

**Elements of Simplification and Persuasion
in Radiological Patient Instructions**

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Tässä pro gradu -tutkielmassa tarkastellaan amerikkalaisille potilaille suunnattujen radiologisten tutkimusohjeiden ymmärrettävyyteen ja suostuttelevuuteen liittyviä kielellisiä tekijöitä. Tutkielman teoreettisessa viitekehysessä radiologisia ohjetekstejä lähestytään viidestä toisistaan täydentävästä, tekstien laadintaa normittavasta näkökulmasta. Aluksi tekstejä tarkastellaan lääketieteellisen kuvantamisen ammattilaisten ja potilaiden välisinä viestintätilanteina: vallitsevassa katsannossa radiologiset potilasohjeet nähdään työkaluina, joiden avulla potilas ja lääkäri pyrkivät yhteisymmärrykseen potilaan hoidosta päätettäessä. Toisekseen tutkimusohjeet voidaan nähdä popularisoituna tieteenä, jossa tarkoitus on tekstien ymmärrettävyyttä ja suostuttelevuutta edistävien keinoin muokata ammattikielinen teksti maallikkokieliseksi.

Radiologiset ohjetekstit ovat amerikkalaisessa kontekstissa yleensä myös ammattimaisen lääketieteellisen viestinnän tuotoksia, jonka keinoin kansalaisille pyritään jakamaan ymmärrettävää ja puolueetonta lääketieteellistä tietoa. Potilasohjeet voidaan edelleen mieltää teksteiksi, joiden laadinnassa tulisi noudattaa selkokielisyyteen tähtääviä oppeja, sillä tutkimusten mukaan suurella osalla amerikkalaisista potilaista on merkittäviä vaikeuksia ymmärtää lääketieteellisiä ohjeita. Lisäksi tekstit voidaan katsoa retoriseksi suostuttelutilanteiksi, joissa lukijan tietopohjaan, asenteisiin ja eritoten toimintaan pyritään lyhyellä tähtäimellä vaikuttamaan.

Tutkielman empiirisenä aineistona käytettiin käsin koostettua korpusta, joka käsitti kymmenen sähköistä, tietokonetomografiatutkimuksiin liittyvää ohjetekstiä. Teoriaosuuteen tukeutuen tekstejä tutkittiin viiden ymmärrettävyyteen ja viiden suostuttelevuuteen liittyvän kielellisen elementin pohjalta. Ymmärrettävyyden näkökulmaan liittyen teksteistä tarkasteltiin lääketieteellisten termien ja käsitteiden selityksiä, substantiivilausekkeiden rakennetta, virkkeiden pituutta ja rakennetta sekä pääverbien aktiivi- ja passiivimuotoja. Tekstien suostuttelevuuteen liittyen tarkastelun kohteena olivat puolestaan viestintätilanteen osapuoliin kohdistuvat viittaussanat, eufemismien käyttö, adjektiivien semantiikka, direktiiviset puheaktit sekä toisteiset rakenteet.

Tekstien substantiivilausekerakenteiden, virkepituuksien tai virkerakenteiden ei kokonaisuutena arvostellen katsottu aiheuttavan merkittäviä esteitä ymmärrettävyydelle: substantiivilausekkeet käsittivät pääosin yhdestä kolmeen sanaa, keskimääräiset virkepituudet olivat selkokielen vaatimuksia noudattaen korkeintaan 20 sanan mittaisia sekä virkkeet rakenteeltaan pääosin joko yhden päälauseen käsittäviä tai kaksi lausetta yhdistäviä. Ymmärrettävyyden kannalta ensimmäiseksi merkittäväksi ongelmaksi nousivat lääketieteelliset termit, joiden merkitystä ei avattu maallikkolukijalle. Toisekseen yksikään teksti ei noudattanut selkokielen vaatimuksia passiivilauseiden rajoittamisesta korkeintaan kymmeneen prosenttiin lauseiden kokonaislukumäärästä.

Retorista suostuttelutilannetta luotiin teksteissä lähinnä runsaslukuisalla yksikön toisen persoonan pronominimuotojen käytöllä, kun taas adjektiivien retorinen kapasiteetti jäi pääosin hyödyntämättä. Direktiivisten puheaktien retorisen tehokkuuden suhteen tuloksissa oli puolestaan runsaasti hajontaa. Lääketieteellisen viestinnän oppien mukaisesti teksteissä viljeltiin eufemistisiksi tulkittavia rakenteita niin yksittäisten sanojen kuin kokonaisten virkkeiden tasolla. Eufemismit vaikuttivat liittyvän erityisesti tutkimuksen aiheuttamista säteilyhaitoista viestimiseen, kun taas tutkimuslaitteiston teknistä edistyneisyyttä esiteltäessä pääasiallisena suostuttelukeinona toimivat sana-, lauseke- ja virketasoiset toisteiset rakenteet ja tutkimuksen kivittomuudesta kerrottaessa lyhyet lauseet. Näin ollen useat kielelliset elementit tukivat samanaikaisesti sekä tekstien ymmärrettävyyttä että suostuttelevuutta.

Avainsanat: potilasohjeet, lääketieteellinen viestintä, ymmärrettävyys, selkokieli, retorinen suostuttelu

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1 Introduction

The purpose of the present thesis is to study the linguistic elements of simplification and persuasion used in a set of ten online instructions designed for patients undergoing a medical imaging procedure. The thesis can roughly be divided into two hemispheres: while Section 2 will theoretically characterise the instructions from five different perspectives, Sections 3 and 4 will introduce the material, methods, and findings of the empirical analysis. Section 5 will summarise and evaluate the findings in relation to the theoretical perspectives, as well as present a critical evaluation on the empirical analysis. Finally, an elaborate enumeration of the empirical and theoretical material is presented in Section 6. As for the present introduction then, the following two subsections will offer brief insights into the practical and theoretical frameworks of the subject-matter at hand.

1.1 The practical background and purpose of the study

My interest in the topic was primarily aroused by personal experience within medicine: as for the specific medical area, I decided to study radiological instructions since I have education in radiography and radiotherapy, together with a cumulative employment experience of some four years in the profession of radiological technologist. From the subspecialty of radiology, I chose to concentrate on instructions concerning computerised tomography scans, or CT scans. A CT scan is a radiological study during which detailed image slices of both bone and soft tissue can be obtained with the aid of massive imaging equipment, ionising radiation, and occasionally also intravenous and oral contrast media. Contrast media are soluble substances based on iodine or barium, the purpose of which is to enhance either normal or pathological tissue structures in the images acquired. During the procedure, the patient lies supine on a scan table which moves horizontally inside a tiltable, ring-shaped device which contains a rotating x-ray tube. A radiological technologist

takes care of the patient and operates the imaging device with a computerised interface, while a radiologist is responsible for interpreting the images.

CT scans were selected as the representatives of radiological procedures in this study since they usually require even quite intricate preparation on the part of the patient. Furthermore, as the perioperative process of these examinations is presumably somewhat unknown to the average patient, and as they also contain several risk factors ranging from radiation hazards to claustrophobic experiences and allergies to contrast media, the language-related requirements of CT instructions seem overwhelmingly demanding. That is, the language has to be simplified without sounding patronising; comprehensive without being verbose; matter-of-fact without sounding inaccessible; informative without being intimidating; and persuasive without obscuring the risks. Of the various requirements imposed on medical instructive texts, I selected the elements of simplification and persuasion as the focus of the present study. In my opinion, these factors can be regarded as the paramount contributors to the usability, functionality and efficiency of these texts: first, the text has to be simple enough to be comprehended, also by the medically illiterate patient; second, it has to be persuasive enough to be abided by, also by the irresolute and apprehensive patient.

The two primary research questions could be formulated as follows: How are linguistic elements of simplification employed to enhance the comprehensibility of the given set of radiological patient instructions? How are linguistic elements of persuasion utilised to enhance the assertiveness of these texts? According to my hypothesis, various elements of simplification and persuasion will presumably be not only plentiful but also discernible at several linguistic levels, ranging from vocabulary to sentence structure and beyond. As for elements of simplification, the texts will be investigated for the introduction of medical terminology and concepts together with the length, complexity and type of noun phrases and sentences; and as for the elements of persuasion, the texts will be examined

for the terms of address, euphemistic vocabulary, semantic nature of adjectives, repetitive structures, and formulation of directives.

On the one hand, the present study can be located within the field of technical writing: indeed, the texts to be examined can be regarded as products of medical writing, which is typically categorised as a subspecialty of technical writing. Patient instruction writing conforms well to the key principle of technical writing: that is, the principle to produce comprehensible and assertive texts that grant the various informational needs of any given audience due respect. The subfield of medical writing is, however, a discipline with a yet brief history and theoretical premises that may best be described as rudimentary. However, for a thesis of this level to contribute to the theoretical background of a developing field would perhaps be far too ambitious of an aim. Indeed, the total number of the instructive texts under analysis being limited to ten, the aim of the study is not to draw any generalisable conclusions applicable to patient instructions at large. Rather, my objective is to describe and evaluate the language in the set of authentic instructions in question, and to possibly provide further research on the area with some preliminary information and source of inspiration. On the other hand then, my study finds its methods and analysis schemes from the discipline of English linguistics. Therefore, the present thesis can as well be characterised as a linguistic study, the material of which merely coincides to be derived from the field of medical writing.

1.2 Previous studies on the language of patient instructions

The present subsection will summarise the key findings of a selection of previous investigations into the subject, with the purpose of employing them as a point of reference to the findings of the present thesis, whenever applicable. To begin with, a plethora of studies quantitatively assessing the readability of patient information exists: to state an example, Pothier et al. (2008) investigated the readability levels of patient information

leaflets on speech disorders. The study revealed that merely every fourth of the 20 leaflets under study complied with the advice offered by the British National Health Service Toolkit for Producing Patient Information, which essentially relies on the principles of plain English to be discussed in 2.4.1 and 2.4.2. After revising the texts to better correspond with the recommendations of the toolkit, readability scores were significantly improved. However, Redish (1985, 130–131) asserts that readability formulas are quite poor indicators of the usability and understandability of public documents as they do not address the plausible predicaments related to the overall organisation, design, or grammar of the texts.

Clerehan and Buchbinder (2006), who analysed a set of 18 rheumatology drug leaflets at the levels of genre, discourse semantics, and lexicogrammar, also argue that readability formulas are of limited value when assessing the simplicity of patient instructions: they tend to ignore nontextual dimensions such as the context of reading, cultural differences, visual elements, density of information, and the appropriateness of the language. Instead of mechanistic readability formulae, these scholars recommend the adoption of more qualitative methods, such as examining the generic structure and rhetorical functions of the texts, the level of specialisation of the lexicon, status relations between the writer and the reader, theme and rheme considerations, lexical density, and modalisation. Their own empirical findings revealed, for instance, high variability in the generic structure of the individual texts, potentially confusing use of rhetorical devices, as well as a high level of technicality and lexical density in the vocabulary of patient information texts. (Clerehan & Buchbinder 2006.)

A recent study examining patient leaflets from an Italian-Spanish contrastive point of view by Calvi and Mapelli (2009) corroborates by pinpointing the impaired legibility of the material studied, which was primarily attributable to the excessive use of technical language. Patient information leaflets were here characterised as a genre of science popularisation that has both informative and directive functions. As for the cultural contrast,

Italian leaflets appeared to prefer impersonal structures, while the Spanish ones were assessed as more user-oriented and communicative. (Calvi & Mapelli 2009.) Finally, Laiho (2003) evaluated the quality of Finnish-language patient instructions on diagnostic radiology from the perspective of nursing science, noticing a similar tendency of impersonalisation: nearly half of the texts preferred passive sentences over active ones. However, Laiho (2003) did not berate the texts for their sentence length or word choice: in fact, the texts were almost entirely bereft of sentences with more than 20 words, and 80 percent of them appeared to contain no specialised vocabulary whatsoever.

2 Characterising radiological patient instructions

As the theoretical framework for the thesis, the present section will characterise the nature of medical instructions and discuss their location within the inventory of communicational occurrences. Owing to the fact that my empirical material is of North American origin, the situation in the United States will be regarded as the vantage point wherever applicable. The ensuing subsections will represent five different perspectives on describing the communicative and linguistic aspects of the radiological patient instructions under analysis: the texts will be regarded as manifestations of medical communicative occurrences, science popularisations, professional medical writing, plain English texts, and rhetorical events. The common denominator that combines all the latter four ways of characterising radiological patient instructions—science popularisation, medical writing, plain English, and rhetoric—is the focus on the reader. For each perspective, the motivation underlying the utilisation of the theory when devising patient instructions is discussed, and any normative and practical applications are presented.

2.1 The instructions as medical communicative situations

From the communicative viewpoint, patient instructions can be seen as communicational situations between medical professionals and the patient. According to Gwyn (2002, 79), the decision-making process concerning health matters occurs on a dichotomous scale. Of the two opposing views on doctor-patient communication to be presented next, the traditional paternalistic view is now losing foothold to the modern collaborative conception.

2.1.1 The traditional paternalistic view

As Tate (2001, 7) states, throughout the medical history, the doctor has been asserting paternalistic, authoritative power over the patient. Thus, at the one extreme of the scale, there is the tradition of paternalism, whereby the patient entirely bequeaths the decision-

making rights to the doctor. In this case, little to no consultation between the doctor and the patient occurs, but the doctor acts independently and on behalf of the patient instead (Gwyn 2002, 79.) Hence, the said situation could readily be characterised as asymmetric in terms of knowledge and the resulting roles adopted by the professional and the patient. As Vihla (1999, 13) elaborates, the inequality of the setting can indeed be seen as posing a threat to the autonomy of the patient. Tate (2001, 12) however maintains that patients often expect imposition on the part of the medical professional: indeed, authoritative behaviour can act as reassuring evidence of the doctoral knowledge and capability to heal.

According to Gwyn (2002, 68), there tends to be a conflict of interests between the interlocutors engaged in a medical encounter, resulting in mismatching agendas. As Vihla (1999, 13) characterises, the medical professional has traditionally been construed as the normative authority and provider of information, whereas the patient is expected to be a mere recipient of such information. Gwyn (2002, 66) agrees by pointing out that during a medical encounter, the dialogue tends to be structured and directed by the medical professional rather than constructed around the needs of the patient. The doctor usually dominates the inventory of topics under discussion, whereby any emotional plea on the part of the patient is often discarded and smothered under purely physical and biomedical considerations (Gwyn 2002, 68). To me, this appears as a manifestation of the non-holistic western way of seeing the human body as fully separable from the mind.

As Gwyn (2002, 55) further suggests, the idea of power is seen as static and exclusively possessed by the medical professional, who represents the authoritative voice of medicine as a professional discipline. This is indeed reflected in language as well: we tend to collocate the word *order* with doctors, rather than using its more mitigative equivalents *advice* or *recommendation*. Gwyn (2002, 55) in fact characterises the medical professional as an extension or a manifestation of the professional domain of medicine, thereby rendering the doctor as a metonym of medicine. Consequently, radiological patient

instructions can be characterised as written personifications of the information and orders delivered by the doctor. Further, according to Gwyn (2002, 62), the patient is expected to adopt the so-called sick role, which includes the requirement of being able to present evidence of the presumed medical condition. The doctor, on the other hand, can be seen as a social arbiter who has the power to judge the legitimacy of these claims (Gwyn 2002, 62). In a sense, CT examinations could be metaphorically depicted as trials wherein the assertions of the patient are proven either true or false.

As Wiese (2001, 234) maintains, however empowered and informed patients may be, they can always be regarded as a lay audience in relation to the specialised discipline of medicine. Gwyn (2002, 33) characterises the lay knowledge on medicine as often being derived from various conflicting sources, such as prior personal experiences, stories from friends and relatives, and information on the media and the internet. However, commonsensical talk and understanding tend to be subject to and dependent on the professional discourse (Gwyn 2002, 33, 35). Thus, the information scheme of a lay person concerning medicine can be seen as a combination of the interwoven discourses of objective scientific and emotive folk knowledge.

As Gwyn (2002, 34) maintains, professional medical knowledge, on the other hand, tends to be highly specialised, technically complicated, and acquired only after years of education. Therefore, medical professionals are inclined to preserve their specialised knowhow from being propagated outside the professional sphere and to fiercely defend it against alternative, unorthodox approaches to medical conditions. Owing to the exclusive and arcane nature of medical knowledge combined with the hierarchical structure of the healthcare system, the very patients who are subjected to and influenced by this knowledge are in a way denied access to it. (Gwyn 2002, 34.) Vihla (1999, 13) suggests that as the specialised terminology of medicine can be seen as the paramount inducer of the knowledge gap, the use of less technical language has the potential to significantly

soften the institutional message and to constrict the gap between the communicative partners. Hence, terminology is a field worth studying in the present empirical material.

According to Vernon et al. (2007, 4), the paramount barriers to efficient healthcare are premised on poor communication, inadequate information, and incomprehensible instructions. Moreover, Vernon et al. (2007, 2) suggest that the sheer nature of the healthcare system as a non-user-friendly environment can be seen as inherently posing a hindrance for the patient to achieve appropriate care. Furthermore, feelings of fear and embarrassment pertaining to a battery of medical conditions tend to deter many patients from seeking clarification for incomprehensible medical advice or treatment instructions. Cultural differences, language barriers, and the low general literacy level can further aggravate the predicament of effective communication between patients and healthcare professionals. (Vernon et al. 2007, 2.) As Gwyn (2002, 66) pinpoints, the public discourse has indeed rather focussed on defining what constitutes poor communication or yields misunderstandings between medical professionals and the patient rather than on describing the constituents of successful communication. The present thesis suggests that at least as far as written communication is concerned, the aforementioned constituents could be derived from the theories of science popularisation, medical writing, plain English, and rhetoric persuasion.

2.1.2 The modern collaborative view

At the other extreme of the medical decision-making scale lies the tradition of informed choice, whereby the role of the doctor is constricted to an objective presenter of the advantages and disadvantages of different viable options (Gwyn 2002, 79). In my opinion, the modern patient is undoubtedly no longer to be seen as a mere passive recipient of health information, but rather as an active, knowledgeable, and independent consumer of medical knowledge. Wiese (2001, 227) characterises the modern evolvement as a change from the paternalistic tradition to one that is based on partnership, whereby the doctor and

the patient establish a therapeutic team. As Gwyn (2002, 79) maintains, the modern prevailing viewpoint on the issue indeed tends towards the idea of shared decision-making, whereby the doctor and the patient are supposed to arrive at a collaborative agreement. As Gwyn (2002, 79) asserts, shared decision-making requires both parties to partake in the process and to agree on the resolution achieved, which in turn calls for the doctor to apportion medical information with the patient. This in turn requires medical professionals to discard any attitudes of medicine as an exclusive practice and patients as mere obedient recipients of doctoral orders. Indeed, as stated by Berry (2007, 3), much of the anxiety and dissatisfaction experienced by the patient is attributable to lack of information and explanation, while enhancing the quality of clinical communication is proven to yield positive health outcomes. Moreover, increasing patient participation tends to improve satisfaction, compliance and treatment outcomes (Berry 2007, 3).

However, as Gwyn (2002, 79) points out, shared decision-making can also be seen as threatening the security provided by the traditional non-egalitarian relationship of doctor-patient communication: patients may feel uncomfortable if they misinterpret this type of behaviour on the part of the doctor as manifesting uncertainty. Moreover, the informed choice of the patient may not always yield desirable outcomes. Undoubtedly, the internet has greatly contributed to patient participation in medical decisions; nonetheless, an estimate of three million Americans have endured emotional distress or physical harm due to misconceiving or misapplying online health information. Furthermore, failure to exercise source critique is a predicament of great proportions, particularly now that 80 percent of Americans report to surf the web in search of medical information. Factors that decrease critical attitudes include the perceived credibility of the source, attractiveness of the information, and impaired computer skills. (Willerton 2008, 311–312.) The above issues can indeed be seen as posing immense challenges to the professionals writing online health information.

2.2 The instructions as popularised science

In radiological communicative situations between medical professionals and the patient, the scientific information of the subject-matter experts needs to be popularised and their specialised language transformed into the layman language of the patient. The two successive subsections will study the need for the scientific language to be translated into commonsensical language, together with the typical linguistic tools used in the process.

2.2.1 Bridging the gap between scientific and lay communities

Whitley (1985, 3) defines science popularisation as “the transmission of scientific knowledge from scientists to the lay public for purposes of edification, legitimation and training”. As Nielson (1998, 10) points out, since providing no information or providing it in an incomprehensible manner on issues of general importance tends to be perceived as secrecy or deception by the general public, albeit none is intended, popularisation also has the potential to enhance the public image and trustworthiness of the scientific community. According to Whitley (1985, 12), popularisation involves the transformation of information from the context of its production into the context of consumption, the consumers traditionally being a larger, less specialised, and more heterogeneous group as compared to the producers. Therefore, in order to bridge the gap between the communicator and the reader, an evaluation of the respective knowledge, values, and beliefs on the subject-matter should be conducted (Schriver 1997, 163).

Wiese (2001, 230–233) recognises five forms of popularisation as regards medical knowledge: first, the practice of oral explanation during a medical consultation, which acts as the most important channel of knowledge transfer; second, the recurrent personal education provided by various medical professionals for patients suffering from a chronic disease; third, patient organisations that deliver information for patients and their families through bulletins, seminars, telephone services, and websites; fourth, information

brochures and patient guidebooks intended to complement the oral communication between medical professionals and their patients; and fifth, health information on the internet as offered by recognised institutions, commercial actors, and other patients. The material studied in the present thesis can be regarded as falling between the latter two categories, thus representing online information brochures. Depending on the publishing format, the texts can be characterised either as true internet texts specifically designed for online use, or as mere ostensible internet texts essentially designed for the paper format and then merely dumped online. The given characterisation reveals one conspicuous dilemma in this type of information delivery: on the one hand, the brochure aspect allows the texts to partially rely on the oral message delivered by the doctor; on the other hand, the online nature of the texts insists that they be independent and self-explanatory units of information as they can be encountered by anyone seeking answers online.

Whitley (1985, 13) argues that the more prestigious the discipline is and the more distant the context of production is from the context of reception in terms of language, skills, and intellectual prestige, the easier it is for the producer to present the popularised knowledge as a reflection of authoritative truth. Owing to the vivid, simplified, and assertive nature of the language, popularised texts tend to present scientifically yet controversial information in a generalised, stable, and incontrovertible manner. For instance, the scientific argumentation underlying the information is scarcely present; the conditions under which the information may not hold are rarely specified; and only little detail to encourage the reader to draw the final conclusions is provided. (Whitley 1985, 15.) To me, this is regrettable yet understandable: the public cannot be assumed to understand all the rigorous principles of scientific argumentation. Further, popularised texts tend to emphasise the importance of the information, as well as tie links between the information and everyday concerns of the readers. The more heterogeneous the audience, the more likely the text is to contain simplification and apodiction. (Whitley 1985, 17.)

2.2.2 Enhancing intelligibility and persuasion through popularisation

According to Gläser (1990, 23), traditional techniques of popularising scientific knowledge comprise providing the reader with ample background knowledge on the subject-matter, adding illustrative examples, and utilising analogies from everyday life. Popular texts also tend to discuss scientific issues with less detail and depth as compared to expert-to-expert communication (Koskela & Puuronen 1995, 128). Reducing the density of terms and explaining or describing technical terms further characterise popularised texts (Gläser 1990, 23). According to research performed by Adams Smith (1987, 635), additional popularisation techniques concerning lexicon include replacing formal terms by colloquial ones, technical terms by non-technical ones, and abstract terms by more concrete ones. Stålhammar (1996, 237) adds metaphors to the list, suggesting that the number of metaphors corresponds to the degree of popularisation in terms of direct proportionality: the more popular the text, the more metaphors it is expected to contain.

Popularised texts also seem to prefer active transitive verbs over passive or stative intransitive ones (Adams Smith 1987, 635). Verbs tend to be concrete and dynamic in nature (Koskela & Puuronen 1995, 129). Furthermore, as Adams Smith (1987, 635) points out, verbal phrases seem to be preferred over nominal phrases in popular texts: for instance, weighty pre-modified noun phrases are typically substituted by relative clauses and post-modification. Koskela and Puuronen (1995, 129) indeed suggest that subordinate clauses tend to be easier to process and understand as compared to pre-modification. However, irrespective of the tendency towards sentence subordination, popularised texts seem to employ shorter sentence lengths in comparison to scientific texts (Koskela & Puuronen 1995, 124). The above points offer a fruitful area of intermingled variables to consider in my empirical material: that is, whether noun phrases are indeed short, without this manifesting as increased sentence complexity and length.

As Adams Smith (1987, 635) further points out, popularised texts tend to substitute tentative modes of expression by more assertive ones, thereby adding to the persuasiveness of the message. Additional means of popularisation include employing rhetoric means typical of journalism, such as striking titles and subtitles, idiomatic vocabulary, as well as hooking introductions which may contain anecdotes, quotations, and accounts of everyday events (Gläser 1990, 23, 27). Elliptical and exclamatory sentences may also be employed, as well as rhetorical questions for the purpose of inviting the reader to engage into an imaginative dialogue with the text. Additionally, a plethora of rhetorical figures of speech lends itself to the use of writers of popularised science, ranging from metonymies and parallel structures to personification and hyperbole. The list can be stretched further by itemising various methods of emphasis, such as the use of intensifying adjuncts, repetitive structures, and typographical means. (Gläser 1990, 19, 29.) The above enumerations considered, the tradition of popularisation thus appears to combine the aspects of simplification and persuasion for the purpose of creating intelligible and effective texts.

2.3 The instructions as products of medical writing

To effectively popularise medical knowledge into everyday language, a specialised professional domain called medical writing has emerged and gained foothold especially in the United States. The ensuing sections will investigate the motivation for the emergence of the field, as well as present the art and craft of medical writing as a normative domain governing the practices of patient information delivery.

2.3.1 Public demand for accurate medical information

Taaffe (1998) maintains that the emergence of the profession of medical writers was necessitated by the exclusive culture of the medical domain, a strong inclination to render

the communication of medical information subservient to the production and intrinsic value of the said information, the highly competitive nature of publishing within the domain, and the public demand for reliable and immediate information needed in solving issues related to health. Nielson (1998, 9) suggests that medical writers possess a vital role in helping the public to arrive at more informed choices concerning technology, drugs, and medical therapies, thereby democratising the society. Medical writing can thus be seen as the art and craft of popularising the expert knowledge of medicine for lay use.

Nielson (1998, 9) argues that over the past decades, explaining and understanding medical science has become more complicated owing to increasing specialisation accompanied by the introduction of new terms and concepts. Simultaneously, the traditional news media has been demonstrating an attitude of lacking interest and misunderstanding towards science, thereby further alienating the public sphere from the world of science. Moreover, the media can be accused of introducing complex and controversial issues in an oversimplified, sensationalist, and incomplete manner: for instance, the first reports on lobotomy as a new procedure were uncritical and biased towards the benefits, notwithstanding that there was no such consensus within the medical community. (Nielson 1998, 9–10.) A demand for a party operating outside the sphere of traditional commercial journalism had thus emerged, a party that would prioritise the needs of the readers for truthful and intelligible health information.

The birth of medical writing responded to this demand. Medical writing can be classified as a subdomain of technical writing, which Schriver (1997, 10–11, 100) characterises as the art and science of document design, the purpose of which is to instruct, inform, and persuade people in order for them to decide on practical matters in everyday reading situations and act accordingly. However, as noted in a qualitative study on the professional status and practices of online medical writers conducted by Willerton (2008, 325), most informants did not identify themselves as technical writers, but rather

regarded medical writing as more of an artistic and intuitive form of professional writing. Moreover, as Taaffe (1998) suggests, when compared to the audience of other technical writing, the readership of medical writing tends to develop a more personal and intense interest towards the text. As suggested by Taaffe (1998), no technology is indeed more applicable to the human condition than that of medicine. While acknowledging the specialised requirements of medical writing, I see no reason why the principles of good technical writing should not be fully applicable to patient communication as well.

According to American Medical Writers Association (AMWA 2009), professionals of medical writing compose and edit information material pertaining to medicine and health. This information is produced either by independently or collaboratively working professionals who gather, interpret, organise, and present information for a given target audience. Approximately one third of American medical writers work on a freelance basis, while the majority of the rest are employed by pharmaceutical companies, health care organisations, and governmental, commercial or non-profit agencies specialising in the production of medical information. (AMWA 2009.) However, as I was searching for references for the thesis, it appeared that most of the literature was composed either by or for medical professionals rather than professionals of language or communication. Thus, it could be inferred that much of medical writing is still being produced by the very subject-matter experts that act as the source of such information, a pattern recognised also by Alanen (2008, 30) in the Finnish context of patient instruction writing.

As stated by AMWA (2009), the range of materials produced within the field is abundant, including patient education brochures, news articles, internet content, and books for the general public; journal articles and education monographs for health care professionals; regulatory documents for government agencies; grant proposals for research scientists and institutions; and sales training and marketing materials for the

pharmaceutical industry. Williams (2002, 25) emphasises the role of written communication within everyday medical practice by pointing out that written discourse enables the delivery of medical information in greater detail as compared to a clinical consultation; moreover, the information can be vested in a readily accessible, portable format. According to Williams (2002, 25), by helping the patient to understand and anticipate the stages of the health care process, written medical information has the potential to improve the experience of the patient within the health care system. Hence, CT instructions do not merely aid the reader in preparing physically for the procedure by offering orders about pre-procedural nutrition and medication: by describing the different phases of the scan, they also assist the patient in terms of mental preparation.

2.3.2 Medical writing as a normative practice

According to AMWA (2009), the production of effective medical information requires skills and knowledge such as an ability to identify the information needs of the target audience; an understanding of medicine and health sciences; an aptitude to gather, analyse, interpret, and integrate data; an ability to simplify complex concepts; and compliance to ethical standards. The following can be listed as plausible objectives for the material produced: to motivate, increase awareness, give information, change attitudes or behaviour, teach a new behaviour or skill, and offer support and advice (Williams 2002, 94). Of these, motivating, informing, advising, and increasing awareness can be seen as predominantly important in the context of radiological patient instructions; further, of pivotal importance is the aim to induce appropriate action in terms of preparation. After all, the general public can be seen as relatively unaware of the world of medical imaging, as well as of the importance of correct preparation in order to safely undergo the scan.

Torkkola et al. (2002, 12) define the following as the required tasks imposed on patient instruction writing: to apportion information, to create meanings, and to invite the reader to partake in the decision-making process related to health matters. As depicted by

Williams (2002, 26), clinical medical writing may achieve the requirement of engaging the reader by explaining the risks and benefits involved in the medical procedure, thereby also enhancing patient satisfaction towards the doctor-patient relationship. Furthermore, information disseminated to patients possesses the potential to improve the effectiveness of the medical intervention by increasing patient comprehension. Additionally, it has a crucial role in ameliorating the accessibility of medical services, thereby promoting preventive measures. (Williams 2002, 26–27.) The approach adopted by scholars of patient instruction writing thus seems to strongly support the collaborative view on medical decision-making rather than that of the traditional paternalistic one.

According to Williams (2002, 14–15), effective medical writing reaches its readership in an accessible and timely manner, as well as communicates a comprehensive but concise message that is relevant both in terms of the intention of the writer and the needs of the reader. Williams (2002, 14–15) therefore instructs the writers of patient instructions to use simple language that engages the attention of the reader, and to employ a tone appropriate for the purpose of the text and the context of its use. Moreover, Torkkola et al. (2002, 47–53) recommend avoiding nominalisations, abbreviations, and words of Latinate origin—that is, the type of constructions avoided in science popularisations as well. Attention should also be paid to sentence length: while sentences exceeding 15 words are typically hard to digest, excessive chopping of sentences tends to render it difficult for the reader to decipher the interrelations between the issues isolated by the comma. Addressing the reader directly is a further point of utmost importance. However, Torkkola et al. (2002, 36–37) maintain that this should solely be accomplished through pronoun usage, as the direct imperative typically appears too harsh, authoritative, and imposing. I strongly disagree: in my opinion, the imperative should always be considered the clearest option when communicating directives. After all, imperativisation does not equal impoliteness, at least in the hands of a skilled writer.

Moreover, as argued by Williams (2002, 26), effective clinical writing has the potential to relieve the pain and anxiety experienced by the patient: information on what to expect, how to prepare, and what the patient may feel at different stages of the procedure enable the reader to prepare physically, mentally, and emotionally for the medical encounter. However, attention should be paid to the emotional load of the message: in practical terms, negative statements should be translated into positive ones (Williams 2002, 98). In a study presented by Berry (2007, 69), patients were significantly more likely to assent to radiological angioplasty treatment when it was characterised as '99 percent safe' as opposed to there being a '1 per cent risk of a serious complication'. Moreover, as maintained by Williams (2002, 98), expressions that are known to elicit strong negative connotations in particular situations, such the words 'cancer' or 'treatment' in recall letters to breast screening patients, should be avoided altogether. Both Berry and Williams thus appear to promote the ethical use of euphemisms in medical writing; whether this is manifested in the present patient instructions is indeed worth examining.

Especially in the American context, the question of liability is of particular importance: as pointed out by Taaffe (1998), legal measures have been taken against medical writers the texts of whom have been deemed unclear, inaccurate, or misleadingly ordered. For instance, if more than one interpretation of drug information could be regarded plausible owing to the order in which warnings were presented, the medical writer would be held responsible for any problems that a patient has in taking the medication (Taaffe 1998). To avoid misunderstandings owing to vague instructions, Williams (2002, 100) emphasises the importance of precise style in medical writing: for instance, the expression 'adequate fluid intake' should be translated according to the pattern 'six glasses of water a day'. Similarly, phrases such as 'excessive bleeding', 'severe pain', 'small discharge' or 'enlarged gland' should be rephrased so that the reader will know exactly how to measure the issues in tangible terms (Williams 2002, 100).

2.4 The instructions as plain English texts

From the viewpoint of the aspect of simplification, patient instructions can be characterised as plain English texts. The ensuing discussion will consider the concept of adult medical illiteracy, which can be seen as immediating the need for clear and simple, yet graceful written medical information—that is, information devised in the spirit of plain English.

2.4.1 Medical illiteracy as a driving force for intelligible information

As Schriver (1997, 26) points out, in the latter part of the twentieth century, citizens and consumers in the United Kingdom, Australia, Canada, and the United States began to voice their desires for more comprehensible documents. Within the context of the United States, the campaign was primarily triggered by the bureaucratic nature of the written communication produced by government agencies and business organisations, wherefrom it propagated into other areas of public communication as well, including academic, technical, legal, and medical writing (Redish 1985, 125; Schriver 1997, 27–28). The movement was strongly supported by President Carter, who in 1978 issued legislation to render federal regulations clearer: all printed federal communication was to be composed in language understandable to the people that were supposed to comply with the regulations—that is, in plain English (Schriver 1997, 27).

The issue of comprehensible documentation can be seen as particularly crucial in clinical medicine where ineptitude to understand medical texts may lead to fatal consequences. As Vernon et al. (2007, 2) assert, acquiring appropriate healthcare requires a competence to read and fill out medical and health insurance forms, to communicate with healthcare professionals, and to understand basic instructions and medical advice. At virtually every phase within the healthcare system, patients are challenged to read and comprehend important medical information, which is regrettably often characterisable as dense, technical, and jargonical (Vernon et al. 2007, 2). As

proposed by the US Institute of Medicine, the concept of health literacy can be defined as the “degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions” (Kutner et al. 2006, iii). Medical illiteracy can thus easily become a matter of life and death.

Recent research reveals that as compared to medically literate individuals, patients with a low health literacy level are more prone to declines in health, frequent hospitalisations, and even premature deceases (Vernon et al. 2007, 5). Baker et al. (2007, 1503) expand the list by asserting that patients with low levels of health literacy tend to possess less health knowledge, manage suboptimally with their chronic diseases, and utilise preventive services less than individuals with higher rates. Moreover, those with a reduced health literacy rate are also less likely to abide by self-care recommendations and prescribed treatment, to err more often in treatment activities and medication dosage, and to lack the skills required to navigate the healthcare system (Vernon et al. 2007, 5). In their empiric study, Baker at al. (2007, 1506–1507) demonstrated that health literacy indeed appeared as a factor independent from other socioeconomic variables when explaining the varying mortality rates of the informants: for instance, in contrast to health literacy, the number of years spent in education appeared only weakly predictive in this respect. What is more, health illiteracy also carries significant economic consequences: according to the estimates of Vernon et al. (2007, 6), in the context of the United States, the annual total costs may amount to more than 200 billion dollars.

In 2003, National Assessment of Adult Literacy examined the health literacy of more than 19,000 adults in the United States. Three scales of literacy were employed: first, prose literacy referred to the knowledge and skills needed to discover, comprehend, and use information from continuous texts of expository, narrative, procedural, and persuasive nature, such as newspaper articles, brochures, and instructional materials; second, document literacy pertained to the knowledge and skills needed for instance to discover,

comprehend, and use information from discontinuous texts, including job applications, transportation schedules, and drug labels; third, quantitative literacy assessed the knowledge and skills required to perform computational tasks using numbers embedded in written texts. The tasks conducted by the informants included, among others, identifying what it is permissible to drink before a medical test on the basis of a set of short instructions; defining a medical term by searching through a complex document; and offering two reasons why a person with no symptoms should be tested for a specific disease based on information in a clearly written brochure. (Kutner et al. 2006, 2, 6.)

According to the adult literacy survey, only 12 percent of American adults manifested a proficient health literacy level, 53 percent were assessed as intermediate, 22 percent had basic health literacy, and 14 percent were deemed as demonstrating skills below basic (Kutner et al. 2006, 14). Vernon et al. (2007, 6) define all adults with basic or below basic skills as representing a low level of health literacy, which thereby denotes 36 percent of the adult US population, or approximately 87 million people. The results also demonstrated the fact that the lower the literacy rating, the less likely the respondent was to acquire health information from any written sources, including newspapers, magazines, books, brochures, and the internet; television and radio were used instead (Kutner et al. 2006, 18). The above findings considered, the level of simplicity in written patient instructions should in fact be stipulated by the needs of the patients with a decreased medical literacy level, particularly now that this characterisation appears to apply to more than one third of the population.

2.4.2 Plain English as a normative practice

As a solution to the predicaments posed by the generally low health literacy level, Vernon et al. (2007, 8) essentially suggest that oral and written instructions be devised in such a way that they can be understood by all patients regardless of their literacy levels. Plain English is thus a case in point. According to Plain English Campaign (2009, 2), texts that

abide by the principles of plain English are clear and concise messages written with the appropriate tone of voice and with the reader in mind. Anything ranging from leaflets to legal documents can be written in plain English without introducing traits of patronisation or oversimplification into the text. Plain English can be defined as “writing that the intended audience can read, understand and act upon the first time they read it”. (Plain English Campaign 2009, 2.) Cutts (2007, 4) has adopted a more prudent approach by describing plain English as the “writing and setting out of essential information in a way that gives a co-operative, motivated person a good chance of understanding it at first reading, and in the same sense that the writer meant it to be understood”. I would rather incline towards the characterisation provided by Cutts: after all, no communication can be conceived as possessing the omnipotent power to work wonders on fully negligent recipients.

Redish (1985, 125) quite nicely reaches the core of the issue by depicting plain English as a straightforward, clear, direct, simple and yet graceful style of writing, which yields texts that resemble spoken texts. Plain English writing also enables the reader to find the required information easily (Redish 1985, 126); in other words, documents adhering to the principles of plain English are convenient to navigate through. Research acknowledges that documents carefully crafted in the spirit of plain English can indeed improve perceived reader comprehension. Cutts (2007, 15) cites an American study on the comprehensibility of a medical consent form: while the test readers of the original form were able to deliver the right responses on average to 2.36 test questions out of 5, with a revised plain English version the correct response rate increased to 4.52, thus manifesting a significant 91-percent improvement. Cutts (2007, 16) suggests that plain English has the power of granting citizens access to services, benefits, justice and fair deals, helping them to arrive at more informed choices, and providing them with a better understanding of their rights and duties.

According to the basic principles of plain English, transforming text into plain English requires neither the meaning of the message to be altered nor the length of the text to be reduced (Plain English Campaign 2009, 2). However, as Schriver (1997, 164) points out, the general public prefers not to read unless absolutely necessary; moreover, people tend to read only as much as they deem essential and not more. Cutts (2007, 54) agrees by maintaining that the modern busy reader wishes to internalise the essentials of the text as fast as possible. Apart from their time-consuming effects, excessively lengthy sentences are also difficult to process as they engulf a larger share of the short-time memory and demand more concentration (Cutts 2007, 19). Cutts (2007, 22–24, 54–56) therefore highlights the importance of tight writing, but not at the expense of lively, polite, and informative language; instead, erasing excess words, repetition, and redundancy is of essence. I agree: erasing words does not equal erasing informativity or persuasiveness.

As further presented by Plain English Campaign (2001, 3) sentences should be maintained brief: the average sentence length should not exceed 15 to 20 words. The research conducted by Cutts (2007, 24) suggests that sentence length indeed appears to correlate with reader perception of the clarity of the text. However, this does not mean making every sentence of the same length, but varying the length of succeeding sentences instead. Moreover, one sentence should not include more than one main idea, plausibly complemented by one related idea. (Plain English Campaign 2009, 3.) Cutts (2007, 21) points out that splitting excessively lengthy sentences is a psychologically legitimised practice as a full stop allows the reader to better internalise the latter point and prepare for the next. As it is quite amazing what such a tiny character is capable of yielding in terms of text simplification, chopping sentences is a method recommended in science popularisation and medical writing as well, as discussed in 2.2.2 and 2.3.2.

According to Plain English Campaign (2001, 3), the passive voice should be avoided in medical plain English writing as it tends to flavour the text with a bureaucratic

undertone, increase the risk of reader confusion, and bereave the text of its liveliness. As Leech and Svartvik (2002, 346) point out, the passive voice is associated with impersonal style, such as scientific and official writing. The active voice, on the other hand, possesses the potential to render the text more personal, concise, and readable (Cutts 2007, 61, 64). Additionally, as the subject and the verb usually provide the majority of the informational content of any sentence, it is reasonable to place them at the beginning. Unlike the passive voice, the active one allows this to be done, without forcing the reader to store large information chunks in the short-time memory while awaiting the action and its performer to be revealed. Readers also tend to manifest a general preference for the active voice. (Cutts 2007, 64–65.) Owing to these overwhelmingly imposing arguments preferring the use of the active voice, it will be interesting to study whether authentic patient instruction writers manifest awareness of the superiority of the active.

However, Plain English Campaign (2009, 4) bestows the use of the passive voice for instance in situations where a negative message needs to be mitigated or where the subject of the sentence is unknown. Cutts (2007, 68) also encourages the use of the passive voice in situations where the subject of the sentence is irrelevant or deductible from the context; where the active voice might appear impolite, blunt or even hostile; where there is a need to spread or obscure responsibility by omitting the agent; where the focus of the sentence needs to be set on the object of the action; and where the known information needs to be placed at the beginning of the sentence, thereby allowing the new information to be revealed at the end. Nevertheless, according to Plain English Campaign (2001, 3), as a general rule, no more than 10 percent of all sentences should be passive. Cutts (2007, 69) has adopted a far more liberal approach by suggesting 50 percent as the saturation point for passives; however, to my opinion, this is beyond doubt a figure hopelessly too high, particularly with regard to patient instructions.

As for addressing the interlocutors, Plain English Campaign (2001, 4) recommends the use of the second person singular and first person plural pronouns when referring to the reader and the authoring organisation, respectively. However, whenever offering instructions, the direct imperative sentence should be considered as the preferred manifestation of a directive speech act instead of a modal auxiliary sentence (Plain English Campaign 2009, 6). As Cutts (2002, 164–165) points out, the direct imperative allows the sentence to be maintained short and simple. Furthermore, the imperative sentence introduces the action at the beginning of the sentence (Cutts 2002, 164), thereby reducing the cumulative information load of the reader. According to Plain English Campaign (2009, 6), the element *please* can be utilised to mitigate the message delivered utilising a direct directive speech act; however, mitigation should not be used if it is an unquestionable imperative that the message should be complied with. Albeit the recommendations to use personal pronouns and the imperative voice are by no means mutually exclusive, studying their interrelationships in the present material could yield interesting results.

As for advice concerning the lexicon, Plain English Campaign (2009, 7) recommends avoiding nominalisations: they tend to render the text abstract, static, and heavy. As pointed out in 2.2.2 and 2.3.2, these constructions are to be evaded in science popularisations and medical writing as well. Cutts (2002, 70) also recommends the use of vigorous, lively verbs instead of nominalised phrases in order to render sentences more powerful, simple, and concise. Within medical writing, Williams (2002, 98) also instructs abbreviations and words with ambiguous meanings to be avoided. Williams (2002, 98) further emphasises the importance of consistent usage of words and explanation of any medical terminology. Plain English Campaign (2001, 4) continues along similar lines by discouraging the use of professional jargon while promoting the adoption of simple everyday words that can be assumed to be comprehended by the intended readership.

As Gwyn (2002, 7–8) suggests, since the early 1970s, medical discourse and terminology have been rapidly penetrating everyday talk; however, as Cutts (2002, 36) points out, judging which words are comprehended by the general public may prove difficult. Cooke et al. (2000, 119) conducted a study assessing the public understanding of the term ‘unconscious’. According to the results, 52 percent mistakenly believed that unconscious patients are able to hear; 42 percent maintained that they cannot open their eyes; and 16 percent thought that unconscious people are capable of conversing and standing up. Research reveals that further terms representing different entities to medical professionals and patients include ‘constipation’, ‘back pain’, and ‘fracture’ versus ‘break’. (Cooke et al. 2000, 119.) Cooke et al. (2000, 119) therefore conclude that medical decision-making should not rely on the interpretation of technical terms. Terminological popularisation as presented in 2.2.2 is thus required. As this requirement was not fulfilled in several of the studies reviewed in 1.2, it will be interesting to examine whether the present material corroborates the findings.

Nevertheless, as Cutts (2007, 3–5) points out, however rigorously the writer adheres to the principles of plain English, the text will not automatically be clearer to the actual readership: instead, the information needs of different audiences depend on factors such as the occupation, prior knowledge, and expectations of the reader, the language of the text, and the diachronic time. Cutts (2007, 4) therefore emphasises the fact that the text should be adjusted to compare to the level of sophistication of the audience: thus, the comprehensibility of any text is to be decided solely by the intended readership. Therefore, high-usage texts should always be tested in practice with representatives of the intended user group (Cutts 2007, 3). Schriver (1997, 160) defines this type of approach as feedback-driven audience analysis, whereby document designers have the opportunity to observe real readers attempting to understand the text after filtering it through their individual knowledge, values, expectations, and needs.

2.5 The instructions as persuasive rhetorical situations

Wherever there is power, there is also resistance. Therefore, understanding medical instructions is not enough: the recommendations have to be abided by as well. The next two subsections will consider the persuasive aspect in relation to patient instructions.

2.5.1 The rhetoric nature of medical decision-making situations

As Storm Klinge (2004, 291) maintains, knowing what to do and how to do it has not been indicated to correlate with action in the medical context. Thus, from the viewpoint of persuasion, patient instructions can be seen as rhetoric situations, whereby the reader is coaxed to agree with the text and act accordingly. According to Miller (2002, 6–12), the aim of persuasion is either to create, reinforce, or alter the responses, attitudes, or behaviours of the recipient. Hauser (2002, 2) sees rhetorical events as communicational occurrences where at least one person engages at least one other to share meanings and interpretations through the use of symbols, the symbols consisting essentially of language. Thus, rhetoric pertains to situations where an agreement needs to be achieved in order for the arguer to attain the desired goal: in other words, a rhetorical situation always emerges from a pragmatic intent, the intent being to influence the decisions of the interlocutor within a relatively short temporal period (Hauser 2002, 2–3). According to Sager et al. (1980, 164), the intent of instructive texts is generally both directive and informative.

According to the principles of modern rhetoric as presented by Hauser (2002, 20), during any rhetorical event, dynamic exchanges of symbols occur between the parties involved. Thus, the tradition of rhetoric sees neither of the interlocutors as the pre-eminently active or the pre-eminently passive (Hauser 2002, 10). The rhetoric vantage point seems applicable only if the modern collaborative view on the nature of doctor-patient communication presented in 2.1.2 is adopted as the ground rule. As Perelman (1980, 19–20) indeed states, persuasion by definition includes the idea of choice based on

free will; thus, if one is obliged to consent, no persuasion is needed. Miller (2002, 4), however, defines persuasive discourse as indirectly coercive, whereby the effectiveness of the persuasion pertains to the credibility of the threats and promises of the arguer.

Radiological patient instructions could be characterised as borderline cases when considering the issue of free will: the readers are indeed free to decide not to undergo the scanning procedure or to discard the required preparations as presented in instructive material, but in so doing they would position their health at stake. Therefore, one might legitimately compromise the idea of patient instructions as merely offering an alternative of truly free in nature. Gwyn (2002, 79) also contests the equipoise of the medical encounter by referring to the resultant outcome as an “informed decision engineered according to doctor preference”: after all, as also discussed in 2.1.1, a vast knowledge gap usually prevails between the interlocutors, rendering the alternatives presented by the doctor rather as pseudo-options from the viewpoint of the patient.

Miller (2002, 6) maintains that persuasion typically relies on both logical appeals to the reason and emotional appeals to the affection, with the relative emphasis of these elements varying from one text to another. Emotive devices are well suited to yield more immediate action; however, the temporal range of impact tends to be shorter as compared to means pertaining to logical argument (Hauser 2002, 102). The linguistic devices typically associated with rhetoric tend to be affective in nature: Perelman (1980, 45–46) states repetition and figurative speech as examples. My intention is not to examine the logical argumentation in the texts; rather, the specific linguistic manifestations of persuasion to be investigated—that is, the use of pronouns, euphemisms, adjectives, repetitive structures, and imperative constructions—can be perceived as pre-eminently working through the emotion of the reader. Considering that the intention of radiological patient instructions is to induce immediate action rather than any type of long-term compliance, the choice can be considered most legitimate.

2.5.2 Compliance-gaining in medical settings

Practice seems to prove that patients often neglect medical orders: as Tate (2001, 14) points out, only one third of patients comply with medical advice to the extent that is sufficient for the advice to be effective; one third follows the advice only partially, whereby sufficient impact is not achieved; and one third completely discards the advice. Research has evinced that non-compliance with medical advice may result in unnecessary or hazardous examinations and treatments, exacerbation or progression of the medical condition, and surging expenses for the patient and the community (Storm Klinge 2004, 290). According to Storm Klinge (2004, 290), this type of non-adherence seems to be independent of variables such as the age, social class, and intellectual level of the patient; correspondingly, the gravity of the symptoms or the disease does not seem to play a part.

While factors such as patient personality and access to health care do influence the adherence to medical prescriptions, communication between the patient and the medical personnel has been established as one of the most essential aspects of compliance-gaining. Persuasion can thus readily be regarded as an imperative element of all medical instructive writing, regardless of the characteristics of the audience. After all, according to Sager et al. (1980, 164), instructions are not to be considered orders or commands but rather as guidelines. Hence, as Sager et al. (1980, 164) assert, instructive texts include the aspect of free will by definition: instructions are “not imperatives for action, but indicate the ways actions are to be carried out if the recipient decides to undertake them”. This considered, it seems that the most decisive stage appears to be the persuasion of the reader to undergo the scan in the first place; after this decision, it is assumed that the reader will regard the instructions as binding.

One way of achieving medical compliance is the use of expert status and power, which can be manifested through utterances implying expert knowledge as well as through simple and comprehensible directions (Storm Klinge 2004, 291). While the former

point rather pertains to issues of factual content, the latter point can be seen as carrying grammatical implications as well: that is, as emphasising that directives be manifested as short, simple and direct imperatives. Appealing to the social consciousness of the patient is a further means of gaining compliance: that is, creating and maintaining a satisfying relationship between the patient and the medical professional, thereby drawing from the innate human need to achieve social approval by pleasing others (Storm Klinge 2004, 296). This could readily be translated into a writing practice that depicts the authoring party as a personalised entity, for instance through the use of the first person plural pronoun as a reference to the authoring party. As this practice is also recommended in plain English writing discussed in 2.4.2, the present material will be studied for the given aspect.

Nonetheless, as Storm Klinge (2004, 292) maintains, people tend to perceive themselves as the select few who remain unaffected by any adverse occurrences; thereupon, creating a satisfying relationship between the patient and the medical professional does not induce enough motivational force to inspire compliance. Hence, the institutionalised message has to be seasoned with an appropriate level of threatening undertones (Storm Klinge 2004, 292). The message has to establish both perceived severity and perceived susceptibility: while the former concept refers to the requirement to communicate that non-compliance will yield serious consequences, the latter one designates the fact that the recipient needs to feel personally vulnerable to the consequences (Storm Klinge 2004, 292). I would not interpret the requirement of perceived severity as recommending the use of direct threats in medical instructions: rather, neutrally expressing the facts should create enough motivation to act. In achieving perceived susceptibility, on the other hand, the use of the second person singular pronouns as a reference to the reader can readily be seen as a case in point, as also recommended in medical and plain English writing. Pronoun usage can thus indeed be considered a variable worth investigating in the present empirical material.

3 The corpus and methodology of the empirical analysis

The ten patient instruction leaflets to be analysed were collected on the internet in September 2009 by searching the string 'CT scan' with the Google search engine. Material gathering was restricted to texts produced in the US in order to avoid variation due to cultural or dialectal factors. American hospitals were chosen for the plain reason that they seemed to be the major provider of English-language radiological instructions on the internet. Further, to ensure maximum randomisation, the first suitable texts were selected. A suitable text was defined as follows: first, the text was to be provided by a practising hospital instead of a governmental body or private association; second, the text was to include both descriptive and instructive segments. The intention of the first criterion was merely to retain a measure of consistency within the authoring parties. The second criterion was then applied in order to exclude any articles merely describing CT scans for any interested parties; hence, in order to be selected, the text was to be primarily intended for patients who are to undergo a CT scan and are therefore in need of instructions. Further, all texts are fairly recent, being published or at least updated within a few years.

Thus, neither the length nor the publishing format of the text was a decisive variable when selecting the material. Table 1 lists the instruction providers selected for the analysis, as well as the approximate word count for each text. The smallest and greatest values have been bolded, a technique employed in tables throughout the paper.

Table 1. Instruction providers and text lengths of the instructions.

Instruction provider	Total word count	Instruction provider	Total word count
Alaska	1,100	Pennsylvania	900
Cleveland	500	San Diego	900
Cooper	1,700	Silicon Valley	900
Johns Hopkins	500	Texas	400
Mayo Clinic	900	Washington	600

Metatextual and navigational elements solely related to the online-nature of the texts, including instructions on using the document, such as ‘back to top’ or ‘click to enlarge’, were distilled before the analysis. Moreover, as a type of a subject-matter expert of medical imaging, I have forbore myself from any evaluations into the information content of the texts, unless the linguistic analysis should so require. As Atkinson (2003, 2) indeed points out, there tends to be a great discrepancy between patient needs and professional beliefs as regards content issues. However, I do wish to pinpoint one content-related peculiarity in the texts: as demonstrated by Table 2, while most texts stated the risks and contraindications for the procedure, many refrained from offering any tangible advantages or indications for the reader, thereby reducing the persuasiveness of the message.

Table 2. The information content of the instructions.

Instruction provider	History of imaging technology	Appearance of scanner	Operation principle of scanner	Indications	Risks and contraindications	Relative advantages	Scheduling	Pre-procedural dieting	Pre-procedural medication	Instructions on oral contrast	Progressive phases of scan	Tasks of patient at hospital	Sensations during scan	Duration of scan	Information on IV contrast	Post-procedural instructions	Information on results	References to further sources
Alaska	x	x	x			x	x	x		x		x		x	x	x	x	
Cleveland		x	x					x	x	x		x	x	x	x	x	x	
Cooper		x	x	x	x	x		x			x	x	x		x	x		x
Johns Hopkins		x	x	x	x			x	x			x	x	x	x			x
Mayo Clinic		x	x	x	x			x			x	x	x	x	x	x	x	
Pennsylvania			x	x	x	x				x		x	x	x	x	x	x	x
San Diego		x	x		x	x	x	x	x	x	x	x	x	x	x	x		
Silicon Valley		x	x		x	x		x		x	x	x	x	x	x	x	x	
Texas		x	x		x			x			x	x	x		x	x		
Washington		x	x		x	x		x			x	x	x	x	x		x	

After gathering the material, the texts were copied, transformed into an MS Word document, and then analysed manually. Albeit extra-linguistic factors, such as typography, layout, and visualisation, can indeed significantly contribute both to the simplicity and persuasiveness of all explanatory and instructive texts, they were excluded from this thesis; instead, the focus is purely linguistic. Both quantitative and qualitative methods were utilised in the analysis, depending on whichever method was better suited to study the given linguistic variable. Moreover, in order to be able to test the hypothesis, variables from various grammatical levels were selected for the analysis. For each variable, a more specific account of the analysis method will be delivered in conjunction with the presentation of the findings. The following three paragraphs will seek theoretical justification for the analysis by discussing the motivation for selecting each variable.

To begin with, terminological considerations were included for the following reasons: as discussed in above sections, albeit reducing the level of lexical specialisation is a key principle in science popularisation as well as in medical and plain English writing, the use of specialised terminology proved to be one of the major stymies to intelligibility in previous studies on the language of patient instructions, as presented in 1.2. Reducing the sentence length is a further means encouraged in the aforementioned fields. Additionally, it can be examined in a highly objective manner. There also appears to be a rather uniform consensus concerning the recommended average sentence length in clear writing, essentially relying on the principles of plain English writing presented in 2.4.2.

However, as the cognitive load imposed by a given sentence is determined by the number of clauses combined to form the sentence rather than the absolute sentence length, the aspect of sentence complexity was included in the analysis as well. Moreover, as presented in 2.2.2, popularised texts tend to introduce subordination in order to substitute for pre-modification. To address this factor, noun phrase complexity was a further variable of simplification to be studied. Additionally, voice was chosen on the

following grounds: while plain English writing strongly encourages the use of active voice, impersonal constructions still seemed to abound in the patient instructions examined within the studies reviewed in 1.2. Since the imperative is a further construction directly addressing the reader, the realisations of the directive speech act were included in the analysis. Owing to its clarity, imperativisation is a highly recommended practice in plain English writing as discussed in 2.4.2: similarly, as inferred in 2.5.2, it can be considered a most legitimate rhetoric method when seeking patient compliance.

As stated in 2.4.2 on plain English and 2.5.2 on rhetoric compliance-gaining, patient instructions need to create a satisfactory doctor-patient relationship resembling an oral communicative situation, as well as communicate perceived susceptibility for the reader. This can be achieved through pronoun usage, wherefore terms of address were chosen as a further variable to be studied. Euphemisms, on the other hand, can be seen as characteristic of medical writing, the subject-matters of which tend to be sensitive in nature. Euphemisms also appear to be recommended in the instructive literature directed at writers of patient information, as presented in 2.3.2. Further, since adjectives can be seen as offering the writers a compact method of communicating various qualifying and persuasive undertones, adjectival semantics will also be studied. Finally, repetition can be seen as the utmost rhetoric device capable of enhancing the clarity, memorability, and persuasiveness of the message. As presented in 2.2.2, this method is widely used in popularised science as well. Table 3 below summarises the analysis template.

Table 3. The analysis template.

Elements of simplification	Elements of persuasion
• The introduction of medical terminology	• References to the communicative parties
• Noun phrase complexity	• Euphemisms
• Sentence length	• Adjectival semantics
• Sentence complexity	• The realisations of directives
• Voice	• Repetitive structures

The division of the individual features under study into the categories of simplification and persuasion is bound to be to some extent artificial: according to Gläser (1990, 22), rhetoric devices contribute not only to the persuasiveness of the text, but also to its clarity. To offer an example, albeit metaphors are traditionally perceived as archetypes of rhetorical persuasion, in the present thesis they will be discussed under the title of simplification. In the material studied, metaphors appeared to first and foremost serve the purpose of explanation rather than that of persuasion. In his account of the comparative use of metaphors in scientific and popularised medical texts, Stålhammar (1996, 241) recognised a similar tendency: with a few exceptions, metaphors were harnessed to serve the purpose of explanation.

In my opinion, the equation works both ways: that is, simplifying elements carry the potential to persuade as well. After all, if one cannot understand, one is hardly persuaded. To cite a case in point, albeit the imperative is here discussed under the topic of persuasion due to its nature of direct appeal, owing to its ability to reduce the syntactic complicity of the sentence and the number of words needed to communicate the message (Cutts 2002, 164–165), it is readily characterised as one of the most straightforward linguistic means of simplification as well. Thus, the elements of simplification and persuasion tend to be intermingled, thereby neatly serving two purposes simultaneously, be these consciously intended by the writer or not. However, as Atkinson (2003, 3) maintains, one must not presume that comprehension should automatically induce persuasion; therefore, both aspects should be addressed in CT instruction writing.

4 Findings of the empirical analysis

The following subsections will introduce the findings of the empirical analysis on the ten patient information texts. Insofar as applicable, the manifestation of each variable is evaluatively compared with the recommendations presented in the theoretical background above. Each variable is also characterised through grammatical information, which serves two purposes: first, it assists in categorising and organising the findings; second, it presents the upper-level framework of practical tools and constraints within which the descriptions and prescriptions presented in Section 3 are to be realised. As a final notice, excerpts from the ten texts will serve as a demonstrating tool in the analysis. In the examples, *italics*—and in relation to the noun phrase analysis, also underlining and [bracketing]—has been used to orient attention to the structures under current interest.

4.1 Elements of simplification

In the following, findings related to the simplificational aspect of the texts will be presented, including the introduction of specialised terms and concepts, the length and complexity of noun phrases and sentences, and the voice of the utterances.

4.1.1 Introducing medical terms and concepts

According to the definition devised by Suonuuti (1997, 9), a concept is a mental collection of characteristics typically associated with a particular real-world referent, be the referent concrete or abstract. A term, on the other hand, is an expression employed to refer to the particular concept (Suonuuti 1997, 9). In the material under study, any terms and concepts judged as belonging to the specialised vocabulary of medicine or medical technology were then identified according to the aforementioned definitions. In the instructions, most specialised terms that were essential for the correct understanding of the preparation procedures proper were introduced with a definition of some type. However, an abundance

of more peripheral terms that appeared in the descriptive sections of the texts remained unexplained. These terms could loosely be classified either as general medical terms shared by several subspecialties within the discourse of medicine or as more specialised technical terms emblematic of the subspecialty of radiology alone, as presented in Table 4.

Table 4. Unexplained terms in the material.

Instruction provider	General medical terms	Specialised technical terms
Alaska	abdomen, pelvis, renal, appendicitis, radiology, angiography, virtual colonoscopy, biopsy, hep lock, PT, PTT, INR, anticoags, conscious sedation, intravenous, referring physician	spiral CT scanner, multi-slice scanner, detector, volume imaging, spiral data acquisition, reconstruct, two-dimensional, three-dimensional, 3D imaging, positioning strap, computer console, intercom, stone study, IV contrast, non-ionic
Cleveland	intravenous, unusual symptom	cross-section, oral preparation
Cooper	intestine, abdomen, abdominal, gastrointestinal, urinary, endocrine, reproductive system, biopsy, endoscopy, colonoscopy, lesion, physical examination, conclusive, surgical clip, outpatient, intravenous (IV) line, rectally, heart palpitation, invasive	cross-sectional, two-dimensional, vertically, standard x-ray, angiogram, barium study, technologist, radiologist
Johns Hopkins	intravenous catheter, hives, anaphylaxis, multiple myeloma	contrast dye, contrast agent, enhanced scan, ACR, RSNA
Mayo Clinic	lower gastrointestinal region, adrenal gland, biopsy, laxative, suppository, hives, outpatient facility	cross section, two-dimensional, stationary x-ray machine, digital detector, MRI, technologist, intercom
Pennsylvania	abdomen, abdominal, rectum, biopsy, health care provider, nausea, hives, antihistamine, steroid, dialysis	cranial CT scan, lumbosacral spine CT scan, orbit CT scan, thoracic CT scan, spiral scanner, multidetector scanner, detector, cross-sectional, three-dimensional, intercom
San Diego	abdomen, pelvis, abdominal cavity, pelvic cavity, creatinine, diabetes regimen, metformin, IV line, intravenously, nausea, medical record (MR) number	oral contrast, contrast media
Silicon Valley	catheterization, fetus, abdomen, solid food, stomach distress	cross-section, radiologist, CT technologist, online system
Texas	aneurysm, abdominal aorta	technologist
Washington	endocrinologist, referring physician	contrast, radioiodine, nuclear medicine physician, nuclear radiologist, radiologist, CT technologist, radioiodine whole body scan, cross-sectional

As a rather surprising finding, the term 'contrast medium' was rarely explained to any thorough extent in the material; moreover, whenever an explanation was provided, it was typically postponed instead of offering it immediately after the first occurrence. The latter tendency was also observable with the key term 'CT scan'. As further presented in Table 4, several texts also discarded defining the professional roles and tasks for the 'referring physician', 'radiologist', and 'technologist', thereupon leaving the prospective patients unsure about whom they will encounter at each phase of the procedure. Apart from these prominent terms, I do not mean to assert that all of the terms presented in Table 4 should have been defined; rather, as most of them could be considered peripheral and therefore unnecessary for the comprehensive description of the procedure, they should have been substituted with everyday equivalents.

In my opinion, ensuring reader comprehension should always override technical preciseness when selecting the vocabulary for a patient instruction leaflet. Therefore, everyday noun phrases such as 'stomach', 'bowels', 'sickness', and 'unborn child' could usually have been used instead of the more precise Latinate terms 'abdomen', 'intestine', 'nausea', and 'fetus', respectively, without much distorting the intended meaning. Moreover, as discussed in 2.4.2, many terms may carry a specific denotation to medical professionals but another, more general or vague one to laymen. In the present material, such terms probably abound, including 'tissue', 'internal organ', 'allergy', 'radiation', and 'tumor', the meanings of which are supposedly much more limited for the intended readership as compared to subject specialists.

Should the introduction of a precise a medical term be necessary, there is a plethora of different means of definition available. According to Svensén (2004, 267–268), different types of lexical definitions include true definitions, paraphrasing, the hybrid type, and usage descriptions. First, true definitions can be either intensions denoting the content of the concept or extensions denoting the range of the concept. While intensions consist of

a combination of the distinctive features of the concept being defined, extensions consist of all the elements or classes which the given concept comprises. (Svensén 2004, 272–273.) True intensional definitions were rather scarce in the present material, but the following explanations could be interpreted as such:

Pennsylvania: A computed tomography (CT) scan is an imaging method that uses x-rays to create cross-sectional pictures of the body.

Silicon Valley: The CT scanner is a doughnut-shaped machine that uses advanced x-ray technology to take pictures of cross-sections of your body, called “slices”.

Cooper: Contrast refers to a substance taken by mouth or injected into an intravenous (IV) line that causes the particular organ or tissue under study to be seen more clearly.

As for extensional definitions, there was one situation where it was categorically utilised:

Silicon Valley: You may, however, have clear liquids (black coffee/tea, broth, clear soups, or juice) during this time in moderate amounts.

Cleveland: Clear liquids include clear broth, tea, strained fruit juices, strained vegetable soup, black coffee, plain gelatin, tomato juice, and ginger ale.

Even if the term ‘clear liquid’ might at first appear fully comprehensible for the layman, explaining it can be regarded a most justifiable choice: after all, a precise apprehension of its denotation is a prerequisite for the successful actualisation of the scan. Moreover, an extensional definition itemising all the allowed beverages can be considered the most suitable explanation for the term, even if the enumerations of different instruction providers proved quite dissimilar. All in all, intensional definition would hardly have yielded a corresponding level of clarity and comprehensibility.

Second, paraphrases can be either synonyms, near-synonyms, or brief rewritings of the given word or a phrase (Svensén 2004, 268–270). Complete synonymy requires the headword and its synonym to be identical in their denotational and connotational meanings, as well as their range of application as regards style (Svensén 2004, 268). Therefore, only a few instances whereby one word was a full word and the other its abbreviation were interpretable as manifesting cases of complete synonymy:

Alaska: *CT scan* or *computerized tomography scan* was first invented by Godfrey Hounsfield in the early 1970’s at the EMI Laboratories in England.

Cooper: If you are to have a procedure done with contrast, an *intravenous (IV)* line will be started in the hand or arm for injection of the contrast dye.

Owing to the requirement of identical range of application, complete synonymy can hardly be seen as possessing much explanatory power, particularly if both units represent specialised language, as was the case here. Indeed, as advised by Svensén (2004, 271), paraphrases should only consist of words which can be expected to be known by the reader. Therefore, CT instructions predominantly resorted to near-synonyms or brief rewritings in their definitions; that is, phrases that have identical denotational meanings but different ranges of application. In the present material, the most popular method of explaining terms seemed to be paraphrasing in parentheses:

Alaska: The patient moves through the *gantry (circular donut shaped part of the scanner)* on a movable table.

Johns Hopkins: If you are taking *Glucophage, an oral drug for diabetes*, your drug should be discontinued prior to the study and for 48 hours thereafter.

Mayo Clinic: CT scans can be done even if you have a *pacemaker or an internal cardioverter defibrillator (devices implanted in your chest to help regulate your heartbeat)*.

Typically, the first unit belonged to specialised and its counterpart to general language.

Grammatically, these kinds of structures are called appositions. According to Quirk and Greenbaum (1973, 276), apposition consists of two or more grammatical units which are either identical in reference or the reference of one is included in the reference of the other. Quirk and Greenbaum (1973, 278–283) also point out that reformulation, or paraphrasing in the second appositive, is usual when giving the more technical equivalent of the term in the second unit:

San Diego: Since contrast media is filtered through your kidneys, you will need to have a blood test to determine *kidney function (creatinine level)*, before you can be given the contrast media.

Silicon Valley: You may have been given contrast material earlier as part of a CT scan, a *kidney x-ray (also called an IVP)*, or a *heart or blood vessel catheterization (also called an angiogram)*.

Pennsylvania: Rarely, the dye may cause a *life-threatening allergic response called anaphylaxis*.

In the above instances, the intention of the utterance seemed to be to familiarise patients with medical discourse, should the terms appear during health care encounters.

Inclusive appositions were also observable, defined as non-identical appositions where the first unit includes the reference of the second (Quirk & Greenbaum 1973, 282):

Mayo Clinic: Your doctor may recommend a CT scan to help diagnose *muscle and bone disorders, such as bone tumors and fractures*.

Pennsylvania: If you absolutely must be given such contrast, your doctor may choose to treat you with *antihistamines (such as Benadryl)* or steroids before the test.

Albeit inclusive appositions have imprecision as their inherent drawback, enumerating all the possible items would often be not only unnecessary but also impossible.

Third, the hybrid type consists of a paraphrase or a true definition ensued by one or more synonyms or near-synonyms (Svensén 2004, 295):

Texas: A CT scan (“cat scan”) is an x-ray technique that uses a computer to create cross-sectional (or slice-like) pictures of the heart.

Mayo Clinic: A CT scan — also called computerized tomography or just CT — is an X-ray technique that produces images of your body that visualize internal structures in cross section rather than the overlapping images typically produced by conventional X-ray exams.

Cleveland: Computed tomography, commonly known as a CT scan, uses X-rays and computers to produce images of a cross-section of the body.

Fourth, usage descriptions accompanied by practical examples can be utilised when true definitions or paraphrases would be impossible to generate, as with function words and interjections (Svensén 2004, 297). This type was not observable in the present material.

Moreover, a host of technical and medical concepts were explained through metaphors and everyday analogies. According to Montgomery et al. (2000, 151, 153, 156), metaphors are effective and persuasive kinds of meaning transfer occurring in any part of speech and operating through similarity and semantic connotations. However, in instructive texts, metaphors must be employed most thoughtfully: as Montgomery et al. (2000, 150) point out, since figurative language tends to embellish the text with indeterminacy, readers may differ in their interpretations of metaphors. Indeed, entangling the meaning of a metaphor calls for a degree of sheer guessing (Montgomery et al. 2000, 150). In general, radiological discourse seems to host an abundance of metaphors: the imaging device itself is called a CT *scanner*; the part of the scanner on which the patient is positioned is referred to as a *table*; the contrast medium is sometimes described as *dye*;

and the images produced by CT scanners are *slices*. Most of the metaphors discernible in the present material could therefore be interpreted as standardised metaphors, or references established during the course of history, instead of stylistic eloquence employed by individual writers.

Montgomery et al. (2000, 154) introduce three metaphor categories: first, concrete metaphors refer to abstract concepts with a concrete term; second, animistic metaphors employ a vocabulary item usually associated with animate things to describe an inanimate phenomenon; third, the humanising metaphor, or personification, describes non-human entities with terminology usually connected to humans. As discussed in 2.2.2, concretisation is also a method characteristic of science popularisations. Describing processes, be they physical or physiological, typically inspired the authors to employ established metaphors, particularly in terms of concrete verbs:

Cooper: You will be asked to remove any clothing, jewelry, or other objects that may *interfere* with the procedure.

Cooper: The x-rays *absorbed* by the body's tissues will be *detected* by the scanner and transmitted to the computer.

Washington: Contrast contains large amounts of iodine, which may *block* or significantly reduce the uptake of radioiodine by thyroid tissue.

San Diego: The water helps *flush* the contrast media from your system.

While purely animistic metaphors could not be pinpointed in the material, personification appeared to be a highly pervasive technique. When describing the functions of the imaging machinery, the underlying technology was often described as an anthropomorphic, agentive performer of actions equipped with emotional or cognitive capabilities:

Silicon Valley: *CT can see* inside the brain and other parts of the body, into areas that cannot be seen on regular x-ray examinations. . . . Because most diseases are better treated when found early, *CT scans can help save lives*.

Mayo Clinic: *A CT scan, however, clearly reveals* these bones and organs as well as their inner structure and detailed anatomy of your pancreas, adrenal glands, kidneys and blood vessels.

Pennsylvania: Since *x-rays have difficulty* passing through metal, you will be asked to remove jewelry and wear a hospital gown during the study.

All in all, the use of metaphoric language rendered the text more lively and concrete, thereby neatly contributing both to the comprehensibility and persuasiveness of the institutional message. As theorised by Gibbs (2008, 210), human beings tend to deposit everyday understanding into their cognition as metaphoric schemes of thought. Thus, introducing the familiar element of metaphor into a specialised text may indeed enhance the intelligibility of the text. Furthermore, as established by recent empirical studies, metaphors tend to induce emotionally charged, concrete bodily responses to texts (Gibbs 2008, 214), which readily increases the persuasiveness and memorability of instructions.

Moreover, as discussed in 2.2.2, everyday analogies are a widely used clarification method in science popularisations. In the present material, some patient instructions rather demonstratively compared CT scans to plain x-rays with which most patients are presumably more familiar:

Cooper: In standard x-rays, a beam of energy is aimed at the body part being studied. . . . In computed tomography, the x-ray beam moves in a circle around the body.

Mayo Clinic: Conventional X-ray exams use a stationary X-ray machine to focus beams of radiation on a particular area of your body to produce two-dimensional images on film or a digital detector, much like a photograph. But CT scans use an X-ray unit that rotates around your body and a powerful computer.

Everyday analogies were thus particularly common when describing the appearance and functions of the imaging device. In an all-American way, several instructions identified the shape of the imaging device with that of a doughnut, which conveniently also implied the fact that the patient hosting of the scanner is far from a claustrophobia-inducing tunnel:

Mayo Clinic: During a CT scan, you lie on a table inside a *doughnut-shaped* machine called a gantry.

Cleveland: The patient must lie as still as possible as the table moves through the large, *donut-shaped* scanning device.

The operating principle of the CT scanner was then most inventively identified with the act of slicing a loaf of bread:

Alaska: The CT scanner produces slices of the body in the same way a loaf of bread is sliced.

Washington: This would be the same if one took multiple little X-rays around a loaf of bread, and then with computer processing, an image is displayed showing you the details of one of

the slices of bread in the loaf. The image of that one slice of bread from the middle of the loaf is a cross-sectional image.

One text even concerned with the accuracy of the bread analogy by delivering a gratuitously condescending metatextual comment on its usability:

Washington: Although this analogy is not completely accurate, it does convey a general concept of how CT scans obtain cross-sectional images.

In my opinion, the analogy appeared quite applicable, albeit the underlying idea might indeed seem a rather brutal one.

Finally, the texts also employed similes to simplify technical and medical concepts. Montgomery et al. (2000, 151) define similes as a subdivision of metaphor; however, while the metaphor proper merely implies a connection between the juxtaposed items, the simile does it explicitly, with the aid of a linguistic signal such as *like* or *as*:

Texas: The CT scanner is a large X-ray machine that has a short, open-ended tube in the middle (*like a very short tunnel*).

Mayo Clinic: The result with CT scans is a set of cross-sectional images, *like slices*, of the inside of your body.

Johns Hopkins: Other people may have an allergic reaction to the dye, *just as some people are allergic to bee stings*.

As similes are thus to be understood literally (Montgomery et al. 2000, 151), they can be regarded as a more secure means of explanation in instructive texts. However, the clarification provided by Johns Hopkins above appeared quite a peculiar choice: by referring to bee stings, the simile invites the reader to associate a contrast agent reaction to something that is typically conceived as ailing or even intimidating.

4.1.2 Noun phrase complexity

In the material studied, noun phrase complexity was determined by calculating the number of words modifying the headword. Word was here understood in an orthographic sense as a string of characters separated from previous and succeeding strings either by a space or a punctuation mark. This way, hyphenated compound nouns such as *x-ray*, *life-threatening*, and *state-of-the-art* were regarded as one word. However, as character

strings separated by dashes, such as *himself/herself*, *and/or*, and *coffee/tea*, can be regarded as consisting of two dissociable and typically opposing meaning units, they were reckoned as two individual words. Nevertheless, as the aforementioned instances were rather marginal in the material studied, their impact on the final results is in any case to be considered minor. Further, while pronouns were here regarded as noun phrases, the dummy 'it' was not, as it has no referential meaning. In addition to the calculations, the internal structure of the noun phrases was qualitatively analysed.

As Huddleston (1988, 85) states, noun phrases consist of an obligatory noun functioning as the head of the phrase and optional pre- and post-head dependents. Pre-head dependents can be either determiners or modifiers. Determiners take the form of possessive phrases, cardinal numerals, determinatives such as 'the', 'some' and 'which' or noun phrases expressing quantification such as 'a few' or 'a dozen'. Modifiers can then be realised by adjectives, nouns, participial verb forms and possessive phrases. Whereas determiners primarily characterise noun phrases in terms of their number, countability, definiteness and quantification, modifiers add further truth value to the head noun, simultaneously restricting the meaning of the head (Huddleston 1988, 85–86, 92–93).

According to Huddleston (1988, 92), although the possible number of determiners in each noun phrase is limited to three, there are no grammatical restrictions as to the number of either pre-head modifiers or any of the post-head dependent types. Post-head dependents exist in three types: complements realised as clauses or prepositional phrases, modifiers taking the form of clauses, adjectival phrases or noun phrases, and peripheral dependents realised as clauses or noun phrases. Complements are only to be combined with certain nouns and thus comparable to the complements required by verbs and adjectives, although never obligatory; modifiers are adopted by all types of nouns and thus comparable to relative clauses; and peripheral dependents are always freely omissible and thus parenthetical by nature (Huddleston 1988, 93–94).

As inserting a determiner is often a grammatical necessity, phrases combining one determiner and a headword can be regarded as the most simple types of noun phrases available for writers of English, obviously in addition to noun phrases consisting of the headword only. The relative shares of these most basic types of noun phrases observable in the material studied have been demonstrated in Table 5.

Table 5. Percentages for the most simple noun phrase types in the material.

Instruction provider	Headword only	1 determiner + headword	Total
Alaska	31.0	25.7	56.7
Cleveland	25.9	28.8	54.4
Cooper	25.7	29.3	55.0
Johns Hopkins	37.9	32.9	70.8
Mayo Clinic	27.5	30.3	57.8
Pennsylvania	30.0	30.8	60.8
San Diego	34.1	19.3	53.4
Silicon Valley	29.6	30.0	59.6
Texas	25.0	26.7	51.7
Washington	31.1	28.1	59.2

Thus, in all of the texts examined, the most rudimentary types of noun phrases accounted for at least a generous half of the totality of noun phrases. Artificial simplification of noun phrases was also observable in one of the texts, which gained dubious honour by occasionally manifesting telegraphic style in its instructions. Here, the omitted articles have been resurrected with the zero character:

Alaska: 0 Admission, exam and recovery may take 2-6 hours.

Alaska: 0 Patient must have 0 responsible adult driver for discharge.

In my opinion, as regards prosaic instructive texts—and particularly those issued into the infinity of the internet—this style yields only little in terms of text economy or space savings, but rather assigns the text an aura of imperfection.

When proceeding to noun phrases that do involve modification, a somewhat stable majority ranging from 60 to 72 percent of the noun phrases in the material were pre-modified, as presented by Table 6. Noun phrases not including pre- or post-modification have been excluded from the calculations on the average number of words in pre- and post-modification, respectively.

Table 6. The percentage of modified noun phrases in the material, together with the average number of words in modification.

Instruction provider	Percentage of pre-modified NPs	Average number of pre-modifiers in NP	Percentage of post-modified NPs	Average number of post-modifiers in NP
Alaska	66.3	1.5	14.2	4.8
Cleveland	69.1	1.4	10.8	4.0
Cooper	66.5	1.3	20.1	5.2
Johns Hopkins	61.4	1.5	9.3	3.4
Mayo Clinic	69.7	1.4	17.7	5.2
Pennsylvania	64.2	1.4	17.7	4.3
San Diego	60.3	1.5	18.1	4.5
Silicon Valley	68.2	1.4	14.2	5.0
Texas	72.4	1.6	18.1	6.4
Washington	66.5	1.4	22.2	3.2

Hence, if any pre-modification was present in a noun phrase, it typically consisted of either one or two words. As an average value, this can be regarded as strongly supporting the readability and comprehensibility of the texts. However, in the rare instances when a noun phrase with more than three words in pre-modification was observable, it tended to render the utterance rather cumbersome to read. In the examples, the noun phrases under current interest have been bracketed and the headword underlined:

Alaska: The CT scanners at Providence Radiology Services are [state-of-the-art spiral CT and multi-slice scanners].

Washington: This could affect the quality of [your radioiodine whole body scan] or effectiveness of your treatment.

[Johns Hopkins](#): For additional information on the web, we recommend you click on the link below to visit [the ACR and RSNA patient information [site](#)].

Here readers are required to store several pre-modificational elements in their short-time memory in anticipation of the headword. What is more, lengthy pre-modificational strings typically contained specialised lexicon, thereby adding to the cumbersome nature of the noun phrase.

As compared to pre-modification, post-modification manifested much wider variation, ranging between every tenth to every fifth noun phrase being post-modified. In addition, the average number of post-modifying words per noun phrase demonstrated more extensive differentiation, ranging from three to six words. Post-modifiers were typically realised as relative clauses or prepositional *of*-constructions. As mentioned in 2.2.2, in popularised texts, relative clauses typically act as substitutes for the heavy pre-modificational constructions emblematic of learned texts, thereby enhancing readability. However, in the texts studied, prepositional or clausal post-modification occasionally proved counteractive when stitched after the grammatical subject of the sentence:

[Pennsylvania](#): [The most common type of contrast given into a vein] contains iodine.

[Cooper](#): [Patients who are allergic to or sensitive to medications, contrast dye, iodine, or shellfish] should notify their physician.

[Cooper](#): [Other related procedures that may be used to diagnose abdominal problems] include abdominal x-rays, pancreas scan, liver scan, gallbladder scan, kidney scan, endoscopy procedures such as colonoscopy, abdominal ultrasound, and abdominal angiogram.

In the above types of utterances, the lengthy subject postpones the revelation of the predicate—a tendency which, as stated in 2.4.2, is discouraged in plain English writing.

Generally however, instead of the absolute length of the post-modifying element, the internal structure of the noun phrases could be regarded as more of an issue in the material studied. First, this manifested as multiple levels of noun phrase embedding, particularly in terms of interweaved prepositional constructions:

[Texas](#): The CT scanner takes [many x-ray pictures of [thin slices of [your heart]]].

[Washington](#): Through computer processing, these images allow [the construction of [highly detailed cross-sectional images of [many of [the organs and structures in [the area]]]]].

Washington: This would be the same if one took multiple little X-rays around a loaf of bread, and then with computer processing, an image is displayed showing you [the details of [one of [the slices of [bread] in [the loaf]]]].

In general, noun phrases representing three levels of embedding were no curios in the texts studied; four and five levels were also observable. Simply by ablating the construction ‘of bread in the loaf’ in the latter example and by dividing the other two examples into separate sentences, the readability and understandability of the utterances could have rather effortlessly been elevated.

A second issue related to the inner anatomy of post-modificational elements was the notion of disjointed noun phrases. In the examples below, the noun phrases disrupted by parenthetical information have been italicised:

Mayo Clinic: The result with CT scans is a set of *cross-sectional images*, like slices, of the *inside of your body*.

Silicon Valley: As part of your test, before or during the study, you may be given an injection (by a nurse, technologist or doctor) of a *contrast agent*.

Johns Hopkins: For this reason, you will be asked to sign a consent form before we give you the dye *which will describe all the possible things that can possibly go wrong when someone is given contrast agents*.

Fortunately, these types of disjunctions were rather marginal in the texts studied.

4.1.3 Sentence length

The average sentence length was calculated as a words-per-sentence basis in the texts examined. The definition of word as applied in 4.1.2 was adopted here as well. As for the definition of sentence, the introductory sentence to a list was included in the total word count of every individual listed sentence: indeed, in order to correctly decode the meaning of every list item in its intended context, readers have to restore the introductory part in their short-term memory when advancing in the reading process. The list format was in fact quite a popular means of structuring text in the material: altogether, there were 20 numbered and bulleted lists used by seven instruction providers. Lists also served a voluminous variety of purposes: for instance, when itemising indications, contraindications, preparation instructions, and the different phases of the scan. Nonetheless, as introductory

sentences were invariably brief and only limited to seven typically short lists, they do not play a major role in the results.

As presented in Table 7 below, the sentence length in all of the ten texts averaged to fewer than 20 words; moreover, two instruction providers had succeeded to squeeze their word counts in less than 15 words per sentence.

Table 7. Average sentence length in the material.

Instruction provider	Average sentence length	Instruction provider	Average sentence length
Alaska	15.7	Pennsylvania	14.7
Cleveland	13.8	San Diego	19.2
Cooper	18.5	Silicon Valley	16.6
Johns Hopkins	19.2	Texas	16.2
Mayo Clinic	17.9	Washington	16.9

Hence, the texts complied rather well with the recommendation of Plain English Campaign to limit the average sentence length to 15 or 20 words, as discussed in 2.4.2. Particularly, sentences stating the painlessness of the scanning procedure were typically very brief and plain, lacking any hesitant elements:

Mayo Clinic: CT scans are painless.

Alaska: The CT examination is fast and painless.

Washington: There is no pain.

Imperative sentences were also typically short, thereby enhancing the comprehensibility and memorability of the list of directives:

Cooper: Read the form carefully and ask questions if something is not clear.

Cleveland: Continue taking your medicines as usual.

San Diego: Start drinking the oral contrast 1½ to 2 hours before your CT scan.

One further group operating with strikingly short sentences were the reasons stated for directives or procedures described earlier in the text:

Silicon Valley: This will allow the necessary time to prepare your paperwork.

Cooper: This allows many different views of the same organ or structure.

San Diego: This is to prevent kidney damage and a serious reaction called lactic acidosis.

Thus, retaining directives and their arguments short did not merely contribute to the simplicity but also to the persuasiveness and assertiveness of the message.

Sentences with 30 or more words were either highly rare or fully absent in the texts. However, when present, they indeed appeared quite tortuous for the reader, who may attempt to digest the message in a state of anxiety and trepidation:

Mayo Clinic: A CT scan — also called computerized tomography or just CT — is an X-ray technique that produces images of your body that visualize internal structures in cross section rather than the overlapping images typically produced by conventional X-ray exams.

Cooper: A CT scan of the abdomen may be performed to assess the abdomen and its organs for tumors and other lesions, injuries, intra-abdominal bleeding, infections, unexplained abdominal pain, obstructions, or other conditions, particularly when another type of examination, such as x-rays or physical examination, is not conclusive.

Alaska: Images can be viewed individually or in rapid sequence, or reconstructed by the technologist as a three-dimensional model that can be manipulated and rotated to provide the physician with an optimal image for review.

By including several separate themes and units of meaning in one sentence, these utterances did not merely violate the recommendations of Plain English Campaign; for the exact same reason, they could have rather effortlessly been dismantled into shorter ones by following the policy of tight writing as presented in 2.4.2. Fortunately however, these excessively elaborated sentences typically occurred in the less significant sections of the text: that is, when the intention of the utterance was descriptive rather than directive. Directives can be seen as the most essential element of the texts: in the case of medical texts, misconceiving or ignoring them may indeed prove lethal, as discussed in 2.4.1.

4.1.4 Sentence complexity

According to Downing and Locke (1992, 275), sentences can be divided into three basic categories: first, the simple sentence solely consists of one independent clause; second, the compound sentence is composed of two independent clauses; third, complex sentences are formed by combining independent and dependent clauses. As Leech and

Svartvik (2002, 277, 399) state, independent clauses can be combined with the coordinators *and*, *or* and *but*, whereas dependent clauses can be realised through relative pronouns, lacking finite verbs, subject-verb inversions, *wh*-words, and subordinating conjunctions such as *before*, *if*, *that*, and *when*. In addition, according to Downing and Locke (1992, 20), both coordinating and subordinating relationships can also be realised *asyndetically*; that is, without any lexical marker referring to a combination of clauses.

Generally, the texts manifested 9 to 12 diverse sentence complexity types; two of the shorter texts, however, had restricted their sentence complexity variation to 5 or 6 types. Three of the most favoured types in each text represented a more or less notable majority, ranging from 62 to 92 percent of the totality. As demonstrated by Tables 8 and 9, all of the ten texts appeared to favour the least complex sentence types available. If two types share a ranking, both are listed in the columns that apply.

Table 8. The three most usual sentence complexity types in the material (main = main clause, sub = subordinate clause).

Instruction provider	Most usual sentence complexity type	2nd most usual sentence complexity type	3rd most usual sentence complexity type
Alaska	1 main	1 main + 1 sub 2 main	1 main + 1 sub 2 main
Cleveland	1 main	1 main + 1 sub	1 main + 2 sub
Cooper	1 main + 1 sub	1 main	1 main + 2 sub
Johns Hopkins	1 main + 1 sub	1 main 1 main + 2 sub	1 main 1 main + 2 sub
Mayo Clinic	1 main + 2 sub	1 main	1 main + 1 sub 1 main + 3 sub
Pennsylvania	1 main + 1 sub	1 main	1 main + 2 sub
San Diego	1 main	1 main + 1 sub	1 main + 2 sub
Silicon Valley	1 main 1 main + 1 sub	1 main 1 main + 1 sub	1 main + 2 sub
Texas	1 main + 1 sub	1 main	1 main + 2 sub
Washington	1 main	1 main + 1 sub	1 main + 2 sub

Notably, as demonstrated by Table 8 above, the simplest sentence type available always appeared among the two most usual types employed. As presented in Table 9 below, the simple sentence claimed a relative share ranging from every fifth to nearly every second sentence containing neither coordination nor subordination.

Table 9. The relative shares of the three collectively most usual sentence complexity types in the material expressed in percentages (main = main clause, sub = subordinate clause).

Instruction provider	1 main	1 main + 1 sub	1 main + 2 sub
Alaska	39.7	14.3	12.7
Cleveland	42.9	25.7	20.0
Cooper	20.7	49.4	10.3
Johns Hopkins	19.2	23.1	19.2
Mayo Clinic	18.9	17.6	21.6
Pennsylvania	23.2	35.7	19.6
San Diego	24.0	22.0	20.0
Silicon Valley	30.8	30.8	11.6
Texas	26.9	42.3	23.1
Washington	31.4	22.9	11.4

As an exception to the rule, some sentences included several levels of embedding seasoned with occasional coordination, thereby rendering the utterance rather wearisome for the reader:

Mayo clinic: [[[Be sure] [to let your doctor know]] [if you have kidney problems]], [[since contrast material [that's injected into a vein] is removed from your body by your kidneys] [and could potentially cause further damage to your kidneys]].

Silicon Valley: [[[[[Each examination is tailored to individual requirements], [[so don't be alarmed] [[if your exam is different from one] [you've had before]], [[or if some additional pictures are taken] [after the first series is completed]]]].

Cooper: [[[If you notice any pain, redness, and/or swelling at the IV site] [after you return home following your procedure]], [[you should notify your physician] [as this could indicate an infection or other type of reaction]]].

Some sentences in fact appeared to approach the writing style of legalese, the one characterised by endless embedding and coordination:

Cooper: [[[We hope] [you find these sites helpful]], [[but please remember] [we do not control [or endorse the information presented on these Web sites], [nor do these sites endorse the information contained here]]].

Johns Hopkins: [[[[[Although this risk is small] [and the benefits of giving you the dye are great]], [[[[we have created the consent form] [[so that you know all the risks involved] [[before agreeing] [to have the dye]]]]]].

The semantic content of the above excerpts considered, the intent may well have been to include all possible meaning items within one sentence in order to disclaim liabilities owing to any possible adverse legal interpretations.

However, the major issue in the material studied was not sentence complexity as such, but rather the fact that coordinated and complex sentences tended to express several ideas simultaneously, without endowing the reader with a moment of cognitive rest in the form of a comma. As discussed in 2.4.2, the convention of cramming several information items into one sentence is also discouraged in plain English writing.

Occasionally, the meaning items were only remotely related in the material studied, as is the case particularly with the elements coordinated in the first example sentence:

Alaska: [[[The units are comfortable for the patient] [[and software development has permitted imaging techniques] [that were not available just a few short years ago]]].

Alaska: [[[[Some exams will also require IV contrast (iodine)] [[which will be injected through an IV], [[which will be started] [when you reach the CT room]]]].

San Diego: [[[[[Since contrast media is filtered through your kidneys], [[you will need to have a blood test] [to determine kidney function (creatinine level)], [before you can be given the contrast media]]]].

In the latter two excerpts, three meaning items can be identified, as presented in Table 10.

Table 10. Assorting meaning items in two example sentences from the material.

Alaska	San Diego
<ul style="list-style-type: none"> Some exams require iodine contrast 	<ul style="list-style-type: none"> You need to have a creatinine test before the contrast injection
<ul style="list-style-type: none"> The contrast medium will be injected through an IV line 	<ul style="list-style-type: none"> A creatinine test measures the functionality of kidneys
<ul style="list-style-type: none"> The IV will be started in the CT room 	<ul style="list-style-type: none"> Kidneys filter contrast medium out of your body

Particularly distracting or even misleading were sentences which, owing to coordination or embedding, contained discontinuous clauses. Here the disjunctive clauses have been italicised:

Silicon Valley: Because x-rays can harm a developing fetus, however, be sure to tell your doctor *if you are*, or think you may be, *pregnant* before preparing for the CT exam.

Cooper: *Contrast refers to a substance taken by mouth or injected into an intravenous (IV) line that causes the particular organ or tissue under study to be seen more clearly.*

Mayo Clinic: *But CT scans use an X-ray unit that rotates around your body and a powerful computer.*

Notwithstanding that these types of disjunctive structures are fully grammatical in English and also tend to provide a neat means of condensing the text, they are perilously liable to misunderstandings. This is perhaps best demonstrated by the latter example: the 'x-ray unit' does not indeed rotate around 'a powerful computer', albeit this reading is equally plausible with the one intended.

4.1.5 Voice

Clause was chosen as the unit of the voice analysis owing to the fact that the texts seemed to manifest extensive sentence-internal variation as regarded their voice choices:

Alaska: These volume scanners *provide* detailed information that *can be manipulated* by the technologist to produce two and three-dimensional images of the body.

San Diego: Since contrast media *is filtered* through your kidneys, you *will need to have* a blood test to determine kidney function (creatinine level), before you *can be given* the contrast media.

Johns Hopkins: For this study you *will either lie* on your back or on your stomach and *be placed* within the scanner opening.

Non-finite clauses, which in the present material consisted of *to*-, *wh*-, and bare infinitives as well as *-ing* and *-ed* participle clauses, were regarded as constructions embedded in the active or passive clause to which they were subordinates and were thus not analysed as independent units in this respect. However, imperative clauses can be considered finite clauses as they usually imply the existence of an omitted second person pronoun (Quirk & Greenbaum 1973, 201, 310); therefore, they were here categorised as active sentences. As the active voice is the unmarked sentence type (Declerck 1992, 2000), it should be

regarded as the default choice in any writing, and particularly in instructive writing.

Therefore, the ensuing discussion will concentrate on analysing the deviations from the rule: that is, the passive occurrences.

The calculation of active and passive clauses in the material revealed a more or less strong preference for the active construction, as manifested by Table 11.

Table 11. The division of active and passive clauses in the material.

Instruction provider	Number of active clauses	Percentage of active clauses	Number of passive clauses	Percentage of passive clauses
Alaska	79	71.2	32	28.8
Cleveland	37	77.1	11	22.9
Cooper	115	74.2	40	25.8
Johns Hopkins	50	84.7	9	15.3
Mayo Clinic	110	86.6	17	13.4
Pennsylvania	71	74.7	24	25.3
San Diego	73	84.9	13	15.1
Silicon Valley	66	75.0	22	25.0
Texas	33	76.7	10	23.3
Washington	46	76.7	14	23.3

Hence, the texts appeared to vary in their voice choices, with the passive count ranging from every eighth to every third clause appearing in the passive voice. If the instructions of Plain English Campaign presented in 2.4.2 are regarded as the point of comparison, none of the texts complied with the recommendation to limit the percentage of passives to 10. A majority of the passive counts of the texts fell between the percentages of 23 and 26, with Alaska appearing as a notable exception with its 29 percentage points.

According to Downing and Locke (1992, 251), voice is a grammatical category which allows the situation described by the utterance to be seen from different points of view, given that there are at least two participants involved in the situation. As Declerck (1992, 200) suggests, passivisation requires the situation to be a dynamic action or

process controlled by a capable agent. The passive construction allows the receiver of the action to become the subject and hence the topic of the clause (Declerck 1992, 200). According to Downing and Locke (1992, 253–254), the passive voice can be employed for instance for the purpose of end-focus, whereby the agent of the sentence can be emphasised, or for the purpose of end-weight, which allows a weighty agent to be placed at the end of the sentence. As Quirk and Greenbaum (1973, 411) point out, the principles of end-focus and end-weight are often inseparable as it is rational to express known information briefly, such as by pronominal substitution, whereas new information deserves more emphasis and readily requires more explication. As discussed in 2.4.2, albeit this type of passivisation is encouraged in the realm of plain English writing, the passive voice was only rarely harnessed to highlight the agent and to simultaneously achieve the advantage of end-weight in the present material:

Cleveland: The test is performed, and the results are reviewed by registered and licensed technologists and board-certified radiologists.

Silicon Valley: Your exam will be reviewed by Silicon Valley radiologists who specialize in this type of imaging.

Indeed, in only 9 instances out of the total of 197 passive clauses in the material, the agent of the passivised sentence was expressed with the prepositional *by*-construction.

As Downing and Locke (1992, 253–254) further list, the passive voice can also be used for the purpose of omitting the agent due to it being for instance unknown, irrelevant, or implied by the context. Hence, the passive voice allows the agent to be either accented or silenced. In the present material, a great majority of the passive constructions exemplified instances of the agent being irrelevant as the purpose of the utterance was to communicate established radiological practice:

Cooper: CT scans may be performed on an outpatient basis or as part of your stay in a hospital.

Silicon Valley: For example, if your abdomen is being studied, a series of pictures will be taken from your lower chest down to the upper pelvis.

Mayo Clinic: CT images are stored as electronic data files and usually reviewed on a computer.

However, most such instances included an implied agent, usually the radiological technologist as the device operator and patient carer:

Texas: You will be asked to undress and put on a hospital gown.

Cooper: A second set of scans will be taken after the contrast dye has been administered.

Pennsylvania: Three-dimensional models of organs can be created by stacking the individual slices together.

In order for passivisation to be recommended in plain English writing, the obscured agent needs to be either irrelevant or deductable from the context, as mentioned in 2.4.2.

However, the above excerpts considered from the perspective of the patient, it may not be apparent as to whom the implied agent refers. This information could be not only meaningful for the patient but it would also allow the activation of the clause by offering it a subject. In the excerpts below, the implied agent is most presumably the departmental secretary, radiological technologist, and referring physician, respectively:

San Diego: If you are receiving insulin as part of your diabetes regimen, every attempt will be made to schedule your CT scan between 7:30 and 9:00 am.

Silicon Valley: Depending on the type of study being done, you may be injected with, or be asked to drink, contrast material.

Johns Hopkins: If you are taking Glucophage, an oral drug for diabetes, your drug should be discontinued prior to the study and for 48 hours thereafter.

The issue was further complicated by the fact that, as noticed in 4.1.1, the roles and tasks of the various professionals involved in CT scanning—particularly, those of the referring doctor, radiological technologist, and radiologist—were not explained for the reader.

In one text, there were two instances where the implied agent of the passive voice was the patient, which can be regarded as even more confusing for the reader:

Alaska: Readi-Cat is best if it has been refrigerated prior to drinking.

Alaska: This can be accomplished through pre-registration (by phone-call 261-3149) or by stopping by the Admitting desk in the front lobby at least 15 minutes before your scheduled exam time.

A more personal construction could and should have been used in both cases, with the imperative being the option recommended both in medical and plain English writing.

As Downing and Locke (1992, 253–254) maintain, omitting the subject also enables highlighting the predicator, whereby the sentence can be presented as a general statement or an unquestionable truth:

Pennsylvania: An abdominal CT scan is usually not recommended for pregnant women, because it may harm the unborn child.

Cooper: While much information can be obtained from a standard x-ray, a lot of detail about internal organs and other structures is not available.

Pennsylvania: Results are considered normal if the organs and structures being examined are normal in appearance.

The passive voice could therefore be used to communicate a general statement relying on established radiological knowledge.

Finally, as Downing and Locke (1992, 255) assert, passivisation enables the phenomenon of thematic progression, or consistent advancement from known to new information within and between clauses and sentences. This type of passive usage contributes both to the comprehensibility of the utterance and the perceived amenity of the reading experience (Downing & Locke 1992, 255). The simple linear progression type enables the rheme of one sentence to become the theme of the successive sentence:

Cooper: CT scans may be done with or without “*contrast*”. *Contrast* refers to a substance taken by mouth or injected into an intravenous (IV) line that causes the particular organ or tissue under study to be seen more clearly.

Johns Hopkins: For this study you will either lie on your back or on your stomach and be placed within *the scanner opening*. *The CT scanner opening* is very wide and you will not feel confined within the space.

In the topic continuity type, passivisation allows the same theme to act as the subject for all the clauses within a given sentence:

Cooper: *The x-rays absorbed by the body’s tissues* will be detected by the scanner and transmitted to the computer.

Alaska: *Images* can be viewed individually or in rapid sequence, or reconstructed by the technologist as a *three-dimensional model* that can be manipulated and rotated to provide the physician with an optimal image for review.

By obviating the need of stating a second grammatical subject, topic continuity type of passivisation readily allows for shorter sentences and a more amiable reading experience.

As a final remark, it should be noted that virtually in any passive instance, more than one motivation for its use could be operative. This considered, deciphering the exact triggering factor for a particular passive usage is bound to be a matter of mere scholarly guessing. Hence, the interpretations above present only one possibility of many. The predicament is, nonetheless, diminished by the fact that by inferring the grounds, I have done exactly what an actual reader of the text would do: that is, constantly create assumptions as to the trains of thought of the writer in order for them to contribute to the overall meaning of the text (Schriver 1997, 367). Whether the interpretation was in fact intended by the writer or not, plays virtually no role for the reader.

4.2 Elements of persuasion

In the following, findings related to the persuasive aspect of the texts will be presented, including references to the authoring and receiving party, euphemisms, semantic nature of adjectives, repetitive structures, and realisations of the directive speech act.

4.2.1 Referring to the communicative participants

If a text addresses its readership directly, either through the use of personal pronouns or the imperative verb form, it provides the reader with the possibility to identify with the text, to experience that the text is in essence designed with the individual reader in mind.

Furthermore, if readers feel that the text is directly talking to themselves instead of some undefined mass audience, it may legitimately be assumed that they are also more easily persuaded. As presented in 2.4.2 and recommended by Plain English Campaign, the communicative situation is best constructed through the use of personal pronouns: that is, the first person plural for the authoring party and the second person singular for the receiving party. In all of the texts studied, this piece of advice was in fact rather strictly abided by as regards the use of the second person singular pronoun:

San Diego: *Your physician* has ordered a CT scan of *your abdomen and/or pelvis*, which allows precise visualization of the organs and structures within *your abdominal and/or pelvic cavity*.

Silicon Valley: Specific instructions will be given to *you* at the time *you* pick up *your contrast*.

Cooper: If *you* notice any pain, redness, and/or swelling at the IV site after *you* return home following *your procedure*, *you* should notify *your physician* as this could indicate an infection or other type of reaction.

Irrespective of the fact that this type of pronoun use is typically redundant from the purely grammatical perspective, it readily serves the purpose of rendering the text more personal and immediate for the reader. It thus appears reasonable to assume that especially the frequent cultivation of the second person singular forms manifested instances of deliberate repetition used for the purpose of direct address, personalisation, and persuasion.

However, the generally advisable utilisation of the second person singular pronoun occasionally suffused the use the imperative mood, which can always be regarded as the clearest option whenever orders or advice has to be communicated:

Cooper: If you are pregnant or suspect that you may be pregnant, *you should* notify your physician.

Washington: *You should* wear comfortable, loose-fitting clothing for your CT exam.

Pennsylvania: If you have any trouble breathing during the test, *you should* notify the scanner operator immediately.

Indeed, merely omitting the unnecessary italicised personal construction would not only have transformed the utterance into the recommended imperative but it would also have abided by the policy of tight communication discussed in 2.4.2.

According to Downing and Locke (1992, 415), as far as spoken discourse is concerned, pronouns typically claim a large share of the vocabulary. As pronouns assume a degree of shared knowledge, they tend to be used more sparingly in written texts (Downing & Locke 1992, 416). However, as the use of personal pronouns as a reference to both of the communicative parties verily renders the texts to resemble oral communicative situations, their usage is encouraged in plain English writing, as discussed in 2.4.2. However, in the present material, only one text utilised the first person plural pronoun forms as a reference to the authoring party to any constant extent:

Johns Hopkins: We try to reduce the exposure of patients to radiation at all times and, if you are pregnant, we would not want to expose you to such radiation unnecessarily.

Johns Hopkins: If you have multiple myeloma or diabetes with kidney failure or have kidney failure from other causes, please let us know in advance. We may be able to perform the study without contrast dye or may be able to perform an alternative study.

Three other information providers demonstrated mere single cases of the first person plural usage, thereby rendering the exact interpretation of the reference rather difficult:

Alaska: Today, we operate two state of the art spiral CT scanners, and offer high-end examinations like CT angiography of the brain and body, virtual colonoscopy and 3D imaging.

Silicon Valley: For your safety, the amount of radiation is kept to an absolute minimum and our equipment is kept in top shape.

Cooper: We hope you find these sites helpful, but please remember we do not control or endorse the information presented on these Web sites, nor do these sites endorse the information contained here.

In all of the cases, the meaning of we excluded the reader, thereby implying an authoritative undertone and contributing to the persuasiveness of the text by signalling that it is a group of yet anonymous professionals whose recommendations the text reflects.

Admittedly, the first person plural pronoun may thus sometimes be regarded as inherently vague, especially as there are several different professional groups involved in completing the CT scan. As discussed in 4.1.5 on voice, since most texts appeared to disguise the reference to the authoring party behind a passive sentence, the predicament concerning the precise referent was often not solved for the reader. Therefore, referring to the representatives of the professional group in question with a precise noun phrase could often be regarded as the most legitimate choice:

Alaska: The staff in Admitting will enter your information into our registration system, and direct you to the Radiology/CT area.

Washington: The CT technologists will give you all the instructions for your CT scan.

Mayo Clinic: A radiologist interprets these images and sends a report to your doctor.

Owing to the precise reference, using these types of noun phrases could in fact be regarded as an option surpassing the benefits of using we.

Irrespective of the fact that recommendations on construing the roles for the interlocutors were typically well complied with, the same communicative participant was

occasionally addressed in varying terms between different sentences. Typically, it was the reader who was sometimes referred to as *patient* and sometimes as *you*:

Washington: In brief, *you* will lie on a table, and the table will be positioned within the CT scanner's opening. . . . A small amount of radiation is passed through *the patient*, and a small X-ray image is obtained and stored on a computer.

Texas: *The patient* lies on a scanning table, which slides through the middle of the CT scanner. The CT scanner takes many x-ray pictures of thin slices of *your heart*.

Cleveland: *The patient* must lie as still as possible as the table moves through the large, donut-shaped scanning device. . . . The technologist will help *you* lie in the correct position on the examining table.

It may well be that the present-day conscious and independent readers do not want to adopt the sick role presented in 2.1.1, which includes accepting the denotation of *patient* as a reference to oneself: therefore, readers might consciously or unconsciously apply the meaning of *patient* merely to some outside third party instead of to themselves. Hence, when an order or a recommendation was the underlying presupposition behind the utterance, the use of indirect noun and pronoun phrases as a reference to the reader appeared specifically distracting, particularly those including the word *patient*:

Alaska: *Patients* should not withhold prescribed medications.

Pennsylvania: *Women who are or may be pregnant* should speak with *their health care provider* to determine if ultrasound can be used instead.

Cooper: *Patients who are allergic to or sensitive to medications, contrast dye, iodine, or shellfish* should notify *their physician*.

One motivation for the above type of distancing reference policy could have been the wish to add an aura of politeness in the text. Nonetheless, in my opinion, this is fallacious: clarity should always override politeness in medical writing, albeit these aspects are by no means mutually exclusive.

Readers were hence referred to with both noun phrases and personal pronouns, and additionally addressed through direct imperative sentences. Thus, the result was sometimes a jungle of discordant grammatical cues that provided the readers with no means of entangling which utterances are intended to apply to themselves and which merely to some individuals outside the immediate communicative situation. As

Declerck (1992, 265) points out, the third person plural form indeed presupposes a group of people to which neither the speaker nor the receiver belongs. If the above instances were not confusing enough for the reader due to the relative spatial distance between the varying terms of address, altering the term abruptly in the middle of one sentence may direct the reader to assume that two different referents are being presupposed:

Alaska: If *patient* is Diabetic, take insulin as directed followed by a light meal, i.e. toast, juice, coffee.

Johns Hopkins: For *some patients*, a small intravenous catheter will be placed in *your arm* to administer an iodine based contrast agent or “dye”.

Alaska: As *the patient* moves through the gantry, the detectors constantly collect data as the radiation passes through *your body*, and with the aid of a complex computer, a two-dimensional image is created.

In the given examples, the reader is first referred to as *patient* and then as *you*, which in the first example is implied by the direct imperative verb form.

Moreover, the reader referent *patient* or *you* was occasionally changed into the first person singular form. However, this type of practice was only used in relation to the frequently-asked-questions type of textual organisation observable in three texts:

Washington: How should *I* prepare for the procedure?

Texas: What should *I* expect?

Silicon Valley: When do *I* get the results?

In these cases, the question including the first person singular pronoun served as a title for the ensuing discussion; the body text was then devised with the second person singular pronoun as the referent for the reader. The use of *I* readily renders the text more immediate for the reader; however, its use appeared regrettably scarce and occasionally also inconsistent in the material investigated.

Interestingly, when the subject under discussion was conceivable as something unpleasant or frightening for the patient, the second person singular form was categorically discarded and altered into a noun phrase that would appear more general and less direct:

Pennsylvania: *Some people* may have discomfort from lying on the hard table.

Texas: *Some people* find that *they* have a bad reaction to the contrast dye, but this is rare.

Silicon Valley: Many contrast agents contain iodine, which causes an allergic reaction in *some individuals*.

This type of linguistic strategy is easily seen as most legitimate and favourable in terms of rhetoric persuasion: now that something negative has to be delivered, the object of the unpleasant experience is implied to be someone outside the immediate communicative situation. Thereby, the utterance suggests that the reader either may or is likely to be unaffected, depending on the exact wording and level of linguistic hedging.

4.2.2 Euphemisms

According to Ayto (1993, 1, 3) euphemisms are expressions utilised to obscure or mitigate plausibly upsetting statements, such as those related to physical disease, which indeed is an issue in CT scanning. Many of the terms used in the present CT instructions, such as *radiation* and *tumour*, presumably convey additional, emotionally laden and exclusively negative connotations for lay readers. Thus, as CT scans include aspects that can generally be considered as frightening or unpleasant, it is no wonder that expressions classifiable as euphemisms abounded in the texts. These aspects pertain especially to radiation hazards, claustrophobic experiences, and any unpleasant experiences related to the administration of contrast media. Radiation-related risks particularly inspired the writers of patient instructions to employ euphemistic understatements which surprisingly often seemed to hover on or even surpass the borders of truthfulness:

Washington: As noted above, CT scans use x-ray; however, the amount of radiation is *low*.

Cooper: The amount of radiation used during a CT procedure is considered *minimal*; therefore, the risk for radiation exposure is *very low*.

Mayo Clinic: During the CT scan, you're *briefly* exposed to radiation.

Cooper: As the scanner begins to rotate around you, *low-dosage* x-rays will pass through the body for *short* amounts of time.

As these utterances characterise the associated risks with relative adjectives, it is quite impossible to deem them as fully erroneous, however. As compared to the benefits of the

scan, the amount of radiation can indeed be seen as low or minimal, at least with regard to large populations. However, when contrasted with alternative imaging procedures, this without doubt ceases to be the case. All of the above utterances can thus be regarded as simplifications of a controversial medical issue presented as undeniable truths for the lay reader. As presented in 2.2.2, this is a strategy widely utilised in the tradition of science popularisation, particularly with regard to prestigious sciences such as medicine.

Nevertheless, none of the texts denied the use of radiation to produce CT images. However, they occasionally preferred expressions not associated to it, including *image*, *picture*, *slice*, and *view* instead of *x-ray*, when referring to the outcome of the scan:

Texas: You will be asked to lie still and to hold your breath briefly as each *picture* is taken.

Mayo Clinic: The result with CT scans is a set of cross-sectional *images*, like *slices*, of the inside of your body.

Alaska: The CT scanner produces *slices* of the body in the same way a loaf of bread is sliced.

Washington: Repeat or extra *views* are frequently necessary, and they do not necessarily mean that the radiologist has found something of concern.

However, some utterances related to the radiation and contrast media risks appeared almost surprisingly straightforward, having only minor mitigating elements:

Pennsylvania: CT scans do create low levels of ionizing radiation, which has the potential to cause cancer and other defects.

Cooper: Radiation exposure during pregnancy may lead to birth defects.

Cooper: In some cases, the contrast dye can cause kidney failure, especially if the person is taking Glucophage (a diabetic medication).

Pennsylvania: If you have any trouble breathing during the test, you should notify the scanner operator immediately.

As the benefits of CT scanning outweigh the associated risks at the level of large populations, the ethical use of euphemisms can be considered a legitimate practice in mass communication, as also suggested in 2.3.2 on medical writing. However, albeit the concept of euphemism is quite established in linguistics, judging between beneficially euphemistic and insincerely misleading usage may prove difficult in practice.

Albeit claustrophobic experiences are more of an issue in MRI examinations rather than in CT scans, owing to the similarity of these two procedures as perceived by

the general public, CT instructions should address the issue, particularly as it may in some rare occasions manifest during CT scans as well. Words such as *claustrophobia* or *panic* were not discernible in the instructions; instead, they were replaced by relative expressions which patients with a corpulent figure or claustrophobic inclinations would most probably interpret as understatements:

Texas: The CT scanner is a large X-ray machine that has a *short, open-ended tube* in the middle (like a *very short tunnel*).

Johns Hopkins: The CT scanner *opening* is *very wide* and you will not feel confined within the *space*.

Cleveland: The patient must lie as still as possible as the table moves through the *large, donut-shaped* scanning device.

Only one text mentioned the word *tunnel* when depicting the physical appearance of the scanning device; generally, expressions emphasising the wideness and openness of the patient housing of the scanner were used instead.

Additionally, words with negative associations were sometimes substituted by more positive ones. For instance, none of the texts mentioned the words *suffer*, *endure* or *side effect*; instead, expressions such as *experience*, *feel*, and *sensation* were used as their less intimidating equivalents:

Alaska: The technologist will explain the procedure to you, instruct you on holding still, breathing, and any *sensations* you may *experience*.

Mayo Clinic: If your exam involves use of an intravenous contrast medium, you may *feel* a brief *sensation* of heat or *experience* a metallic taste in your mouth.

Cooper: If you are given contrast by mouth, you may *experience* diarrhea after the procedure.

As for the concept of pain, it can be seen as a very relative and subjective one. In the material studied, the word was categorically used in negative sentences declaring the absence of pain; however, whenever a reference to pain had to be expressed in a positive statement, the word was usually downgraded to the more abstract *discomfort*:

Pennsylvania: Some people may have *discomfort* from lying on the hard table.

Washington: The test itself will not hurt, but it may be *uncomfortable* to lie still on a table.

Silicon Valley: Should you have *any discomfort* during the test or after the injection, tell the technologist.

As in the above excerpts, these utterances typically included further mitigating elements in addition to euphemisms, such as equivocal determinatives and modal verbs denoting epistemic possibility.

Occasionally, the texts also appeared to eschew mentioning the words *disease*, *illness*, or *sickness*, or the specific names for medical conditions, presumably in order to avoid any frightening connotations related to the diagnosis. According to Ayto (1993, 4), these types of instances can be seen as expressions of vagueness, whereby a superordinate term is used to refer to the concept to be veiled:

Cooper: Based upon your *medical condition*, your physician may request other specific preparation.

Washington: Repeat or extra views are frequently necessary, and they do not necessarily mean that the radiologist has found *something of concern*.

Pennsylvania: The significance of abnormal results depends on the part of the body being studied and the nature of the *problem*.

However, while there is the Latinate coinage *neoplasm* available to substitute *cancer* and *tumour* (Ayto 1993, 5), this euphemism was not used in the material studied:

Mayo Clinic: Your doctor may recommend a CT scan to help . . . Detect and monitor diseases such as *cancer* or heart disease.

Pennsylvania: For example, it can be more risky not to have the exam, especially if your health care provider thinks you might have *cancer*.

San Diego: When you schedule your CT scan, the person scheduling the scan needs to know . . . If you have asthma, kidney problems, and/or a history of *cancer*.

While the specialist term would have clearly interfered with the comprehensibility of the texts, the repentant usage of the word *cancer* has its obvious drawbacks as well: in the mind of an anxious reader, it may evoke unnecessarily frightening connotations.

As Ayto (1993, 2) points out, apart from individual words, syntax and grammar can also be euphemistic: specifically, using the passive voice can indeed be a means of obscuring the directness of the message. As nakedness can be considered a taboo of some degree in the American context, all the sentences that expressed the need for the patient to undress for the scan were interestingly enough constructed in the passive voice:

Texas: You will be asked to undress and put on a hospital gown.

Mayo Clinic: You may be asked to remove your clothing and wear a hospital gown.

Cooper: If you are asked to remove clothing, you will be given a gown to wear.

In the following excerpts, one of the motives to use the passive voice or some other type of impersonal, distancing construction could have been the wish to avoid taking the blame:

Cooper: If your procedure involves the use of contrast dye, you will be asked to sign a consent form that gives permission to do the procedure.

Mayo Clinic: Be sure to let your doctor know if you have kidney problems, since contrast material that's injected into a vein is removed from your body by your kidneys and could potentially cause further damage to your kidneys.

Pennsylvania: If a person with an iodine allergy is given this type of contrast, nausea, sneezing, vomiting, itching, or hives may occur.

Here the first person plural pronoun is not stated as the party responsible of administering the detrimental contrast agent; instead, it is some unspecified agent, or the procedure itself that requires it. Similarly, the plausible side effects appear to merely occur instead of being caused by the authoring party, or at least it is the substance itself that is to take the blame.

4.2.3 The semantic nature of adjectives

According to Downing and Locke (1992, 450–451), adjectives can express either objective or subjective characteristics of noun phrases and clauses: in the former case, the adjective either describes or defines the entity with objectively measurable characteristics typically acknowledged by the entire speech community; in the latter one, the adjective expresses the subjective attitude or experience of the writer. Further, a binary division can also be drawn between gradable and non-gradable adjectives. As Quirk and Greenbaum (1973, 124, 132) state, most adjectives are gradable: that is, perceived as having values on a scale, wherefore they can be amplified by adverbs and inflected for comparison. Owing to these characteristics, gradable adjectives are typically more suitable to expressions of subjective evaluation or emotion. This notion could then be used as a rough measure of the subjectivity of an adjective in the material studied: non-gradable adjectives were typically classifiable as objective and gradable ones as subjective.

Apart from the notion of gradability, which is here casted for a mere supporting role, analysing the semantic nature of adjectives is bound to be highly subjective activity. Therefore, no exact figures will be issued. Moreover, the present semantic categorisation of adjectives is only partially premised on the typology devised by Downing and Locke (1992, 450–451), which basically acknowledges a distinction between objective and subjective adjectives without further subclassifications. Instead, the present analysis rests on a self-devised source-driven quaternary scheme presented by Table 12.

Table 12. A typology for the classification of adjectives in the material.

Objective adjectives		Subjective adjectives	
Neutral	Impressionistic	Evaluative	Emotive
<ul style="list-style-type: none"> • Mostly non-gradable • Mostly specialised vocabulary • Technical or medical in meaning • Not persuasive 	<ul style="list-style-type: none"> • Mostly non-gradable • Objectively measurable or formally verifiable • Subjective meaning implied • Always persuasive 	<ul style="list-style-type: none"> • Always gradable • Often relative in meaning • Only subjectively measurable • Occasionally persuasive 	<ul style="list-style-type: none"> • Mostly gradable • Not measurable • Appealing to the emotion and values of the reader • Always persuasive

Furthermore, the approach is here different from the ones adopted in the analysis of any other variable: that is, one pre-eminently spurring from the intentions of the writer. This does not merely derive from the sheer definition of adjectives presented above; in my opinion, it also provides the analysis with an aura of additional depth.

A remarkable majority of the most common adjectives in the material were deemed non-gradable: that is, conceived as merely having two values that establish direct opposites for one another. Most non-gradable adjectives were technical or medical in nature and therefore straightforwardly characterisable as objective-neutral adjectives, including *computed*, *computerized*, *three-dimensional*, *cross-sectional*, *medical*, *pregnant*, *oral*, *abdominal*, and *allergic*. The exact meaning of some objective-neutral adjectives, particularly of those appearing in directive speech acts, remained unexplained and therefore plausibly opaque for the reader:

San Diego: Do not eat any *solid* food for 4 hours prior to your CT scan.

Silicon Valley: You may, however, have clear liquids (black coffee/tea, broth, *clear* soups, or juice) during this time in *moderate* amounts.

Cleveland: If you experience shortness of breath or any *unusual* symptoms, please tell the technologist.

The middle example also violates the maxim of expressing any measurable amounts in exact units, as discussed in 2.3.2 on medical writing. However, as these types of objective adjectives can hardly be seen as calling forth interest in terms of persuasive power—if not by in fact reducing compliance by irritating the reader with unintelligible vocabulary—they will not be discussed here any further.

Further, the texts displayed a host of objective adjectives interpretable as impressionistic: that is, adjectives which objectively describe the entity but are used by the writer to convey an attitudinal meaning of some kind (Downing & Locke 1992, 452). This kind of usage was primarily related to situations where CT technology was depicted as representing state-of-the-art medical engineering, particularly when eulogising the operating speed of the device and thereby the rapidity of the procedure:

Alaska: Scanners are *faster* and more anatomy can be scanned in a *shorter* time.

Alaska: A *complete* body scan can be acquired in a matter of seconds.

Pennsylvania: The *newest* multidetector scanners can image your *entire* body, head to toe, in less than 30 seconds.

Now that subjective undertones have been vested into an adjective the truth value of which is numerically measurable, a mighty sense of suggestion is created. Similarly, the reliability of the CT staff was highlighted with the impressionistic usage of adjectives indicating their formal educational and professional credentials:

Cleveland: The test is performed, and the results are reviewed by *registered* and *licensed* technologists and *board-certified* radiologists.

Silicon Valley: All the CT personnel are *trained* and *certified* and know how to help you.

Impressionistic adjectives were further utilised when soothing the patient concerning situations with negative associations:

Washington: Repeat or extra views are *frequently necessary*, and they do not necessarily mean that the radiologist has found something of concern.

Pennsylvania: These sensations are *normal* and usually go away within a few seconds.

Cooper: The technologist will be watching you at all times and will be in *constant* communication.

As impressionistic adjectives can be seen as carrying the subjective agenda of the writer vested into a seemingly objective surface manifestation, readers encountering them are hardly likely to pause and compromise the truth value of the adjective. Thus, this type of adjectival usage possesses the persuasive advantage of operating through the unconsciousness of the reader.

In addition to impressionistic usage, subjective adjectives can also be regarded as mighty vehicles of persuasion. While Downing and Locke (1992, 450, 452) categorise adjectives such as *thin*, *short*, and *small* as objective adjectives, in the present study, these types of adjectives were regarded as subjective-evaluative adjectives as they do require the writer to subjectively assess the relative measures of the noun they modify. Moreover, in the material studied, subjective-evaluative adjectives were more or less invariably used to describe entities that are supposedly yet unfamiliar to the majority of the intended readership. Therefore, the average reader can be seen as unable to fully assess the objectivity of the characterisation in the given context. In fact, owing to their relative nature, these adjectives cannot be deemed incorrect in the given context either:

Texas: The CT scanner takes many x-ray pictures of *thin* slices of your heart.

Texas: The CT scanner is a *large* X-ray machine that has a *short*, open-ended tube in the middle (like a very *short* tunnel).

Washington: A *small* amount of radiation is passed through the patient, and a *small* X-ray image is obtained and stored on a computer.

In the above examples, the italicised adjectives do not merely express the relative proportions of the noun phrases they modify, but can also be seen as resembling the impressionistic usage of objective adjectives. That is, the adjective *thin* can be interpreted as implying that the heart of the patient will be most thoroughly examined; *large* and *short* as communicating the fact that the risk for a claustrophobic experience is highly unlikely; and *small* as implying that the amount of radiation exposure remains low.

The second subcategory created for subjective adjectives is the category of subjective-emotive adjectives. Adjectives classified as such appeared to appeal at least as much to the emotion as to the reason of the reader. These types of adjectives typically highlighted the diagnostic capabilities of CT scanning as compared to the related risks:

Washington: Computerized Tomography is a *valuable* scan, which is widely available.

Mayo Clinic: But doctors and other scientists believe that CT scans provide enough *valuable* information to outweigh the associated risks.

Texas: CT scanning is a *safe* test.

Typically, subjective-emotive adjectives thus appeared rather low in their preciseness and informational content. One of the texts also used subjective-emotive adjectives in a sense that smacked of sheer advertising, especially with the repetitive vocabulary involved:

Alaska: Today, we operate two *state of the art* spiral CT scanners, and offer *high-end* examinations like CT angiography of the brain and body, virtual colonoscopy and 3D imaging.

Alaska: The CT scanners at Providence Radiology Services are *state-of-the-art* spiral CT and multi-slice scanners.

Further, when communicating directions, emotive appeals embedded in additional introductory constructions were in fact surprisingly often apparent:

Cleveland: Please be aware that correct preparation is *very important* for the test to be performed properly.

Cooper: Be *sure* to discuss any concerns with your physician prior to the procedure.

Johns Hopkins: During the scanning, it is *important* for you to hold as still as possible because motion makes the scans blurry.

All in all, while subjective-emotive adjectives appeared the most explicitly persuasive of all, they tended to be either highly scarce or fully absent in the texts examined.

4.2.4 Repetitive structures

As Burton (2006) maintains, repetition is a significant rhetorical strategy that can be employed for the purposes of emphasis, clarity, amplification, and emotional effect. In my opinion, albeit repetitive structures are rhetoric strategies typically employed in the domains of literature and advertising, they are fully applicable to instructional writing as well. After all, repetition readily increases the memorability of instructions, which indeed

are intended to be remembered, be it only for a while. In the material studied, repetition abounded at several levels, ranging from conceptual ideas and sentences to phrases and individual words. The structures most often repeated for the purpose of persuasion consisted of entire ideas, typically when celebrating the excellence of CT technology. As defined by Burton (2006), *expolitio* is a type of repetition in which the same idea is recited through variable wording, delivery, or overall treatment. The following utterances highlighting the ability of the CT scanner to yield highly detailed images could be interpreted as instances of *expolitio*:

San Diego: Your physician has ordered a CT scan of your abdomen and/or pelvis, which allows *precise visualization* of the organs and structures within your abdominal and/or pelvic cavity. A series of x-rays will be taken at various angles allowing for *detailed examination* of the abdominal organs.

Cooper: A CT scan shows *detailed images* of any part of the body, including the bones, muscles, fat, and organs. CT scans are *more detailed than standard x-rays*. . . . CT scans of the abdomen can provide *more detailed information* about abdominal organs and structures than standard x-rays of the abdomen, thus providing *more information* related to injuries and/or diseases of the abdominal organs.

Alaska: Each image provides *detailed anatomy* of the body at the specific location or slice. This technology ushered in a new age in medicine and diagnosis as the images provided *extremely high detail* of body structures including bones, soft tissue, brain, organs and blood vessels.

Interestingly enough, albeit the low risk of radiation-related issues and the painlessness of the procedure could be regarded as the most alluring arguments from the point of view of the reader, they were not expressed repeatedly in any of the texts. Rather, as discussed in 4.2.2, utterances communicating radiation risks were principally mitigated with euphemisms. Moreover, as presented in 4.1.3, arguments pertaining to the absence of pain were rendered more convincing by using strikingly short sentences.

Apart from extolling the exactitude of the examination, its costs were also repeatedly characterised as scant when measured against the benefits. In addition to reiterating ideas in different linguistic attires, isocolonic repetition was also observable in risk communication. Burton (2006) defines isocolonic repetition as a series of similarly structured elements, which the following excerpts from the texts studied exemplify:

Johns Hopkins: Although *this risk is small* and *the benefits of giving you the dye are great*, we have created the consent form so that you know all the risks involved before agreeing to have the dye.

Silicon Valley: For your safety, *the amount of radiation is kept to an absolute minimum* and *our equipment is kept in top shape*.

The above examples also contain antistasis, or repeating a word and its antonym within one sentence (Burton 2006), realised with *small* and *great* in the former excerpt and with *minimum* and *top* in the latter one. By resurrecting the antonym of the first word, this type of rhetoric repetition verily reinforces the meaning of both items in the dichotomic dyad.

In addition, structural repetition was also observable when pinpointing the most important issues in the preparation instructions. By introducing structural familiarity, this type of repetition imposes less strain on the short-time memory of the reader, thereby rendering successive sentences faster and easier to read, absorb, and memorise:

Texas: If a contrast dye is **not** going to be used during your CT scan, you should not eat for about 2 hours before the test. If a contrast dye **is** going to be used, you should not eat for about 4 hours before the test.

Cooper: Notify the technologist if you have ever had a reaction to any contrast dye, or if you are allergic to iodine or seafood. . . . Notify the technologist if you are pregnant or suspect you may be pregnant. Notify the technologist if you have any body piercing on your chest and/or abdomen.

However, structural repetition also has its drawbacks. When encountering lengthy stretches of repetitive constructions, an impatient reader may assume that repetition is in fact all that the successive sentence will contain, thereby incorrectly correlating structural repetition with the repetition of an idea. However, in the former excerpt above, this issue was circumvented with the witty use of typographic means. In general though, repeating shorter stretches can always be considered a secure option in instructive writing:

Washington: A CT scan is frequently performed with an injection of a material called "*contrast*." Before receiving the *contrast* injection, check with your endocrinologist, nuclear medicine physician or nuclear radiologist to assure that you are permitted to receive the *contrast*. If you are not sure, do not take the *contrast*. In most cases, you may assume that your endocrinologist does not want you to be given *contrast*.

San Diego: After the CT scan, you must have another *blood test to check your kidney function* before you can start taking *metformin* again. Call your doctor for the results of the *blood test for kidney function* and for instructions about resuming *metformin*. . . . If you are a diabetic who takes any medication that contains *metformin*, you must have a *blood test to check your kidney function* before you can start taking *metformin* again. Call your doctor for the results of the *blood test* and for instructions about resuming *metformin*.

Washington: After completion of your images but before you leave, a radiologist will usually review your images in order to determine whether any *repeat or extra images* are needed. However, do not be concerned if any *repeat or extra images* are performed. *Repeat or extra views* are frequently necessary, and they do not necessarily mean that the radiologist has found something of concern.

As presented by Burton (2006), the above instances utilise epistrophic repetition: that is, ending a series of lines, phrases, clauses, or sentences with the same word or words.

Moreover, the latter excerpt also contains anadiplosis, or duplication of the end of a line or clause at the beginning of the next (Burton 2006). Anadiplosis is typically related to the phenomenon of simple linear progression type of passivisation introduced in 4.1.5, whereby the rheme of one sentence becomes the theme of the successive sentence. This type of rhetoric repetition thus conveniently allows for one grammatical structure to serve two purposes contemporaneously: that is, enhancing the perceived amenity of the reading experience provided by rheme-theme continuity and highlighting the key words of the message offered by anadiplosis.

Additionally, exact or near-exact duplication of the linguistic manifestation was also observable in the texts examined, particularly in relation to delivering instructions and arguing for their compliance:

Cleveland: The patient must lie as still as possible as the table moves through the large, donut-shaped scanning device. Movement could blur the images produced by the scanner. . . . It is very important that you lie as still as possible during the entire procedure. Movement could blur the images.

San Diego: Call your doctor for the results of the blood test for kidney function and for instructions about resuming metformin. This is to prevent kidney damage and a serious reaction called lactic acidosis. . . . Call your doctor for the results of the blood test and for instructions about resuming metformin. This is to prevent kidney damage and a serious reaction called lactic acidosis.

However, instead of replicating the exact word or phrase, words from the same semantic field but different part of speech were occasionally utilised to enhance the message:

Pennsylvania: If you *weigh* more than 300 pounds, have your doctor contact the scanner operator before the exam. CT scanners have a *weight limit*. Too much *weight* can cause damage to the scanner's working parts.

Cooper: If you are *pregnant* or suspect that you may be *pregnant*, you should notify your physician. Radiation exposure during *pregnancy* may lead to birth defects.

According to Burton (2006), this type of repetition is referred to as polyptoton, or recital of the same word or root in various grammatical functions or manifestations.

Moreover, the frequent and often grammatically superfluous repetition of the second person singular pronoun in reference to the reader as discussed in 4.2.1 can be seen as representing pleonasmus, the use of more words than is semantically or grammatically required (Burton 2006). Similarly, as also discussed in the aforementioned section, reciting a distancing noun phrase as a reference to the reader when communicating unpleasant issues could be interpreted as representing rhetoric repetition. As a final observation, obvious rhetoric repetition of structures below the word level, such as letters, syllables or sounds, was not observable in the texts. Notwithstanding, I see no reason why these rhetoric devices emblematic of fictional writing should not season instructive texts as well, given that they are employed with thought and temperance.

4.2.5 Realising the directive speech act

According to Bach and Harnish (1979, 3), the underlying intention of the utterance composer together with the realisation of the utterance is referred to as a speech act. As Downing and Locke (1992, 165–166) state, speech acts can be realised through the four sentence types of declaratives, imperatives, interrogatives, and exclamatives. When these sentence types are used to realise the speech act typically associated to them, they are said to present instances of direct speech acts: that is, when a declarative sentence is employed to make a statement, the imperative type to deliver a directive, the interrogative sentence to inquire or the exclamative type to express an exclamation (Downing & Locke 1992, 166.). When a sentence type has any other but the typical speech act related to it, it is categorised as an indirect speech act (Downing & Locke 1992, 166). As interrogative and exclamative speech acts were either scarce or non-existent in the material studied, respectively, they will not be considered here any further.

CT instructions can be seen to consist of two kinds of writer intentions: on the one hand, they describe the indications and contraindications of the examination as well as the radiological technology, the standardised process of the study, and the plausible risks involved; on the other hand, they offer their readers advice and orders about the mental and physical preparation as well as the means to obtain the results. The descriptive part of the instructions was pre-eminently realised as declarative sentences, with the underlying intention being a constative speech act; that is, a speech act which expresses a belief on the part of the writer together with the presupposition that the reader establishes a corresponding belief (Bach & Harnish 1979, 42). This considered, any constative speech act, and therefore most human communication, can in fact be regarded as persuasive by its very definitional nature.

In the classification presented by Bach and Harnish (1979, 41, 47), the advice and order providing part of the instructions would fall into the category of directive speech acts; that is, speech acts which presuppose the reader to consider the intention delivered by the utterance as a reason to act. Thus, directive speech acts are directly intended to persuade, to induce action. For the present study, orders, prohibitions, and requests to seek further information from other sources were considered directive speech acts; of these, orders devised as positive statements and related to the preoperative preparation established a highly notable majority. The analysis was performed semantically rather than confined to any grammatical structures. Typically, however, one directive sentence corresponded to one directive speech act, which indeed worked in accordance with the recommendation of plain English writing to preferably express only one idea in one sentence. However, the following types of sentences were regarded as consisting of two separate speech acts, as also signalled by the coordinating conjunctions *and* and *or*.

Alaska: Do not take metformin on the day of your CT scan *and* do not resume taking it until your doctor has instructed you to do so.

Cooper: Notify the technologist if you have ever had a reaction to any contrast dye, *or* if you are allergic to iodine or seafood.

Further, only speech acts that required the patient to perform an independent action without any health care professional specifying the exact point of time to realise it were here regarded as directive speech acts. Hence, the following were seen as constative speech acts merely describing future instructions to be delivered by a third party:

San Diego: You will be asked to pick up a container of oral contrast from the Radiology Department.

Washington: You may also be asked to remove hairpins, jewelry, eyeglasses, hearing aids and any removable dental work, depending on the part of the body that is being scanned.

Texas: You will be asked to lie still and to hold your breath briefly as each picture is taken.

Thus, the patient is not expected to fulfill these speech acts merely based on reading the instructive text; rather, these actions will be preceded by the immediate advice of a health care professional, which was also linguistically signalled. These types of utterances were typically related to the scanning procedure proper rather than any preparational activities. However, the following types of utterances were considered directive speech acts as the patient is expected to perform them in a self-guided manner, whenever the situation should so require:

Mayo Clinic: If you experience hives, itchiness or swelling in your throat during or after your CT exam, immediately tell your technologist or doctor.

Silicon Valley: Should you have any discomfort during the test or after the injection, tell the technologist.

These essential pieces of information were typically realised as direct imperatives.

As demonstrated by Table 13 below, the material studied manifested extreme dispersion as to the realisation of the directive speech act. Following the recommendations of plain English writing as presented in 2.4.2, only two texts categorically utilised the imperative mood when communicating directives; in contrast, one text never did.

Table 13. The realisations of the directive speech act in the material.

Instruction provider	Total number of directive speech acts	Number of direct realisations	Number of indirect realisations
Alaska	18	5	13
Cleveland	11	10	1
Cooper	16	10	6
Johns Hopkins	8	4	4
Mayo Clinic	8	8	0
Pennsylvania	11	7	4
San Diego	29	18	11
Silicon Valley	10	10	0
Texas	3	0	3
Washington	6	4	2

Exemplary use of the imperative mood was presented particularly by San Diego and Cleveland Clinic, the directives of which were typically concise and arranged as clear, easily discernible and memorable bullet lists:

San Diego: Do not eat any solid food for 4 hours prior to your CT scan.

Cleveland: Continue taking your medicines as usual.

Cleveland: Please do not bring valuables such as jewelry or credit cards.

Occasionally, typographical means were employed to enhance the message:

Texas: If a contrast dye **is** going to be used, you should not eat for about 4 hours before the test.

Alaska: On the day of the exam, **DO NOT** eat or drink four hrs. prior to the exam.

San Diego: It can take from 30 to 60 minutes to drink all the contrast; you will need to be finished drinking all the oral contrast 1 hour before your scan.

The consistent use of bolding, capitalisation, and underlining readily orients the attention of the reader to the key point of the utterance, thereby empowering its persuasiveness.

As mentioned in 4.2.3, several instruction providers appeared to embellish their imperative sentences with introductory constructions such as *be sure that*, *be sure to*, *be certain to*, and *plan to*:

San Diego: *Be sure* you have a kidney function test within 30 days prior to the CT scan.

Cooper: *Be sure to* discuss any concerns with your physician prior to the procedure.

Silicon Valley: *Plan to* arrive at the CT scan suite at least 15 minutes before your scheduled appointment.

Erasing the italicised, unnecessary constructions would have not only rendered the sentences shorter but also transferred them from directives merely appealing to the cognitive processes of the reader into more active, performative imperatives.

Moreover, in 15 instances out of the total of 76, or circa in every fifth of the imperative sentences, the utterance was mitigated by *please*. As manifested in 2.4.2, plain English guidelines instruct writers to refrain from using mitigation in instances where it is absolutely essential that the directive be complied with. Notwithstanding, in the texts studied, *please* was used virtually in all types of imperatives. Thus, factors such as how important the message was, how much effort it would require on the part of the patient, and whether it related to the successful performance of the scan or the sheer safety of the patient, played no part in the choice as whether to use *please*. Instead, its utilisation seemed purely random both within one text and the entire inventory of texts:

San Diego: If you call after hours, *please* leave your name, Medical Record (MR) number, telephone number and a message.

Silicon Valley: On the day of your CT scan, *please* do not eat solid food for four hours prior to your CT appointment.

Cleveland: If you experience shortness of breath or any unusual symptoms, *please* tell the technologist.

Indeed, as Leech and Svartvik (2002, 175) point out, *please* tends to weaken the directive force of the imperative sentence.

The indirect directive speech acts were predominantly composed with the use of the modal auxiliary verb *should*, with this verb accounting for 16 instances, or a generous one third of all indirect directives. According to Leech and Svartvik (2002, 172, 176), *should* can be interpreted as communicating advice rather than a command, as well as expressing an obligation the fulfilment of which depends on the person referred to. In either case, the final decision concerning obedience remains with the reader (Leech &

Svartvik 2002, 176). As Declerck (1992, 377–378) further characterises, *should* is typically utilised when the speaker is doubtful about the actualisation of the utterance since its basic meaning tends to denote moral obligation or recommendation, wherefore it is often translatable into ‘it is right/proper/correct/decent/righteous to’ or ‘it would be wise to’, respectively. However, in practice, *should* is usually interpreted as a tactful means of delivering commands and instructions (Leech & Svartvik 2002, 176). Nevertheless, as *should* is thus inherently ambiguous in meaning, either interpretation may be possible for the reader in the extracts below, albeit whether to comply with them could in fact prove a sheer matter of life and death:

Johns Hopkins: You *should* take your medications in their routine schedule except if you are a diabetic and are taking medicines to reduce your blood sugar.

Pennsylvania: If you have any trouble breathing during the test, you *should* notify the scanner operator immediately.

Cooper: You *should* notify the technologist if you feel any breathing difficulties, sweating, numbness, or heart palpitations.

In addition, directives that related to the successful realisation of the scanning procedure were sometimes realised with *should*:

Johns Hopkins: If you are scheduled to have contrast dye for your study you *should* not eat for 4 hours prior to the scheduled time of your exam.

Texas: If a contrast dye is not going to be used during your CT scan, you *should* not eat for about 2 hours before the test.

The correct understanding of these utterances is indeed essential for accurate diagnosing.

As discussed in previous sections, directives that were realised with impersonal constructions, either through the passive voice or an impersonal subject, could be interpreted as even more vague in terms of their directive power:

Cooper: *Patients* who are allergic to or sensitive to medications, contrast dye, iodine, or shellfish *should* notify their physician.

Pennsylvania: *Women* who are or may be pregnant *should* speak with their health care provider to determine if ultrasound can be used instead.

Thus, in the above types of instances, there were two factors decreasing the persuasiveness of the utterance: that is, the impersonal reference to the reader and the modal verb construction that typically allows for the utterance to be interpreted as a mere

recommendation instead of obligation intended to cherish the health and security of the patient. In fact, only one of the directive speech acts realised with *should* was interpretable as a mere piece of advice:

Washington: You should wear comfortable, loose-fitting clothing for your CT exam.

The non-compliance of this recommendation would not, at least directly, jeopardise either the safety of the patient or the attainment of a correct diagnosis; therefore, *should* is a legitimate choice.

In addition to *should*, the main verb construction *need to* and the modal auxiliary *must* were occasionally, although scarcely, employed in directives:

Alaska: As with all medical exams, you will *need to* register before your exam.

San Diego: You will *need to* drink this contrast before coming to the hospital for your CT scan.

Alaska: Patient *must* have responsible adult driver for discharge.

Pennsylvania: After the CT scan, you *must* have another blood test to check your kidney function before you can start taking metformin again.

According to Leech and Svartvik (2002, 171–172), while *need to* indicates internal compulsion induced by the situation of the person referred to, *must* can be interpreted to imply obligation that indicates the authority of the writer over the reader. Both can be translated into ‘it is necessary to’ (Declerck 1992, 381, 385): however, while *need to* typically appeals to the personal obligation of the reader, *must* tends to be interpreted as expressing more authoritative and writer-oriented necessity. All in all, both *need to* and *must* especially appear more assertive and persuasive in tone when compared to *should*.

In addition to modal auxiliaries, more subtle declaratives were also utilised while offering advice and orders. Omitting the circumlocutive construction would have once again enabled shortening and imperativising the utterance:

San Diego: Therefore, *it is important that* you pick up the oral contrast no later than the day before your scan.

Washington: *It is best not to* wear clothes with metal, like zippers and snaps, as this can affect the images.

Through the direct and indirect realisations of the directive speech act the texts could be seen as manifesting the ideas of paternalism and informed choice, respectively, as presented in 2.1.1 and 2.1.2. Linguistically considered, the direct imperative mood leaves no room for equivocation on the part of the reader as whether to abide by the utterance or not; thus, the decision is already made for the reader. Indirect realisations of the directive speech act, on the other hand, more readily rely on the personal judgment of the receiver, therefore encouraging the reader to contribute to the decision. Regrettably, indirect speech acts also possess the innate quality of circumlocution, which tends to render the utterance more prone to misunderstandings.

5 Conclusion

Now that the theoretical foundations of patient instruction writing have been laid and the findings of the empirical analysis unveiled, it is time to say a few concluding and summarising remarks. Section 5.1 below will encapsulate the results of the empirical study and weave them together with the viewpoints reviewed in the theoretical background. Section 5.2, on the other hand, will present a critical evaluation of the study, as well as offer suggestions for future scholars interested in investigating patient instructions.

5.1 Summary and discussion of the results

To begin with considerations into noun phrase complexity, the most simple noun phrases—those consisting of a headword only or a headword accompanied by one grammatically obligatory determiner—accounted for 50 to 70 percent of the totality in all of the texts examined. If any pre-modification was present, it typically consisted of one to two words. Similarly, post-modification was generally introduced into the texts with relative modesty: emblematically of popularised texts, relative clauses and *of*-constructions often appeared to act as substitutes for heavy pre-modification, thereby enhancing readability while admittedly increasing noun phrase length. Occasionally however, verbose pre-modification and excessive embedding tended to gratuitously postpone the revelation of the headword of the noun phrase or the predicate of the clause, respectively. As this type of writing forces readers to store lengthy chunks of information in their short-term memory, it is discordant with the recommendations of Plain English Campaign discussed in 2.4.2. However, the above observations considered in their entirety, the texts studied appeared to support the idea of simplification in terms of noun phrase complexity.

The instructions examined earn further commendation for their compliance with the advice of medical and plain English writing to restrict the average sentence length to fewer than 15 to 20 words. Imperative sentences, sentences stating reasons for the

directives, as well as those acknowledging the painlessness of the scanning procedure were typically realised as strikingly short utterances, thereby enhancing not only the comprehensibility but also the persuasiveness of the message. However, sentence length is not to be seen as the sole decisive factor dictating the arduousness of a particular sentence; in fact, this issue can rather be seen as governed by the number of clauses employed to constitute the sentence. Notwithstanding, sentence complexity did not manifest as a predicament of great proportions in the texts examined either: in fact, the simple sentence always appeared among the two most usual types employed, accounting for a generous 19 to 43 percent of all sentences in the material. The most imminent problem with sentence complexity appeared to be the issue of expressing several, occasionally only remotely related or disjunctive ideas within one single coordinated or complex sentence. This policy is indeed disdained in plain English writing: should the ideas be disjunctive, distinct, and merely remotely related, dividing them into separate sentences can readily be regarded as the most evident option.

Hence, despite occasional lapses into excessive embedding and coordination, the overall comprehensibility of the texts was not hindered by noun phrase complexity, sentence length, or sentence complexity. Rather, the predicament crystallised in the active-passive ratio on the one hand and jargonistic terminology on the other, thereby corresponding with previous studies presented in 1.2. As for the former issue, none of the texts complied with the recommendation of plain English writing to limit the percentage of passives to 10, with the average passive count ranging from 13 to 29 percent in the texts studied. Passive constructions served a variety of purposes, but pre-eminently those of omitting the agent due to it being either presumably irrelevant or implied by the context. While employing the passive voice in the aforementioned types of situations is fully mandated by plain English writing, deciphering whether this truly is the case for the reader may prove difficult to assess. Stating the subject in most sentences would not only have

enabled the activation of the structure, but also offered readers essential information on whom from the hospital personnel they will encounter at each phase.

Moreover, by highlighting the predicator and omitting any hesitant elements, the passive voice also enabled ideas to be expressed as established practices and unquestionable truths. This in turn appears to reinforce the idea of medical paternalism discussed in 2.1.1, emblematic of which is to feed patients with ready-made decisions without presenting them with alternative ways of thinking and acting. Indeed, as presented in 2.3.1, the birth of entire realm of professional medical writing was originally premised on the public demand for reliable and unbiased health communication. Thus, the delivery of public medical information should be engineered towards the needs of the lay audience rather than those of the scientific community, albeit these are by no means mutually exclusive. However, patient instruction writing can indeed be regarded as a most delicate business: the disclosure of medical risks is always a negotiation between the elements of preciseness and persuasiveness.

As for terminological considerations, the level of terminological popularisation occasionally appeared insufficient in the texts studied. Thereby the texts also violated the maxim of fostering everyday words in patient communication as encouraged in medical and plain English writing, discussed in 2.3.2 and 2.4.2. As the unexplained terms typically appeared quite peripheral for the correct understanding of the subject-matter, they could have rather effortlessly been either left unmentioned or substituted by items from the general lexicon. Fortunately however, most key terms essential for understanding the preparation instructions proper were provided with an explanation of some type. The most popular means of explanation included metaphors, everyday analogies, as well as near-synonyms and paraphrases acting as appositives. Additionally, true intensional and extensional definitions, similes, and hybrid explanations were also observable.

Correspondingly to the findings of Stålhammar presented in Section 4, metaphors, similes,

and analogies primarily appeared to serve the purpose of simplification and explanation. However, as concretising abstract processes, personifying the scanning device, and comparing medical technology to everyday phenomena rendered the texts more vivacious, these means also contributed to the persuasiveness of the institutional message.

Thus, several variables appeared to conveniently contribute both to the comprehensibility and persuasion of the texts. Apart from short sentences and buoyant figures of speech, the use of imperatives is a further case in point. As presented in 2.4.2, plain English writing strongly encourages the use of unmitigated imperatives. Regrettably, the texts manifested utmost dispersion in relation to this issue: while merely two texts always employed the imperative mood when communicating a directive speech act, one text never did. Some directions were indeed realised in an exemplary manner as concise imperatives, which were intermittently seasoned with typographical effects or organised as parallel and easily memorable bullet lists. Most directive speech act realisations, however, appeared far more vague and unpersuasive due to the utilisation of mitigative elements, such as using the word *please* in a highly haphazard manner, inserting fully unnecessary introductory constructions, as well as realising directions with auxiliary verbs, impersonal subjects, and passive constructions.

What is more, *should* as the semantically vaguest verb in comparison to *need to* and *must* appeared to be the preferred option when delivering directives in an indirect manner. Mitigative and indirect constructions were apparently employed for the purpose of politeness. By leaving ample room for interpretation, they also appeared to encourage readers to partake in the medical decision-making, thereby encouraging the collaborative view on medical decision-making as described in 2.1.2. However, in my opinion, this is not the optimal spot for cherishing politeness and reader interpretation: after all, unintentionally misinterpreting or intentionally discarding the advice may prove detrimental or even lethal, as established in 2.4.1.

However, supplanting direct imperatives with modal verbs possesses one indisputable advantage: that is, it enables the explicit use of the second person singular pronoun as a reference to the reader. This practice is also recommended within plain English writing as presented in 2.4.2; additionally, it can be regarded as a forcible means of rhetoric persuasion as discussed in 2.5.2. However, I would once again criticise the application of the rule in the texts examined: in my opinion, the imperative mood is always to be considered the only viable option when communicating directions in patient instructions. Constatative speech acts describing the forthcoming experiences of the patient are readily regarded as the appropriate place for applying the said pronoun rule. Indeed, as discussed in 2.5.2, patient instructions need to emphasise the fact that the reader might be personally susceptible to the effects of non-compliance with the advice provided by the text. By frequently repeating the second person singular pronoun, the texts in fact managed to achieve a measure of personalisation and persuasion to a praiseworthy extent. However, the reader was woefully often addressed with discordant grammatical constructions, including the imperative mood, personal pronouns ranging from *you* to *they* and *I*, the passive voice, as well as impersonal noun phrases.

Such depersonalising constructions were particularly common when communicating facts that the reader might perceive as uncomfortable or intimidating. These types of instances can be regarded as euphemisms, the use of which abounded in the texts, particularly in relation to radiation risks, claustrophobic experiences, and contrast media administration. Occasionally, words with negative connotations were omitted, downgraded in tone, or superseded by more positive ones. In my opinion, euphemisms were mostly used in a considerate and ethical manner in the texts studied. However, radiation hazards were intermittently described with excessively minuscule terms, thereby hindering the reader to arrive at an informed decision in a way depicted in 2.1.2. Apart from individual words then, euphemistic grammar and syntax were also observable,

particularly when voicing the possibility of the contrast medium to cause adverse bodily reactions and when communicating the need for the patient to undress for the scan. The underlying intention behind the former situation might be the wish to evade responsibility, and the taboo nature of nakedness behind the latter one. All in all, as CT scans are considered statistically low-risk procedures, the use of euphemisms is in my opinion fully legitimate, and in fact encouraged in medical writing as discussed in 2.3.2.

In addition to euphemisms, owing to their quality of conciseness, adjectives can be regarded as most convenient means of conveying the opinions of the writer. Adjectives with impressionistic or emotive undertones in particular can be considered possessing mighty persuasive potential as they can be seen as operating through the unconsciousness of the reader. Such adjectives were chiefly harnessed to celebrate the state-of-the-art nature of the scanning device and the high-end diagnostic capabilities of the procedure as compared to any plausible risks. Further, the persuasive usage of evaluative adjectives utilised to characterise the relative proportions of medical equipment was seen as a rather peculiar instance in the texts examined. Owing to its specialised context of appearance, the average lay reader has assumedly no point of comparison to test the truth value of a particular evaluative adjective; therefore, seemingly neutral adjectives can be employed to achieve persuasive ends. All in all, as a great majority of the adjectives appearing in the texts were characterised as objective and neutral in tone, the full potential of adjectival persuasion was in fact ignored.

To finish with, repetition can be regarded as one of the most obvious rhetoric strategies usable for the purposes of emphasis, clarity, amplification, and emotiveness. Repetition indeed abounded at several levels in the material examined, ranging from ideas and sentences to phrases and individual words. This rhetoric device was not, however, exploited to its fullest: no clear instances of syllabic or phonetic repetition were distinguishable. The structures most prone to persuasive repetition appeared to be entire

ideas, typically when highlighting the precise and state-of-the-art nature of CT scanning. Thus, the use of rhetoric devices appeared to be to some extent dependent on the subject-matter: first, arguments extolling the excellence of CT technology thus chiefly employed repetitive structures; second, statements highlighting the painlessness of the procedure chiefly used short sentence lengths; third, expressions communicating the plausible risks related to contrast media administration tended to rely on impersonal and detaching grammatical structures; and fourth, utterances vindicating the improbability of any radiation-related harms primarily resorted to euphemistic adjectives.

As hypothesised, the patient instructions under investigation manifested rather extensive use of all elements of simplification and persuasion included in the analysis, with these elements appearing at several grammatical levels. Further, several elements appeared to simultaneously contribute both to simplification and persuasion. Indeed, within the realm of speech act theory presented in 4.2.5, the intention of constative speech acts is to express a belief with which the reader is presupposed to agree. Hence, all constative speech acts, and therefore most human communication, can in fact be regarded as utterly persuasive in nature. As discussed in 2.5.1, subtly steering the opinions and actions of the recipient towards those of the sender is also the exact foundation of rhetoric persuasion.

However, without comprehension there can be no persuasion: therefore, the level of simplicity of the text needs to be engineered so as to observe the level of medical literacy and state of plausible anxiety of the readership. This is, however, easier said than done: a text that is effortless to read is by no means effortless to write, particularly without a specific education in written communication. Therefore, in order to produce patient instructions that are matter-of-fact yet accessible, understandable yet unpatronising, comprehensive yet concise, informative yet unintimidating, and persuasive yet unbiased, the expertise of professional medical writers should be capitalised to the fullest.

5.2 Evaluation and suggestions for future research

To begin with, qualitative research methods are by and large bound to be subjective in nature. In the present thesis, analysing the semantic nature of adjectives can be regarded as a flagship example of subjectivity; moreover, sections extrapolating writer intentions in relation to particular passive or euphemistic occurrences also include subjective elements. However, I do consider the final conclusions to be premised on a solid ground: after all, the analysis does not solely rely on these types of measures deemed subjective, but is rather underpinned by quantitative considerations and what I would call reasonable deduction based on applying prescriptive and descriptive linguistic information. However, the most imminent concern perhaps pertains to my educational and employment background as a professional of medical imaging: in the field of technical writing, subject-matter experts are not indeed considered the most appropriate writers or assessors of instructive texts. I do agree that my background has distanced me from the average reader of CT instructions; nevertheless, this has its irrefutable advantages as well, by way of allowing me to perhaps better determine writer intentions underlying euphemism and adjective usage as well as the level of momentousness in different directive speech acts.

Furthermore, with the present thesis, I have merely scratched the surface of investigating and defining the constituents of comprehensible and persuasive patient instruction writing. Nonetheless, I am quite convinced of the comprehensiveness of the variable inventory employed in the paper, the required and allowed range of the thesis considered. However, much is yet to be said in what I consider a most meaningful and fruitful realm of study, also from the vantage point of the communicatively and linguistically oriented researcher. The analysis template could be employed to examine patient instruction writing in subspecialties outside radiology as such or with modifications to the variable inventory employed. As for elements of simplification, variables such as word and paragraph length, information density, nominalisation practices, as well as textual

cohesion and coherence have received either very limited or non-existent attention in the present thesis and could thereupon be included in future investigations. As for elements of persuasion then, variables such as the logical argumentation structure, modalisation practices, and journalistic means characteristic of popularised texts as presented in 2.2.2 have suffered an identical destiny and are accordingly in need of future attention.

Moreover, issues of the exhaustiveness of the information content, as well as of the appropriateness of layout and typography applied to medical instruction documents could be of interest to researchers of technical and medical writing. Examining patient instructions as manifestations of online health communication is a further phenomenon of utmost social influence, whereupon the issue readily deserves critical scientific interest. For those interested in popularisation, studies comparing scientific and popular-scientific articles do abound, but contrasting the linguistic manifestations of medical examination instructions designed for patients and physicians should unfold a world of interesting research. Finally, as discussed in 2.4.2, the teachings of Plain English Campaign are readily applicable to a host of different types of texts, wherefore its recommendations can be employed as an analysis template in various fields of public writing.

As for considerations into research methodology, I am inclined to agree with the counsel presented by Clerehan and Buchbinder (2006) as reviewed in 1.2. That is, despite the hazards of subjectivity, the methodological balance should preferably tend towards qualitative methods rather than those of purely quantitative in nature. I firmly believe that texts are to be regarded and examined as unique, comprehensive entiretys, the intelligibility or assertiveness of which cannot be reduced to mere numbers. Mechanistic readability formulae indubitably have their share in assessing the comprehensibility of texts from one specialised viewpoint, but in my opinion, they should more often than not be accompanied by qualitative considerations. Moreover, as presented in 2.4.2, the disciplines of technical and plain English writing highlight the

momentousness of testing all high-use texts with representatives of the intended readership. I could not agree more: after all, readers are readily regarded as the most competent assessors of whether the text manages to satisfy their informational needs in terms of content; to accord with their medical literacy level in terms of simplicity; and to inspire them to exercise compliance in terms of persuasion.

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