building or mine. (MED2, H, “Radiation and You”, paragraph 3 [Main Body])
- (34) These resistant strains endure for some time—*often* for weeks—after the drug is removed. (MED2, C, “Considering the Environmental Impact”, paragraph 1 [Conclusion])

Once again, medicine emerged as the topic area with the highest incidence of hedges (2.84 per 1,000 words; n=133). In economics, incidence was also relatively high (2.07; 82), but noticeably lower in technology (1.31; 50). In comparison with the RA data, the figures for technology were essentially the same in the popular scientific articles, but in the other two disciplines the frequency of such hedges was considerably higher in the SA articles than in the RAs, especially in medicine. A slight increase in the overall variety of such hedges was detected in the SA articles when compared with the RAs (13 vs. 11). The popular scientific articles on technology, although least heavily hedged by this group of devices, contained the widest selection of items (12), but the

choice was not much narrower in economics and medicine either (11 in each). In comparison with the RA data from the three disciplines, the figures were slightly higher (10 in the RAs on economics, and eight in the other two fields of study).

**c. Adverbs of indefinite degree.** The popular scientific data contained 24 different<sup>8</sup> adverbs of indefinite degree in hedging use (201 overall occurrences), *relatively* (n=37), *significantly* (19), and *fairly* (16) forming the top three items in terms of frequency. Items of this kind were quite commonly employed in the SA articles to provide indefinite quantifications or to otherwise tone down the assertiveness of what is being stated:

- (35) Additional uses are limited *mostly* by issuers' imaginations and consumer acceptance. (TEC2, E, Introduction, paragraph 3 [Introduction])
- (36) Such early-life factors as excessive growth caused by overeating and insufficient exercise could be a component cause in perhaps 5 percent of cancers of the breast and prostate, which become fatal *relatively* frequently. (MED2, H, "Eat Right, Live Longer", paragraph 7 [Main Body])
- (37) Considerable demographic evidence indicates that declines in birth rates *quite* often follow declines in death rates. (ECO2, J, 25 [Conclusion])

Only slight disciplinary variation in the use of this group of hedges was detected in the popular scientific data. The articles on technology included 1.70 such hedges per 1,000 words (n=65), as opposed to 1.69 (79) in medicine and 1.44 (57) in economics. However, in the case of medicine and, to a lesser degree, in economics, incidence was higher than in the RA data, whereas in technology such hedges occurred more frequently in the RA corpus. The widest array of devices, 19, was found in technology, followed by medicine (18), and economics (16). In economics and technology, the selection was slightly wider than in the RAs (13 and 18, respectively), whereas in medicine the choice of expressions was somewhat narrower than in the RAs (20).

**d. Approximative adverbs.** The popular scientific articles included 11 different<sup>9</sup> approximative adverbs deemed as hedges, adding up to 291 occurrences. More than half of these cases (149) involved the adverb *about*, the following items in terms of frequency being *almost* (40), *nearly* (21), and *virtually* (21). Some typical occurrences are exemplified below:

- (38) It has long been known that at least some cases are caused by genetic abnormalities: in some families, *roughly* one half of each generation acquires this familial type of Alzheimer's disease. (MED2, F, 40 [Introduction])
- (39) The unit of magnetic-field strength is the gauss, and as a benchmark, the strength of the earth's magnetic field is *about* one-half gauss. (TEC2, A, 36 [Main Body])
- (40) In a more mature industry, growth will *almost* certainly come from refined products in more diversified lines. (ECO2, E, "Big Plants, Little Variety", paragraph 4 [Conclusion])

In each subject area, hedges of this type were more common than in the RAs. As was the case in the RA data, such hedging occurred most frequently in technology (3.22 per 1,000 words; n=123), followed by economics (2.09; 83), and medicine (1.82; 85). In technology and economics, the numbers of different items employed were the same as in the RAs (10 and 9, respectively), but in medicine the choice of items was doubled (10) in comparison with the RAs.

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As can be seen from the results above, some differences according to the type of adverb could be detected between the popular scientific articles from the three subject fields. Furthermore, the relationship between the results from the RAs and the popular scientific data also varied to some extent according to the type of adverb. As the category of adjectives includes many items closely related to the adverbs examined, let us consider the results regarding adjectival hedging in the popular scientific data before summarizing the discussion concerning adverbs in hedging use in the SA articles.

#### 6.2.4 Adjectives

The popular scientific articles contained altogether 40 different adjectives interpreted as hedging devices, constituting a total of 216 occurrences. Thus, the array of devices employed was noticeably narrower in the SA articles than in the RAs (57). In order to see whether these results also imply a lower incidence of the various kinds of adjectival hedging, let us take a look at the frequencies of the four subcategories in the popular scientific data.

**a. Probability adjectives.** While 19 different probability adjectives were identified in hedging use in the RAs, only 9 different<sup>10</sup> items (111 occurrences in all) were found in the popular scientific articles. The items most commonly identified as hedges were *likely* (n=53), *possible* (29), and *potential* (13). The following represent the kinds of hedging use frequently encountered in the data:

- (41) Nevertheless, microlasers have generated enormous excitement for their *potential* applications in optical computers as well as in optical communications and information processing in general. (TEC2, G, 56 [Introduction])
- (42) One *possible* solution is to reduce the value of the dielectric constant, making the insulator more impermeable to cross-talk. (ECO2, E, “Breakthroughs Needed”, paragraph 3 [Main Body])
- (43) These numbers, like those associated with pandemics, are *likely* to fall in the next several years as new anti-flu drugs become available and as vaccines become more widely used and faster to produce. (MED2, B, “Questions”, paragraph 7 [Conclusion])

The highest relative number of hedges of this type was found in the data on economics, with an incidence of 1.01 per 1,000 words (n=40). In the other two disciplines, occurrence was slightly lower, that is, 0.94 in medicine (n=44) and 0.71 in technology (n=27). As to variety in the number of different devices used, the differences were also quite narrow, but reversed in comparison with the relative frequencies. The widest choice of items was found in technology (7), followed by medicine (6), and economics (5). In comparison with the RA data, then, the order of the three topic areas was the same in terms of the relative incidence of such hedges. However, in economics and medicine, the figures were lower than in the RAs, but slightly higher in technology. In each subject field, the variety of items employed was noticeably narrower than in the RA data, where 13 different devices were found in economics and medicine and 12 in technology.

**b. Adjectives of indefinite frequency.** 13 different<sup>11</sup> adjectives of indefinite frequency were interpreted as hedges in the popular scientific data, amounting to 48 cases of hedging. The most frequent of these items were *common* (n=21), *typical* (7), and *rare* (5). As the following illustrate, such devices were typically used to point toward the possibility that what is said might not be invariably applicable or to express imprecise quantification where precise figures might not be available or necessary:

- (44) A *typical* diode laser measures a few microns wide by several hundred microns long—making it several hundred times bigger than one of its microelectronic counterparts. (TEC2, G, 56 [Introduction])
- (45) Some effective drugs or combinations of such drugs used to treat cancers such as Hodgkin’s disease can cause acute leukemia in about 5 percent of survivors and, in *rare* cases, bladder cancer. (MED2, H, “Of Work, Medications and Microbes”, paragraph 3 [Main Body])
- (46) In addition, a *common* cause of nonresponse to antidepressants is the presence of previously undiagnosed thyroid insufficiency. (MED2, E, “Hormonal Abnormalities”, paragraph 2 [Main Body])

As was the case with adverbs indicating indefinite frequency, the highest number of this hedge type was found in the articles on medicine (0.53 per 1,000 words; n=25). In the other two disciplines, incidence was slightly lower, 0.34 per 1,000 words (n=13) in technology and 0.25 in economics (10). In the case of medicine, then, the figures were somewhat higher than in the RA data, exactly the same in economics, and slightly lower than in the RAs on technology. As concerns the selection of hedges used, six different devices were found in each subject area in the SA articles. In economics and technology, the choice was thus slightly narrower than in the RA data (8), but somewhat wider in medicine (4).

**c. Adjectives of indefinite degree.** 15 different<sup>12</sup> adjectives (53 occurrences) indicating indefinite degree were identified as hedges in the data drawn from *Scientific American*. In the majority of cases, the items were found where authors apparently wished to give some idea about the frequency of a given phenomenon without presenting precise quantifications:

- (47) When imports displace a dollar of domestic manufacturing sales, a *substantial* fraction of that dollar would have been spent on inputs from the service sector, which are not part of manufacturing’s contribution to GDP. (ECO2, F, 24 [Main Body])
- (48) Such an arrangement enables the coils to withstand *considerable* pressure. (TEC2, A, 39 [Main Body])
- (49) In the absence of antibiotics, susceptible strains have a *slight* survival advantage, because the resistant bacteria have to divert some of their valuable energy from reproduction to maintaining antibiotic-fighting traits. (MED2, C, “Considering the Environmental Impact”, paragraph 2 [Conclusion])

The results concerning hedges of this type are in line with the earlier findings concerning similar adverbs in the SA articles and corresponding adjectives in the RA data insofar as technology was the topic area with the highest frequency of the devices in hedging use (0.76 per 1,000 words; n=29). In economics, the items were somewhat less frequent (0.40; 16), and considerably less common in medicine (0.17; 8). Furthermore, the choice of items was also remarkably wider in technology, where 14 different items were found, as opposed to four in each of the other subject fields. In the RAs, the choice of items was similar in the field of economics, whereas in the RAs on medicine and technology there was a wider choice (9 and 18, respectively).

**d. Approximative adjectives.** Only three different approximative adjectives, each with one occurrence, were found in hedging use in the popular scientific data. The devices were employed to indicate the approximate, noncategorical nature of what is being stated, as in the following:

- (50) Destruction begins when a *T* cell encounters its antigen in the cleft of an HLA molecule and releases proteins and peptides, including tumor necrosis factor, a chemical relative called lymphotoxin and gamma interferon. These chemicals have been identified as the *proximate* cause of demyelination. (MED2, G, 79 [Main Body])

Two of the items (*approximate*, *proximate*) were found in the medical articles (0.04 per 1,000 words) and one (*rough*) in economics (0.03 per 1,000 words). The most noteworthy finding emerging from these marginal occurrences is perhaps the absence of such hedges from the technology articles, whereas in the RA data technology was the discipline with the highest number of such hedges, although the occurrence was quite low even there. Furthermore, given that approximative adverbs were quite common in the SA articles on technology, in fact considerably more common than in the RAs, one might have expected this hedge type, too, to be well represented in the popular scientific articles.

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To sum up, then, it is interesting to consider the results concerning the hedging use of adverbs and adjectives in the two types of discourse examined. When compared with the findings concerning the RAs, the overall results concerning adverbs and adjectives in the SA articles are rather different. The overall use of adverbs in as hedges in the popular scientific articles was more

frequent than in the RAs, no matter what the discipline (5.96 vs. 4.72 in economics, 8.47 vs. 2.61 in medicine, and 7.16 vs. 5.57 in technology). Similarly, the array of different adverbs used was somewhat wider than in the RAs regardless of the discipline (43 vs. 40 in economics, 48 vs. 43 in medicine, and 46 vs. 44 in technology). In the overall hedging use of adjectives, these trends were reversed, such hedging becoming less frequent (1.69 vs. 2.50 in economics, 1.69 vs. 2.22 in medicine, and 1.80 vs. 2.47 in technology) and less varied (16 vs. 27 in economics, 18 vs. 27 in medicine, and 27 vs. 40 in technology) in comparison with the RA data.

Apart from the differences detected in the overall frequency and variety of adverbs and adjectives employed as hedges, differences also emerge when we take a closer look at the subcategories of adverbs and adjectives distinguished. In the case of probability adverbs, the RA data and the popular scientific articles were somewhat dissimilar, that is, in the research articles examined, economics was the most heavily hedged discipline, followed by technology and medicine. In the SA articles medicine was the subject area most heavily hedged by probability adverbs, followed by technology and economics, only the latter field being hedged less heavily than in the RA data. On the other hand, as far as probability adjectives are concerned, the respective ranks of the subject areas according to relative frequency were the same in RAs and popular scientific articles alike (economics-medicine-technology), RAs on economics and medicine being more heavily hedged by probability adjectives than the popular scientific articles. As concerns variety in the hedges used, there was not much of a difference between the RAs and popular scientific articles in the case of probability adverbs, but the selection of corresponding adjectives was significantly narrower in the SA articles than in the RAs. Thus, the findings indicate that devices from the two subcategories, although quite similar in meaning, were not used similarly in the present data.

As stated earlier, the other categories of adverbs and adjectives, namely those indicating indefinite frequency, indefinite degree, and approximation, often occur in quite similar contexts insofar as they are commonly linked to quantifications. If we combine the above results, adverbs belonging to these three subcategories were used more frequently in the popular scientific articles in the disciplines examined than in the RA data (5.60 vs. 4.04 in economics, 6.34 vs. 2.15 in medicine, and 6.22 vs. 5.02 in technology). As we can see, the difference is particularly wide in medicine, where the number of hedges of this kind is almost tripled in the SA data in comparison with the RAs. As concerns variety in devices used, no clear differences can be detected between the levels of technicality (48 different items in the RAs, 49 in the popular scientific articles). When we turn to the corresponding groups of adjectives, on the other hand, such results no longer



apply to all subject fields. In economics, incidence remained slightly higher in the popular scientific articles (0.68 vs. 0.44), but in the other two subject areas hedges belonging to the three groups of adjectives were less frequent in the *SA* articles than in the *RAs* (0.75 vs. 0.87 in medicine, 1.10 vs. 1.91 in technology). Furthermore, a somewhat wider selection of such hedges was used in the *RAs* (altogether 38 different items) than in the popular scientific data (32). Thus, despite the functional similarity of adverbs and adjectives pertaining to indefinite frequency, indefinite degree, and approximation, one could discern differences in the hedging use of these word-classes between the two levels of specialization examined.

As concerns disciplinary variation, the figures indicate that the popular scientific data was not altogether uniform in the use of adverbs and adjectives as hedges. If we combine the results concerning probability adverbs and adjectives, the highest incidence of such hedges emerged from medicine (3.06 per 1,000 words), where the selection of devices belonging to these categories was also widest (15). In technology, the relative frequency of such hedges was 1.65, with 12 different devices present, and in economics the figures were 1.36 and 12. Furthermore, when we sum up the results concerning the other three types of adverb and adjective, the discipline with the highest number of such hedges turns out to be technology, with 7.27 such hedges per 1,000 words and a selection of 61 different items. The following field in terms of frequency is medicine, with a relative incidence of 7.10 per 1,000 words and an array of 51 items. The lowest number of such hedges occurred in the *SA* articles on economics (6.28 per 1,000 words), the selection also being the narrowest of the three disciplines (47). In the *RA* data, too, technology was the subject area with the highest number of such hedges (6.93 per 1,000 words), but the order of the other two disciplines was reversed in terms of relative frequency (economics 4.48, medicine 3.02). As already mentioned, one explanation for such differences may be that the quantification-oriented nature of technology gives rise to a greater degree of such hedging than is necessary in the other two subject areas.

### 6.2.5 Nouns

A selection of 58 different nouns deemed as hedges emerged from the popular scientific articles, constituting a total of 309 occurrences. The choice of items was therefore of the same order as that seen in the *RAs* (56).

**a. Nonfactive assertive nouns.** Eight different nonfactive assertive nouns (52 occurrences) were found as hedges in the *SA* articles<sup>13</sup>, *argument* being the commonest item (n=14), followed by *implication* (11), and *proposal* (10). As the examples below illustrate, hedges of this kind characteristically indicated that the issues discussed are for instance *proposals*, *arguments*, or *predictions*, not certifiably attested facts:

- (51) An especially persuasive *proposal* derives from the observation that certain features of allergy occur in only one other circumstance: when the immune system attempts to eradicate parasites. (MED2, D, 85 [Introduction])
- (52) This *argument* implies that information technology will help make markets more efficient. (ECO2, G, 96 [Main Body])
- (53) Experiments in superconductivity might verify an exciting and counterintuitive theoretical *prediction*: superconductivity in some materials, once destroyed by an intense magnetic field, might actually be reestablished by still higher fields. (TEC2, A, 40 [Conclusion])

While the highest degree of nonfactive reporting verbs often similar to the present subcategory of nouns was seen in the popular scientific articles on medicine, the highest number of nonfactive assertive nouns in hedging use was found in economics (0.73 per 1,000 words; n=29). The figures for technology (0.31; 12) and medicine (0.24; 11) were considerably lower. The frequencies for each discipline were below those seen in the RAs, but the respective order of the disciplines in terms of the relative number of hedges was the same at both levels of specialization. On the whole, then, the results concerning the relative frequencies of this group of nouns were closer to the findings concerning the same group in the RAs than to those regarding the hedging use of the corresponding subcategory of verbs in the popular scientific articles. As to variety in the items used, a somewhat narrower selection of items was identified in the *SA* articles than in the RAs (8 vs. 12). As concerns the different disciplines, a considerably narrower selection of hedges was found in the popular scientific data on economics than in the RAs (5 vs. 10). In technology, too, the choice was slightly narrower (5 vs. 6), but in medicine the selection was slightly larger (7 vs. 6) despite the low frequency of the items.

**b. Tentative cognition nouns.** Altogether 36 different<sup>14</sup> tentative cognition nouns (173 occurrences) were interpreted as hedges in the popular scientific data. The most frequently

employed items were *hypothesis* (n=25), *theory* (19), and *view* (19). Some typical cases, marking the accompanying information as not necessary unquestionably accurate, are given below:

- (54) The *hypothesis* suggests that the allergic response initially evolved to help the body cope with parasites (MED2, D, 85 [Introduction])
- (55) It is my *impression* that among the urban middle classes in northern India, the transition to a lower fertility rate has already been achieved. (ECO2, C, 31 [Main Body])
- (56) The answers to economic questions such as these depend on various *assumptions*, so they must be taken with a grain of salt. (TEC2, I, "Private Sector Investments", paragraph 1 [Conclusion])

It was interesting to see that although many of the hedges employed in the *SA* articles were stylistically quite similar to those seen in the *RAs*, on rare occasions the authors had decided to employ items that would perhaps seem out of place in *RAs*:

- (57) I have a *hunch* that Hofmann *père* had osteoarthritis and got away with lower, analgesic doses of acetylsalicylic acid rather than anti-inflammatory quantities of sodium salicylate. (MED2, I, 60 [Main Body])

In terms of order according to frequency, the findings for this subcategory of nouns were quite close to those concerning the hedging use of tentative cognition verbs in the popular scientific data. The incidence of these nouns was highest in economics (2.12 per 1,000 words; n=84), followed by medicine (1.20; 56), and technology (0.86; 33). The highest number of different devices was also seen in economics (22), where the selection was slightly higher than in the *RAs* (20). As to the other disciplines, the choice of items in the *SA* articles on medicine was far wider than in the *RAs* (18 vs. 10), but somewhat narrower in technology (17 vs. 20).

**c. Nouns of tentative likelihood.** The popular scientific articles included 14 different<sup>15</sup> (84 occurrences) nouns of tentative likelihood that could be taken as hedging phenomena. The item most commonly used was *possibility* (n=21), followed by *chance* and *probability* (12 each). The following are examples of devices belonging to this group, whose members were typically used to indicate that the matters under discussion involve for instance probabilities, possibilities, or tendencies, which is why the information given cannot be presented as certifiably accurate:

- (58) The *promise* of harnessing fusion has led to substantial commitments of the four powers involved. (TEC2, B, 75 [Introduction])
- (59) No one can say with certainty what has reduced the relative demand for less skilled workers throughout the economy. Technological change, especially the increased use of computers, is a likely *candidate* [...]. (ECO2, F, 27 [Main Body])
- (60) Initial attempts to interfere with binding to CD4 were disappointing, but new *possibilities* have recently come to light, and many groups are examining compounds that might sheath the HIV-docking site on co-receptors to keep HIV at bay [...]. (MED2, A, “Other Therapeutic Ideas”, paragraph 3 [Conclusion])

The results concerning this group of nouns were not in accordance with the findings regarding the same nouns in the RAs or the corresponding group of verbs in the SA articles, because it was in fact technology where the highest number of such hedges occurred (0.76 per 1,000 words; n=29), whereas the figures for medicine (0.71; 33) and economics (0.56; 22) were lower, albeit only slightly. The widest choice of items was to be found in medicine (13), followed by technology (8), and economics (6). In technology and economics, then, the selection was narrower than in the RA data (9 and 11, respectively), but wider than in the RAs on medicine (9).

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To conclude, then, various observations may be made concerning the hedging use of nouns between the three subject areas and between the two levels of specialization. Overall, the three kinds of nominal hedge were most frequent in economics (3.41 per 1,000 words; n=135), whereas the numbers for medicine (2.14; 100) and technology (1.93; 74) were noticeably lower. On the other hand, the widest selection of nominal hedges emerged from medicine (38), followed by economics (33), and technology (30). In the field of economics, the relative frequency was significantly lower in comparison with the RA data (3.41 vs. 6.07) and slightly lower in technology (1.93 vs. 2.46), while in medicine hedging in the form of nouns was only marginally more frequent than in the RAs (2.14 vs. 2.09). Furthermore, whereas in the RA data medicine was the discipline with the narrowest selection of nominal hedges (25), in the popular scientific articles it was the topic area with the widest selection of devices. In the SA articles on economics, the number of different nouns employed as hedges was noticeably lower than in the RAs (41), and in technology the selection was also somewhat wider in the RAs (35). On the basis of these results, then, it again seems that hedging becomes more varied and frequent in the field of

medicine when we move to the more popularized discourse. However, the same cannot be said of the other two disciplines, hedging becoming noticeably less common and less varied particularly in the field of economics.

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To end the discussion of all of the above lexical hedge categories, we can start by saying that the various types of lexical hedge dealt with occurred most commonly in the popular scientific articles on medicine (23.64 per 1,000 words; n=1106), considerably more often than in the medical RAs (15.32 per 1,000 words). In the SA articles on economics, the number of such hedges was 19.48 per 1,000 words (n=772), and in technology the frequency was 18.04 per 1,000 words (n=690). Hence, in economics, the incidence was visibly lower than in the RA data (25.94 per 1,000 words), and in technology the frequency was somewhat higher than in the RAs (16.36). As to the choice of items used, the different groups of lexical hedges included a total of 220 different items, which is slightly fewer than in the RAs (236).<sup>16</sup> Out of these 220 devices, 133 occurred in economics, 145 in medicine, and 147 in technology. The high number seen in the field of technology is probably due to the combined frequencies of hedges typically pertaining to numerical data, such as adverbs and adjectives to do with indefinite frequency, indefinite degree, and approximation, items apparently less common in the less quantification-oriented disciplines. What is most interesting in these figures, however, is that the selection grew narrower in both economics and technology in comparison with the RA data (133 vs. 161 and 147 vs. 156, respectively), but widened in medicine (145 vs. 134).

### 6.2.6 Clausal Elements

Apart from the kinds of lexical hedge dealt with above, the SA data also included a number of hedging phenomena in the form of clauses or sentences. Altogether 199 instances of hedging in the popular scientific articles were found to be realized by such means. As was the case in the RAs, in the popular scientific data, too, about one fifth of these hedges were in the form of *if*-clauses, as in the following:

- (61) First, *if growing international trade is the main force driving increased wage equality*, the ratio of skilled to unskilled employment should decline in most U.S. industries.  
(ECO2, F, 26 [Main Body])

- (62) *If these cells synthesized either excess or altered forms of beta-APP*, some of those molecules might be broken down by an alternative enzymatic pathway [...]. (MED2, F, 47 [Main Body])
- (63) Although that might be conceivable *if higher fuel economy were obtained by rapidly mandating smaller vehicles* [...]. (TEC2, C, 34 [Conclusion])

The remaining hedges belonging to this category took a variety of forms, hedging often being encoded in entire sentences or parts thereof pointing toward the tentative nature of the information presented:

- (64) *As we lay the bricks of the information age, trying to envision the ultimate edifice and its uses is as challenging for us as it would have been for writers in the late 1700s to anticipate the automobile, the helicopter, the jet airplane and the myriad of other modern engines along with all that we do with these machines. So we simply offer readers our best impressionistic glimpses into this future, its underlying technologies and surrounding issues.* (TEC2, D, 31 [Introduction])
- (65) *No one can say with certainty what* has reduced the relative demand for less skilled workers throughout the economy. (ECO2, F, 27 [Main Body])
- (66) *At present, we have a very limited understanding of how* these interactions allow potential carcinogens to cause cancer. (MED2, H, “Elusive Mechanisms”, paragraph 3 [Conclusion])

As one might expect on the basis of some of the previous findings, medicine was again the field of expertise with the highest degree of such hedging (2.63 per 1,000 words; n=123). In the SA articles on economics (1.16; 46) and technology (0.78; 30), the frequencies of this hedge type were considerably lower than in the medical articles. In technology, the findings were quite similar in the RAs and the popular scientific articles alike, in economics the degree of such hedging decreased in the SA data in comparison with the RAs, and in medicine the incidence of hedges of this type almost doubled in the popular scientific articles. As concerns the share of this hedge type out of all hedges identified, the figures ranged from about 2.5% (technology) to some 6.8% (medicine), the percentage being marginally higher than in the RAs in the field of medicine and noticeably lower in the other two topic areas.

### 6.2.7 Questions

As we saw in Chapter 4, the use of questions as hedging devices was rare in the RAs examined. The hedging use of questions was also quite uncommon in the popular scientific articles, the entire corpus of SA articles yielding altogether 23 questions that could be taken to relate to hedging insofar as they drew attention to issues where full certainty or accuracy might not have been achieved:

- (67) *But will these [information] technologies also increase white-collar crimes and violations of privacy? We don't know; we must be vigilant.* (TEC2, D, 32 [Introduction])
- (68) Even if one assumes that these various observations support the early deposition of amyloid beta-protein in Alzheimer's disease, *what real evidence is there that the beta-protein is biologically active?* (MED2, F, 46 [Main Body])

This time, the highest incidence of hedges was found in the SA articles on technology (0.34 per 1,000 words; n=13), where the relative incidence was nearly six times higher than in the RAs on technology. In medicine, too, the frequency of such items was technically speaking much higher than in the RAs (0.13; 6), whereas the figures for the SA articles on economics (0.10; 4) were quite similar to those for the RAs. However, given the low incidence of questions as hedges in the data, no greater emphasis should be put on the differences observed.

### 6.2.8 Other Hedges

The category of "Other" hedges made up a considerable share of hedging in the data drawn from SA, altogether some 1300 occurrences. The highest relative incidence of "Other" hedges was detected in medicine (12.06 per 1,000 words; n=564), where this group of devices made up some 31.4% of the overall number of hedges. Technology was the subject area second most commonly hedged by this category (11.74 per 1,000 words; n=449), the share of this group out of all hedging devices in fact being even higher than in medicine (38.0%). In economics, on the other hand, the incidence of "Other" hedges was somewhat lower (7.32 per 1,000 words; n=290), as was also the share of such hedges out of the overall number of hedging phenomena (26.1%). In comparison with the RA data, these results indicate that "Other" hedges were much more frequent in the popular scientific data across the disciplines, and also constituted a noticeably higher percentage of the overall number of hedges than in the RAs.

As to the nature of the “Other” hedges, the majority of them had to do with quantification, as was also observed in the RA data. Thus, for instance, such hedges were employed to indicate limits in the accuracy or precision of figures cited or to give approximate information without presenting numerical data:<sup>17</sup>

- (69) What is more, strains of *at least* three bacterial species capable of causing life-threatening illnesses [...] already evade every antibiotic in the clinician’s armamentarium, a stockpile of *more than* 100 drugs. (MED2, C, Introduction, paragraph 4 [Introduction])
- (70) *The great bulk of* the slowdown in command GNP was caused by the slower growth of real GNP per worker—by the purely domestic impact of the decline in productivity growth. (ECO2, F, 26 [Main Body])
- (71) *Many of* these advancements, especially load-reduction measures, are essential steps on the way to the next generation of vehicles that will use electric drivetrains and fuel cells. (TEC2, C, 35 [Conclusion])

In technology and economics, the shares of hedges linked to quantification out of all “Other” hedges were in fact quite similar to those in the RAs, that is, at least about 75 percent in the former subject area and some 60 percent in the latter. In medicine, on the other hand, the share of such hedges was lower than in the RAs (at least about 64%). Despite these differences, however, it is to be noticed that these kinds of “Other” hedges were considerably more common in the popular scientific articles than in the RAs, no matter what the discipline. At the very least, such hedges occurred 8.78 times per 1,000 words (n=336) in the SA articles on technology, the medical articles included 7.67 occurrences per 1,000 words (n=359), and the data on economics involved 4.37 cases per 1,000 words (n=173). In the RAs, as seen in 4.2.8, the figures were 3.09 per 1,000 words in technology, 4.12 in medicine, and 1.41 in economics.

The remaining hedges, those not typically linked to quantification, were very much like the ones seen in the RAs, that is, they were employed for example to point toward the preliminary nature of the information presented, or to indicate that what is said may be theoretically—but not necessarily practically—the case:

- (72) Although electrically driven vehicles have a history as old as that of the internal-combustion engine, a number of recent technological developments [...] *promise* to make this form of transportation efficient and inexpensive enough to compete with gasoline. (TEC2, J, Introduction, paragraph 4 [Introduction])



- (73) *In principle*, decision makers in a hierarchy can consider all the information known to anyone in the group with much less communication that would be needed if each person communicated with everyone else. (ECO2, G, 97 [Main Body])
- (74) Another *promising* class of drugs activates specific serotonin receptors [...]. (MED2, E, “Support for a Model”, paragraph 9 [Conclusion])

\* \* \*

As the results concerning the various types of hedge identified in the popular scientific articles illustrate, there indeed seem to be differences in incidence between the topic areas treated and between the two types of discourse, RAs and popular scientific articles. For purposes of illustration, let us summarize the broad findings concerning the three disciplines and the two levels of specialization in tabular form:

Table 13. Summary of the Frequency and Variety of Hedges in RAs and Popular Scientific Articles on Economics, Medicine, and Technology (E=economics, M=medicine, T=technology; bracketed symbols indicate that the figures were virtually the same for both RAs and popular scientific articles (within a range of 0.05 per 1,000 words), slashes mean that the figures were virtually the same for the disciplines indicated)

	Research Articles	Popular Scientific Articles
<b>Modal Auxiliaries</b>		
Descending order of frequency	E—M—T	M—E—T
More frequent in RAs/popular scientific articles	E	M, T
Total selection of items	8	7
Descending order according to the width of selection	E/M/T	E/M—T
Wider selection in RAs/popular scientific articles	(E), (M), T	(E), (M)
<b>Nonfactive Reporting Verbs</b>		
Descending order of frequency	E—M—T	M—E—T
More frequent in RAs/popular scientific articles	E, M, T	
Total selection of items	16	12

Descending order according to the width of selection	E—M—T	M/T—E
Wider selection in RAs/popular scientific articles	E, M	T
<b>Tentative Cognition Verbs</b>		
Descending order of frequency	E—M—T	E—M—T
More frequent in RAs/popular scientific articles	E, M, T	
Total selection of items	35	38
Descending order according to the width of selection	E—M/T	T—E—M
Wider selection in RAs/popular scientific articles	E	M, T
<b>Tentative Linking Verbs</b>		
Descending order of frequency	E—M—T	M—E—T
More frequent in RAs/popular scientific articles	E	M, T
Total selection of items	3	5
Descending order according to the width of selection	E/M/T	T—E/M
Wider selection in RAs/popular scientific articles	(E), (M)	(E), (M), T
<b>Full Verbs Total</b>		
Descending order of frequency	E—M—T	M—E—T
More frequent in RAs/popular scientific articles	E, M, T	
Total selection of items	54	55
Descending order according to the width of selection	E—M—T	T—E/M
Wider selection in RAs/popular scientific articles	E	M, T
<b>Probability Adverbs</b>		
Descending order of frequency	E—T—M	M—T—E
More frequent in RAs/popular scientific articles	E	M, T
Total selection of items	13	12
Descending order according to the width of selection	E—T—M	M—E—T
Wider selection in RAs/popular scientific	E, T	M

articles		
<b>Adverbs of Indefinite Frequency</b>		
Descending order of frequency	E—T—M	M—E—T
More frequent in RAs/popular scientific articles	(T)	E, M, (T)
Total selection of items	11	13
Descending order according to the width of selection	E—M/T	T—E/M
Wider selection in RAs/popular scientific articles		E, M, T
<b>Adverbs of Indefinite Degree</b>		
Descending order of frequency	T—E—M	T—M—E
More frequent in RAs/popular scientific articles	E, T	M
Total selection of items	26	24
Descending order according to the width of selection	M—T—E	T—M—E
Wider selection in RAs/popular scientific articles	M	E, T
<b>Approximative Adverbs</b>		
Descending order of frequency	T—E—M	T—E—M
More frequent in RAs/popular scientific articles		E, M, T
Total selection of items	11	11
Descending order according to the width of selection	T—E—M	M/T—E
Wider selection in RAs/popular scientific articles	(E), (T)	(E), M, (T)
<b>Adverbs Total</b>		
Descending order of frequency	T—E—M	M—T—E
More frequent in RAs/popular scientific articles		E, M, T
Total selection of items	61	60
Descending order according to the width of selection	T—M—E	M—T—E
Wider selection in RAs/popular scientific articles		E, M, T
<b>Probability Adjectives</b>		
Descending order of frequency	E—M—T	E—M—T

More frequent in RAs/popular scientific articles	E, M	T
Total selection of items	19	9
Descending order according to the width of selection	E/M—T	T—M—E
Wider selection in RAs/popular scientific articles	E, M, T	
<b>Adjs of Indefinite Frequency</b>		
Descending order of frequency	T—M—E	M—T—E
More frequent in RAs/popular scientific articles	(E), T	(E), M
Total selection of items	12	13
Descending order according to the width of selection	E/T—M	E/M/T
Wider selection in RAs/popular scientific articles	E, T	M
<b>Adjectives of Indefinite Degree</b>		
Descending order of frequency	T—M—E	T—E—M
More frequent in RAs/popular scientific articles	M, T	E
Total selection of items	22	15
Descending order according to the width of selection	T—M—E	T—E/M
Wider selection in RAs/popular scientific articles	(E), M, T	(E)
<b>Approximative Adjectives</b>		
Descending order of frequency	T—M—E	M—E <sup>18</sup>
More frequent in RAs/popular scientific articles	(E), (M), T	(E), (M)
Total selection of items	4	3
Descending order according to the width of selection	E/T—M	M—E <sup>19</sup>
Wider selection in RAs/popular scientific articles	E, T	M
<b>Adjectives Total</b>		
Descending order of frequency	E—T—M	E/M—T
More frequent in RAs/popular scientific articles	E, M, T	
Total selection of items	57	40
Descending order	T—E/M	T—M—E

according to the width of selection		
Wider selection in RAs/popular scientific articles	E, M, T	
<b>Nonfactive Assertive Nouns</b>		
Descending order of frequency	E—T—M	E—T—M
More frequent in RAs/popular scientific articles	E, M, T	
Total selection of items	13	8
Descending order according to the width of selection	E—M/T	M—E/T
Wider selection in RAs/popular scientific articles	E, T	M
<b>Tentative Cognition Nouns</b>		
Descending order of frequency	E—T—M	E—M—T
More frequent in RAs/popular scientific articles	E, T	M
Total selection of items	28	36
Descending order according to the width of selection	E/T—M	E—M—T
Wider selection in RAs/popular scientific articles	T	E, M
<b>Nouns of Tentative Likelihood</b>		
Descending order of frequency	E—M—T	T—M—E
More frequent in RAs/popular scientific articles	E, M	T
Total selection of items	15	14
Descending order according to the width of selection	E—T/M	M—T—E
Wider selection in RAs/popular scientific articles	E, T	M
<b>Nouns Total</b>		
Descending order of frequency	E—T—M	E—M—T
More frequent in RAs/popular scientific articles	E, (M), T	(M)
Total selection of items	56	58
Descending order according to the width of selection	E—T—M	M—E—T
Wider selection in RAs/popular scientific articles	E, T	M

<b>Lexical Items Total</b>		
Descending order of frequency	E—T—M	M—E—T
More frequent in RAs/popular scientific articles	E	M, T
Total selection of items	236	220
Descending order according to the width of selection	E—T—M	T—M—E
Wider selection in RAs/popular scientific articles	E, T	M
<b>Clausal Elements</b>		
Descending order of frequency	E—M—T	M—E—T
More frequent in RAs/popular scientific articles	E, T	M
<b>Questions</b>		
Descending order of frequency	E—T—M	T—M—E
More frequent in RAs/popular scientific articles	(E)	(E), M, T
<b>Other Hedges</b>		
Descending order of frequency	M—T—E	M—T—E
More frequent in RAs/popular scientific articles		E, M, T
<b>Total</b>		
Descending order of frequency	E—M—T	M—T—E
More frequent in RAs/popular scientific articles	E	M, T

As regards variation according to subject area, the popular scientific articles on medicine and technology contained a higher number of hedges than the RAs, a finding not in accordance with certain earlier views on the incidence of hedging in popular science. In the *SA* articles on economics, on the other hand, the overall incidence of hedges was slightly lower than in the RAs. In addition, in economics and technology, the variety of lexical devices used as hedges grew narrower than in the RAs, whereas an opposite trend was seen in medicine. Thus, the results indicate that when hedging in popular science is considered and contrasted with hedging in discourse like research articles, it is necessary to give attention to variation according to subject area. To conclude the discussion of hedging in the popular scientific articles, let us turn to the

distribution of hedges in the *SA* articles and an overview of the motivations for hedging cited by the authors of the articles themselves.

### 6.3 Distributional Information and Authorial Views on Hedging

As we saw in Chapter 4, there may be noticeable differences in the incidence of hedging phenomena in the different rhetorical sections of RAs, the three subject areas examined also manifesting some disciplinary differences as to the distribution of hedges. As noted earlier, straightforward comparisons of the distribution of hedging in RAs and popular scientific articles are not feasible due to the different nature of the kinds of discourse. The main difficulty in such an endeavor has to do with the differences in the overall makeup of the two kinds of article.

While it may be that, as Myers (1990: 185) points out, popular scientific articles in magazines like *SA* may resemble the scholarly mode of expression characteristic of RAs to a greater degree than corresponding material in general-interest magazines and newspapers, there are nonetheless remarkable differences between discourse such as RAs and popular scientific articles when it comes to the structure of the discourse, evidenced in Myers' own work and for instance that by Nwogu and Bloor (1991). Nonetheless, it is of interest to see how hedging phenomena are distributed in the popular scientific articles examined and to investigate whether any disciplinary variation emerges from the data in this respect.

#### 6.3.1 Incidence of Hedges in the Different Parts of the Popular Scientific Articles

Although researchers such as Myers (1990) and Nwogu and Bloor (1991) have given some attention to the textual makeup of popular scientific articles, no systematic framework describing the rhetorical structure of such discourse has been put forth. In fact, it is questionable whether it is even possible to decipher any such uniform framework, as there appears to be relative freedom in the way in which authors construct articles such as those selected for analysis from *SA*. Hence, it seems that a framework based on a genre analytic model of the kind which has been used to analyze the structure of RAs may not be applicable to the kind of discourse represented by the *SA* articles here. For the lack of a more refined framework, then, the *SA* articles were roughly divided into three parts. The first part, "Introduction", typically consists of a brief introductory paragraph printed in bold type-face and of a few relatively concise paragraphs introducing the issue treated. The following part is the "Main Body" of the article, where the authors proceed to the discussion

proper. It is particularly this part of the *SA* article that is difficult to describe in terms of rhetorical progression. While many of the articles proceeded in their presentation chronologically, typically providing a historical overview of the topic, discussing its present stage and leading toward future developments and implications, the different steps were given unequal weight in the articles and the progression was carried out in a variety of ways. In brief, the “Main Body” of the popular scientific articles could not be seen to follow any clear structural model that could for example be likened to the rhetorical move analysis model suggested by genre analysts scrutinizing RAs (e.g. Swales 1990). The last component distinguished was the “Conclusion”, a section where the authors typically for example drew together the main issues raised as the article progressed, summarized the implications and prescriptions arising from the information presented, introduced alternatives to the ideas put forth, and/or dealt with problems inherent in the information provided.

As we can see from Table 14, some differences could be detected in the incidence of hedges between the three *SA* article sections distinguished:

Table 14. Incidence of Hedges in the Different Sections of the *SA* Articles.

(The figures indicate incidence per 1,000 words, rank order of each section according to the number of hedges per 1,000 words in decreasing order of frequency, and percentage of hedges out of the total number in the articles.)

Section	Economics	Medicine	Technology
Introduction	34.87 (1), 13.5% (4,302 words)	45.26 (1), 15.7% (6,230 words)	32.31 (2), 17.3% (6,345 words)
Main Body	27.11 (3), 75.4% (30,946 words)	37.13 (3), 73.8% (35,739 words)	29.59 (3), 68.1% (27,207 words)
Conclusion	28.11 (2), 11.1% (4,375 words)	39.52 (2), 10.6% (4,808 words)	36.84 (1), 14.6% (4,696 words)
Total	28.06, 100% (39,623 words)	38.46, 100% (46,777 words)	30.90, 100% (38,248 words)

As we can see, the section-by-section results reflect the overall findings regarding the *SA* articles insofar as medicine was the field of study with the highest degree of hedging no matter what the section. Medicine was also the subject area with the greatest variation between the sections, the difference between the most and least heavily hedged sections being 8.13 per 1,000 words. Although economics was the discipline with the lowest overall degree of hedging, the difference between the sections was almost as wide as in medicine, that is, 7.76 per 1,000 words. In technology, as in the RAs, the difference was somewhat narrower, this time 5.74 per 1,000 words.



However, as the figures show, there was not as much variation between the subject areas as in the RA data, where the differences between rhetorical sections were particularly pronounced in the field of medicine as opposed to the other disciplines.

In terms of the raw number of hedges, the Main Body was the section where the majority of the hedges occurred because this was by far the longest of the three sections distinguished. In relative terms, however, the Main Body had the lowest frequency of hedges in all subject areas. As to the other sections, the Introduction was the most heavily hedged section in economics and medicine, whereas in technology the Conclusion contained the highest relative number of hedges. However, whether these general findings apply to all types of hedge examined is not certain, which is why attention was also given to the incidence and uses of the different categories of hedging phenomena in the three sections.<sup>20</sup>

### 6.3.2 Hedging in Introductions

As Table 15 indicates, the disciplines differed to some extent as regards the shares of the eight major categories of hedges in the Introduction section. Common to all fields of study was the finding that “Other” hedges occurred most frequently in the Introduction sections, but hedges belonging to the other categories were employed to different degrees in the three subject areas. In economics and medicine, where the incidence of hedges was at its peak in this particular section, four out of the eight hedge categories were most frequently employed in the Introduction. In technology, where the overall degree of hedging in Introductions was the second highest out of the three sections, only the main category of “Other” hedges was at its commonest in this section.

Table 15. Incidence of Hedges in the Introduction Sections of the SA Articles.

(The figures indicate the number per 1,000 words, respective rank order of the section for each hedge type in comparison with the other sections, and percentage of all hedges in the section.)

Type of Hedge	Economics (4,302 words)	Medicine (6,230 words)	Technology (6,345 words)
Modal Auxs	4.18 (2), 12.0%	5.30 (3), 11.7%	2.52 (3), 7.8%
Full Vbs Total	6.51 (1), 18.7%	5.14 (1), 11.3%	2.21 (3), 6.8%
Adverbs Total	6.51 (1), 18.7%	7.70 (2), 17.0%	7.72 (2), 23.9%
Adjectives Total	0.93 (3), 2.7%	2.25 (2), 5.0%	1.73 (2), 5.4%
Nouns Total	6.28 (1), 18.0%	4.01 (1), 8.9%	3.15 (2), 9.8%
Clausal Elements	0.23 (3), 0.7%	3.21 (2), 7.1%	0.63 (3), 2.0%
Questions	-	0.16 (1), 0.4%	0.79 (2), 2.4%
Other	10.23 (1), 29.3%	17.50 (1), 38.7%	13.55 (1), 42.0%

Total	34.87 (1), 100%	45.26 (1), 100%	32.31 (2), 100%
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As we can see from this Table and from Appendix 5, there were noticeable differences between the disciplines in the incidence of certain hedge types and their shares out of the overall number of hedging phenomena in this section. Full verbs, for instance, were considerably more frequent in economics than in technology, the relative number and percentage out of all hedges in technology being only about one third of those seen in economics. Another hedge type that manifested a good deal of disciplinary variation was the category of clausal elements. The incidence of this hedge type was very low in economics, but in medicine the relative number and percentage out of the overall number of hedges were over ten times higher.

As to other differences, in the case of the RA Introductions, it was observed that the data on technology included a greater relative number of the types of hedge that are typically linked to quantification, that is, “Other” hedges as well as adverbs and adjectives to do with indefinite frequency, indefinite degree, and approximation. In the Introductions to the popular scientific articles, the combined occurrence of such hedges was higher than in any RA section no matter what the discipline, a finding providing support for the afore-mentioned idea that the kind of precision and accuracy often expected in discourse such as RAs is not as vital in popularized accounts of scientific issues. Nonetheless, it is to be noticed that this tendency may not apply to all disciplines to the same degree. The highest relative incidence of such hedges was found in medicine (25.85 per 1,000 words), followed by technology (21.27), and economics (17.20). However, in terms of the ratio of such hedges of all cases of hedging, the highest percentage was again seen in technology (65.8%), followed by medicine (57.1%), and economics (49.3%), the relative frequencies and the percentages also being higher than in for example the RA Introductions in each subject area. However, the present results nonetheless reflect the findings concerning the RAs insofar as economics continued to be the topic area with the lowest incidence of such hedges, whereas in the other two disciplines hedges commonly linked to quantification were somewhat more frequent and constituted a greater share of the overall number of hedges.

In order to gain information regarding the motivations that the authors of the popular scientific articles had for employing hedging phenomena, the authors of the SA articles were contacted and requested to provide their interpretation of the reasons for hedging in a few passages taken from different parts of the articles. As seen (section 4.3), the response rate was quite low in the case of the RAs. A somewhat higher number of the authors of the popular scientific articles responded to my inquiry. Information was obtained from altogether 13 of the

authors (economics 4, medicine 6, technology 3), resulting in a response rate of about 43%. In the majority of cases, no clear disciplinary differences could be detected between the reasons the authors cited for the use of hedges. In economics, Introductions were said to be hedged because of the speculative and preliminary nature of the issues presented, that is, the authors “didn’t know at the time [of writing the article] whether this would be true” (e.g. 20)<sup>21</sup>, and because all predictions about the future are “bound to be uncertain, imprecise, and tentative.” In addition, authors said that hedging phenomena occurred in economics where generalized descriptions regarding the magnitude of the matters discussed were made, descriptions where precise figures were not cited for one reason or another. This was also one of the motivations cited by the authors of the *SA* articles on medicine, hedging taking place where numerical precision was not possible or necessary (see e.g. 38), when for instance the authors of the medical articles did not know the exact degree to which a given factor causes illness. In technology, too, similar general reasons were provided by the authors, one of whom for instance motivated hedging by saying that “more precise statements were not warranted given the current state of knowledge.” What is more, another author explained that hedging was employed when the article proceeded to “specify a *possibility* that is peculiar to our subject”, and according to yet another writer hedging was employed to point toward “the approximate nature” of a concept utilized.

Perhaps the most noteworthy disciplinary difference arising from the replies concerning Introductions concerns hedging in medicine. According to an author discussing a dangerous medical condition, hedges were used because

[t]he lay public is quick to panic at the thought that something may cause [the medical condition in question] and so I tried to stick to generalizations and indicate that few causes are definitely known.

Thus, although issues regarding all three subject areas treated may have some bearing on our lives, the effects of the information may be very different depending on its nature. It is clear that issues to do with economics and technology may have a considerable effect on our everyday activities, and these matters should therefore be dealt with cautiously by experts popularizing information for the benefit of less informed audiences. This is so particularly when there is a chance that the information presented may not be categorically accurate or could be misunderstood by the audience. However, when it comes to medicine, such caution may be more or less essential. As Prince et al. (1982: 96) point out, medical professionals are in contact with a lay public far more often than professionals from other fields. During such contacts, Prince et al.

say, medical professionals may be regarded “as omniscient, and omniscient in areas of life-and-death importance.” Hence, although a certain degree of caution may be required in discussing issues pertaining to economics and technology as well, such caution may be even more vital in medicine, where the topics dealt with can be far more personal, emotional, and grave. Dubois (1986: 252) is of the opinion that the lack of scientific knowledge on medical issues may cause misunderstandings when for instance treatments for certain ailments are discussed in popularizations. I think that some of the reasons why the expert authors of popular scientific articles on medicine hedge their utterances are based on such observations. The aim of hedging on occasions is likely to be that of avoiding unnecessarily grim outlooks or potentially false optimism when providing information on matters of delicacy that may not have been researched conclusively enough to allow categorical statements. This rationale, then, might be thought to account for the higher overall incidence of hedges not only in the Introductions but also in the other parts of the popular scientific articles on medicine in comparison with both the RAs and the SA articles from the other disciplines.

### 6.3.3 Hedging in the Main Body

The occurrence of hedges was at its lowest in the Main Body of the popular scientific articles in all disciplines. As shown in Table 16, the main categories of hedges distinguished occupied either the second or third place in terms of frequency when compared with the other two sections, apart from clausal elements in economics, adverbs in medicine, and adjectives in technology. Further differences were also to be detected in the incidence of the various subtypes of these main categories (see Appendix 5).

Table 16. Incidence of Hedges in the Main Body of the SA Articles.

(The figures indicate the number per 1,000 words, respective rank order of the section for each hedge type in comparison with the other sections, and percentage of all hedges in the section.)

Type of Hedge	Economics (30,946 words)	Medicine (35,739 words)	Technology (27,207 words)
Modal Auxs	4.14 (3), 15.3%	6.44 (2), 17.3%	4.01 (2), 13.5%
Full Vbs Total	3.72 (3), 13.7%	4.64 (2), 12.5%	3.01 (2), 10.2%
Adverbs Total	6.11 (2), 22.5%	9.07 (1), 24.4%	6.84 (3), 23.1%
Adjectives Total	1.58 (2), 5.8%	1.51 (3), 4.1%	1.91 (1), 6.5%
Nouns Total	2.88 (3), 10.6%	1.76 (3), 4.7%	1.32 (3), 4.5%
Clausal Elements	1.32 (1), 4.9%	2.13 (3), 5.7%	0.70 (2), 2.4%
Questions	0.10 (2), 0.4%	0.14 (2), 0.4%	0.11 (3), 0.4%
Other	7.27 (2), 26.8%	11.44 (2), 30.8%	11.69 (2), 39.5%

Total	27.11 (3), 100%	37.13 (3), 100%	29.59 (3), 100%
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It is again of interest to see that the afore-mentioned hedges generally to do with quantification figured quite commonly in technology, amounting to 19.04 per 1,000 words and accounting for 53.1% of all hedges in this article section. In medicine, too, such hedges occurred quite frequently (18.68 per 1,000 words), but accounted for a somewhat lower share of the overall number of hedges (37.5%), whereas in economics their relative incidence was visibly lower than in the other two disciplines (13.77 per 1,000 words), but their share out of all hedges in the section was nonetheless quite high (50.8%). In each field, the frequency of such hedges was higher than in any of the RA sections.

As concerns the motivations that authors cited for the use of hedges, relatively similar reasons emerged across the disciplines. One such reason was the speculative, at times subjective or otherwise noncategorical nature of the information presented (see e.g. 2). As the authors of the medical articles put it, hedging was employed when a conclusion mentioned by the author was arrived at by the author, “but is not universally shared”, or when “the lack of consensus among the scientific community” requires the use of hedges. Often, the reason was linked to the preliminary nature of the information presented and to the methodological problems involved in the research process, although the latter were not discussed at any greater length in the SA articles (e.g. 21). According to the author of an article on economics, then, hedging occurred where the information presented was “probabilistically right” due to the methods employed, but not *certifiably* correct. What is more, in technology hedges were for example used when the authors “had not carried out a thorough analysis of the subject in question”, and medical articles were hedged where the studies reported “had been done exclusively in animal models at that point, and the details of the mechanisms that [had been] proposed were not fully verified”, or when for instance the findings reported were “early and not widely confirmed.”

Another common reason for hedging cited by the authors was associated with expressing quantifications in less than absolute terms. Instead of attempting at precise numerical characterizations of the matters discussed, the authors frequently resorted to various hedging phenomena when, as the author of an economics article put it, they simply wished to talk about “central tendencies” without giving precise numerical data. In medicine, too, such hedging was quite common when authors for instance wished to indicate that “it is hard to agree on the exact number” of disease cases. As the results above indicate, the number of hedges of this kind was highest in technology, where articles had for instance been so hedged in order to “describe the

general characteristics of the field without becoming too mathematical” or to indicate that the authors “were not prepared to commit to a numerical value.”

In sum, then, it was in medicine that the Main Body of the SA articles was hedged most heavily, perhaps again due to the delicate nature of the information. Hedges typically linked to quantification were also quite common in each field of study, more frequent than in any of the RA sections. Such hedges were particularly common in technology, a finding apparently linked to the quantification-oriented nature of the discipline.

#### 6.3.4 Hedging in Conclusions

As in the Main Body, the results for the Conclusion reflect the overall findings regarding the SA articles in that medicine emerged as the discipline with the greatest degree of hedging, followed by technology and economics:

Table 17. Incidence of Hedges in the Conclusion sections of the SA articles.

(The figures indicate the number per 1,000 words, respective rank order of the section for each hedge type in comparison with the other sections, and percentage of all hedges in the section.)

Type of Hedge	Economics (4,375 words)	Medicine (4,808 words)	Technology (4,696 words)
Modal Auxs	6.17 (1), 22.0%	9.98 (1), 25.3%	6.60 (1), 17.9%
Full Vbs Total	4.11 (2), 14.6%	4.58 (2), 11.6%	4.47 (1), 12.1%
Adverbs Total	4.34 (3), 15.4%	4.99 (3), 12.6%	8.30 (1), 22.5%
Adjectives Total	3.20 (1), 11.4%	2.29 (1), 5.8%	1.49 (3), 4.0%
Nouns Total	4.34 (2), 15.4%	2.50 (2), 6.3%	3.83 (1), 10.4%
Clausal Elements	0.91 (2), 3.3%	5.62 (1), 14.2%	1.49 (1), 4.0%
Questions	0.23 (1), 0.8%	-	1.06 (1), 2.9%
Other	4.80 (3), 17.1%	9.57 (3), 24.2%	9.58 (3), 26.0%
Total	28.11 (2), 100%	39.52 (2), 100%	36.84 (1), 100%

However, it is worth noticing that in technology, this was the most heavily hedged section, while in economics and medicine, the Introduction was hedged even more heavily. In fact, altogether six of the eight major categories of hedges were most commonly employed in the technology Conclusions, whereas in the other two subject areas only three of the main types were most frequently found in this section. Relatively remarkable disciplinary differences were to be detected in the use of adverbs between technology and the other two disciplines, whereas adjectives were noticeably more common especially in economics than in technology. Yet another

rather clear difference was seen in the occurrence of “Other” hedges, whose relative number in economics was about half of those seen in the other two fields of study.

As to hedges commonly linked to quantification, technology was again the field with the highest number of such hedges, 15.72 per 1,000 words and 44.5% of all hedges in the section. Such hedging was also quite common in medicine in terms of relative incidence (13.93 per 1,000 words), but constituted a lower share of all hedges (35.2%). The incidence and share of such devices out of all hedges were once more lowest in economics, that is, 8.91 per 1,000 words and 31.7% of the total number of hedges. Thus, these findings, too, support the idea that quite a high degree of hedging is linked to quantification in technology, and articles on medicine are also quite commonly qualified by such devices, but their role in terms of relative incidence and/or their share of all hedges is less pronounced in economics, a result parallel to the general findings emerging from the RAs. In comparison with the RA data, the frequency of such hedges in the Conclusions of the *SA* articles was (again) higher than in any of the RA sections in each discipline.

When it comes to authorial motivations for the use of hedges, two main reasons emerged from the responses obtained from the writers of the *SA* articles. On the one hand, authors seem to be cautious in making claims about the future developments in the area treated, discussions offering possible solutions to the problems dealt with or predicting the potential directions of future work being commonly hedged by the authors (e.g. 25, 31). Hence, as pointed out by the author of an economics article, hedging in Conclusions may be due to “uncertainty about future events.” In medicine, too, similar reasons were stated, one author pointing out that “I’m predicting the future, so I have to express the prediction in less than absolute terms”, or as another author said, hedging is due to the realization that “it is not 100% certain that research will lead to better cures.” A similar rationale also surfaced in technology, where one author for instance justified the use of hedges by saying that what is said “is all speculation” about future research directions and thus needs to be toned down.

On the other hand, in the Conclusions the authors also commonly commented on the information presented in the Main Body of the texts, summarizing the points made and possibly pointing toward limitations by hedging the strength of their arguments. Accordingly, one of the economics articles offered hedged conclusions because the author did not know the conclusions “to be true.” Similarly, hedging occurred in medicine where the information presented had not been proven to be categorically correct, because the conclusions were based on information yielded by laboratory models, but had not “been tested in clinical trials.” The idea perhaps

underlying much of such hedging is nicely summed up by the author of a technology article, who says that while the authors may be relatively certain about what is being said, “we are not interested in bullying the readers into agreeing with us, we just want to make sure they consider it as a possible truth.”

\* \* \*

As we have seen above, there were both differences and similarities between the disciplines in the use of the various kinds of hedging phenomena in the different parts of the articles drawn from *Scientific American*. Evidently, on a number of occasions, the use of hedges is linked to the kind of scientific frame of mind that scholarly discourse is expected to reflect, albeit the discourse under scrutiny may not be what one might immediately deem as ‘high-brow’ scientific discourse, to borrow Huddleston’s (1971) term. Quite often, it seems, the general motivations underlying hedging are not far from those cited in connection with the RA data. What is to be noticed, however, is that in two of the disciplines, the overall frequency of hedging was in fact higher than in the RA data, a finding not consistent with certain earlier views. Furthermore, it is of interest to see that the disciplinary differences detected in the RA data were in a sense reversed in the popular scientific articles insofar as economics, the most heavily hedged discipline in the RA data, was the least heavily hedged one in the data from *SA*. In medicine and in technology, an opposite trend was seen, hedging becoming more common especially in medicine in comparison with the RAs. I have already pointed toward some factors possibly explaining these trends, and it is in the following chapter that the discussion of the nature of the disciplines and the resultant effect on hedging in the two kinds of article will continue, with the aim of illustrating the kinds of implication that the results have on the research and pedagogy of special-subject discourse.

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<sup>1</sup> A Table summarizing the results for the various subcategories of hedges is provided in Appendix 4.

<sup>2</sup> As noted previously, the category of “Other” hedges is omitted from some of the comparisons because it involves a mixture of hedging phenomena that resemble items included in many of the other categories but which nonetheless cannot be assigned to any of the other categories.

<sup>3</sup> It is interesting to see that the RA data included a higher share of hedges belonging to the five major lexical categories of hedges distinguished. Hyland (1998: 104) mentions that in his data, hedging was “principally a lexical phenomenon.” When it comes to the five major lexical hedge categories dealt with here, it seems that hedging in popular scientific articles may not be realized by means of single lexical items to the same extent as in the RAs.

<sup>4</sup> The twelve verbs are *allege, argue, assert, claim, forecast, foreshadow, hint, implicate, imply, predict, propose, and suggest*.

<sup>5</sup> The verbs in question are *anticipate, assess, assume, believe, conclude, consider, deem, doubt, envision, estimate, evaluate, expect, extrapolate, fear, feel, find, foresee, hold, hope, imagine, infer, judge, maintain, perceive, presume, project, reason, regard (as), see (as), speculate, suppose, surmise, suspect, think, view (as), wish, wonder, and worry*.



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<sup>6</sup> The adverbs are *apparently, arguably, conceivably, likely, ostensibly, perhaps, possibly, potentially, presumably, probably, seemingly, and supposedly*.

<sup>7</sup> The devices found in the data are *commonly, frequently, generally, normally, occasionally, often, oftentimes, rarely, routinely, seldom, sometimes, typically, and usually*.

<sup>8</sup> The list of items includes *considerably, dramatically, fairly, greatly, largely, mainly, markedly, massively, moderately, modestly, mostly, partly, primarily, quite, rather, reasonably, relatively, shortly, significantly, slightly, somewhat, substantially, vastly, and widely*.

<sup>9</sup> *About, almost, approximately, around, basically, essentially, nearly, practically, roughly, some, and virtually* are the items in question.

<sup>10</sup> The nine adjectives are *apparent, conceivable, hypothetical, implausible, likely, possible, potential, prone to, and unlikely*.

<sup>11</sup> The data included the following devices: *common, commonplace, frequent, general, occasional, pervasive, popular, prevalent, rare, scarce, typical, uncommon, and widespread*.

<sup>12</sup> The items are: *considerable, devastating, immense, impressive, large, notable, reasonable, relative, remarkable, significant, slight, small, substantial, tiny, and tremendous*.

<sup>13</sup> The nouns in question are *argument, claim, clue, hint, implication, indication, prediction, and proposal*.

<sup>14</sup> The items identified are *approach, approximation, assessment, assumption, concept, conclusion, deduction, estimate, evaluation, expectancy, expectation, fantasy, fear, guess, hope, hunch, hypothesis, idea, illusion, impression, judgment, notion, opinion, perception, perspective, point of view, presumption, projection, scenario, scheme, speculation, suspicion, theory, thesis, view, and vision*.

<sup>15</sup> *Avenue, candidate, chance, odds, option, possibility, potential, probability, prospect, scenario, sign, tendency, threat, and trend* are the items included in this group.

<sup>16</sup> A list of all lexical hedging devices found in the RAs and in the popular scientific articles is provided in Appendix 6.

<sup>17</sup> As suggested, the reasons for such hedging may be various. The possible motivations underlying the use of hedges linked to quantification in the popular scientific data will be discussed in more detail below.

<sup>18</sup> Approximative adjectives were not found in the SA articles on technology.

<sup>19</sup> Such devices did not occur in the SA articles on technology.

<sup>20</sup> The sectional breakdown of the figures regarding the various subcategories of hedges is presented in Appendix 5.

<sup>21</sup> It should be emphasized that (for reasons of anonymity) the authorial motivations cited and the examples referred to do not originate from the same authors.

## 7. Discussion and Implications

The aim of the present chapter is to briefly summarize the outcome of the study, discuss the reasons underlying the results, consider their relation to earlier views regarding hedging, and to present implications that may be of interest for those involved with special-subject discourse either in the role of teachers or researchers of special-subject language use, or as future or practicing scientists.

### 7.1 Reconsidering the Role of Hedging in Research Articles from the Three Disciplines

#### 7.1.1 The Uses of Hedging in Research Articles

As we saw in Chapters 3 and 4, the use of hedges in RAs can be viewed as a convention linked to the socially constructed expectations of the scientific community, a convention with a variety of motivations. In inserting hedges into the different RA sections, authors can indicate that the information presented or the terminology employed may not be categorically accurate or precise. In ideational terms, then, the effect of hedging is commonly that of pointing toward the conceptual or propositional limitations of what is said—in other words, hedges render the relationship between what is said and the phenomena referred to more precise. However, as will be shown below, the opposite may also occasionally be the case, hedges possibly being used to render things less precise when absolute exactitude is not required. However, it appears that in the majority of cases hedges in RAs may be viewed as a means of expressing caution. In brief, as we have seen above, expressing caution may be seen as a strategy by which authors can for instance create research space in Introductions where hedges are employed to subtly point toward limitations in earlier work, to modestly bring to the fore the value of their own contribution, and to put forward their own pre-research ideas without presenting them as absolute. In the other parts of RAs, hedging can be associated with the various stages of the idealized research process, authors making use of hedges to delicately point toward the possible methodological limitations of the research protocol, to signal the uncertainties and inaccuracies potentially lurking behind the results, or to bring out the tentative nature of the conclusions drawn and generalizations made.

## Hedging as a Social Intracommunal Feature in RAs

Granted the above, the different uses of hedges can be seen as a manifestation of RA authors' adherence to the communally accepted rules of the scientific 'game'. In fact, it seems that although in most cases the rationale underlying hedging can be retraced to one or more of the motivations discussed above, there are occasions where hedging may be more in the nature of a mere convention reflecting the rules of the game than anything else, that is, there may not always be an apparent reason why hedging should be applied. As already observed in Chapter 3 (see note 40), in one of the economics RAs, for example, the authors offered the following conclusion,

- (1) The majority of the respondents (78%) were CEOs, Directors, Presidents, or Vice Presidents of the company. *It would seem a reasonable assumption* that these respondents have a strong hand in the policies implemented by the company. (ECO1, I, "Conclusions", paragraph 1 [Discussion])

which seems quite heavily hedged given the nature of the information presented. One should think that it is safe to say that CEOs, Directors, Presidents, and Vice Presidents are exactly the persons strongly involved with the implementation of company policies, a conclusion that most economists would also most likely accept. Thus, it seems that on some occasions hedges may be employed mainly because of their stylistic value rather than because of the nature of the accompanying information. Hedging of this kind, then, can be seen as conformity owing to convention rather than to epistemic reasons such as those exemplified previously. However, in the great majority of cases, hedging in the RAs was evidently at heart due to the epistemic limitations associated with the information put forth. Such hedging is obviously conducive to an atmosphere that for instance offers protection to the authors against the threat of being proven wrong, allows for alternatives, enhances the possibility of ratification of the knowledge offered for validation before the scientific community—in brief, it is a fruitful way of expressing conformity to the conventions of the scientific community.

Given the institutional rather than personal nature of discourse such as RAs, for reasons outlined earlier (see 3.3.1) an analysis of hedges based on the politeness theory postulated by Brown and Levinson (1978/1987) is not feasible in most cases. However, what we are dealing with in RAs is not necessarily *completely* distanced from what is understood by politeness insofar as hedging in RAs may for example be intended to shield authors against criticism where full agreement does not exist or when absolute accuracy is unattainable. Nevertheless, such use of

hedges cannot be perceived as politeness *à la* Brown and Levinson because hedging is motivated in view of the communal constraints involved instead of interpersonal considerations of face. In other words, hedging can be taken as an indication of sensitivity toward the scientific community, information being put forth in a tone that also takes into account the expertise of the scientific peer group, acknowledges its crucial role in the validation of information, and allows for other opinions. Hedging is therefore clearly associated with the social aspects of communication—the function of the strategy perhaps being best termed *intracommunal* rather than interpersonal.

Accordingly, it seems that the use of hedges in connection with references to other scholars' work when for example creating research space is the only occasion where Brown and Levinson's interpersonal politeness theory is at least to some degree applicable. For instance, tentatively colored items such as "Smith has *argued* that" or "Jones *thinks* that" may be used when putting forth comments that (explicitly or implicitly) express criticism toward other scholars. Such hedging can be viewed as a politeness feature if we assume that the use of hedges is conditioned by the author's wish to tone down his or her criticisms of the sources referred to and in so doing to work toward maintaining good personal relations with the sources. From this viewpoint, then, hedging might be taken as a *positive politeness* feature because it indicates that

[the sender] considers [the addressee] to be in important respects 'the same' as he, with in-group rights and duties and expectations of reciprocity, or by the implication that [the sender] likes [the addressee] so that the FTA doesn't mean a negative evaluation in general of [the addressee's] face. (Brown and Levinson 1987: 70)

On the other hand, hedging of this kind might also be described as *negative politeness* due to the idea that in avoiding unmitigated criticisms of other scholars' work, authors express a certain degree of deference toward other scholars' views. Hence, although RA authors may express their reservations when citing other scholars' work, the use of reporting devices not categorically denying the value of the work can be taken as an indication of respect toward the work and opinions of other scholars. Such respect in the form of hedging, then, can be viewed as a negative politeness feature in that it for instance allows RA authors to minimize the interference that creating research space may impose on other scholars' views and their need of self-determination. Nonetheless, although these two politeness-based interpretations may be formulated on the basis of Brown and Levinson's theory, such hedging might also be taken to arise from the institutional status of discourse such as RAs in much the same way as hedging of other kinds, the sensitivity in reporting other researchers' work possibly equally arising from the communal rules of behavior

rather than from interpersonal considerations. Whichever the case, the effect of hedging is clearly that of discreetly pointing toward the potentially noncategorical nature of the information reported, a useful means of for example clearing room for one's own research.

### Hedging as a Textual Feature in RAs

Apart from being taken as a reflection of the uncertainties or inaccuracies encountered by scholars during the research process and of the intracommunal discretion expected in discourse like RAs, the strategy of hedging may be viewed from yet another perspective. As we saw in the earlier parts of this study, hedging may be taken to stem from the problems of finding suitable conceptual renderings of various phenomena of the universe, and the strategy thus fulfills an ideational function (see e.g. Halliday 1970, 1978). Accuracy and precision in using concepts and formulating propositions, in turn, can be claimed to be essential particularly in scientific discourse such as RAs, where communal expectations of honesty, modesty, and caution—at least ideally—lead authors to tone down their mode of expression by means of hedges when treating issues where full accuracy or certainty may not have been achieved, hedging thus fulfilling what I have above termed a social intracommunal function. If we accept the contention that hedging in RAs is a phenomenon whose use is conditioned by the communication situation, especially by the purpose of the discourse and the degree of knowledge shared by sender and audience, in my view hedging in RAs may equally be described as a strategy with a *textual* function, meaning that the strategy is useful in “creating relevance to context” (Halliday 1994: 36) insofar as in adopting the strategy, RA authors accommodate their mode of presentation so that “what is said is relevant and relates to context” (Halliday and Hasan 1989: 45). In other words, it makes the information presented such that it is “appropriate to the state of shared knowledge and the dynamism of sharing knowledge at a particular point in an interaction” (Widdowson 1984: 71).<sup>1</sup> In helping authors to express things with the kind of precision expected by the community, hedges may in my view be taken as a textual ‘precision’ tool whereby authors can adjust their language use according to the communicative context of RAs.<sup>2</sup> Thus, apart from being solely a social intracommunal feature in RAs, hedging may in my opinion also be approached as a phenomenon by which authors can adapt the surface appearance of their contribution to correspond to the presumed level of knowledge and expectations of the audience.<sup>3</sup>

Apart from being a means of rendering the relationship between concepts or propositions and the universe more precise and accurate, hedging devices also occasionally seemed to occur in

RAs in contexts where absolute precision or accuracy might **not** be absolutely necessary. For instance, when discussing issues widely accepted by their scholarly peers or when presenting contextualizing information of relatively marginal importance to their research, RA authors at times seemed to discuss matters in quite a roundabout way. Thus, in some instances it may also be the case that hedging is not really a protective strategy or a means of expressing things as precisely as possible. Instead, hedges may occur in formulations such as ‘*most* scholars agree that’ or ‘*considerable* evidence has amassed’ simply because the nature of the information does not require greater numerical exactitude. In other words, although it might in principle be possible to produce exact numbers in such cases, such an endeavor would be irrelevant in contexts where exactitude is not essential because the information is widely accepted by the scholarly community. Granted this, hedging might thus also have another textual dimension in RAs, that is, where the communication situation does not require absolute precision, hedges may be employed to reduce the degree of exactitude. Naturally, distinguishing such cases from occasions where hedges are employed to specify the status of what is said *vis-à-vis* reality is not a straightforward matter, as the authors may be the only ones aware of the actual motivation for using hedges. Thus, drawing a distinction between the two textual uses would not be feasible in the present data without the possibility of resorting to the authors for the validation of the motivation for a very large number of hedges.

### 7.1.2 Hedging in the Disciplines Examined

While the above considerations illustrate the roles of hedging in communication such as RAs, the results emerging from the RA data examined suggest that different disciplines may not be altogether uniform when it comes to the frequency, forms, and variety of hedges. As noted, the results are in fact somewhat in contradiction with certain previous views. Whereas it has been illustrated earlier that hedging in disciplines like medicine or biology may be quite common as far as RAs are concerned, attention has not been given all that much to differences between subject areas such as medicine and technology. What is more, when researchers have put forth opinions about the possible differences or similarities in hedging across disciplines, contradictory views have been presented. Donald McCloskey (see e.g. 1985: 98, 1994: 120), for instance, has emphasized the rhetorical nature of discourse between economists and, on the basis of Bloor and Bloor’s (1993) research, has implied that features like hedging have a noteworthy position in texts concerning economics, especially when a scholar is “making claims widely relevant for

economics” and “is so to speak a ‘house guest’ intruding on other economists’ space” (McCloskey 1994: 120). Therefore, McCloskey’s work suggests, the differences between disciplines in the use of rhetorical features like hedges may not be so very great. On the other hand, certain scholars have interpreted Bloor and Bloor’s (1993) study differently, postulating that discourse on economics often proceeds without hedging in contexts where hedges might be employed in other subject areas. According to Backhouse et al.’s (1993) interpretation of Bloor and Bloor’s (1993) study, then, economists primarily use hedging devices in connection with methodological considerations, but “economists do not regard claims about the economy as ‘field-central’ claims in need of hedging” (Backhouse et al. 1993: 15) in the same way that for instance biologists feel the need to hedge field-central claims pertaining to biology. Thus, Backhouse et al. (ibid.) conclude that “the language-strategies used by economists do, to a certain degree, differ from those used in the natural sciences, and hence that McCloskey’s approach may exaggerate the similarities between economics and other disciplines.” The idea that phenomena like hedges might not be all that common in economics also seems to be implicit in Klammer’s (1984) description of discourse between economists, where it is stated that “[a]nyone who has had a chance to observe interactions among economists is likely to be struck by the passion and commitment of their arguments” [...] (pp. viii-ix).

As the results of the current study indicate, at least in the present data certain noticeable disciplinary differences were to be detected in the use of hedges in RAs. The overall incidence of hedges was highest in the field of economics, whereas the relative overall number of hedges in medicine and technology was about one third lower. Furthermore, as the calculations concerning the use of different types of hedge in the various rhetorical sections of the RAs illustrated, noteworthy disciplinary variation of other kinds was also to be found in the corpus.

To return to the question of the reasons underlying the differences in the use of hedges, it is useful to consider the nature of the three subject areas and the different features of the RAs in more detail. We may commence from the basic observation that a certain difference between the research traditions of the disciplines seemed to be reflected in the use of hedges in the research articles. It must be emphasized that in all fields of study, we are evidently dealing with reports of research aiming at reliable results concerning matters of importance for experts in each area of specialization, but it does appear that the field of economics is more prone to a style of presentation that favors hedging than the other two disciplines. The reasons for this can be sought from the characteristics of the disciplines and the objects of research in the three areas, as well as from the kinds of material and method used to obtain information on those objects.

To begin with, we can return to the afore-mentioned observations concerning the general nature of the disciplines, which might have an effect on the overall incidence of hedges in the different topic areas. As the comments from the RA authors illustrated, the field of economics differs from the other two disciplines to quite a degree insofar as it is a social science, relatively speaking ‘softer’ than medicine and technology. In the latter two disciplines, the objects of study and methods applied seem more closely related to the traditional rigorous empiricism of the natural sciences, whereas in economics, as some of the RA authors readily admitted, the theoretical foundations are much more tentative. The present results concerning economics, then, can be taken as a reflection of such tentativeness, the higher overall incidence of hedging in the economics RAs apparently often relating to the theoretical uncertainties concerning the discipline.

On the other hand, compared with ‘softer’ sciences like economics, the share of hedging commonly relating to quantification out of the overall number of hedges was higher in the data from the ‘harder sciences’, especially technology. Again, this difference is evidently due to the general nature of the disciplines, technology in particular being a field of study where various measurements, equations and calculations are part and parcel of the research process, and, where need be, the imprecision to do with the numerical data is commented on by means of hedging devices. This may explain some of the disciplinary differences detected in the incidence of hedges in for instance Methods and Results sections. In view of the RA data, technology is clearly the discipline with the greatest emphasis on numerical data, and the various ways of obtaining numerical data in technology were characteristically presented in the Methods sections, to be followed by the figures obtained in the Results sections, which is why it seems only natural that these particular sections should be quite heavily hedged. In medicine, too, such hedging was more common than in economics, but as medicine apparently does not characteristically appear as quantification-oriented as technology, the frequency of such devices was lower.

Another difference between economics, medicine, and technology that may also be linked to the overall number of hedges is the emphasis given to the various RA sections. One illustration of this is the length of Introduction sections in the three disciplines, the section making up a considerably larger share of the data on economics than of the research articles from medicine and technology (18,275 vs. 4,456 and 7,866 words, respectively, i.e. some 29% vs. 9% and 17% of the articles). Granted this, it is thus also conceivable that the kinds of hedge typical of this section are more amply represented in the research articles on economics when the RAs are considered *in toto*. A brief glance at the RAs indicates that one difference applies for example to the extent to which hedging occurs in references to other sources, the Introduction sections of the economics



articles not only including lengthier considerations of previous work linked to the objects of study, but also evidently more hedges pertaining to the information obtained from the sources than the research articles on medicine and technology.

Another divergence between the three disciplines potentially affecting the length of Introductions and the frequency of hedges particularly in this section has to do with the objectives of the research process. In the RAs on economics, various hedges (e.g. *assume*, *hypothesize*, *postulate*, *presumption*, etc.) occurred frequently in the Introduction sections in the presentation of research hypotheses, that is, of various conjectures relating to the issue under scrutiny, ideas whose validity the researchers then proceeded to consider. The formulation of explicit research hypotheses was quite common in the field of economics, where six out of the ten RAs included clearly delineated research hypotheses. In most cases, these hypotheses were discussed at length and marked as speculative by a variety of hedging devices. In fact, when research hypotheses were *not* formulated, their absence was at times pointed out and justified by the authors, as in the following:

- (2) The thrust of this study is exploratory and descriptive and should be considered preliminary to the subsequent inductive development of a more general growth management theory. Therefore, the study does not offer specific hypotheses to be tested. (ECO1, H, 50 [Introduction])

In the research articles on medicine and technology, on the other hand, such research hypotheses were uncommon, in fact only one of the medical articles presenting an explicitly formulated hypothesis to be tested. Thus, it seems that an additional reason for using a higher number of hedging devices particularly in the Introductions of the research articles on economics has to do with the tendency to formulate one or more hypotheses concerning the issue at hand, the central purpose of the research indeed sometimes appearing to be the testing of hypotheses rather than conducting a purely empirical type of project. In this sense, it appears that the scientific tradition represented by the research articles on economics commonly resembles the hypothetico-deductive model of research, empirical evidence being used to weigh the accuracy of hypotheses, whereas the fields of medicine and technology more typically concentrate on conclusions reached through empiricist experiments as such.

A further difference between the disciplines that may have an effect on the degree of hedging, this time mainly in the Methods and Results sections, has to do with the kinds of material and method used in obtaining information on the objects of study. Most of the research

articles on economics addressed issues that have to do with the different aspects of practical economics, which means that in many cases research focused on the behavior and attitudes of economists and other people associated with commercial endeavors. In eight out of the ten economics research articles examined, at least part of the research was based on personal interviews, questionnaires, or other kinds of survey concentrating on the experiences of those involved in the processes observed. Although such information was commonly subjected to rigorous statistical analyses relating to validity and reliability, it can be postulated that since information obtained from individual people is at heart subjective, the authors reporting such information may wish to approach their material somewhat cautiously. Furthermore, most of the ten economics articles were to some degree based on research data obtained from sources not originally focusing on the phenomena studied as objects of scientific research, the results often being founded on the recollections of individual informants with experiences regarding the topic or on the researchers' interpretations of various other documents used as research material (e.g. census data and sales figures). In the former case, the information collected from informants might for instance be biased because of the time elapsed since the time of observation. The unreliability of the latter type of data has to do with the problems of analysis that researchers may experience because the analysis of material not originally compiled for research purposes is to some extent dependent upon the researchers' knowledge and intuition. This might render the interpretive process subjective.

The last-mentioned characteristics may equally be reflected in the greater propensity for hedging in the data on economics. Especially in the Methods as well as Results sections, there seemed to be a clear tendency to use a relatively high number of lexical items such as *assess*, *estimate*, *assume*, *tend*, and *evaluation*, clearly markers of tentativeness in comparison with more assertive items like *measure*, *determine*, and *say*, for example. The nature of scientific inquiry in the field, the subjectivity of the data from informants, and the authors' problems of analysis may make it difficult for the authors to use more assertive terminology particularly in the presentation of research procedures and results. In the fields of medicine and technology, on the other hand, the research projects reported were more typically founded on experiments carried out especially for purposes of research, results being more characteristically derived from laboratory experiments involving refined measuring techniques in controlled surroundings, which may be taken to reduce the subjectivity of information obtained. Occasionally, the research projects reported in the medical RAs also involved interviews, but to a visibly lesser extent than in economics, and in technology such information was never used as experimental material. This

may be why the research articles on medicine and technology included fewer instances of the kinds of tentative item cited above, the more objective methods of data collection and analysis perhaps allowing the authors to speak about their research in more confident terms than in economics.

Apart from variation in the incidence of hedges in the three subject fields, it was also observed that the disciplines differed in the choice of hedges used. As noted, the widest selection of hedges belonging to the categories of lexical items established was found in the economics RAs (161), followed by technology (156), and medicine (134). That this should be so is quite natural in that it may be presumed that where the frequency of lexical hedging is highest, the selection of items employed is also widest, and it was exactly in economics that the highest relative incidence of lexical hedges was detected (25.94 per 1,000 words). Although the relative frequency of such hedges was noticeably lower (16.36) in technology, the variety of hedges employed did not reduce to the same extent, which seems to be due to the relatively wide selection of lexical hedges commonly to do with quantification identified in the technology RAs (102), a type of hedge not as common in the economics RAs, which results in a narrower selection of such items as well (72). In the medical RAs, the variety of lexical hedges employed was noticeably narrower (134) than in the other two disciplines, although the relative incidence of lexical hedges was not much lower than in technology (15.32). Given that the medical RAs are not as quantification-oriented as those on technology, the variety of the lexical hedges commonly to do with quantification was not as wide (73).

Another issue associated with the variety of hedges employed relates to their level of formality. As was seen in connection with lexical items such as *appear* and *seem*, RAs on economics may be slightly less formal in tone, which may be reflected in a certain degree of freedom in the choice of hedging devices, whereas ‘harder’ sciences such as medicine may be somewhat more formal in tone, which may in turn impose some limits on the kinds of hedge employed and thus narrow down the choice of hedging devices. Hence, apart from differences in the degree of hedging, the three disciplines equally manifested not only variation in the choice of hedges employed but also some variation in the degree of formality of the items used, differences again arising from the general nature of the disciplines.

In brief, the differences in the incidence and variety of hedges between the research articles on economics, medicine, and technology can be seen as emerging from the different kinds of object of study, the different types of material and method used to study these objects, and the different general nature of the disciplines. In the field of economics, more use seemed to be made of earlier work, references to outside sources being often marked as tentative by hedging. Furthermore, the economics articles often focused on the testing of certain hypotheses, the tentative nature of which may partially account for the higher incidence of hedging than in the more empirically focused studies into medicine and technology. In economics, moreover, the theories employed are more tentative by nature than in the 'hard' sciences, which can equally be linked to the degree of hedging. Moreover, the focus in economics is frequently on issues dependent on the behavior of human beings or groups of people outside laboratory conditions, as is often the case in the social sciences. As such, researchers may not be able to fully investigate the reasons underlying the choices, decisions, and thoughts of their study population and may thus be incapable of providing precise explanations for or analyses of the phenomena observed. Therefore, the best the researchers can occasionally do is introduce assumptions, predictions, tendencies, and the like, because due to the human element and the limitations of the kinds of research materials used there might not be any certainty that the conclusions and the real-life economy will turn out to be in a one-to-one correspondence. In research into medicine and technology, on the other hand, the matters dealt with tend to be studied in more controlled surroundings, where various biases and potential distortions can be accounted for, the emphasis also often being on rather mechanical chemical or physiological processes that can be measured quite confidently, without the distortion of personal beliefs or biases. In sum, then, it seems that the frequency of hedges as well as the type and selection of hedging devices in the three disciplines to a great degree depend upon the general nature of the disciplines. In addition, being more in the strand of 'soft' social-sciences, it may be argued that the kind of hedging employed in economics is more focused on the various tentative aspects of the theories employed. As a 'hard' quantification-oriented science, technology on the other hand seems to favor hedges linked to numerical precision and accuracy. The third field of study examined, medicine, appears to be situated between the other two disciplines as far as hedging is concerned, the RA sections introducing earlier work and discussing the outcome of research being more heavily hedged than in technology but somewhat less heavily hedged than in economics, perhaps illustrating that the theoretical choices made are not seen as tentative as in economics, but a slightly more cautious approach is nonetheless taken than in technology when introducing and discussing the topics under scrutiny. On the other hand, hedging relating to

quantification was generally speaking used more commonly in medicine than in economics, but to a lesser degree than in technology. Thus, the differences between medicine and technology seen especially in the Methods and Results sections are probably due to the different roles that quantification plays in these two fields, research on technology being more focused on numerical data than medicine.

The considerations above suggest that instead of perceiving research articles from all fields of study as rhetorically similar, we should perhaps devote more thought to variation between disciplines. As Donald McCloskey (1985: 105) implies, there is overlap in the rhetorical choices between subject fields, but we should not overlook the differences either. Knowledge of the rhetorical styles of the various subject areas may be essential for the users of special-subject discourse like scientists, hedging representing a central means of modifying one's style of presentation for various reasons. Especially from the viewpoint of pedagogy, more emphasis should be put on potential variation in the incidence and uses of hedging between individual disciplines. In view of producing contextually appropriate accounts of research for the perusal of specialist audiences, one should evidently be aware of the rhetorical characteristics of one's field of specialization. Therefore, an understanding of rhetorical devices such as hedges is needed, because success in presenting one's work concerning any given field requires not only a thorough knowledge of the objects of research but also of the rhetoric of the particular field, in brief, familiarity with "a class of objects and a way of conversing about them" (McCloskey, *ibid.*). The question of how one might strive toward such an understanding in the research and pedagogy of special-subject discourse will be given further thought in section 7.3.

## 7.2 Reconsidering the Role of Hedging in Popular Scientific Articles from the Three Disciplines

As explained previously, the role of hedges in popular scientific discourse has been described in different ways in literature. On the one hand, some authors have put forth the idea that hedging is not necessary in accounts intended for an audience with a considerably lower level of background knowledge in the same way as it is in discourse between scientific peers, because the authors of such popularizations no longer have to worry about the audience's reactions toward the accuracy of what is being said. On the other hand, however, it has also been observed that certain types of hedge, particularly those to do with quantification, may be even more frequent in popularized scientific discourse than in for instance RAs. As the results presented above illustrate, hedging did

occur relatively frequently in the popular scientific articles in all subject areas scrutinized, illustrating that the present data is not in accordance with certain earlier views.

In addition, what has not been commented on much in earlier work is the potential disciplinary variation in the use of hedges in popular scientific discourse from different subject areas. As is visible from the results, noticeable disciplinary variation in the use of hedges was detected in the data drawn from *SA*, hedging becoming more common and varied in the field of medicine in comparison with the medical RAs. In technology, too, the frequency of hedging increased in comparison with the RA data, but hedges grew less frequent in economics, the field most commonly hedged in the RA data. In fact, in the popular scientific data, economics was the least heavily hedged of the three subject areas. In this section, I will first concentrate on the reasons as to why, contrary to some earlier views, hedging might indeed be employed quite regularly in popular science such as the *SA* articles. After this, attention will be given to the possible reasons underlying the differences in the frequency and variety of hedges in the popular scientific articles from the three subject areas.

### 7.2.1 The Uses of Hedging in Popular Scientific Articles vs. Research Articles

Whereas the use of hedges in RAs to comment on the precision and accuracy of concepts employed and propositions formulated is apparently conditioned by the communal constraints pertaining to discourse between scientific peers, it can be postulated that the motivations for using hedges in popularized renderings of scientific information are somewhat different. As explained, one evident difference between the RAs and the popular scientific data is that the latter does not give as much emphasis on the methodological issues involved in scientific work. Instead, the popular scientific articles are more clearly concentrated on those aspects of scientifically derived information that are likely to be of interest and/or practical importance for an audience not made up of specialists in the area. Hence, some of the contexts in which hedges were found in the RAs were not as prominent in the popular scientific articles. What is more, popular scientific articles are not necessarily accounts of the authors' own scientific work only, but are often amalgamations reporting both the authors' research and that of other scholars in the field. In my corpus, then, hedges in the popular scientific articles more commonly resembled those seen in the RA sections that introduce the topic and discuss the outcome and implications of research, the popular scientific articles frequently being more in the nature of reviews summarizing the work of not only the authors but also that of other researchers, with relatively little attention to the technical

issues involved. While hedging of the latter type can on many occasions at heart be associated with more or less the same epistemic considerations as in RAs, there may nonetheless be differences in the reasons as to why such issues are brought to the fore by means of hedges to quite an extent in discourse where the requirements of scientific honesty, modesty, and caution might not be as essential as in discourse such as RAs. Various scholars (e.g. Cloître and Shinn 1985: 58, Perelman and Olbrechts-Tyteca 1969: 100, Fahnestock 1998: 333, Myers 1989: 28, 1994: 188-9) have implied that science popularizations represent discourse mainly aiming at handing down uncontroversial facts from expert to layperson rather than presenting cautious formulations qualified by quite a strong epistemic component. This view, however, is largely based on the uses that hedging has been presumed to have in discourse like RAs, but sufficient attention has perhaps not been given to the roles that hedges may occupy in the communication situation of popularizations such as those taken from SA, where the relationship between sender and audience as well as the purpose of language use are noticeably different from RAs.

#### Hedging as a Social Interpersonal Feature in Popular Scientific Articles

As hypothesized in Chapter 5, one way of motivating the use of hedges in popular scientific articles can be formulated by starting from Myers' (1989: 28) study that portrayed hedging in RAs as a negative politeness feature—a depiction perhaps not compatible with the communal nature of RAs, as we have seen. Myers hints that in popular scientific discourse the protection of negative face is not a central interactional problem, which is why hedges might not figure often in popular science. Instead, Myers says, a considerable problem revolves around the notion that when more knowledgeable authors produce texts for the perusal of less informed audiences, they have “to avoid insulting the readers, to try to make them feel like part of the [esoteric] community” (ibid.). Although this question is not addressed by Myers, hedging might also be seen as useful toward such an end, an end which can be linked to Brown and Levinson's theory of politeness as well. Due to their high level of knowledge, the authors of popular scientific articles of the kind investigated here are apparently in a powerful position in the communication situation *vis-à-vis* the audience. However, if they manage to avoid appearing too forceful, the authors may boost the appeal of their texts by trying to close the knowledge gap between themselves and the non-expert audience. Brown and Levinson (1987: 101 ff.) imply that positive politeness strategies provide a means toward this end. While the need for positive politeness in discourse between unequal discourse participants such as the senders and addressees of the popular scientific articles

examined has been expressed at least implicitly in previous research, hedging has rarely been included among such strategies. Nonetheless, as for example Aijmer's (1986) work on the use of hedges in the London-Lund Corpus of Spoken English shows, there have been indications that hedges could indeed be used as devices emphasizing friendliness and intimacy between sender and addressee, a procedure in my view apparently associated with positive politeness.

In my opinion, hedging as an indication of positive politeness might be a further reason for the use of hedges in popular science such as the *SA* articles examined. This assumption, as explained in Chapter 5, is based on the hypothesis that although the intended audience of the more popularized articles consists of non-experts in the field, many of the readers can be reasoned to have some knowledge of the discursive conventions of scholarly language use, including the use of hedging devices. Thus, it can be argued that certain instances of hedging in the popular scientific articles represent a strategy that gives descriptions of matters of expertise the scientific tone that the audience expects of them, hinting that "the article must be science, if it is written like science" (Dubois 1986: 251). From this perspective, the authors may be seen to appeal to the audience by reproducing "science as the public wants it to be" (Myers 1990: 190). Although the authors could possibly occasionally present straightforward knowledge claims without appearing too assertive in the eyes of the audience or without the fear of being criticized by the readership, the insertion of hedges provides the authors with "a cooperation signal inviting the listener [or reader] to become involved in the communication situation" (Aijmer 1986: 15) even though the readers might be incapable of reacting to what is said. The important thing, however, is not the actual reacting, but the theoretical possibility of doing so.

Providing this possibility, then, can be associated with Brown and Levinson's (1978/1987) concept of positive politeness, the aim being "to imply common ground or sharing of wants to a limited extent even between strangers who perceive themselves, for the purposes of the interaction, as somehow similar" (Brown and Levinson 1987: 103). By employing devices that are typically associated with the style of scholarly peer communication, writers can be thought to emphasize closeness between author and reader and thus enhance the audience's self-image. Hedging represents the kind of procedure typically found in discourse between the members of the esoteric group of researchers, which is why the use of such "in-group markers" (Brown and Levinson 1987: 107) can be useful in claiming common ground between expert authors and non-expert addressees and so expressing positive politeness toward the exoteric audience.

The positive politeness interpretation of hedging provides one possible explanation for the relatively high occurrence of hedges in the popular scientific articles examined. This is especially



so because, as Brown and Levinson (1987: 101-102) propose, positive politeness devices may be used quite lavishly<sup>4</sup> in order to show that even though the sender may not be altogether sincere in indicating similarity with the addressees, the sender sincerely wishes to take into account the addressees' positive face. Although the use of hedges in the *SA* articles may at times appear somewhat excessive in view of the level of knowledge of sender and addressee, it may be the high frequency of hedges that allows their user to "come closer" (Brown and Levinson 1987: 102) to the audience. Thus, although Myers (1989) does not acknowledge the interactional force of hedging in popular science, relating the strategy to positive politeness can be used to illuminate the reasons why hedges might after all be used quite often in discourse such as the *SA* data examined.

As implied in section 5.2, another objection that might be raised be against Myers' (1989) comments about hedging concerns his implicit assumption that hedges are not employed toward negative politeness in popular science. It is conceivable that in discourse between experts and non-experts hedging is not always necessary as an indication of negative politeness, because, on the one hand, straightforward knowledge claims concerning scientific matters do not seem damaging to the non-expert addressees' want of self-determination. On the other hand, the negative face of the sender does not seem to be in any greater need for protection either, since it can be assumed that the average reader of a popular scientific article is not in a position to contest much of the information presented. What has not been taken into account in previous work, however, is that the authors and the presumed lay readers of popular scientific articles are not the only parties whose reactions should be considered. In Myers' (1989) opinion, the nature of scientific popularizations is such that the authors "do not have any tensions between their roles as writers and their roles as researchers, and they only have to think of the general audience, not of the other researchers in the esoteric group" (p. 28). However, I would like to think otherwise. In the data drawn from *SA*, hedging was quite commonly employed where the authors put forth information drawn from the work of other scholars, hedges hinting that the information presented might not be altogether accurate or precise, but not entirely disproving the information either. Apart from being a means by which the authors signal the possible uncertainties and inaccuracies relating to the information reported, such hedging may in my opinion also be taken as a considerate way of pointing toward the problems involved in the work of other scholars, a strategy with politeness potential. As Myers (*ibid.*) acknowledges, popular scientific articles may also be read by other scientists, and I think that this possibility is one reason why the authors of popular scientific articles might use cautionary devices such as hedges when discussing the

potential problems inherent in the work of other scholars. Although the writers of the popularizations might not agree entirely with the sources referred to and may be taken to signal this to the non-expert audience by hedging, they can equally be thought to refer to their sources rather cautiously in order to avoid imposing on the beliefs of the latter. On the one hand, this could apparently represent an indication of negative politeness by which authors' "disagreements are mollified" (Brown and Levinson 1987: 162) in referring to the work of their scientific peers where matters might not be entirely unproblematic. On the other hand, as we have seen above, this could also be taken as positive politeness in that the information referred to is not criticized in an outright manner, but the criticism is stated in less than absolute terms so as to reduce the negative evaluation of the source (Brown and Levinson 1987: 70). This illustrates that, apart from considering the anticipated audience of popular scientific articles, the authors may also continue to pay attention to the needs and expectations of the specialist discourse community when its members are referred to. In part, then, hedging in the popular scientific articles can be seen as parallel to the kinds seen in the research articles, demonstrating that the authors might indeed want to give some thought to the esoteric scholarly community as well. As a matter of fact, instead of being an interpersonal feature, such hedging might also be viewed as a manifestation of the communal rules of scientific conduct carried over from RAs to popular science. From this perspective, then, it could also be claimed that hedging is a social intracommunal feature rather than an interpersonal politeness strategy. Whichever the case, nevertheless, I would like to argue that the authors of popular scientific articles may indeed sometimes wish to account for not only the reactions of the presumed non-expert audience but also that of their scientific peers in employing hedging devices.

Yet another aspect of popularizations not accounted for in arguments that negative politeness is not needed in discourse such as the *SA* articles is the possibility that in certain cases, the audience may after all very well present criticisms toward views presented by the author. As we have seen above, on many occasions the authors of the popular scientific articles put forth various recommendations or predictions on the basis of the information they presented. In the medical articles, for instance, indications about the future developments in the treatment of certain illnesses were given, and the authors also made some remarks about the way in which one should behave in order to prevent illness. On many occasions, such indications and recommendations were hedged by the authors, and it can be argued that one reason for this is exactly the protection of negative face. Thus, when for instance predicting future developments, it is conceivable that authors wish to be quite cautious where the evidence behind the predictions is less than

uncontroversial or empirically tested. By hedging their predictions, the authors may be protecting themselves toward the embarrassment of being later found wrong and being therefore criticized for creating a false impression of things to come. From this stance, then, hedging might after all sometimes be taken as a negative politeness strategy “leaving open the [...] possibility that the writers will be judged wrong” (Myers 1989: 14). Although a certain difference can be detected between RAs and popular scientific articles in the consequences of putting forth predictions or recommendations with less than due caution, it seems that the consequences are desirable in neither case since unnecessary rashness in presenting predictions or recommendations may definitely be harmful for both author and audience in each type of discourse. In RAs, on the one hand, presenting information that is later found wrong may influence a host of other scholars working on the same area, such carelessness evidently leading to communal disapproval. In popular scientific articles, on the other hand, less than due caution may for example lead to false expectations or fears. As noted previously, this may be particularly problematic in delicate areas such as medicine. Thus, in order to prevent false impressions where full certainty does not exist, hedging presents a useful way for the authors of popular scientific articles to avoid full commitment where there is a possibility of later negative feedback from the public.

### Hedging as a Textual Feature in Popular Scientific Articles

Apart from interpersonal politeness considerations, the observed presence of hedging in the popular scientific articles can also be accounted for with reference to the possible textual functions of hedging in the SA articles. As we saw above, in the RA data hedging may be perceived as a strategy by which authors commonly aim at being precise in the use of concepts and in the formulation of propositions *vis-à-vis* the actual observations of the scientist, or, sometimes, they may tone down the degree of exactitude if precision is not of the essence. Such uses of hedging can be described as a textual feature in that they make the discourse more appropriate in view of its context of use. When we consider the nature of hedging in discourse such as the popular scientific articles, the reasons for using hedges may be somewhat different, but the textual interpretation of hedging can also be extended to this kind of language use.

As noted above, hedging phenomena are a useful means of accommodating descriptions of scientifically derived information to meet the needs and expectations of the presumed non-expert audience. In terms of the ideational function of language use, such accommodation has two apparently opposing effects. On the one hand, as pointed out in previous research, the kind of

accuracy and precision deemed necessary in RAs is not as vital in popular science. This observation is linked to the idea that in scientific popularizations it is not always necessary to provide numerical data or explain the formulae used to acquire results as precisely as in, say, research articles. This is a reflection of the tendency of the more popular articles to concentrate on the general outcomes and implications of research, not on the precise results and the processes by which they were arrived at, because presenting the methods used and results obtained to the same degree of exactitude as in research articles is not always of equal interest to the intended readership. It can therefore be postulated that imprecise and vague formulations are used quite regularly when the methods or results of research are discussed in the more popularized articles. In terms of the ideational function of language use, then, such hedges can be taken to decrease the precision of what is being said.

On the other hand, as explained, it is also possible to see hedging from another perspective, namely as a strategy increasing the conceptual or propositional accuracy of what is stated. As Fahnestock (1998: 333-334) suggests, popular scientific texts may also have to be more explicit when they describe matters of expertise, because the authors cannot be certain that the readers will understand whether the information presented is important or unimportant, correct or incorrect. In this sense, the authors can be thought to give the readership a clearer and more precise picture of the information in employing hedges, the aim being to secure that the readers do not take the information as absolute. For example, by using certain tentative full verbs (e.g. *suggest, speculate*) or nouns (e.g. *assumption, thesis*), writers can signal to readers that the information presented should perhaps not be regarded as categorically certain. In terms of the ideational function of language, such hedging can thus be taken to increase precision in that hedges render the relationship between concepts or propositions and phenomena of the universe more accurate.

In the RA data, the use of hedges could characteristically be associated with the expected rules of behavior of the scientific community, whereas in the popular scientific articles, hedging often appears more in the nature of a strategy by which information is presented in a form that better corresponds to the needs and expectations of the non-expert audience. Thus, in employing hedges to reduce the level of precision where absolute accuracy is not of the essence or to specify that the information put forth may not be altogether accurate, the authors of popular scientific articles can be said to accommodate the information to the communication situation involving expert senders and non-expert addressees, hedging therefore apparently having to do with the textual function of language. Whether the need for such accommodation derives from the

unnecessity of absolute precision or the wish to be more precise is of course not easy to resolve in each individual case without recourse to information from the authors. However, these possibilities of interpretation illustrate that in comparison with RAs, the status of hedging in popular scientific articles may be more varied. In RAs, hedging is in ideational terms primarily linked to as high a level of precision as possible, whereas the use of hedges to tone down the level of precision seems secondary. In other words, it appears that in scientific peer communication such as RAs, the textual aspect of hedging is first and foremost associated with the scientific precision expected of such language use. However, the textual use of hedges to *reduce* the level of exactitude where the context allows this is not quite as compatible with the general precision-oriented nature of discourse like RAs. In popular science, on the other hand, the relationship between the two uses appears more balanced, hedges occupying a wide textual domain insofar as they can quite commonly both reduce the level of precision where absolute accuracy is not needed and increase precision where a possibility of misconception might exist.

\* \* \*

As the discussion above demonstrates, then, there may indeed be a variety of reasons why devices such as hedges may after all be employed in discourse such as the *SA* articles. In comparison with RAs, however, the reasons that I have established for hedging in popular scientific articles are often somewhat different, the motivation for hedges commonly arising from the different sender-audience configuration. Furthermore, even where hedges can be paralleled with those seen in RAs, as in connection with references to other scholars' work, the situation can be seen as slightly different in that such hedging may simultaneously be deemed as a textual feature by which the authors of popularizations adapt the mode of presentation according to the audience's *limited* background knowledge. In other words, hedges expressing limitations regarding information presented by other scholars may also be taken to originate from the authors' wish to make it clear to the non-expert readers that the views cited may not be categorically correct and should therefore perhaps not be taken at face value.

It must be underlined that the various interpretations of hedging offered above are not mutually exclusive. Instead, as I have attempted to show, individual hedges can be approached from different vantage points and seen to have more than one use in a given context. Hence, in addition to their basic ideational functions involving conceptual or propositional precision or imprecision, hedges can at the same time be approached as intracommunal/interpersonal and

textual phenomena. Moreover, it should be re-emphasized that without the possibility of ascertaining the reasons for the use of each individual hedge from the authors of the data examined, specific hedges cannot be taken to have one particular ideational, intracommunal/interpersonal, and/or textual interpretation. Rather, in approaching the communication situation in question from different angles, it may be possible to interpret a given hedge as multifunctional, that is, as involving either of the ideational dimensions, as well as more than one intracommunal/interpersonal and textual aspect.

To recapitulate the interpretations of hedging in research articles and popular scientific articles, we can briefly summarize the main uses of hedges discussed above:

Research Articles	Popular Scientific Articles
Ideational Function -Increase in Precision -(Decrease in Precision)	Ideational Function -Increase in Precision -Decrease in Precision
Intracommunal Social Function -scientific honesty, modesty, and caution in presenting information for validation -conformity to the rules of the scientific community (-interpersonal positive or negative politeness toward sources referred to?)	Interpersonal Politeness Function -positive politeness toward audience -positive or negative politeness toward sources referred to -negative politeness for authorial protection in presenting predictions or recommendations
Textual Function -contextually appropriate precision and caution in the use of concepts and the formulation of propositions (-contextually appropriate inexactitude where precision is not necessary)	Textual Function -contextually appropriate precision and caution where a possibility of misunderstanding exists -contextually appropriate inexactitude where precision is not necessary

As stated, the precise reasons for the use of hedges might only be found by obtaining authorial information concerning the use of each individual hedge, an undertaking beyond the scope of this study. Hence, it should be repeated, the interpretations summarized above are to be taken as *possibilities* of interpretation illustrating the various aspects of hedging, but the intention here is by no means to say that these interpretations always apply or even that these are the *only* possibilities of interpretation. Rather, what I have wished to do above is to provide insights into

the reasons why hedges may be employed in the two types of article, insights hopefully useful for not only explaining the findings of this study but also providing information benefiting the research and pedagogy of special-subject communication.

### 7.2.2 Hedging in the Disciplines Examined

As the results presented previously showed, hedging did occur quite frequently in the popular scientific articles from all three subject fields. However, the results also demonstrated that the three disciplines were not altogether uniform in the degree to which hedging was applied, the differences apparently arising from the general nature of the subject fields as well as from the effect that information from the different areas may have on the audience. As seen, the most noteworthy findings concerning the three disciplines were that, in comparison with the RA data, hedging first of all became considerably more common and more varied in the field of medicine. In technology, too, the relative incidence of hedges was noticeably higher in the popular scientific articles. In the SA articles on economics, on the other hand, hedging was slightly less frequent than in the RAs and the choice of items employed was also narrower.

It seems that it is in the field of economics where some of the earlier views suggesting that hedges may not be as frequent as in discourse such as RAs may apply, for which there may be more than one reason. One explanation for this finding may be associated with the observation that the RAs on economics were often focused on specific research hypotheses to be tested. The formulation of such hypotheses, as noted, may partially account for the frequency of hedges in the economics RAs. In the popular scientific articles, however, the topics addressed were approached without reference to any clearly formulated research hypotheses, such hypotheses apparently being characteristically provided as pre-empirical starting points in scholarly peer communication like RAs. In the popularized scientific discourse, on the contrary, the topics were approached with more freedom, the focus not being on the hypothetico-deductive model characteristic of many of the RAs.

What is more, according to some of the RA authors, the discipline of economics seems rather tentative due to the nature of the theories employed. In addition, as was pointed out, the materials and methods employed in research to do with the economy may also give rise to a certain degree of tentativeness. Hedging commonly linked to quantification, on the other hand, was less common in the economics RAs than in the other two disciplines. However, it seems that such tendencies possibly underlying the findings concerning the RAs are not directly applicable to

the data drawn from *SA*. Even as such, the relative overall frequency of hedges illustrated that the kind of caution and tentativeness seen in the economics RAs was not present in the popular scientific data to quite the same degree. In other words, it appears that while economists were quite keen on hedging the information put forth in RAs, they tended to approach their topics with a somewhat lower degree of reservation in the popular scientific articles. Hence, the idea that the kind of caution expected in discourse between scientific peers is not necessarily mediated to popularizations may be so in the case of economics. In fact, when we look at the results more closely, it appears that hedging to do with the imprecision of economic theories and the tentative nature of the materials and methods was present in the *SA* articles to an even lower degree than the overall results would indicate. Considering that some 49% of the hedges identified in the popularized articles on economics belonged to those groups of hedges commonly used in connection with quantifications, the share of the other hedging phenomena, more typically employed when dealing with the limitations concerning theories, materials, and methods, remained much lower than in the RAs, where only about 22.5% of the hedges were of the kinds commonly linked to quantifications.

With an eye on the *SA* articles, these observations concerning economics may be the result of the afore-mentioned tendency to omit lengthier considerations of the theoretical and methodological issues involved in research. In discourse like RAs, community expectations encourage authors to dwell on such issues at some length<sup>5</sup> and to mark them as less than absolutely accurate where need be, and particularly so in economics, where the theories and methods employed may give rise to doubt concerning the validity of what is said. In popular scientific articles, however, such issues may be left without greater attention, the relative incidence of concomitant hedges thus also reducing. In contrast, in comparison with the RAs, the relative frequency of hedges commonly to do with quantification doubled in the popular scientific articles on economics, possibly illustrating that where quantifications are presented, they can on the one hand be formulated quite loosely because absolute figures are not as important for non-expert readers as they may be in scholarly peer discourse. On the other hand, such hedging might also be quite common in cases where authors wish to specify to the readers that what is said may not be quite accurate. In brief, then, the results may be explained by the idea that in the popular scientific data on economics there is a tendency not to present research hypotheses, which commonly involve hedging, or to use hedges to comment on theoretical and methodological concerns to the same degree as in RAs. However, this does not lead to a very steep reduction in



the overall occurrence of hedges, because hedges typically associated with quantification seem to demonstrate an opposite trend, becoming more frequent in comparison with RAs.

In the field of medicine, a much more evident change was seen between the RAs and the popular scientific articles as far as the relative frequency of hedging is concerned. Contrary to certain earlier views, the frequency of hedges in the popular scientific articles on medicine was much higher than in the RAs. Why this should be so is to my mind best explained by the characteristics of the discipline and the way in which information on the field is dispensed for the benefit of non-experts. Evidently, hedging in medicine is in many instances employed in ways similar to the other two disciplines. However, as suggested in the previous chapter, popularized renderings of information pertaining to medicine may hold something of a special status in comparison with the other two disciplines due to the delicate nature of the subjects treated, which is why hedges may figure more commonly in certain contexts in popular scientific articles on medicine. As implied, this may be especially the case when for instance authors speak about the prevalence of certain medical conditions, the reasons leading to them, the cures for different ailments, the recommendations that can be formulated on the basis of research, or the future developments of medical research relating to medical conditions and possible therapies against them. Hedging linked to such issues may be seen to lead to an increase in the precision of the information presented. As the authorial responses suggested, in some cases authors may wish to keep to generalizations, because they do not want to unnecessarily alarm the public when there is no certainty about, say, the usefulness of a given medication or the causes of a certain illness. Thus, in hedging the information presented, authors can speak about their topics in suitably general terms, implying to the readers that what is stated is perhaps, but not necessarily, the 'truth' about the medical matters under scrutiny. Hence, it seems that the role of hedges as a textual tool better relating the status of the information presented to the level of knowledge of the audience is quite central in medicine due to the sensitivity of the matters dealt with, perhaps more so than in the other two fields of expertise.<sup>6</sup>

On the other hand, apart from being cautionary notes intended to avoid public alarm, hedges also occurred quite often in contexts where the authors delicately expressed their optimism concerning the medical matters dealt with. In other words, in my experience, despite the sometimes morbid nature of the topics treated in popular scientific articles on medicine, the authors frequently tentatively point toward a brighter future. The use of hedges toward such an end can for instance be detected in the concluding paragraph of a popular scientific article discussing depression:

- (3) More therapies based on new understandings of the biology of mood disorders are sure to follow as well. As research into the neurobiological underpinnings progresses, treatment *should* become ever more effective and *less likely to* produce unwanted side effects. (MED2, E, “Support for a Model”, paragraph 10)

In such use, then, hedging might be taken as a strategy whereby authors cautiously provide a positive outlook on a sensitive matter, hoping to signal to the readers that research does fuel a certain degree of optimism, but that what is said is not absolute. In view of the functions postulated above, hedging of this type can from one perspective be linked to the textual function of language, that is, it may be linked to the wish to be quite precise insofar as the optimistic impressions presented are not necessarily absolute ‘truths’, the communication situation being such that the audience cannot be expected to be able to judge for themselves.

It may also be postulated that the delicate nature of the discipline may give rise to a somewhat higher degree of hedging to do with the interpersonal function of language than in the other two disciplines. Such an interpretation may for instance be applied to hedges employed when putting forth predictions about future developments in the field of medical research or disease prevention (cf. example 3) and when presenting recommendations or prescriptions concerning health issues. From another perspective, then, hedges in cases like (3) may also be taken to involve the interpersonal domain. Expressions of a certain degree of reservation in such instances may not only be taken to involve the ideational and textual functions of language, but can likewise be posited to involve interpersonal politeness insofar as hedging shields the authors against the threat posed by the possibility of being proven wrong or by the possibility of having put forth predictions or recommendations that might not after all have the desired result. Such a politeness strategy safeguarding the negative face of the authors may be of particular importance in areas such as medicine, where, as explained, the non-expert audience may view specialists in the field as more or less omniscient and might therefore take their recommendations and predictions quite literally if they are not carefully formulated.

When it comes to the use of the different categories of hedges, the incidence of hedging devices typically to do with quantification and their percentage of all instances of hedging were also higher in the popular scientific data on medicine than in the RAs, the same general result that also emerged from the data on economics. The frequency of such devices more than doubled in the SA articles and the share of such hedges out of all cases identified was also higher, approximately 50%. Thus, Varantola’s (1987) observations concerning hedges to do with

numerical data were also reflected in the medical articles from *SA*, which suggests that when numerical data is presented in popular science, the degree of precision often lowers. Despite the high frequency of such items, however, the relative number of hedges of other kinds also remained high in the *SA* articles on medicine. Hence, it seems that in medicine, both hedges commonly pertaining to quantification and hedges of other types were employed more commonly than in the medical RAs, illustrating that the kind of tentativeness involved may be considerably more characteristic of popularizations to do with medicine than in those dealing with topic areas such as economics.

When we turn to technology, the frequency of hedging also increased in comparison with the RAs, but not as much as in medicine. While the kinds of interpretation cited above can also to some degree be extended to hedging in the *SA* articles on technology, it appears that the quantification-oriented nature of the discipline is the main factor in the increase detected in the incidence of hedges. In the popular scientific articles, over 60% of hedges were of the kinds typically to do with quantification, the relative number of such hedges again growing considerably in comparison with the RAs. When considered together, hedges of the other kinds, on the other hand, were only marginally more frequent than in the RAs. Hence, it appears that the increase in the number of hedges is mainly attributable to the of hedging quantifications in popular scientific articles more heavily than in RAs, hedges thus often figuring in a textual function in that they either reduce the degree of precision where accuracy is not necessary in view of the audience's expectations or signal the inexact nature of the figures cited where authors want to emphasize to the audience that the figures cited should not be taken as absolute, the intention being to avoid possible misconceptions where the readers are not necessarily in a position to judge for themselves. Particularly in the latter use, hedges may equally be viewed as a politeness feature to do with the writers' negative face insofar as authors may in this way avoid committing themselves to precise quantifications and thus avoid later criticisms if the data presented does not prove to be quite accurate. Given the quantification-oriented nature of technology, it is not surprising that hedges useful toward such ends were in a prominent position in the *SA* articles.

What remain to be discussed are the differences in the variety of hedges employed in the different disciplines and the possible reasons behind this variation. Although the selection of lexical hedges employed was slightly wider in the RA data considered overall (236) than in the popular scientific articles (220), similar findings did not apply to all fields of study examined. As stated, in comparison with the RA data, medicine was the only field of study where the variety of different lexical items used as hedges grew wider in the popular scientific data, with 145 different

items identified (134 in the medical RAs). Compared with the medical RAs, the choice of lexical hedges typically associated with quantification grew narrower (51 vs. 73) despite an increase in the relative incidence of hedging to do with quantification. As concerns other hedges, there was an increase in not only the relative incidence of lexical hedges **not** as typically linked to quantification but also in their variety. However, it is to be noticed that the overall variety of lexical hedges did not grow in quite the same proportion as the figures regarding the relative incidence of hedges might suggest.

As to the other disciplines, the widest selection of lexical hedges (147) was in fact found in the *SA* articles on technology, but the selection was slightly narrower than in the technology RAs (156). Especially the choice of lexical hedges commonly linked to quantification became narrower than in the technology RAs (61 vs. 102) even though the relative incidence of hedges commonly linked to quantification again increased from the figures seen in the RAs. In contrast, the variety of the other types of lexical hedge increased in comparison with the technology RAs (86 vs. 54), although the relative frequency of such hedges was not very much different from the RA data.

Turning to economics, the choice of items became noticeably less varied in the popular scientific articles (133) in comparison with the RAs (161). Once again, a clear decrease was seen in the selection of lexical hedges generally linked to quantification when compared with the RA data (47 vs. 72) although the relative frequency of hedging typically linked to quantification increased. When it comes to the variety of lexical hedges of the other kinds, there was not much of a difference between the *SA* articles and the RAs on economics (86 vs. 89), although the relative frequency of hedges **not** commonly pertaining to quantification was noticeably lower in the *SA* articles than in the RAs.

In sum, then, in each discipline examined, the selection of lexical hedges typically associated with quantification grew narrower than in the RAs even though the relative frequency of hedges commonly to do with quantification simultaneously increased. This seems to be indicative of a general trend to resort to a narrower selection of such lexical hedges in the *SA* articles and of a tendency to give more emphasis to non-lexical means of realizing such hedging than in the RAs, as will be illustrated below. In contrast, the choice of lexical hedges **not** as commonly linked to quantifications was quite wide in all subject areas, even where the relative incidence of hedges **not** characteristically oriented toward quantification decreased. Thus, lexical hedging of this kind seemed to become more varied than in the RAs, perhaps bearing witness to a certain tendency to be more inventive and less formal in the use of such lexical hedges than in

RAs. Support for this idea is also provided by the afore-mentioned observations regarding the frequencies of the verbs *appear* and *seem*, the example concerning the noun *hunch* in section 6.2.5, as well as the finding that certain other somewhat informal choices of lexical hedge were at times made in the SA articles (e.g. the nouns *fantasy*, *illusion*, and *odds*; see Chapter 6, notes 14 and 15), choices which would probably appear quite out of place in RAs.

As regards the differences in the selections of hedges in the three subject areas, one reason for the variation observed between the subject areas may obviously be linked to the relative frequency of hedges. Granted the higher frequency of hedges in the popular scientific articles on medicine than in the RAs, it seems only natural that the variety of lexical hedges should increase along with the frequency of hedges. However, it is nevertheless to be noticed that the increase in the choice of items was not as great as one might expect on the basis of the increase in the overall frequency of hedging, that is, there is not a straightforward one-to-one relationship between the frequency of hedges and the variety of lexical items used. The reason for this can be traced back to the finding that in comparison with the RA data, the share of lexical hedges out of all instances of hedging identified in the SA articles decreased by some eight percentage points, the emphasis in popular science moving more toward hedging phenomena belonging to the non-lexical categories of hedges established than in the RAs. A similar observation can also be made in the field of technology, where the variety of lexical hedges did not increase despite the increase in the relative frequency of hedging in comparison with the RAs. In this case, the share of lexical hedges out of all cases of hedging decreased by about 15 percentage points in comparison with the RAs. As to economics, although the overall incidence of hedges decreased slightly in comparison with the RAs, the reduction in the number of different lexical hedges employed seems disproportionately large. This, too, can be explained by the finding that the share of lexical hedges out of the overall number of hedges dropped by about 15 percentage points when compared with the RA data, and in this case, unlike in technology, the relative frequency of lexical hedges was noticeably lower than in the RA data. In brief, then, the result that the choice of lexical hedges in medicine increased to a somewhat lower degree than the relative overall incidence of hedges might suggest and in fact decreased in the other two disciplines when compared with the selections seen in the RAs can be taken to stem from the tendency to put more emphasis on the non-lexical categories of hedges distinguished in the popular scientific articles on economics and technology than in those on medicine. Furthermore, another causative factor in economics is simply the observation that in economics, the relative frequency of lexical hedges is considerably lower than in the RA data.

## 7.3 Implications

### 7.3.1 Implications for Research on Subject-specific Discourse

Earlier studies of hedging in subject-specific discourse have often been motivated by the implications that such research might have for the instruction of scholarly discourse to both native and nonnative speakers of English. More often than not studies have stressed the importance of giving more attention to teaching hedging techniques to future or practicing scholars, and some studies (e.g. Hyland 1994, Salager-Meyer 1994) suggest that teaching should put more emphasis on the use of hedging elements in specialist discourse such as the research articles here. However, as I have argued previously, certain previous studies on hedging in special-subject discourse have approached the strategy with reference to the uses which it has been observed to fulfill in authentic materials such as research articles and in topic areas representing relatively 'hard' sciences like medicine and biology. On the basis of those observations, it has then been assumed that, in view of the functions that hedging fulfills in such contexts, it is not employed as often in discourse like popular scientific articles. In addition, while it has been established that hedges have a remarkable role in RAs in disciplines like medicine, opinions concerning the use of hedges in the various fields of science have been contradictory. To my mind, it is precisely this earlier tendency to approach hedging from the perspective of its observed uses in discourse like RAs and only in a limited number of topic areas that has given rise to generalizations that may not fully reflect the true status of hedging in different types of discourse and in the various disciplines. In other words, by imposing unsubstantiated assumptions upon the use of hedges, certain studies indeed seem to have ended up providing a more simplified portrayal of hedging than what is in keeping with the multiplicity of roles that hedging may actually play in authentic language use. Such problems involved in the analysis of epistemic devices have also been acknowledged by other scholars. Holmes (1988: 40), for instance, points out that ESL teaching needs revised material based on authentic texts, because "many discussions of the pragmatics of epistemic devices and, in particular, their use to express politeness, ironically make little or no use of corpus data or attested evidence from genuine contexts, but rather discuss concocted or artificial utterances in a social vacuum [...]." Information yielded by authentic data is undoubtedly of great value for educational purposes, because it gives learners "some awareness of the relative frequency of different devices in different contexts so that they can accurately gauge the stylistic

effect of using one form rather than another” (Holmes, *op. cit.*: 23). Evidently, the authors of material on specialized topics should therefore be made aware of the actual frequency and variety of devices that can be used as hedges in different contexts. However, before such an awareness concerning hedging may be sought what is to my mind first necessary is, as Holmes says, information derived from authentic material, that is, a closer consideration of hedging phenomena in different communicative contexts. In sum, then, in looking into the role of rhetorical strategies like hedging, one should bear in mind that this is best done with an eye on the specific rhetorical context commented on, not on the basis of findings relating to the status of hedging in some other rhetorical context, as has been the case in certain earlier studies.

Hence, although it has been previously postulated that subject-specific discourse might be usefully approached, and especially taught, without reference to any specific subject register, a better point of departure being to focus on the reasoning and interpretation strategies common to all kinds of language use (Hutchinson and Waters 1987: 13), the present findings do suggest that it may also often be fruitful to consider the various rhetorical features of specific language use situations. Thus, endeavors aiming at clarifying the roles that the different components of the communication, or rhetorical, situation play in special-subject communication are in an important position in the production of information useful in terms of both the research and teaching of special-subject communication. The characteristics of the different subject areas have been considered especially by scholars interested in the field of register analysis, where the focus has been particularly on questions of subject-specificity, genre analysis, where the primary emphasis has been on the effect of the purpose of language use on the nature of special-subject discourse, and in other work concentrating on the relationship between sender and addressee in subject-specific communication. As Russell (1991: 14) pointed out in the early 1990s, work into such issues is only in its initial stages, as

[s]cholars have just begun to study the rhetoric of academic disciplines and other professional communities on a case-by-case basis, to analyze the interactional rules, tacit and implicit, which govern the knowledge-making and communicating activities of various discourse communities and subcommunities [...]. [O]nly such sociorhetorical analysis, discipline by discipline, will provide a foundation on which to construct meaningful generalizations about how writing works—and how students learn to make it work.

Similarly, there is a need to narrow down the scope of research into the characteristics of specific disciplines, because labels such as ‘medical English’ or ‘legal English’ “overprivilege a

homogeneity of content at the expense of variation in communicative purpose, addresser-addressee relationships and genre conventions” (Swales 1990: 3).

In the light of the present findings, two major conclusions can be formulated to motivate the importance of variation-oriented research into the rhetoric of special-subject discourse. First, it appears that the topics researched, the materials and methods employed, and the research traditions of the different disciplines may have an effect on the degree, type and motivations of hedging in discourse like RAs. In consequence, in-depth investigations of rhetorical strategies like hedging in RAs should give due attention to the characteristics of the discipline scrutinized when considering to what extent and for what purposes hedges are employed. In popular science like the *SA* articles, too, the use of hedges can be associated with the disciplinary characteristics of the topic areas treated, and in such discourse specific attention should be given to the nature of the information from the subject area treated and its effects on the presumed audience, effects which may differ from discipline to discipline.

Second, while hedges have a variety of observed uses in scientific peer discourse such as RAs, this does not automatically mean that since similar cases of hedging might not be absolutely necessary in popular science such as the *SA* articles, hedges do not occur in such popularizations at all. In other words, research should take into account the multifunctional nature of hedging phenomena and the possibility that hedges may indeed figure quite commonly in popularizations, only in uses somewhat different from those seen in RAs. Granted the afore-mentioned importance of popularizations (see Chapter 5), information concerning the rhetorical features of such discourse may in fact be essential for those accommodating scientific information for a public wider than the immediate scholarly community.

\* \* \*

To sum up, then, the results concerning the use of hedges in the three subject fields and the two types of article examined give rise to the idea that in considering the use of hedges in special-subject discourse, due attention is to be given to the rhetorical situation dealt with, obviously not only when it comes to RAs and discourse such as the *SA* articles, but also in the various other kinds of special-subject discourse. In addition, given the noticeable differences in hedging, it is equally to be presumed that variation yet unaccounted for might apply to various other linguistic features in special-subject discourse. In consequence, the variability of rhetorical situations and



the resultant effects on different linguistic phenomena would in all likelihood merit further attention in future work.

### 7.3.2 Implications for the Pedagogy of Subject-specific Discourse

Different pedagogical solutions for raising learners' awareness regarding hedging and for teaching hedging techniques have been presented in previous work as concerns both English language teaching in general and the pedagogy of the subject-specific use of English. Skelton (1988), for instance, discusses the ways in which hedging has been presented in English language teaching materials. He suggests three broad types of exercise useful in the teaching of hedging techniques, namely sensitization exercises, rewriting exercises, and sets of hedging phenomena that may be employed as a starting point in elementary courses. In work relating to hedging in scientific contexts, refined versions of the kinds of exercise mentioned by Skelton are also presented as useful pedagogical solutions. Salager-Meyer (1994: 165), for example, also mentions the use of rewriting exercises in teaching hedging techniques, and Hyland (1998: 232 ff.) presents a variety of tasks that may be employed to develop second language learners' "awareness of the effects on statements" (p. 234), help them in "the productive use of hedges" (p. 238), and develop their "consideration of audience and purpose" (p. 240). Hence, it seems that the types of task useful toward such ends have already been discussed at some length in earlier work. Therefore, in what follows, I will offer a fairly limited account of the implications of the present study, paying attention to quite broad questions. This means that I will leave open the more precise pedagogical solutions that might be useful in developing learners' hedging skills, but since specific pedagogical solutions should in any rate always be determined according to the characteristics of individual learners and groups of learners, I will not put forth any refined pedagogical solutions in the present context.

Having scrutinized a wide selection of style guides, ESP textbooks, and other materials guiding both native and nonnative speakers of English in scientifically oriented language use, I cannot but agree with Hyland (1994: 250) in that

[g]enerally, the presentation of hedges in published materials is not encouraging, with information scattered, explanations inadequate, practice material limited, and alternatives to modal verbs omitted.

That this should be so is obviously a problem for those in need of guidance regarding scientific language use, be they either nonnative or native speakers of English. After all, it is by no means self-evident that even native speakers of English are automatically equipped to adapt their linguistic habits according to the “hedging guidelines” (Salager-Meyer 1994: 165) of the scientific community whose linguistic conventions they wish to master. Although native speakers of English are apparently in principle familiar with the various means by which the strategy of hedging can be realized, what may be necessary for instance at the early stages of one’s scientific training is a certain amount of sensitization relating to the specific characteristics of the discipline in which one is being trained and to the ways in which issues pertaining to the discipline are typically discussed. In other words, apart from subject studies concerning the field in question, what is in many cases to my mind needed is also instruction aimed at developing students’ awareness of subject-specific linguistic features and of the typical discursive practices of the field in question.

In my opinion, one important aspect of such instruction would be a consideration of the kinds of hedge used in different types of discourse to do with one’s own area of expertise, to what degree hedges are employed and why, as well as how hedging in the topic area relates to hedging in other areas of specialization and in non-subject-specific language use. There may be numerous forms that such instruction could take, but one promising alternative would probably be a text-based approach, where learners could be presented with authentic sample texts<sup>7</sup> from different genres representing their own area of specialization and from other fields of expertise. Moreover, in view of acquainting learners with the processes of popularization, samples from various kinds of scientific popularization could be included in such exercises.<sup>8</sup> By contrasting the various kinds of discourse, then, learners could be led to consider not only the frequency and different forms of hedging, but also the various reasons underlying the use (or non-use) of hedges in texts that differ according to topic, sender-audience relationship, and the general purpose of language use. Such sensitization, to my mind, would be a useful means of acquainting both native and nonnative speakers of English with the role that hedging can take in academic discourse such as for instance RAs and thus lead toward “eventual membership in a professional discourse community” (Hyland 1994: 244), of helping them see why hedges may be used differently in other fields of expertise, as well as of providing insights for learners as to how to make use of hedges when addressing audiences with a lower level of background knowledge in the field of expertise dealt with.

As a follow-up to such initial exercises, instruction could for example proceed to the kinds of “rewriting exercise” mentioned by Salager-Meyer (1994: 165), learners being invited to for

instance rewrite a popular article so that it is hedged in the style of scholarly writing in their field of expertise. On the other hand, granted the importance of being able to explain one's scholarly work for less informed audiences, such exercises could also take the form of popularization tasks, specific attention being given to the degree, types, and functions of hedges in popularizations. What is in my view central to such tasks is support from authentic data, useful in illustrating the multiplicity of forms and functions that hedges may involve. In my opinion, such exercises would be a much welcomed step away from pedagogical materials taking a slightly mechanistic approach to hedges as a taxonomy of isolated verbs or adverbs expressing specific degrees of certainty or commitment (see e.g. Hamp-Lyons and Heasley 1987: 91). Although such taxonomic approaches are undoubtedly useful when dealing with learners with a relatively low level of proficiency, what is needed at least in the instruction of native speakers and advanced nonnative learners is a somewhat broader approach reflecting the extent of variation and creativity that the use of hedges may manifest.<sup>9</sup>

Further challenges emerge when we consider questions to do with acquainting nonnative speakers of English with hedging techniques. One major aspect of these challenges is obviously linked to the level of learners' linguistic proficiency. Ventola and Mauranen (1990) and Mauranen (1997), for instance, have found that Finnish speakers of English do not appear to use hedges in the same way as native speakers of English. As one of the language revisers interviewed by Mauranen (1997: 132) pointed out, this tendency might be explained by the observation that nonnative speakers with a lower-level proficiency hedge less than those with a higher level of proficiency, the inability to use hedges in a native-like fashion simply being a question of language skills. It is in this respect that teaching materials introducing relatively simple taxonomies of hedging devices (e.g. Hamp-Lyons and Heasley 1987) might be useful insofar as they provide nonnative speakers with basic tools for expressing different degrees of commitment. The question naturally arises to what extent such simplified lists of hedges correspond to the hedging phenomena employed by native speakers, but I think that they do represent a useful *starting point* from which nonnative speakers may strive toward a better command of the skill of hedging, the lack of which in higher education, Hinkel (1997: 362) says, "may reflect negatively on the NNS writer."

Another facet of the matter has to do with the cultural background of nonnative speakers of English, which may also lead to nonnativelike use of hedges in scientific discourse. For instance, Clyne (1991: 57 ff.) has observed that when German scholars produce academic texts in English, they tend to hedge their statements far more strongly than native speakers of English, a tendency

probably associated with the linguistic conventions of the corresponding type of discourse in German. This trend, Clyne (op. cit.: 64) stresses, is open to criticism, because texts that are heavily hedged may appear “laymanlike.” In view of the present results, this could indeed be the case in the fields of medicine and technology, where hedges were more common in the popularizations than in the research articles. In the field of economics, on the other hand, this may not be so, because a noticeably higher degree of hedges occurred at the higher level of specialization in economics.<sup>10</sup> What is more, Clyne also observed certain differences in the types of hedge employed by Germans writing English and native-speaker writers, the idiosyncrasies observed in texts by German writers being “conditioned to some degree by interference” (op. cit.: 60). In addition, Hinkel (1997: 361) has found that a high degree of indirectness is to be detected in academic writing by students raised in Confucian, Taoist, and Buddhist societies, indirectness markers being employed in ways somewhat dissimilar from Anglo-American academic writing by native speakers of English. In each case, what we are clearly dealing with are differences arising from the native languages and cultures of nonnative speakers of English.

In order to guide nonnative writers toward a style of presentation more in line with the Anglo-American tradition, text-based exercises are to my mind again one fruitful point of departure, because they provide a background against which nonnative learners can contrast the use of hedges in scientifically oriented discourse in their own language and in English. By inviting nonnative learners to compare the use of hedges in two languages and cultures, it is possible to open up avenues for discussing differences in the number of hedges, variation in the linguistic choices employed, the reasons for using hedges, and the general principles of scholarly work in the different cultures. As Hinkel’s (1997: 372-4, 382) work reveals, one reason for the differing use of hedges by writers from Confucian, Taoist, and Buddhist backgrounds may be linked to the different culturally determined paradigms and frameworks that influence writers’ rhetorical choices. What is thus sometimes also in my opinion necessary is a thorough consideration of the philosophical foundations of scholarly work in different cultures. One means toward this end might also be provided by a process approach, whereby nonnative writers are first invited to produce a short text on a topic to do with the writers’ field of expertise. The texts can then be scrutinized for hedges (or when too few seem to be used, for the lack of them) with a native-speaker tutor or a group of learners including both nonnative and native speakers of English. The necessity of hedging can thus be commented on so that native speakers may offer their views as to the reasons why hedges should or should not be employed in specific surroundings and justify these views from the perspective of the Anglo-American research

tradition, in this way attempting to illuminate to the writer why the degree and types of hedge employed in some other culture might not produce the desired effect in an Anglo-American context. At the same time, native speakers of English could gain access to culture-specific information about research traditions outside the Anglo-American culture and about the linguistic problems of nonnative speakers of English from different cultural backgrounds. Information of each type may be helpful in providing insights that can lead to amended pedagogical solutions for learners from specific cultures.

To sum up, as Hyland (1994: 244) points out, a full understanding of devices such as hedges is important for those wishing to succeed within the academic world. Hence, the instruction of future or practicing scientists would most likely benefit from closer variation-oriented analyses of special-subject discourse so that pedagogical materials could better assist learners in acquiring information as to how to tint their writing with a degree of hedges appropriate to a given topic,<sup>11</sup> purpose of language use, and author-audience configuration. In addition, what with the increasing interest and activity in scientific popularization (Dixon 1980, Whitley 1985, Peters 1995), those writing for lay publics should understand the rhetorical value that hedging may have in discourse not directly involving the esoteric community of scholars. Considerations of the various topic areas, purposes of language use, and sender-addressee relationships with regard to their effects on rhetorical issues such as hedging would probably provide popularizers with more insight into the rationale underlying the rhetoric of popularized versions of specialist information. Thus, although providing a general awareness of the possibilities offered by hedging is important when providing instruction in specialized language use, it should be noted that a *full* understanding of hedging includes knowledge concerning its diversity in different kinds of special-subject discourse and different cultures. Hence, to provide more thorough information about hedging in scientific language use, pedagogical materials relating to hedging phenomena should, more than before, draw attention to the role of hedges in different disciplines as well as in discourse meant for different kinds of audience and produced for different purposes, not to forget the needs of nonnative speakers arising from their level of proficiency or cultural backgrounds.

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<sup>11</sup> In making this interpretive leap, I am fully aware of researchers' tendency to relate the notion of *textual function* to phenomena such as thematic structure, rhythm, information focus and so on (see Halliday and Hasan 1989: 23). However, extending the domain of hedging to the textual function of language seems justified especially because, as Halliday and Hasan (ibid.) point out, it is not possible to establish straightforward relationships between specific linguistic phenomena and particular functions of language. Instead, in adopting a functional approach to language, we must acknowledge its multifunctional nature. As will be illustrated below, considering hedging from the perspective of the textual function in fact opens up further interpretive possibilities as far as the use of hedges in popular scientific articles is concerned.

<sup>2</sup> As suggested in the previous note, the term textual has often been linked to issues to do with linguistic coherence, but I would also like to suggest that hedges may be useful in producing appropriate formulations in view of extralinguistic matters, such as the level of shared knowledge. In this study, the term textual is extended to this area as well, particularly because it creates a fruitful contrast with the terminology relating to the social aspects of communication. In my view, the textual interpretation presented provides for the possibility to approach hedging not only as a reflection of the social intracommunal rules of the scientific game but also allows for the idea that hedging may be employed for reasons deriving from the level of shared knowledge regarding the issue at hand.

<sup>3</sup> Taken a bit further, this approach to hedging in RAs allows us to establish a theoretical link to an interpretation that is probably more closely associated with what is traditionally understood by the textual function of language (I am grateful to Dr. Juhani Norri for drawing my attention to this theoretical possibility of interpretation). As Myers (1989: 13) says, in the context of RAs, “the hedging of claims is so common that a sentence that looks like a claim but has no hedging is probably not a statement of new knowledge.” Accordingly, Myers’ work suggests, hedging takes place in RAs when new knowledge is put forth, because hedging reflects “the appropriate attitude for offering a claim to the community” (op. cit.: 12-13). While such hedging naturally emphasizes the possibly tentative nature of what is said, it may simultaneously be seen as an implicit marker of *new* statements of knowledge as opposed to statements dealing with old, accepted knowledge. While the term ‘new’ as employed here is by no means in agreement with what is understood by ‘New’ in functional grammar (cf. e.g. Halliday 1994: 296 ff.), it seems that hedges could sometimes also be viewed as a means of marking information foci. In theory, this idea could for instance be applied to Watson and Crick’s (1953) introductory hedges (“We wish to suggest...”, see 3.3.1). While confident about the validity and importance of their findings, the authors carefully hedged the beginning of their article. Given the above, the hedges might be suggested to mark off that which is new, that which is at the center of interest in what follows.

The above, however, is not to say that *all* hedges can be interpreted to signal *new* statements of knowledge, or that hedges are in fact *consciously* used to mark information foci in the first place. As seen, hedges may also be employed in RAs when for instance delicately pointing toward limitations in other scholars’ work. The knowledge involved in such cases may not be new in any sense, the function of hedges being to signal that what other sources say may not be categorically accurate. Moreover, I would like to argue that although hedges linked to new knowledge claims may in theory be interpreted to signal information foci, the underlying motivation for hedging may in practice be elsewhere. It seems reasonable to think that the use of hedges in RAs in fact derives from the communal expectation that when one presents one’s ideas to the scientific community, this is to be done with due caution and modesty, the marking of information foci being more of a potential by-product of this principle. Thus, it seems that the idea of hedging as a marker of information foci is not very viable, but the theoretical possibility of such an interpretation in some contexts provides further support for the conception that hedging may also be associated with what has more traditionally seen as belonging to the textual function of language. (It should also be pointed out that Myers might oversimplify matters slightly in pointing out that “a sentence that looks like a claim but has no hedging is probably not a statement of new knowledge.” In my opinion, we might hypothesize that new knowledge claims with only marginal importance for the topic treated and with a low risk of being contested by the audience might be made without hedges.)

<sup>4</sup> As an anonymous referee of my 1999 article in *English for Specific Purposes* suggested (personal communication), dramatized depictions of scientific discourse on e.g. television may include a considerable amount of hedging, overflowing “with the vague hypotheticals of melodrama.” This is a further illustration of the idea that hedges may be employed to render language use more ‘scientific’ in the eyes of the wider public.

<sup>5</sup> This is probably the case in the majority of disciplines, but as for instance Bazerman (1984: 183) points out in his work on the historical development of articles in *Physical Review*, the share of the sections dealing with methods, as opposed to the shares of other RA sections, seems to be decreasing.

<sup>6</sup> In medical RAs, I think, such issues would not have to be approached as with similar caution, because the uncertainties involved would probably be more readily grasped by experts readers when the various stages of the idealized research process are described in an RA. For lay reader, however, uncertainties might have to be spelt out more clearly.

<sup>7</sup> As observed in the RA data, the incidence and type of hedges may differ considerably within one single text, which is why exercises should ideally involve entire texts, or at least representative samples from all main rhetorical components of the texts examined.

<sup>8</sup> As noted (Ch. 5), being able to popularize one’s work may be a vital skill for a researcher in view of for instance obtaining funding. Furthermore, what with increasing interdisciplinarity, communicating with researchers from other fields may be another reason why a certain amount of popularization is necessary for researchers’ work. I would also like to add that politically speaking it seems most useful indeed for researchers to be able to popularize

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their work for the benefit of non-experts. Scholarly work popularized in a way that catches the eye of the non-specialist in a positive way is bound to be in a better position when resources are allocated.

<sup>9</sup> Such an emphasis would be in line with the concerns of the ‘writing-across-the-curriculum’ approach, students having “a full writing course that gives them extensive practice in addressing different audiences, specialist and nonspecialist, on subjects drawn from their majors” (Fahnestock 1998: 348).

<sup>10</sup> This conclusion may be somewhat oversimplified, as the surroundings in which hedges occur and the extent to which hedges of different kinds are employed may vary between RAs and popular science, the difference not being merely a question of relative frequency.

<sup>11</sup> The idea that subject-specific language instruction for nonnative learners may lead to a better level of proficiency than non-subject specific instruction is evidenced in Kasper’s work on university-level language teaching (e.g. 1997). Kasper says that such subject-specific instruction may be beneficial not only from the point of view of language proficiency, but because it “may also help to facilitate students’ subsequent performance in the college academic mainstream and increase their likelihood of earning a college degree” (p. 30).

## Epilogue

What remains to be done now is to hedge my own work for the final time. As is the case with just about any study, there are a variety of criticisms that the audience might level at my work. I would like to briefly address some of these qualms in what follows. The purpose is not that of avoiding responsibility as to what has been said and done above, but the present discussion is instead rather intended to acknowledge some of the limitations that the present work might be argued to suffer from and to explain what has given rise to them.

The first question that one might bring up concerns the notions of ‘hedge’ and ‘hedging’. In the present work, as we have seen, these concepts are approached in quite broad terms. In fact, one could say that the uses of the terms are quite distanced from what they were originally taken to mean in earlier work, and some of the interpretations of hedges and hedging presented in my work are also quite far from the basic dictionary definition cited at the outset of Chapter 1. In consequence, it might be asked whether or not some of the cases that I refer to as hedges could be termed otherwise. However, as is visible from for instance the debate between Salager-Meyer (1998) and Crompton (1998) on the pages of *English for Specific Purposes*, there is considerable controversy as to what exactly is to be understood by hedges and hedging and how these phenomena should be investigated. As a matter of fact, no unified description concerning hedges and hedging is to be found in literature, and the present approach might be seen as a further addition to the different approaches. With hindsight, we might rephrase the present conception of hedges and hedging by saying that the emphasis in this study is on the contextual interpretation of devices that are traditionally described as being semantically marked by epistemic modality and that indicate degrees of less than full commitment toward the accuracy or precision of what is stated. The terms ‘hedge’ and ‘hedging’ are employed in the pragmatic investigation of such devices, in the analysis of their possible meanings in communication between different senders and addressees. Although some of the interpretations offered above may be only remotely linked to earlier descriptions or to the idea of a hedge as a barrier, limit, or defence, or a means of protection or defence (cf. the dictionary definition cited in Chapter 1), it can be said that the ‘fate’ suffered by the terms ‘hedge’ and ‘hedging’ in this study is not altogether untypical, the scope of the terms being extended beyond their original meanings to accommodate a wider range of interpretations that may apply not only to the kinds of device dealt with in early work by e.g. G. Lakoff (1973) but also to other related phenomena.



Another problem that one may wish to point to is the (non-)exhaustiveness of the present study. However, as I (as well as a number of other authors) have underlined previously, it seems that studying a phenomenon like hedging can never be exhaustive, because hedging may assume a variety of surface forms. Furthermore, the problem with many of the surface forms that hedges have been presumed to take (e.g. passive voice) is that they may often involve an epistemic meaning and can thus be used as hedges, but they may nevertheless on many occasions *not* be used in ways self-evidently associated with hedging, which makes it very difficult to quantify the hedging use of such devices. Therefore, a conscious choice was made in this study to concentrate on devices that involve an inherent component of epistemic meaning and are typically employed for hedging purposes. Hence, the intention here was not to aim at exhaustiveness to begin with, because exhaustiveness in analyzing a phenomenon like hedging is simply not seen as possible.

As to the devices that were chosen for analysis, one may also naturally question the reliability of my non-native-speaker, non-expert interpretations of hedges in the special-subject data. One aspect of this problem has to do with the identification of hedges, namely whether the devices quantified are on a par with what the expert authors have intended to be hedges. Again, I would like to emphasize that in the case of hedging we are not dealing with a phenomenon whose identification is a matter of answering ‘yes, this is a hedge’ or ‘no, this is not a hedge’, and the intention has not been to imply that another analyst would come up with the same exact results as I have. However, in my view, the findings concerning the use of hedges in the data analyzed can be taken as indicating at least certain tendencies, as the principles of identifying hedges in the data were the same across the disciplines and the levels of technicality. Furthermore, to support my subjective non-native-speaker, non-expert analyses, support was sought from native-speaker informants, the expert authors of the articles, and from literature to do with modality and hedging. Thus, attempts were made to increase the reliability of the analysis by means of triangulation.

Another aspect of the problem has to do with the interpretations offered for the use of hedges. Evidently, there are bound to be problems when a non-native-speaker, non-expert analyst tries to determine the functions that might be attributed to hedging in special-subject language use in English. As noted above, support for the interpretations was sought in the form of native-speaker informants, the expert authors, and previous research. Nevertheless, because of the size of the corpus examined, it was impossible to seek confirmation for each suspected case of hedging and to request information as to the motivations underlying the use of each individual hedge, but a satisfactory amount of in-depth information was nonetheless obtained from native-speaker informants and the authors of the articles. It was also of interest to see that opinions differed

between native speakers and the authors of the articles as to what could be seen as hedging and why hedges were used. Of particular interest were responses from a pair of co-authors who (knowingly) responded to my questionnaire without consulting one another. It was interesting to see that some of their answers differed to quite an extent as regards both the identification of hedges and the reasons underlying hedging. On the basis of the answers of this specific pair of authors, then, it appears that even the authors of one and the same article may not see hedging in the same way, which goes to illustrate that absolute interpretations may be quite impossible in the case of hedging.

One aspect of my work on hedging that has been criticized earlier concerns my obvious reluctance to offer final interpretations of specific instances of hedging. In this study, I have not attempted to provide any information as to how many of the hedges identified involve for instance positive politeness toward the audience, how many of them protect the author from audience criticism, and so on. In other words, I have not established any functional taxonomy of hedges and quantified hedges according to such a classification. Should this be seen as a shortcoming, it is a conscious fault on my part. As must already be evident from what I have said, I see hedging as a kaleidoscopic phenomenon, and particularly so as concerns its functions. My unwillingness to offer quantitative information concerning the functions of hedges arises from the realization that no matter how hard I were to try, categorizing individual cases of a multifunctional phenomenon like hedging on the basis of the functions that I have postulated here would undoubtedly oversimplify the picture. In other words, even one individual hedge may be approached from a number of perspectives and can be seen to involve various functions. Trying to classify such a device according to some predetermined set of functions would to my mind distort the portrayal of the phenomenon. In brief, my intention here is not to evade the responsibility for such interpretations, but rather to argue that given the nature of the phenomenon investigated, such an undertaking would not give enough emphasis to its true nature, but would be a most subjective, *ad hoc* procedure. Although I have experimented with the possibility of determining the intended functions of a given hedge, I have come to feel more and more strongly that with a phenomenon like hedging, it is quite simply impossible to nail one's colors to the mast.

Let us conclude by pointing out once more that the aim of the present study has been to examine the use of hedges in scientifically oriented discourse, particularly variation according to discipline and level of technicality. What with the variation observed in the data studied, I have discussed the reasons for the differences and established a number of possibilities of interpreting hedges in the different contexts. Despite the complexities, problems, and shortcomings that the

present work no doubt includes, I would like to entertain the thought that this study has not only presented useful information pertaining to variation within the subject-specific use of English as concerns both research and pedagogy but also illustrated that there is still room for further research into variation within this field, as regards hedging and myriad other linguistic phenomena.

## Appendix 1.

A copy of the letter and examples of the questionnaires sent to the authors of the two types of article examined.

Dear Professor/Doctor/Ms/Mr. NN,

I am a postgraduate student at the University of Tampere, Finland, where I am currently preparing a doctoral thesis dealing with the rhetoric of professional and popular scientific discourse. More specifically, I am interested in the incidence of ‘hedges’, linguistic choices typically thought to relate to uncertainty, hesitation, vagueness, and the like. Through a scrutiny of hedges in a corpus of authentic published texts, it is my purpose to elucidate the various functions that such devices may have in different contexts and thus to provide information that will be of both theoretical and practical benefit for those interested in the characteristics of scientific language use. Included in my corpus of texts to be examined is an article entitled “MM” (published in LL, time), which you have (co-)authored.

In order to gather information about the use of hedges from the point of view of the writers of scientific texts, I have chosen to contact the authors of the articles personally. This is also why I am now writing to you. I have enclosed a sheet containing some extracts from different parts of the article mentioned and some questions concerning particular linguistic choices made therein. I would be most grateful if you (or possibly one of the other authors) could find the time to respond to my queries. Any other comments concerning the extracts are also more than welcome.

I wish to emphasize that my research interest lies in how and why hedges are used in scientific texts of different types. It is therefore not my intention to make value judgments of any kind (positive or negative) as concerns the language of the texts examined—the articles scrutinized are included in the study because they are taken to be representative of a specific topic area and a given type of text. Furthermore, all information gained from the authors will be handled confidentially. If you so wish, your responses will be reported anonymously.

I am very much hoping that you can find the time to answer my questions and that my request does not seem too much of an imposition. In my research, I have discovered that information based on the authors’ views regarding authentic material is of considerable importance in efforts to account for the various characteristics of scientific language use. I would therefore be very grateful if you could look positively upon my request. Should you have any questions or comments about the material enclosed, I will be happy to provide further information.

I am looking forward to hearing from you.

Yours sincerely,

Teppo Varttala  
M. A., University of Tampere, Finland

## QUESTIONNAIRE

### INSTRUCTIONS

Please consider each of the following four extracts from your article and

1) Underline or otherwise list *all* devices that, in your opinion, somehow indicate that what is said is uncertain, imprecise, or otherwise tentative.

2) After each extract, provide reasons as to why you have chosen to use these devices.

3) In the space provided at the end of the questionnaire, discuss whether you would use the kinds of tentative item found in the extracts similarly or differently if you were to deal with similar matters in an article intended for a lay audience instead of the scientific community.

If the space provided for your answers seems insufficient, you may also answer on a separate sheet or continue your answers on the reverse side of the questionnaire.

After completing the questionnaire, please return it in the envelope attached to

Mr. Teppo Varttala  
Dept of English  
FIN-33014 University of Tampere  
Finland

If you so wish, you can also return the questionnaire by fax at +358 3 2157146,  
or you can even reply by sending e-mail to [teppo.varttala@uta.fi](mailto:teppo.varttala@uta.fi).

Thank you for your cooperation.

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## Appendix 2.

Breakdown of the incidence of categories of hedges in research articles on economics, medicine, and technology. The figures indicate relative incidence per 1,000 words and percentage out of the total in each discipline.

Type of Hedge	Economics (63,294 words)	Medicine (48,305 words)	Technology (63,522 words)
<b>Modal Auxs</b>	<b>5.18, 16.9%</b>	<b>3.42, 15.5%</b>	<b>1.95, 8.9%</b>
Nonfactive Reporting Vbs	2.89, 9.4%	1.53, 6.9%	0.96, 4.4%
Tentative Cognition Vbs	3.46, 11.3%	2.63, 11.8%	2.25, 10.3%
Tentative Linking Verbs	1.11, 3.6%	0.83, 3.8%	0.69, 3.2%
<b>Full Vbs Total</b>	<b>7.46, 24.3%</b>	<b>4.99, 22.6%</b>	<b>3.90, 17.9%</b>
Probability Advs	0.68, 2.2%	0.46, 2.1%	0.55, 2.5%
Advs of Indefinite Frequency	1.58, 5.2%	0.43, 2.0%	1.32, 6.1%
Adverbs of Indefinite Degree	1.50, 4.9%	0.93, 4.2%	2.24, 10.2%
Approximative Adverbs	0.96, 3.1%	0.79, 3.6%	1.46, 6.7%
<b>Adverbs Total</b>	<b>4.72, 15.4%</b>	<b>2.61, 11.8%</b>	<b>5.57, 25.5%</b>
Probability Adjs	2.05, 6.7%	1.35, 6.1%	0.57, 2.6%
Adjs of Indefinite Frequency	0.25, 0.8%	0.27, 1.2%	0.60, 2.7%
Adjs of Indefinite Degree	0.14, 0.5%	0.54, 2.4%	1.09, 5.0%
Approximative Adjs	0.05, 0.2%	0.06, 1.2%	0.22, 1.0%
<b>Adjectives Total</b>	<b>2.50, 8.1%</b>	<b>2.22, 10.0%</b>	<b>2.47, 11.3%</b>
Nonfactive Assertive Nouns	1.12, 3.7%	0.35, 1.6%	0.47, 2.2%
Tentative Cognition Nouns	3.59, 11.7%	0.95, 4.3%	1.51, 6.9%
Nouns of Tentative Likelihood	1.36, 4.4%	0.79, 3.6%	0.47, 2.2%
<b>Nouns Total</b>	<b>6.07, 19.8%</b>	<b>2.09, 9.5%</b>	<b>2.46, 11.3%</b>
<b>Clausal Elements</b>	<b>2.21, 7.2%</b>	<b>1.39, 6.3%</b>	<b>1.13, 5.2%</b>
<b>Questions</b>	<b>0.08, 0.3%</b>	<b>0.02, 0.1%</b>	<b>0.06, 0.1%</b>
<b>Other</b>	<b>2.43, 7.9%</b>	<b>5.32, 24.1%</b>	<b>4.30, 19.7%</b>
<b>Total</b>	<b>30.65, 100%</b>	<b>22.05, 100%</b>	<b>21.85, 100%</b>

## Appendix 3.

Breakdown of the incidence of categories of hedges in the different rhetorical sections of research articles on economics, medicine, and technology. The figures indicate relative incidence per 1,000 words, respective rank order of the section for each hedge type in comparison with the other sections, and percentage of all hedges in the section.

## Abstract

Type of Hedge	Economics (1,192 words)	Medicine (2,687 words)	Technology (1,693 words)
<b>Modal Auxs</b>	<b>0.84 (5), 3.2%</b>	<b>4.09 (3), 20.4%</b>	<b>0.59 (5), 2.7%</b>
Nonfactive Reporting Vbs	3.36 (2), 12.9%	1.86 (3), 9.3%	1.18 (2), 5.4%
Tentative Cognition Vbs	5.87 (1), 22.6%	3.35 (1), 16.7%	2.95 (2), 13.5%
Tentative Linking Verbs	1.68 (2), 6.5%	0.74 (2), 3.7%	0.59 (3), 2.7%
<b>Full Vbs Total</b>	<b>10.91 (1), 41.9%</b>	<b>5.95 (3), 29.6%</b>	<b>4.73 (2), 21.6%</b>
Probability Advs	-	0.74 (2), 3.7%	0.59 (3), 2.7%
Advs of Indefinite Frequency	1.68 (2), 6.5%	-	0.59 (5), 2.7%
Adverbs of Indefinite Degree	-	0.74 (2), 3.7%	5.91 (1), 27.0%
Approximative Adverbs	-	1.12 (1), 5.6%	1.18 (4), 5.4%
<b>Adverbs Total</b>	<b>1.68 (5), 6.5%</b>	<b>2.61 (3), 13.0%</b>	<b>8.27 (1), 37.8%</b>
Probability Adjs	1.68 (3), 6.5%	-	0.59 (3), 2.7%
Adjs of Indefinite Frequency	0.84 (1), 3.2%	-	-
Adjs of Indefinite Degree	-	1.12 (1), 5.6%	1.18 (4), 5.4%
Approximative Adjs	-	-	0.59 (1), 2.7%
<b>Adjectives Total</b>	<b>2.52 (3), 9.7%</b>	<b>1.12 (5), 5.6%</b>	<b>2.36 (3), 10.8%</b>
Nonfactive Assertive Nouns	4.19 (1), 16.1%	-	-
Tentative Cognition Nouns	5.03 (1), 19.4%	1.49 (1), 7.4%	1.77 (2), 8.1%
Nouns of Tentative Likelihood	-	0.37 (5), 1.9%	-
<b>Nouns Total</b>	<b>9.23 (1), 35.5%</b>	<b>1.86 (3), 9.3%</b>	<b>1.77 (4), 8.1%</b>
<b>Clausal Elements</b>	-	<b>1.12 (2), 5.6%</b>	<b>1.18 (2), 5.4%</b>
<b>Questions</b>	-	-	-
<b>Other</b>	<b>0.84 (5), 3.2%</b>	<b>3.35 (5), 16.7%</b>	<b>2.95 (5), 13.5%</b>
<b>Total</b>	<b>26.01 (4), 100%</b>	<b>20.10 (3), 100%</b>	<b>21.85 (4), 100%</b>



## Introduction

Type of Hedge	Economics (18,275 words)	Medicine (4,456 words)	Technology (7,866 words)
<b>Modal Auxs</b>	<b>6.73 (2), 20.7%</b>	<b>4.71 (2), 17.5%</b>	<b>1.53 (4), 6.5%</b>
Nonfactive Reporting Vbs	2.79 (4), 8.6%	2.92 (1), 10.8%	1.14 (3), 4.9%
Tentative Cognition Vbs	2.85 (4), 8.8%	3.14 (2), 11.7%	0.89 (5), 3.8%
Tentative Linking Verbs	1.26 (3), 3.9%	0.45 (4), 1.7%	1.02 (2), 4.3%
<b>Full Vbs Total</b>	<b>6.89 (4), 21.2%</b>	<b>6.51 (2), 24.2%</b>	<b>3.05 (5), 13.0%</b>
Probability Advs	1.09 (2), 3.4%	-	0.38 (5), 1.6%
Advs of Indefinite Frequency	2.74 (1), 8.4%	2.02 (1), 7.5%	2.67 (1), 11.4%
Adverbs of Indefinite Degree	2.02 (1), 6.2%	0.45 (5), 1.7%	3.18 (3), 13.5%
Approximative Adverbs	0.38 (4), 1.2%	0.67 (4), 2.5%	1.40 (3), 5.9%
<b>Adverbs Total</b>	<b>6.24 (1), 19.2%</b>	<b>3.14 (2), 11.7%</b>	<b>7.63 (2), 32.4%</b>
Probability Adjs	2.52 (2), 7.8%	2.02 (2), 7.5%	0.76 (2), 3.2%
Adjs of Indefinite Frequency	0.44 (2), 1.3%	0.22 (3), 0.8%	0.25 (3), 1.1%
Adjs of Indefinite Degree	0.16 (2), 0.5%	0.22 (4), 0.8%	1.27 (2), 5.4%
Approximative Adjs	-	-	0.25 (3), 1.1%
<b>Adjectives Total</b>	<b>3.11, (2), 9.6%</b>	<b>2.47 (2), 9.2%</b>	<b>2.54 (2), 10.8%</b>
Nonfactive Assertive Nouns	1.31 (3), 4.0%	0.67 (2), 2.5%	0.25 (3), 1.1%
Tentative Cognition Nouns	4.27 (3), 13.2%	1.35 (2), 5.0%	2.54 (1), 10.8%
Nouns of Tentative Likelihood	0.27 (4), 0.8%	0.90 (2), 3.3%	0.38 (2), 1.6%
<b>Nouns Total</b>	<b>5.85 (3), 18.0%</b>	<b>2.92 (1), 10.8%</b>	<b>3.18 (1), 13.5%</b>
<b>Clausal Elements</b>	<b>1.37 (4), 4.2%</b>	<b>0.67 (3), 2.5%</b>	<b>0.51 (5), 2.2%</b>
<b>Questions</b>	<b>0.22 (1), 0.7%</b>	-	<b>0.38 (1), 1.6%</b>
<b>Other</b>	<b>2.02 (3), 6.2%</b>	<b>6.51 (2), 24.2%</b>	<b>4.70 (3), 20.0%</b>
<b>Total</b>	<b>32.45 (2), 100%</b>	<b>26.93 (2), 100%</b>	<b>23.52 (2), 100%</b>

## Methods

Type of Hedge	Economics (15,037 words)	Medicine (12,947 words)	Technology (8,971 words)
<b>Modal Auxs</b>	<b>3.39 (4), 14.5%</b>	<b>0.85 (5), 5.7%</b>	<b>2.34 (1), 11.1%</b>
Nonfactive Reporting Vbs	1.93 (5), 8.2%	0.08 (5), 0.5%	0.56 (5), 2.6%
Tentative Cognition Vbs	3.59 (3), 15.3%	3.09 (3), 20.6%	2.90 (3), 13.7%
Tentative Linking Verbs	0.27 (5), 1.1%	0.23 (5), 1.5%	0.45 (4), 2.1%
<b>Full Vbs Total</b>	<b>5.79 (5), 24.7%</b>	<b>3.40 (5), 22.7%</b>	<b>3.90 (3), 18.4%</b>
Probability Advs	0.20 (4), 0.9%	0.08 (4), 0.5%	0.45 (4), 2.1%
Advs of Indefinite Frequency	0.93 (5), 4.0%	0.46 (2), 3.1%	0.78 (4), 3.7%
Adverbs of Indefinite Degree	1.13 (3), 4.8%	0.62 (4), 4.1%	1.78 (5), 8.4%
Approximative Adverbs	0.93 (2), 4.0%	1.00 (2), 6.7%	2.01 (1), 9.5%
<b>Adverbs Total</b>	<b>3.19 (4), 13.6%</b>	<b>2.16 (4), 14.4%</b>	<b>5.02 (5), 23.7%</b>
Probability Adjs	1.20 (5), 5.1%	0.70 (4), 4.6%	0.22 (5), 1.1%
Adjs of Indefinite Frequency	0.27 (3), 1.1%	0.46 (1), 3.1%	0.78 (1), 3.7%
Adjs of Indefinite Degree	0.07 (4), 0.3%	-	1.23 (3), 5.8%
Approximative Adjs	0.07 (2), 0.3%	0.08 (2), 0.5%	-
<b>Adjectives Total</b>	<b>1.60 (5), 6.8%</b>	<b>1.24 (4), 8.2%</b>	<b>2.23 (4), 10.5%</b>
Nonfactive Assertive Nouns	1.06 (4), 4.5%	0.08 (4), 0.5%	-
Tentative Cognition Nouns	2.99 (4), 12.8%	1.00 (4), 6.7%	1.67 (3), 7.9%
Nouns of Tentative Likelihood	1.20 (2), 5.1%	0.62 (4), 4.1%	0.11 (3), 0.5%
<b>Nouns Total</b>	<b>5.25 (4), 22.4%</b>	<b>1.70 (4), 11.3%</b>	<b>1.78 (3), 8.4%</b>
<b>Clausal Elements</b>	<b>1.40 (3), 6.0%</b>	<b>0.46 (4), 3.1%</b>	<b>1.00 (4), 4.7%</b>
<b>Questions</b>	-	-	-
<b>Other</b>	<b>2.79 (2), 11.9%</b>	<b>5.17 (3), 34.5%</b>	<b>4.90 (1), 23.2%</b>
<b>Total</b>	<b>23.41 (5), 100%</b>	<b>14.98 (4), 100%</b>	<b>21.18 (5), 100%</b>

## Results

Type of Hedge	Economics (18,206 words)	Medicine (14,101 words)	Technology (22,432 words)
<b>Modal Auxs</b>	<b>3.68 (3), 11.6%</b>	<b>1.06 (4), 7.2%</b>	<b>2.10 (2), 9.4%</b>
Nonfactive Reporting Vbs	2.80 (3), 8.8%	1.28 (4), 8.7%	0.72 (4), 3.2%
Tentative Cognition Vbs	4.28 (2), 13.4%	1.91 (5), 13.0%	1.57 (4), 7.0%
Tentative Linking Verbs	1.26 (3), 4.0%	0.64 (3), 4.3%	1.21 (1), 5.4%
<b>Full Vbs Total</b>	<b>8.35 (3), 26.2%</b>	<b>3.83 (4), 26.0%</b>	<b>3.49 (4), 15.7%</b>
Probability Advs	0.33 (3), 1.0%	0.35 (3), 2.4%	0.85 (2), 3.8%
Advs of Indefinite Frequency	0.99 (4), 3.1%	-	1.47 (3), 6.6%
Adverbs of Indefinite Degree	1.65 (2), 5.2%	0.64 (3), 4.3%	2.54 (4), 11.4%
Approximative Adverbs	1.81 (1), 5.7%	0.92 (3), 6.3%	1.92 (2), 8.6%
<b>Adverbs Total</b>	<b>4.78 (2), 15.0%</b>	<b>1.91 (5), 13.0%</b>	<b>6.78 (4), 30.5%</b>
Probability Adjs	1.65 (4), 5.2%	0.71 (3), 4.8%	0.40 (4), 1.8%
Adjs of Indefinite Frequency	0.22 (4), 0.7%	0.14 (4), 1.0%	0.49 (2), 2.2%
Adjs of Indefinite Degree	0.11 (3), 0.3%	0.99 (2), 6.7%	1.84 (1), 8.2%
Approximative Adjs	0.11 (1), 0.3%	0.14 (1), 1.0%	0.45 (2), 2.0%
<b>Adjectives Total</b>	<b>2.09 (4), 6.6%</b>	<b>1.99 (3), 13.5%</b>	<b>3.17 (1), 14.3%</b>
Nonfactive Assertive Nouns	0.60 (5), 1.9%	0.21 (3), 1.4%	0.36 (2), 1.6%
Tentative Cognition Nouns	4.34 (2), 13.6%	0.50 (5), 3.4%	1.03 (4), 4.6%
Nouns of Tentative Likelihood	2.91 (1), 9.1%	0.71 (3), 4.8%	0.45 (1), 2.0%
<b>Nouns Total</b>	<b>7.85 (2), 24.7%</b>	<b>1.42 (5), 9.6%</b>	<b>1.83 (2), 8.2%</b>
<b>Clausal Elements</b>	<b>3.24 (2), 10.2%</b>	<b>0.43 (5), 2.9%</b>	<b>1.03 (3), 4.6%</b>
<b>Questions</b>	<b>0.05 (2), 0.2%</b>	-	<b>0.04 (2), 0.2%</b>
<b>Other</b>	<b>1.81 (4), 5.7%</b>	<b>4.11 (4), 27.9%</b>	<b>3.79 (4), 17.1%</b>
<b>Total</b>	<b>31.86 (3), 100%</b>	<b>14.75 (5), 100%</b>	<b>22.20 (3), 100%</b>

## Discussion

Type of Hedge	Economics (10,584 words)	Medicine (14,114 words)	Technology (4,159 words)
<b>Modal Auxs</b>	<b>8.13 (1), 22.5%</b>	<b>7.58 (1), 21.7%</b>	<b>1.92 (3), 7.3%</b>
Nonfactive Reporting Vbs	4.54 (1), 12.6%	2.62 (2), 7.5%	1.92 (1), 7.3%
Tentative Cognition Vbs	2.46 (5), 6.8%	2.55 (4), 7.3%	3.37 (1), 12.7%
Tentative Linking Verbs	1.70 (1), 4.7%	1.70 (1), 4.9%	-
<b>Full Vbs Total</b>	<b>8.69 (2), 24.1%</b>	<b>6.87 (1), 19.7%</b>	<b>5.29 (1), 20.0%</b>
Probability Advs	1.32 (1), 3.7%	0.99 (1), 2.8%	0.96 (1), 3.6%
Advs of Indefinite Frequency	1.42 (3), 3.9%	0.43 (3), 1.2%	1.68 (2), 6.4%
Adverbs of Indefinite Degree	1.04 (4), 2.9%	1.70 (1), 4.9%	3.85 (2), 14.5%
Approximative Adverbs	0.66 (3), 1.8%	0.43 (5), 1.2%	0.96 (5), 3.6%
<b>Adverbs Total</b>	<b>4.44 (3), 12.3%</b>	<b>3.54 (1), 10.2%</b>	<b>7.45 (3), 28.2%</b>
Probability Adjs	3.31 (1), 9.2%	2.20 (1), 6.3%	1.20 (1), 4.5%
Adjs of Indefinite Frequency	-	0.28 (2), 0.8%	-
Adjs of Indefinite Degree	0.28 (1), 0.8%	0.57 (3), 1.6%	-
Approximative Adjs	-	-	0.24 (4), 0.9%
<b>Adjectives Total</b>	<b>3.59 (1), 9.9%</b>	<b>3.05 (1), 8.7%</b>	<b>1.44 (5), 5.5%</b>
Nonfactive Assertive Nouns	1.42 (2), 3.9%	0.71 (1), 2.0%	0.48 (1), 1.8%
Tentative Cognition Nouns	1.61 (5), 4.5%	1.13 (3), 3.3%	0.72 (5), 2.7%
Nouns of Tentative Likelihood	0.94 (3), 2.6%	1.06 (1), 3.0%	-
<b>Nouns Total</b>	<b>3.97 (5), 11.0%</b>	<b>2.90 (2), 8.3%</b>	<b>1.20 (5), 4.5%</b>
<b>Clausal Elements</b>	<b>3.31 (1), 9.2%</b>	<b>3.47 (1), 10.0%</b>	<b>4.33 (1), 16.4%</b>
<b>Questions</b>	-	<b>0.07 (1), 0.2%</b>	-
<b>Other</b>	<b>3.97 (1), 11.0%</b>	<b>7.37 (1), 21.1%</b>	<b>4.81 (2), 18.2%</b>
<b>Total</b>	<b>36.09 (1), 100%</b>	<b>34.86 (1), 100%</b>	<b>26.45 (1), 100%</b>

## Appendix 4.

Breakdown of the incidence of categories of hedges in popular scientific articles on economics, medicine, and technology. The figures indicate relative incidence per 1,000 words and percentage out of the total in each discipline.

Type of Hedge	Economics (39,623 words)	Medicine (46,777 words)	Technology (38,248 words)
<b>Modal Auxs</b>	<b>4.37, 15.6%</b>	<b>6.65, 17.3%</b>	<b>4.08, 13.2%</b>
Nonfactive Reporting Vbs	0.96, 3.4%	1.45, 3.8%	0.78, 2.5%
Tentative Cognition Vbs	2.20, 7.8%	1.80, 4.7%	1.52, 4.9%
Tentative Linking Verbs	0.91, 3.2%	1.45, 3.8%	0.76, 2.5%
<b>Full Vbs Total</b>	<b>4.06, 14.5%</b>	<b>4.70, 12.2%</b>	<b>3.06, 9.9%</b>
Probability Adv	0.35, 1.3%	2.12, 5.5%	0.94, 3.0%
Adv of Indefinite Frequency	2.07, 7.4%	2.84, 7.4%	1.31, 4.2%
Adverbs of Indefinite Degree	1.44, 5.1%	1.69, 4.4%	1.70, 5.5%
Approximative Adverbs	2.09, 7.5%	1.82, 4.7%	3.22, 10.4%
<b>Adverbs Total</b>	<b>5.96, 21.2%</b>	<b>8.47, 22.0%</b>	<b>7.16, 23.2%</b>
Probability Adjs	1.01, 3.6%	0.94, 2.4%	0.71, 2.3%
Adjs of Indefinite Frequency	0.25, 0.9%	0.53, 1.4%	0.34, 1.1%
Adjs of Indefinite Degree	0.40, 1.4%	0.17, 0.4%	0.76, 2.5%
Approximative Adjs	0.03, 0.09%	0.04, 0.1%	-
<b>Adjectives Total</b>	<b>1.69, 6.0%</b>	<b>1.69, 4.4%</b>	<b>1.80, 5.8%</b>
Nonfactive Assertive Nouns	0.73, 2.6%	0.24, 0.6%	0.31, 1.0%
Tentative Cognition Nouns	2.12, 7.6%	1.20, 3.1%	0.86, 2.8%
Nouns of Tentative Likelihood	0.56, 2.0%	0.71, 1.8%	0.76, 2.5%
<b>Nouns Total</b>	<b>3.41, 12.1%</b>	<b>2.14, 5.6%</b>	<b>1.93, 6.3%</b>
<b>Clausal Elements</b>	<b>1.16, 4.1%</b>	<b>2.63, 6.8%</b>	<b>0.78, 2.5%</b>
<b>Questions</b>	<b>0.10, 0.4%</b>	<b>0.13, 0.3%</b>	<b>0.34, 1.1%</b>
<b>Other</b>	<b>7.32, 26.1%</b>	<b>12.06, 31.4%</b>	<b>11.74, 38.0%</b>
<b>Total</b>	<b>28.06, 100%</b>	<b>38.46, 100%</b>	<b>30.90, 100%</b>

## Appendix 5.

Breakdown of the incidence of categories of hedges in the different sections of popular scientific articles on economics, medicine, and technology. The figures indicate relative incidence per 1,000 words, respective rank order of the section for each hedge type in comparison with the other sections, and percentage of all hedges in the section.

## Introduction

Type of Hedge	Economics (4,302 words)	Medicine (6,230 words)	Technology (6,345 words)
<b>Modal Auxs</b>	<b>4.18 (2), 12.0%</b>	<b>5.30 (3), 11.7%</b>	<b>2.52 (3), 7.8%</b>
Nonfactive Reporting Vbs	2.09 (1), 6.0%	0.64 (3), 1.4%	0.79 (2), 2.4%
Tentative Cognition Vbs	3.25 (1), 9.3%	2.57 (1), 5.7%	1.26 (3), 3.9%
Tentative Linking Verbs	1.16 (1), 3.3%	1.93 (1), 4.3%	0.16 (3), 0.5%
<b>Full Vbs Total</b>	<b>6.51 (1), 18.7%</b>	<b>5.14 (1), 11.3%</b>	<b>2.21 (3), 6.8%</b>
Probability Advs	0.23 (3), 0.7%	0.96 (3), 2.1%	1.10 (2), 3.4%
Advs of Indefinite Frequency	4.42 (1), 12.7%	2.57 (2), 5.7%	1.73 (1), 5.4%
Adverbs of Indefinite Degree	0.70 (3), 2.0%	2.09 (1), 4.6%	1.89 (2), 5.9%
Approximative Adverbs	1.16 (3), 3.3%	2.09 (1), 4.6%	2.99 (2), 9.3%
<b>Adverbs Total</b>	<b>6.51 (1), 18.7%</b>	<b>7.70 (2), 17.0%</b>	<b>7.72 (2), 23.9%</b>
Probability Adjs	0.23 (3), 0.7%	0.64 (3), 1.4%	0.63 (3), 2.0%
Adjs of Indefinite Frequency	0.46 (1), 1.3%	1.44 (1), 3.2%	0.16 (3), 0.5%
Adjs of Indefinite Degree	0.23 (3), 0.7%	0.16 (2), 0.4%	0.95 (1), 2.9%
Approximative Adjs	-	-	-
<b>Adjectives Total</b>	<b>0.93 (3), 2.7%</b>	<b>2.25 (2), 5.0%</b>	<b>1.73 (2), 5.4%</b>
Nonfactive Assertive Nouns	1.39 (1), 4.0%	0.16 (3), 0.4%	0.32 (2), 1.0%
Tentative Cognition Nouns	4.88 (1), 14.0%	2.25 (1), 5.0%	1.42 (2), 4.4%
Nouns of Tentative Likelihood	-	1.61 (1), 3.5%	1.42 (1), 4.4%
<b>Nouns Total</b>	<b>6.28 (1), 18.0%</b>	<b>4.01 (1), 8.9%</b>	<b>3.15 (2), 9.8%</b>
<b>Clausal Elements</b>	<b>0.23 (3), 0.7%</b>	<b>3.21 (2), 7.1%</b>	<b>0.63 (3), 2.0%</b>
<b>Questions</b>	-	<b>0.16 (1), 0.4%</b>	<b>0.79 (2), 2.4%</b>
<b>Other</b>	<b>10.23 (1), 29.3%</b>	<b>17.50 (1), 38.7%</b>	<b>13.55 (1), 42.0%</b>
<b>Total</b>	<b>34.87 (1), 100%</b>	<b>45.26 (1), 100%</b>	<b>32.31 (2), 100%</b>

## Main Body

Type of Hedge	Economics (30,946 words)	Medicine (35,739 words)	Technology (27,207 words)
<b>Modal Auxs</b>	<b>4.14 (3), 15.3%</b>	<b>6.44 (2), 17.3%</b>	<b>4.01 (2), 13.5%</b>
Nonfactive Reporting Vbs	0.78 (3), 2.9%	1.54 (2), 4.1%	0.77 (3), 2.6%
Tentative Cognition Vbs	2.10 (2), 7.7%	1.65 (3), 4.4%	1.47 (2), 5.0%
Tentative Linking Verbs	0.84 (3), 3.1%	1.45 (2), 3.9%	0.77 (2), 2.6%
<b>Full Vbs Total</b>	<b>3.72 (3), 13.7%</b>	<b>4.64 (2), 12.5%</b>	<b>3.01 (2), 10.2%</b>
Probability Advs	0.29 (2), 1.1%	2.38 (1), 6.4%	0.74 (3), 2.5%
Advs of Indefinite Frequency	1.91 (2), 7.0%	3.13 (1), 8.4%	1.25 (2), 4.2%
Adverbs of Indefinite Degree	1.62 (1), 6.0%	1.76 (2), 4.7%	1.54 (3), 5.2%
Approximative Adverbs	2.29 (1), 8.5%	1.79 (2), 4.8%	3.31 (1), 11.2%
<b>Adverbs Total</b>	<b>6.11 (2), 22.5%</b>	<b>9.07 (1), 24.4%</b>	<b>6.84 (3), 23.1%</b>
Probability Adjs	0.90 (2), 3.3%	0.95 (2), 2.6%	0.66 (2), 2.2%
Adjs of Indefinite Frequency	0.23 (2), 0.8%	0.39 (3), 1.1%	0.40 (1), 1.4%
Adjs of Indefinite Degree	0.42 (2), 1.5%	0.11 (3), 0.3%	0.81 (2), 2.7%
Approximative Adjs	0.03 (1), 0.1%	0.06 (1), 0.2%	0.04 (1), 0.1%
<b>Adjectives Total</b>	<b>1.58 (2), 5.8%</b>	<b>1.51 (3), 4.1%</b>	<b>1.91 (1), 6.5%</b>
Nonfactive Assertive Nouns	0.61 (3), 2.3%	0.25 (1), 0.7%	0.15 (3), 0.5%
Tentative Cognition Nouns	1.68 (3), 6.2%	0.98 (3), 2.6%	0.59 (3), 2.0%
Nouns of Tentative Likelihood	0.58 (2), 2.1%	0.53 (3), 1.4%	0.59 (3), 2.0%
<b>Nouns Total</b>	<b>2.88 (3), 10.6%</b>	<b>1.76 (3), 4.7%</b>	<b>1.32 (3), 4.5%</b>
<b>Clausal Elements</b>	<b>1.32 (1), 4.9%</b>	<b>2.13 (3), 5.7%</b>	<b>0.70 (2), 2.4%</b>
<b>Questions</b>	<b>0.10 (2), 0.4%</b>	<b>0.14 (2), 0.4%</b>	<b>0.11 (3), 0.4%</b>
<b>Other</b>	<b>7.27 (2), 26.8%</b>	<b>11.44 (2), 30.8%</b>	<b>11.69 (2), 39.5%</b>
<b>Total</b>	<b>27.11 (3), 100%</b>	<b>37.13 (3), 100%</b>	<b>29.59 (3), 100%</b>

## Conclusion

Type of Hedge	Economics (4,375 words)	Medicine (4,808 words)	Technology (4,696 words)
<b>Modal Auxs</b>	<b>6.17 (1), 22.0%</b>	<b>9.98 (1), 25.3%</b>	<b>6.60 (1), 17.9%</b>
Nonfactive Reporting Vbs	1.14 (2), 4.1%	1.87 (1), 4.7%	0.85 (1), 2.3%
Tentative Cognition Vbs	1.83 (3), 6.5%	1.87 (2), 4.7%	2.13 (1), 5.8%
Tentative Linking Verbs	1.14 (2), 4.1%	0.83 (3), 2.1%	1.49 (1), 4.0%
<b>Full Vbs Total</b>	<b>4.11 (2), 14.6%</b>	<b>4.58 (2), 11.6%</b>	<b>4.47 (1), 12.1%</b>
Probability Advs	0.91 (1), 3.3%	1.66 (2), 4.2%	1.92 (1), 5.2%
Advs of Indefinite Frequency	0.91 (3), 3.3%	1.04 (3), 2.6%	1.06 (3), 2.9%
Adverbs of Indefinite Degree	0.91 (2), 3.3%	0.62 (3), 1.6%	2.34 (1), 6.4%
Approximative Adverbs	1.60 (2), 5.7%	1.66 (3), 4.2%	2.98 (3), 8.1%
<b>Adverbs Total</b>	<b>4.34 (3), 15.4%</b>	<b>4.99 (3), 12.6%</b>	<b>8.30 (1), 22.5%</b>
Probability Adjs	2.51 (1), 8.9%	1.25 (1), 3.2%	1.06 (1), 2.9%
Adjs of Indefinite Frequency	-	0.42 (2), 1.1%	0.21 (2), 0.6%
Adjs of Indefinite Degree	0.69 (1), 2.4%	0.62 (1), 1.6%	0.21 (3), 0.6%
Approximative Adjs	-	-	-
<b>Adjectives Total</b>	<b>3.20 (1), 11.4%</b>	<b>2.29 (1), 5.8%</b>	<b>1.49 (3), 4.0%</b>
Nonfactive Assertive Nouns	0.91 (2), 3.3%	0.21 (2), 0.5%	1.28 (1), 3.5%
Tentative Cognition Nouns	2.51 (2), 8.9%	1.46 (2), 3.7%	1.70 (1), 4.6%
Nouns of Tentative Likelihood	0.91 (1), 3.3%	0.83 (2), 2.1%	0.85 (2), 2.3%
<b>Nouns Total</b>	<b>4.34 (2), 15.4%</b>	<b>2.50 (2), 6.3%</b>	<b>3.83 (1), 10.4%</b>
<b>Clausal Elements</b>	<b>0.91, (2), 3.3%</b>	<b>5.62 (1), 14.2%</b>	<b>1.49 (1), 4.0%</b>
<b>Questions</b>	<b>0.23 (1), 0.8%</b>	-	<b>1.06 (1), 2.9%</b>
<b>Other</b>	<b>4.80 (3), 17.1%</b>	<b>9.57 (3), 24.2%</b>	<b>9.58 (3), 26.0%</b>
<b>Total</b>	<b>28.11 (2), 100%</b>	<b>39.52 (2), 100%</b>	<b>36.84 (1), 100%</b>



## Appendix 6.

List of lexical hedging devices identified in the data.

(The items from each subtype are listed in alphabetical order.)

A. Devices found in the research articles  
(236)

Modal auxiliaries (8):

*can*  
*could*  
*may*  
*might*  
*must*  
*should*  
*will*  
*would*

Full verbs (54)

Nonfactive reporting verbs (16):

*allege*  
*allude*  
*argue*  
*charge*  
*claim*  
*contend*  
*forecast*  
*implicate*  
*imply*  
*point to(ward)*  
*portend*  
*posit*  
*postulate*  
*predict*  
*propose*  
*suggest*

Tentative cognition verbs (35):

*anticipate*  
*approximate*  
*assess (re-)*  
*assume*  
*believe*  
*conceive*  
*conceptualize*  
*conclude*

B. Devices found in the popular scientific  
articles (220)

Modal auxiliaries (7):

*can*  
*could*  
*may*  
*might*  
*must*  
*should*  
*would*

Full verbs (55)

Nonfactive reporting verbs (12):

*allege*  
*argue*  
*assert*  
*claim*  
*forecast*  
*foreshadow*  
*hint*  
*implicate*  
*imply*  
*predict*  
*propose*  
*suggest*

Tentative cognition verbs (38):

*anticipate*  
*assess*  
*assume*  
*believe*  
*conclude*  
*consider*  
*deem*  
*doubt*

*consider*  
*deem*  
*estimate (re-)*  
*evaluate*  
*expect*  
*extrapolate*  
*feel*  
*hold (that)*  
*hypothesize*  
*imagine*  
*infer*  
*interpret*  
*judge*  
*maintain*  
*perceive*  
*postulate*  
*presume*  
*project*  
*regard (as)*  
*see (as)*  
*speculate*  
*suppose*  
*suspect*  
*theorize*  
*think*  
*view (as)*  
*wish*

Tentative linking verbs (3):

*appear*  
*seem*  
*tend*

Adverbs (61)

Probability Adverbs (13):

*apparently*  
*arguably*  
*likely*  
*perhaps*  
*possibly*  
*potentially*  
*presumably*  
*probably*

*envision*  
*estimate*  
*evaluate*  
*expect*  
*extrapolate*  
*fear*  
*feel*  
*find*  
*foresee*  
*hold (that)*  
*hope*  
*imagine*  
*infer*  
*judge*  
*maintain*  
*perceive*  
*presume*  
*project*  
*reason*  
*regard (as)*  
*see (as)*  
*speculate*  
*suppose*  
*surmise*  
*suspect*  
*think*  
*view (as)*  
*wish*  
*wonder*  
*worry*

Tentative linking verbs (5):

*appear*  
*look*  
*seem*  
*sound*  
*tend*

Adverbs (60)

Probability Adverbs (12):

*apparently*  
*arguably*  
*conceivably*  
*likely*  
*ostensibly*  
*perhaps*  
*possibly*  
*potentially*

*seemingly*  
*supposedly*  
*tentatively*  
*theoretically*  
*unlikely*

Adverbs of Indefinite Frequency (11):

*commonly*  
*frequently*  
*generally*  
*normally*  
*occasionally*  
*often*  
*rarely*  
*seldom*  
*sometimes*  
*typically*  
*usually*

Adverbs of Indefinite Degree (26):

*considerably*  
*dramatically*  
*drastically*  
*fairly*  
*greatly*  
*highly*  
*largely*  
*mainly*  
*markedly*  
*moderately*  
*modestly*  
*mostly*  
*partly/partially*  
*predominantly/predominately*  
*primarily*  
*principally*  
*quite*  
*rather*  
*reasonably*  
*relatively*  
*significantly*  
*slightly*  
*somewhat*  
*strongly*  
*substantially*  
*widely*

*presumably*  
*probably*  
*seemingly*  
*supposedly*

Adverbs of Indefinite Frequency (13):

*commonly*  
*frequently*  
*generally*  
*normally*  
*occasionally*  
*often*  
*oftentimes*  
*rarely*  
*routinely*  
*seldom*  
*sometimes*  
*typically*  
*usually*

Adverbs of Indefinite Degree (24):

*considerably*  
*dramatically*  
*fairly*  
*greatly*  
*largely*  
*mainly*  
*markedly*  
*massively*  
*moderately*  
*modestly*  
*mostly*  
*partly*  
*primarily*  
*quite*  
*rather*  
*reasonably*  
*relatively*  
*shortly*  
*significantly*  
*slightly*  
*somewhat*  
*substantially*  
*vastly*  
*widely*

## Approximative Adverbs (11):

*about*  
*almost*  
*approximately*  
*around*  
*closely*  
*essentially*  
*just*  
*nearly*  
*roughly*  
*some*  
*virtually*

## Approximative Adverbs (11):

*about*  
*almost*  
*approximately*  
*around*  
*basically*  
*essentially*  
*nearly*  
*practically*  
*roughly*  
*some*  
*virtually*

## Adjectives (57)

## Probability Adjectives (19):

*apparent*  
*apt to*  
*doubtful*  
*hypothetical*  
*improbable*  
*indicative*  
*likely*  
*plausible*  
*possible*  
*potential*  
*predictive*  
*probabilistic*  
*probable*  
*prone to*  
*putative*  
*speculative*  
*suggestive*  
*theoretical*  
*unlikely*

## Adjectives (40)

## Probability Adjectives (9):

*apparent*  
*conceivable*  
*hypothetical*  
*implausible*  
*likely*  
*possible*  
*potential*  
*prone to*  
*unlikely*

## Adjectives of Indefinite Frequency (12):

*characteristic*  
*common*  
*frequent*  
*general*  
*normal*  
*popular*  
*prevalent*  
*rare*  
*regular*  
*typical*  
*uncommon (not)*  
*usual*

## Adjectives of Indefinite Frequency (13):

*common*  
*commonplace*  
*frequent*  
*general*  
*occasional*  
*pervasive*  
*popular*  
*prevalent*  
*rare*  
*scarce*  
*typical*  
*uncommon*

*widespread*

Adjectives of Indefinite Degree (22):

*appreciable*  
*central*  
*considerable*  
*fair*  
*large*  
*little*  
*main*  
*major*  
*marked*  
*moderate*  
*modest*  
*negligible*  
*noticeable*  
*relative*  
*primary*  
*principal*  
*reasonable*  
*relative*  
*significant*  
*slight*  
*small*  
*substantial*

Adjectives of Indefinite Degree (15):

*considerable*  
*devastating*  
*immense*  
*impressive*  
*large*  
*notable*  
*reasonable*  
*relative*  
*remarkable*  
*significant*  
*slight*  
*small*  
*substantial*  
*tiny*  
*tremendous*

Approximative Adjectives (4):

*approximate*  
*close*  
*gross*  
*virtual*

Approximative Adjectives (3):

*approximate*  
*proximate*  
*rough*

Nouns (56)

Nonfactive assertive nouns (13):

*allegation*  
*argument*  
*assertion*  
*charge*  
*claim*  
*clue*  
*contention*  
*implication*  
*indication*  
*postulate*  
*prediction*  
*proposition*  
*suggestion*

Nouns (58)

Nonfactive assertive nouns (8):

*argument*  
*claim*  
*clue*  
*hint*  
*implication*  
*indication*  
*prediction*  
*proposal*

## Tentative cognition nouns (28):

*approximation*  
*assessment*  
*assumption*  
*belief*  
*concept*  
*conceptualization*  
*conclusion*  
*construct*  
*estimate/-ion*  
*estimator*  
*evaluation*  
*expectation*  
*hope*  
*hypothesis*  
*idea*  
*inference*  
*interpretation*  
*notion*  
*perception*  
*philosophy*  
*premise*  
*scenario*  
*supposition*  
*tenet*  
*theory*  
*thinking/thought*  
*view*  
*viewpoint*

## Tentative cognition nouns (36):

*approach*  
*approximation*  
*assessment*  
*assumption*  
*concept*  
*conclusion*  
*deduction*  
*estimate*  
*evaluation*  
*expectancy*  
*expectation*  
*fantasy*  
*fear*  
*guess*  
*hope*  
*hunch*  
*hypothesis*  
*idea*  
*illusion*  
*impression*  
*judgment*  
*notion*  
*opinion*  
*perception*  
*perspective*  
*point of view*  
*presumption*  
*projection*  
*scenario*  
*scheme*  
*speculation*  
*suspicion*  
*theory*  
*thesis*  
*view*  
*vision*

## Nouns of tentative likelihood (15):

*alternative*  
*appearance*  
*avenue*  
*candidate*  
*chance*  
*inclination*  
*likelihood*  
*opportunity*  
*possibility*  
*potential*  
*probability*

## Nouns of tentative likelihood (14):

*avenue*  
*candidate*  
*chance*  
*odds*  
*option*  
*possibility*  
*potential*  
*probability*  
*promise*  
*prospect*  
*sign*

*promise*  
*sign*  
*tendency*  
*trend*

*tendency*  
*threat*  
*trend*

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