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Academic Cultures
in the Finnish Mass Research University

Change and continuity

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Summary

The dissertation explores the dynamics of change and continuity in the values and practices of academic cultures. The context of the study is the Finnish 'mass research university', which has emerged due to a significant growth in the funding of academic research in Finland since the 1990s. Only a small proportion of the increased research funding has been channelled to universities through their budget funding, while the bulk of it has been allocated through mechanisms designed to increase the internationality, efficiency and societal relevance of research. These changes have led to a situation in which a large share of academic research today is conducted by PhD students working in externally funded projects. At the same time, the number of academics having university posts has remained constant, regardless of the growth in the number of students and the expansion of responsibilities in attracting and managing externally funded research projects.

The dissertation consists of five journal articles, which were written between 1998 and 2008 in connection with several research projects, and an introductory essay, which binds the articles together. The research questions presented in the articles can be rephrased as three broader questions:

1. How has the Finnish policy emphasis on the internationalization of research been interpreted and reacted to in different disciplines? (Articles I and II)

2. To what extent has the increase of external research funding shaped understandings of the audiences of research, and thus the motivation for doing research, in different disciplinary and organizational contexts? (Articles III and IV)

3. Have research environments characterized by external funding and utility-oriented research given rise to new modes of research training, socialization and identities? (Articles IV and V)

In analyzing these questions, the dissertation brings together the tradition of describing and classifying differences among disciplinary cultures, most often associated with Tony Becher's work, and more recent research focusing on change

in academia toward entrepreneurial and managerial practices. Despite many references to change in the values, practices and identities of academics, the recent research only rarely pays explicit attention to the role of academic cultures in the process. The empirical analyses are qualitative and comparative. The data comprises three sets of semi-structured interviews with researchers representing different disciplines and organizational contexts as well as different generations and statuses.

The dissertation shows that the recent macro-level trends can be detected in various forms and combinations in distinct academic communities. Change in the values and meanings is a matter of shifting balances rather than a dramatic transformation from one type of culture to another: new elements enter the web of meanings and interlace with the already existing elements. At the centre of these shifts are the future of the academic research orientation and the moral framework it provides to academics. While the academic orientation is not the only motivating element in any of the academic environments studied, it is important in all of them. However, there are significant differences between the senior and junior researchers and among different disciplinary contexts in how pressures for change are experienced.

The dissertation also demonstrates that even though internationalization is welcomed in all disciplinary groups, the meanings attached to internationality are different in the soft and the hard fields. Especially researchers in the soft fields think that pressure for further internationalization homogenizes research fields and thus makes it difficult to address all important audiences of research. Furthermore, the dissertation shows that academic socialization and doctoral education suffer from problems that are related both to the German-influenced tradition of research training in Finland and to the current funding patterns and personnel structures of academic units. Thus they cannot be solved through the graduate school system. It is suggested that providing more stable academic environments would improve the likelihood that researchers at different stages of their academic careers would find the mass research university an attractive place in which to work also in the future.

Tiivistelmä

Väitöskirjassa tarkastellaan muutoksen ja pysyvyyden dynamiikkaa akateemisten kulttuurien arvoissa ja käytännöissä. Tutkimuksen kontekstina on suomalainen "massatutkimusyliopisto", joka on syntynyt 1990-luvun puolivälissä alkaneen, lähinnä julkisen tutkimusrahoituksen kasvun myötä. Lisärahoitus on jaettu yliopistoille lähes yksinomaan kilpailtujen tutkimushankkeiden muodossa, millä on pyritty lisäämään tutkimuksen kansainvälisyyttä, tehokkuutta ja yhteiskunnallista merkitystä. Samaan aikaan jatkokoulutettavien määrää on kasvatettu huomattavasti. Näiden valintojen seurauksena suuri osa akateemisesta tutkimuksesta tehdään nykyisin ulkopuolisesti rahoitetuissa määräaikaisissa tutkimushankkeissa, joissa työskentelee pääasiassa jatko-opiskelijoita. Yliopisto-opettajien määrä on pysynyt ennallaan huolimatta perus- ja jatko-opiskelijamäärien sekä tutkimushankkeiden suunnitteluun ja johtamiseen liittyvien tehtävien lisääntymisestä.

Väitöskirja sisältää viisi tieteellisissä lehdissä ilmestynyttä artikkelia, jotka on kirjoitettu vuosina 1998–2008. Artikkelit sitoo yhteen erillinen johdanto-osio. Siinä artikkeleissa asetetut tutkimuskysymykset on ryhmitelty kolmeksi laajemmaksi kysymykseksi:

1) Miten suomalaisen tiedepolitiikan kansainvälistymispainotus on tulkittu eri tieteenaloilla ja miten siihen on reagoitu? (Artikkelit I ja II)

2) Missä määrin ulkopuolisen tutkimusrahoituksen kasvu on muovannut käsityksiä tutkimuksen yleisöistä ja näin myös tutkimustyön motivaatiolähteitä eri tieteen-aloilla ja organisaatiomuodoltaan erilaisissa yksiköissä? (Artikkelit III ja IV)

3) Onko ulkopuolisella tutkimusrahoituksella toimeen tulevissa ja soveltavaan ja strategiseen tutkimuksen suuntautuneissa tutkimusympäristöissä syntynyt uusia jatkokoulutuksen ja sosiaalistumisen muotoja tai uusia akateemisia identi-teettejä? (Artikkelit IV ja V)

Näitä kysymyksiä tarkastellaan yhdistämällä tieteenalakulttuurien eroja tutkiva traditio, joka yleensä liitetään Tony Becherin työhön, sekä viimeaikainen tutkimus akateemisen maailman muutoksesta yhä tulosvastuullisempaan ja yritysmäisempään

suuntaan. Tämä on tarpeen siksi, että vaikka uudempi tutkimus usein viittaa muutoksiin akateemisissa arvoissa, käytännöissä ja identiteeteissä, se analysoi vain harvoin akateemisten kulttuurien merkitystä muutoksessa. Väitöskirjan empiiriset analyysit ovat laadullisia ja pohjautuvat vertailuun. Aineisto koostuu kolmen tutkimushankkeen yhteydessä kerätyistä teemahaastatteluista. Haastateltavat tulevat eri tieteenaloilta ja organisaatiomuodoltaan erilaisista akateemisista yksiköistä. Osaan haastatteluista on valittu eri sukupolvia ja akateemisia asemia edustavia tutkijoita.

Väitöskirjassa osoitetaan, että viime vuosien tiede- ja korkeakoulupoliittiset linjaukset näkyvät akateemisissa yhteisöissä eri muodoissa ja erilaisina yhdistelminä. Akateemiseen työhön liitettyjen arvojen ja merkitysten muutosta voi täten kuvata parhaiten aiemman tasapainon järkkymisenä, ei niinkään dramaattisena siirtymänä: kulttuuriseen kudelmaan tulee uusia elemettejä, jotka kietoutuvat yhteen olemassa olevien elementtien kanssa. Muutosten keskiössä on akateemisen tutkimusorientaation ja sen tarjoaman moraalisen kehyksen tulevaisuus. Vaikka akateeminen tutkimusorientaatio ei ole tutkijoiden ainoa motivaation lähde yhdessäkään tarkastellussa tutkimusyhteisössä, sen merkitys on keskeinen niissä kaikissa. Vanhempien ja nuorempien tutkijoiden sekä eri tieteenalojen välillä on kuitenkin merkittäviä eroja siinä, miten ulkoiset paineet, jotka jättävät yhä pienemmän tilan akateemiselle orientaatiolle, koetaan.

Väitöskirja tuo myös esiin, että vaikka kansainvälistyminen koetaan eri tieteenaloilla sinänsä myönteisenä asiana, siihen liitetyt merkitykset vaihtelevat etenkin ns. pehmeiden ja kovien tutkimussalojen välillä. Erityisesti pehmeiden alojen tutkijat kokevat, että kansainvälistymispaine yhdistettynä ulkopuolisen rahoituksen tuomiin muutoksiin ajaa tieteenaloja yhteen muottiin ja siten estää vastaamisen erilaisten yleisöjen tarpeisiin. Lisäksi väitöskirja osoittaa, että jatkokoulutuksessa ja nuorten tutkijoiden sosialisaatiossa ilmenee useita tutkimuksen rahoitukseen ja seniori-asemissa olevien vähyyteen liittyviä ongelmia, joita tutkijakoulut eivät voi ratkaista. Niiden seurauksena saksalaisperäinen jatkokoulutuksen traditio, joka korostaa jatko-opiskelijan omaa vastuuta, jatkuu vahvana. Tutkimuksen pohjalta voi todeta, että niin eri tieteenalojen erityispiirteiden säilyttäminen kuin nykyistä vakaampien tutkimusolosuhteiden tarjoaminen ja tutkimusyhteisöjen henkilöstörakenteen tasapainottaminen on välttämätöntä, jotta uransa eri vaiheissa olevat tutkijat pitäisivät massatutkimusyliopistoa mielekkäänä työskentely-ympäristönä.

Acknowledgements

My first encounter with studies of science and higher education took place in the summer of 1995 when I got a three-month traineeship in the Science Studies Unit at the Research Institute for Social Sciences at the University of Tampere (now the Unit for Science, Technology and Innovation Studies, TaSTI, at the Institute for Social Research). Since then, and even more so since 1998, when I became a full-time researcher in the unit, I have been engaged in various research projects and collaborated with many TaSTI researchers. This dissertation is the result of that research.

The five articles included in this dissertation are connected to three projects: The Finnish Scientific Elite (1994–1996); University Research in Transition (1997–1999); and The Dynamics and Innovativeness of Research Communities (2001–2003). All three projects were funded by the Academy of Finland and led by the research director of TaSTI, Dr Erkki Kaukonen; the first project together with Professor Marja Häyrinen-Alestalo. Erkki has played an invaluable role in acquainting me with issues and networks in the field of science studies, in Finland and abroad, and I am deeply indebted to him. He was also the one to introduce me to Docent Oili-Helena Ylijoki and Dr Mika Nieminen, both of whom became my close colleagues. In addition, Oili-Helena has skilfully and patiently supervised my dissertation work, as well as co-written one of the articles included in this dissertation. I doubt I could ever have finished the dissertation if Oili-Helena had not helped to restore my confidence time and again. My collaboration with Erkki, Oili-Helena and Mika has been a most rewarding experience, not least because of our shared sense of humour (evident, for instance, in the hilarious title proposals we thought up for our book appearing in 2003). The same goes for the whole TaSTI group, which has kept growing and changing over the years. I greatly appreciate the lively discussions we have had in TaSTI research seminars and over lunch in the Minerva cafeteria. I would especially like to mention MA Otto Auranen and MSc Pia Vuolanto, who have always made the time to answer my questions and comment on my texts.

In autumn 2002 I applied for the status of a PhD student in sociology and Professor Ilkka Arminen was appointed my main supervisor. The postgraduate seminars led by Ilkka were crucial in helping me direct my energies toward writing a doctoral dissertation. Together with Oili-Helena, Ilkka has guided me through the writing of the last two articles included in this dissertation as well as the introduction that accompanies the articles, for which I am most grateful. I would also like to thank Ilkka and Oili-Helena for overseeing the last steps of the dissertation process, which have gone surprisingly smoothly. For this I also owe greatly to Dr Joan Löfgren, who checked the English of my articles as well as the introduction within a very tight schedule last autumn. I have been fortunate to have had Joan do the proofreading: she has very high standards and never lets a vague sentence go unnoticed. Also Head of Communications Katja Ayres and Docent Pirjo Nikander have come to my aid several times when I have had an urgent need for getting a piece of text checked fast but properly, and I am very grateful to them for doing so.

In autumn 2006, when my thoughts were directed at finishing my last articles and writing the introduction that accompanies the articles, I got a job offer from Tampere University of Technology (TUT). During the two years that I have worked there I have participated in the restructuring of TUT as well as in the process of TUT transforming into a foundation university. This means that I have not only studied academic cultures and changes in them but also become actively involved in their transformation. I wish to thank my colleagues at TUT, in particular, my boss, Director of Administration Tiina Äijälä, Rector Emeritus Jarl-Thure Eriksson, Rector Markku Kivikoski and Katja Ayres for helping me gain an understanding of how universities function as organizations and for being so pleasant to work with. During a five-month leave from Hervanta in spring and summer 2008, I was warmly welcomed back to TaSTI. For this invaluable opportunity, I would like to thank both TaSTI and TUT, as well as the Finnish Cultural Foundation, from which I received a scholarship.

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Gulbrandssen, Professor Sven Hemlin, Dr Pirjo Kutinlahti, Dr Hans Mäntylä and Professor Keijo Räsänen have also been an important source of inspiration. My thanks go also to fellow researchers involved in Tatte, the Tampere University Association of Researchers and Teachers. Moreover, I would like to acknowledge the influence of and encouragement by academics with whom I became acquainted when studying toward my Master's degree in international relations, especially Professor Osmo Apunen, Docent Helena Rytövuori-Apunen and Docent Tarja Väyrynen. It goes without saying that my scientific thinking has been greatly influenced by the many intense and fun debates I had with my friends MA Riikka Härkönen and Dr Aini Linjakumpu during the time we were working on our Master's theses.

I also want to express my gratitude to Professor Rosemary Deem and Professor Jussi Välimaa, who acted as the preliminary examiners of the dissertation. Their pertinent and insightful comments facilitated the finalization of the manuscript. Professor Rosemary Deem also agreed to act as opponent in the dissertation defence, which I greatly appreciate. I am also very pleased to have Docent Lea Henriksson as a member of the board evaluating my dissertation after the defence. It should also be mentioned that my work has benefited considerably from the anonymous referee comments that I received on the journal articles included in this dissertation. I am naturally indebted to the many academics who gave their time and shared their thoughts and thus made possible the gathering of the interview data.

More than twenty years have passed since I started university studies at the University of Tampere in the autumn of 1988. During this period, I have shifted academic fields from international relations to sociology, and perhaps also re-oriented my research interests from science studies toward higher education studies. More recently I have moved from a multi-faculty university to a technical university and from research (at least as a weekday, daytime job) to administrative tasks. Thus in different periods I have become socialized into different types of academic life and from different angles. I am glad to have had all these experiences and I feel privileged to have so many intelligent and inspiring colleagues and friends, of whom I have mentioned only a few by name. Last but not least, I thank my parents, Sirkka and Jaakko Hakala, who have provided me help and encouragement all along.

List of original publications

Article I   Hakala, J. (1998). Internationalisation of Science. Views of the Scientific Elite in Finland, *Science Studies*, 11, 1, 52–74.

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Article II   Hakala, J. (2002). Internationalisation of research – necessity, duty or waste of time? Academic cultures and profiles of internationalisation. *VEST – Journal for Science and Technology Studies*, 15, 1, 7–32.

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Article III   Hakala, J. and Ylijoki, O-H. (2001). Research for whom? Research orientations in three academic cultures, *Organization*, 8, 2, 375–382.*

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Article IV   Hakala, J. (2009). The future of the academic calling? Junior researchers in the entrepreneurial university. *Higher Education*, 57, 2, 173–190.

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Article V   Hakala, J. (forthcoming). Socialization of junior researchers in new academic research environments: two case studies from Finland. Forthcoming in *Studies in Higher Education* in autumn 2009. Published in iFirst format 12 Feburuary 2009, see www.informaworld.com, DOI: 10.1080/03075070802597119.

* Both authors participated equally in the analysis of the data and the writing of the article.

1. Introduction

It is hard to imagine a field of the social sciences where change is not an important and everlasting topic of research. In the fields of higher education and science studies, much of the current debate – despite important national and local differences in emphases – has focused on two sets of issues. Firstly, attention has focused on changes in the policies, financing and systems of higher education and science taking place in most developed countries since the 1980s. Secondly, scholars have explored the impacts of these macro-level changes on universities as institutions as well as on academic work, cultures and identities.

While the majority of scholars analyzing these issues seem to believe that significant changes have indeed taken place, there is less agreement on the nature of the changes. At one extreme, there is the view that changes in policies and funding have led universities and academic work into a severe and unprecedented crisis. Seen from this perspective, the reduced governmental funding and increased emphasis on the efficiency, accountability and relevance of higher education and science are undermining the core values of academia, resulting in a loss of identity and motivation. Teaching and research are instrumentalized and lose their potential for enriching the lives of individuals and for providing critical insights and fundamental scientific discoveries. Academic work is routinized and academics become knowledge workers at an academic assembly line of a project mill.

At the other end of the spectrum, we find those who regard the current changes as a long-desired closing down of the ivory tower and opening up to society and citizens and their needs. From this perspective, there is now a chance of getting rid of obsolete borderlines between organizations, units and people, and thus giving rise to new types of academic environments characterized by flexibility and innovativeness as well as improved organization and leadership. Universities become engines of economic growth and social well-being; researchers can forget disciplinary straightjackets, find new motivation from interaction with users of research and build interesting careers at the interface of academia and society.

Against this background, this dissertation explores the dynamics of change and continuity at the micro-level of Finnish universities, which have since the late 1980s experienced a multitude of changes familiar from other OECD countries. Such changes have included rising student numbers, increased external funding for research, and the establishment of new steering mechanisms (e.g. quality assessment, performance indicators, programme-based funding) extending to areas previously left to academic discretion. During the same period, the research function of Finnish universities has been reinforced considerably, mainly due to substantial increases in external funding from public sources. As a result, we have witnessed the emergence of the 'mass research university' (Delanty 2001, 109) in Finland, a development that is analogous to the massification of universities as educational institutions at the end of the 1970s.

The increased funding for research in universities has been tied to several specific policy objectives, such as internationalization, efficiency and the relevance of research. It is thus is in the context of the *steered* mass research university that this dissertation explores the transformation of Finnish academic research cultures. More specifically, the purpose of the dissertation is to analyze how certain new policies – as well as the interplay of different policies – have influenced the values and practices that hold academic communities together and give meaning and direction to academics comprising these communities.

No research is free from preconceptions and anticipations. In this dissertation, they are shaped, firstly, by the view that the micro-level of academia should be studied in light of disciplinary and organizational cultures that are based on shared, but constantly negotiated, values and practices. Secondly, they are shaped by a parallel commitment to the qualitative and comparative tradition of social analysis. In particular, my dissertation brings together the tradition of describing and classifying differences among disciplinary cultures, most often associated with Tony Becher's work, and more recent research focusing on change in academia, which – regardless of many references to change in the values, practices and identities of academics – only rarely pays explicit attention to the role of academic cultures in the process. In doing so, I have aimed to utilize relevant contributions both in higher

education studies and in science and technology studies, that is, two fields that share important research themes and yet have little communication with each other.[1]

The dissertation consists of five journal articles and an introductory essay, which binds the articles together. In the articles, the above-mentioned broad questions regarding change at the micro-level of Finnish universities are explored through three specific themes:

1. The internationality and internationalization of research: How has the Finnish policy emphasis on the internationalization of research been interpreted and reacted to in different disciplines? (Articles I and II)

2. The audiences of research: To what extent has the increase in external research funding shaped understandings of the audiences of research, and thus the motivation for doing research, in different disciplinary and organizational contexts? (Articles III and IV)

3. Research training and the socialization of junior researchers: Have research environments characterized by external funding and utility-oriented research given rise to new modes of research training, socialization and identities? (Articles IV and V)

The empirical data on which the articles are based consist of three sets of semi-structured interviews with researchers representing different disciplines and organizational contexts as well as different generations and statuses. Due to the focus on the three specific themes as well as the absence of longitudinal data, I do not claim to present a full picture of changes taking place in present-day Finnish academia. Instead, I provide 'windows' on the changes and explore in detail the interplay between externally and internally induced change as well as the balance between change and continuity. As I see it, my dissertation is to be regarded as one contribution to the ongoing debate on change in academic values and practices, a topic that has been recently studied from other points of view in Finnish doctoral dissertations by Hans Mäntylä (2007), Mika Nieminen (2005) and Juha Tuunainen (2004) (see also Kutinlahti 2005; Pelkonen 2008; Saari 2003; Treudthardt 2004; Ursin 2004).

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[1] This distance is salient, for instance, in the academic journals in these fields (see Slaughter and Rhoades 2004, 36–37) as well as in recent handbooks aiming to provide an overview of the fields (e.g. Hackett et al. 2008; Smart 2007).

The main purpose of this introductory essay is to explore the conceptual and empirical background of the five original contributions of the dissertation in more detail than what is allowed by the article format. The main results of the five articles are then drawn together on this common basis. The introduction is divided into six sections in addition to the present one. Section 2 clarifies the shared conceptual framework of the articles, that is, the cultural approach, which is traced to such scholars as Robert Merton and Tony Becher. Section 3 analyzes the current debate on changes in academia, focusing on claims concerning the transformation of academic work, the values and practices of academic communities and the identity of academics. Section 4 provides a view on the Finnish scene, exploring the macro-level changes that have taken place in the policies, funding and personnel structure of higher education and academic research since the late 1980s. Section 5 introduces the data and methods of the dissertation. Section 6, which is divided into three subsections according to the research questions presented above, summarizes and discusses the results outlined in the journal articles. Finally, section 7 evaluates the relevance of the results as well as the cultural approach adopted in this dissertation. It also points out some future directions for research.

2. Studying academic life from the perspective of culture

The analysis of academic work and communities from the perspective of culture is based on the understanding that the values and practices of academia are socially constructed and thus vary across time and place. This general idea is widely accepted in science and technology studies (STS) as well as in higher education studies (HES) today. However, in the history of these two fields, the number of scholars whose primary interest would have been to analyze the culture and dynamics of scientific communities, rather than scientific knowledge itself, has been limited. Seminal work in this respect has been done by the German-American sociologist Robert Merton, who explored the norms shared by the worldwide scientific community. The roots of the idea that academia hosts a variety of cultures can be traced to many scholars, but Tony Becher's book *Academic Tribes and Territories*, first published in 1989, provides the most comprehensive exploration of it. However, it is argued that Becher's concept of disciplinary culture is not sufficient for understanding the layers of cultures found in universities or the dynamics of change in academic cultures. These issues will be analyzed towards the end of this section.

2.1 The Mertonian norms of science

Merton described the 'norms of science' in two short essays written in 1938 and 1942 (Merton 1972, 254–278).[2] The norms are often referred to by the acronym CUDOS, whereby C stands for communism/communalism (science should be public); U for universalism (the characteristics of a person, such as race and

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[2] As Kiikeri and Ylikoski (2004) note, the context of writing these essays should be taken into account. Merton himself was one of the many German scholars who fled the Nazis to the USA in the 1930s, and it can be argued that his essays on the norms of science were influenced heavily by his wish to defend the autonomy of science from external threats such as that posed by the Nazis.

religion, should have no impact on how his/her scientific arguments are treated); D for disinterestedness (science should be pursued for the sake of knowledge itself); O for organized (science is organized activity); and S for scepticism (all scientific arguments should be submitted to rigorous examination by the scientific community). Merton arrived at these norms on the basis of his historical studies of Western science.

Merton emphasized that these norms are institutional, which means that the reward system and other institutional arrangements of universities ensure that they are followed. It is also likely that most scientists internalize these norms. If somebody does not, and breaches the norms, the institution and colleagues show their moral resentment and may issue sanctions. Thus, for instance, the norm of disinterestedness is not thwarted by the 'wide range of motives which characterizes the behaviour of scientists', argues Merton (1973, 267). The norms are also functional: they ensure that science progresses as it should. Merton does not claim that there are no other norms and that norms would not vary, for instance, in national contexts, but only that these norms are shared most widely and that they are necessary.[3] (Kiikeri and Ylikoski 2004, 112.)

Merton's work has been criticized on several grounds. Firstly, it has been argued that Merton misidentified the norms of science. For instance, Mitroff's famous study of astronomers showed that scientists value and engage in behaviour opposite to that described by Merton. More generally, it has been claimed that Merton did not present evidence for arguing that the five norms (CUDOS) are the most important norms or the ones that best serve the progress of science. Secondly, it has been argued that Merton failed to explain how the norms are institutionalized (Kiikeri and Ylikoski 2004, 124). Thirdly, some critics repudiate altogether the significance of norms as guiding the thoughts and behaviour of scientists. From this perspective, norms – of which scientists may eagerly talk – are primarily ideological assets for gaining legitimacy and thus resources (Mulkay 1973/1991; Pinch 1990, 297).

The latter strand of critique towards the Mertonian tradition of examining scientific culture and its constitutive norms is correct in pointing out the weaknesses

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[3] At a later phase of his career, Merton himself conducted many empirical studies showing that the five norms are frequently disregarded in academia. For instance, he found that those with most prestige are most likely to receive it also in the future (the so-called Matthew effect), in contrast to the norm of universalism which requires that all arguments be treated equally regardless the background of their presenter (Merton 1973, 439–459).

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of treating the Mertonian norms – or any other norms – as an 'iron-cast' description or prescription of scientists' values and behaviour. Such view disregards the variety of cultural forms across time and place. However, the argument that norms are merely ideological devices – that is, explanations used by scientists for legitimizing their interests – seems equally misguided, since it provides an impoverished view of academic work and those who do it. As Shapin points out in his review of Bruno Latour's book *Science in Action*, this kind of view is based on the ontological view that scientists' sole purpose is to protect and enhance the value of their 'investments' in science (Shapin 1988, 544). In contrast, Tony Becher's work on academic cultures provides a more nuanced picture of the multitude of values, norms, practices and beliefs prevailing in the academic world and explores their *meaning* for academics belonging to different disciplinary communities.

2.2   Disciplinary cultures

The idea that academia does not host a unified scientific culture is not a new idea.[4] In the British context, an influential argument to this end was presented by the writer and physicist C.P. Snow in his essay *The two cultures*, which was published in 1959. Snow argued that the academic world had become divided into two cultures, those of the 'technologists' and the 'humanists'. These two cultures differ from each other in every possible way, in their 'intellectual, moral and psychological' climates, which are visible, for instance, in the ways of talk, dress and sense of humour (Snow 1993, x). Snow was concerned that the two cultures diverged too far and were thus unable to fully contribute to the benefit of humankind; the restoration of a dialogue between the two camps was his main interest. (See also Välimaa 1995, 27–30.)

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[4] The roots of the idea can be traced to the distinction between *Naturwissenschaften* and *Geisteswissenschaften*, which has been discussed widely by several 19th and 20th century German philosophers. The debate has concerned, among other things, the basic rationales and methods of these two strands of scientific inquiry. (E.g. Bleicher 1980.)

Tony Becher begins the preface of his book *Academic Tribes and Territories* (1989) by reminiscing how annoyed he became when reading Snow's argument in 1959. Dividing academia into two camps was in Becher's view a crude generalization in face of the huge variety hosted by universities. This gave him the impetus to begin his own studies of disciplinary cultures. He traces the roots of his own approach to two different research traditions. The first one is anthropological ethnography, which has traditionally focused on studying non-Western cultures. While Becher mentions that he got his inspiration from the anthropologist Clifford Geertz, he does not discuss Geertz's work explicitly. I will take it up here, as it represents the notion of culture adopted in this dissertation, even though in Becher's work it is less pronounced.

Referring to Max Weber, Geertz (1973/1993) defines culture as *webs of significance* spun by humans themselves. Culture offers a common stock of ideas, beliefs and meanings which offers a sense of direction and enables interaction without constant confusion. Consequently, the analysis of cultures is 'not an experimental science in search of law but an interpretive one in search of meaning' (Geertz 1973/1993, 5). This method – similar to constructing a reading of a foreign, disjointed manuscript – Geertz identifies as ethnography (ibid., 10). In ethnographic research, the actors' interpretations of the web themselves comprise the object of analysis, since there is no other way of accessing the webs (see also Tierney 1988, 4). Thus the study of culture is more than a study of social structure or a pattern of behaviour; neither is its aim to provide a list of norms followed in a culture. The main aim is to explore what norms and practices *mean* to people (see also Alvesson 2002, 3–4, 14).[5] As such, culture is about everyday life, not only rituals and stories, and it is embedded in social structures and material conditions (Alvesson 2002, 148–149).

While Becher's analysis is motivated by Geertz's view on culture, he also has an interest in the classification of disciplines. As Braxton and Hargens (1996) point out, the classification of disciplines is an established strand of analysis based on exploring the nature of knowledge, on the one hand, and on the identification of social patterns in disciplinary groups, on the other. Becher's basic classification of

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[5] The term 'thick description' used by Geertz, and subsequently by a multitude of scholars in the social sciences and humanities, refers to the aim of providing a rich account of culture and meanings and the subtleties they involve.

disciplines into soft and hard and into pure and applied fields draws on his own empirical work – 221 interviews with senior scientists in twelve disciplines. He also draws upon the earlier classifications, most importantly those presented by Biglan in the early 1970s (based on a survey study) and Kolb at the beginning of the 1980s (based on psychometric tests). (Becher 1989, 11–12.) As Becher himself notes, Biglan's and Kolb's classifications are not wholly different from the many other classifications (e.g. those by Kuhn and Whitley) but they are derived from empirical data rather than through 'detached observation'. The basic idea is that the nature of knowledge shapes the social characteristics of a discipline. Reflecting this starting point, Becher calls his approach 'internalist', in opposition to 'externalist' approaches which pay greater attention to 'contextual issues and influences' (ibid., 4).[6] In the second edition of *Academic Tribes and Territories*, co-authored with Paul Trowler, the latter receive more attention than in the original edition of the book (Becher and Trowler 2001).

The four classes of disciplines Becher arrives at are characterized by the nature of knowledge, which is hard–pure, hard–applied, soft–pure or soft–applied. Hard–pure knowledge is typical of the natural sciences. Its dominant features include relatively steady cumulative growth and thus linear, even predictable, generation of new research questions. This type of knowledge can be contrasted with soft–pure knowledge, which is characterized by a reiterative dynamic. This means that academics in such fields, for instance history and sociology, often return to questions and issues that have been explored by generations of academics before. Likewise, in the domain of hard–pure knowledge it is fairly easy to create criteria for accepting or refuting knowledge claims, while in the soft fields there is a diversity of criteria and a lack of consensus concerning what constitutes a valid contribution to a field.

On the applied vs. pure axis, disciplines are distinguished primarily according to the purpose of knowledge generation. In the hard–applied fields, for instance, engineering and clinical medicine, research is aimed at practical ends and judged by effectiveness. The primary outcomes are products and techniques. In the soft–

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[6] Whitley (1984/1990) denies that fields have 'essential properties' relating to their subject matter and constructs an elaborate, seven-fold classification of 'intellectual fields' on the basis of their external connections and the dynamics of their agenda-setting. Whitley's ambitious project, however, eventually fails to provide fruitful approach to disciplines/intellectual fields due to its overly complicated nature.

applied fields, research is directed at guiding decision-making and enhancing the quality of life. However, it lacks the sense of progress typical of hard–applied fields. Its outcomes, for instance, protocols and procedures, are judged against criteria depending on specific needs and situations. (Becher 1989, 13–16.)

Becher classifies disciplines also according to their social characteristics on two dimensions. First, convergent fields are tightly connected and governed by clear rules, while divergent fields are loosely connected and less regulated. Second, life in urban fields is fast-paced and competitive, while in rural fields researchers focus on their own topics and thus competition is less intense and communication slower. Becher argues that hard fields are typically both convergent and urban; soft fields tend to be divergent and rural. However, the axis of convergent-divergent is only loosely tied to the hard-pure distinction. Thus, for instance history can be characterized as a rural, but convergent field. Multidisciplinary fields, in turn, are typically divergent. (Becher and Trowler 2001, 183–191.)

Becher emphasizes that his categorizations should be considered as *ideal types*. He also considers the increasing growth of specialisms within disciplines and provides examples of disciplines that have both hard and soft characteristics (e.g. economics, psychology). Thus his framework can be understood mainly as a heuristic tool for analysis (Välimaa 1995), which can be supplemented with other cultural perspectives. These perspectives, discussed in the two following sections, are better able to highlight the dynamics of change in present-day academia.

2.3   The layers of culture in academia

Becher's focus on the nature of knowledge and how it shapes disciplinary cultures can be challenged from at least two viewpoints. Firstly, so-called laboratory ethnographers (e.g. Knorr-Cetina 1981) point out that even scientific facts are the product of social interaction. Yet, it seems that these detailed empirical descriptions of how knowledge is produced through negotiations at the lab bench do not contradict the broader picture of ideals and practices in the hard and pure fields – the typical focus of laboratory ethnographers – painted by Becher and others doing similar work. Secondly, and more importantly from the point of view of this dissertation, Becher has been criticized for neglecting the 'external' forces that also

shape academic cultures (e.g. Huber 1990; Välimaa 1995, 40–41). In fact, it can be asked whether academic cultures are primarily disciplinary cultures or whether they are shaped equally by other contexts such as national, organizational and professional practices and traditions. Having adopted for this dissertation Geertz's view of culture, answer to the question is that the focus must be on the multiple layers of culture that together constitute the local webs of meaning (see also Tuunainen and Knuuttila 2008).

Comparative studies of higher education and research systems and traditions in various countries show there are significant national differences among them (e.g. Ben-David 1973/1992; Clark 1987, 1995.) Owing to the spread of ideas across borders, also broader cultural traditions can be discerned. In particular, the German and the Anglo-American traditions of higher education and research have exerted strong influence on other countries. The German tradition is known for its strong emphasis on research as the basis of teaching as well as the chair system, which gives considerable individual autonomy to professors. The relationship between state and universities is close: academic freedom and funding are granted by the state as long as universities service the needs of the state, primarily by educating civil servants. (See also Enders 2001; Schimank 2005.) In contrast, the roots of the Anglo-American tradition are in providing practical education for various professions in private institutions, and the concept of autonomy applies best to the institutional level. Accordingly, departments are typically characterized by a more collegial culture.[7] As will be suggested in section 3 the significance of these differences has diminished over the last decades. This is partly due to the fact that the practices and ideals of higher education and research are dominated more and more by Anglo-American models. However, it would be wrong to assume that such differences in tradition have lost their meaning altogether.

As mentioned, the Anglo-American tradition has put emphasis on institutional autonomy. Private universities are common in Britain and the USA as well as in the Commonwealth countries like Canada and Australia, while in many countries of continental Europe they are not even allowed by law. Thus it is not surprising that

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[7] It should be noted, however, that American research cultures have been influence strongly by Germany due to migration of many eminent scientists from Germany to the USA in the 1930s. It is also evident that a closer analysis would reveal differences between countries that have been put under the label 'Anglo-American' here.

the analysis of organizational diversity in academia has been most common in the USA, where the higher education system is highly diversified and stratified, ranging from top-level elite research universities to colleges specialized in teaching (e.g. Kuh and Whitt 1988).

In contrast, European higher education systems tend to be fairly coherent within a national context and thus the interest in exploring organizational differences has been more limited (Välimaa 1995). This is, however, changing fast and the question is: What does the organizational analysis of higher education and research add to the analysis of academic cultures? Firstly, it directs attention to the fact that universities as organizations – with certain structures, leadership styles, strategic aims and 'organizational sagas' (Clark 1972) – exert influence over the ideals and practices of academics, even when their primary identification is with their discipline, which extends well beyond the limits of the university and the national borders. Secondly, it highlights the significance of organizational arrangements and leadership at the micro-level of academia. For instance Morris (2002) has argued that organizational diversity within universities is increasing due reinforcement of departmental profiles and strategies and leadership in response to external pressures and the increase of external funding. These issues will be discussed further in section 3.

Moreover, other cultural layers can be discerned in academia. For instance, it has been shown that academics engaged in different types of tasks – teaching, research, and leadership tasks – develop their own ideals and practices (e.g. Henkel 2000). However, these and other differences in the professional identities of academics are typically related to disciplinary and organizational cultures (Välimaa 1995, 49–55). For instance, Henkel (2000) finds that identification with teaching tasks is more common in the humanities and the social sciences, whereas academics in the natural sciences prioritize research tasks. Furthermore, it has been shown that academic units may host a variety of 'sub-cultures' that develop in distinct research groups (e.g. Saari 2003; Ursin 2004) or among different generations of academics (e.g. Becker and Carper 1956; Traweek 1998). What all these perspectives together imply is that research on academic cultures should not consist of a search for a single explanation for cultural dynamics, such as discipline, national tradition or organization. In contrast, the analysis of culture – the webs of significance – must take into account the layers of culture that have developed and interlaced over long periods of time.

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2.4   Change and permanence in academic cultures

As the previous sections suggest, academic cultures are shaped by several different factors and contexts. Of these, the cognitive factors analyzed by Becher are the most resilient to change, while the others are more easily shaped by the development of science, the interaction of academics (for instance, in international collaboration) as well as by external pressures coming from society. Before turning to these issues, which help to understand the dynamics of change in academia, this section explores academic socialization, which is the main source of continuity in an academic culture.

2.4.1   Maintaining culture through the socialization of newcomers

One of the most important ways of creating stability and maintaining culture is the socialization of newcomers. Through socialization individuals acquire 'the norms and standards, the values and attitudes, as well as the knowledge, skills, and behaviour patterns associated with particular statuses and roles' in their culture (Zuckerman 1977, 123). Socialization into academic cultures begins when first entering the university as an undergraduate student. Already in this phase, students become familiar with and are socialized into disciplinary cultures through interaction with both teachers and fellow students (Becker and Carper 1956; Ylijoki 1998, 2000).

Doctoral studies present the second phase of socialization, whereby PhD students become socialized into academia as producers, rather than consumers, of knowledge. They gradually become full members of the disciplinary and departmental culture. As ethnographers of science have shown, academic socialization is as much about acquiring a cultural competence and 'tacit knowledge', as it is about learning the theories and methods of the field (e.g. Becher and Trowler 2001, 47–51; Gerholm 1990; Roth and Bowen 2001). It involves, among other things, learning to cope with conflicting norms, acquiring an understanding of the essence of one's discipline as well as developing a relationship to neighbouring disciplines and non-academic actors (e.g. financiers of research). Much of this tacit knowledge is conveyed to the doctoral student through the 'department folklore', which provides, in Gerholm's words, 'images of various

kinds of life as a scientist (those to be imitated and those to avoided, for example) [as well as] notions of typical careers open to graduate students, of danger and pitfalls' (Gerholm 1990, 265).

In distinct disciplines, the things to be learned as well as the ways of learning are different. Not surprisingly, the differences are clearest between the hard and the soft fields (Delamont et al. 2000). In the hard fields, the status and role of a PhD student are predetermined, and independence is gained gradually, step by step. The support of the group, especially of its post-doctoral researchers, is important, and the responsibility for supervision and problem-solving is thus shared. It is particularly important to learn to work as a member of the research team, to cope with failure in experiments and to write up results so that they look solid and reliable. In the soft fields one is usually expected to choose her own topic and to assume an independent work style from the very beginning. Likewise, it usually depends on the talent and initiative of the student whether she is able to adopt those characteristics and behaviours that make one a worthwhile colleague in the eyes of the seniors. (See also Bennich-Björkman 1997, 60–92; Gumport 1993, 269–273.)

The outcomes and practices of socialization are also subject to change, often due to a more general transformation in the values and practices of academic communities. However, it seems that many case studies exploring socialization tend to leave unexplored the multiplicity of both explicit and implicit aims, values and beliefs pertaining to postgraduate training and socialization. These studies analyze PhD students as their own group, whose primary aim is to graduate quickly, not as part of the local research community with its specific dynamics (e.g. Gardner 2007; Golde 2005; Mendoza 2007). Also the fact that senior academics may themselves be confused about what values and beliefs should be mediated to the next generation tends to be disregarded (Hackett 1990). Thus there is a need for more nuanced research on change in the values and beliefs mediated to the novices as well as in the ways in which this is done.

At the same time, it is important to note that change may also be the result of changes in the backgrounds, expectations and values of the novices. As Becher and Trowler (2001, 47–51) point out, the expansion of higher education has meant that present-day university students come from more varied backgrounds, sometimes with previous professional experience, and this in itself is likely to affect academic cultures in various ways. Such impulses for change may be vital for the renewal the

culture, which in turn may be important for the survival of the culture in new circumstances (Tierney 1997, 16).

2.4.2   The sources and dynamics of cultural change

As the above discussion suggests, change pertains to academic cultures in all their aspects, and thus it is necessary to explore more closely what the literature on academic cultures and higher education says about the sources and dynamics of change. It can be argued that studying academic cultures along the lines of Merton and Becher's work on 'academic tribes' is bound to result in a fairly static picture of academia.[8] In the case of Merton, this tendency owes to his maxim that the five norms are those that should be followed. This directs attention to the functions of the norms and deviations from them, rather than to how they change. In Becher's case the moderate attention to the issue of change is due to the fact that he tends to prioritize cognitive factors that are resilient if not immune to change. However, Becher does note the continuous growth of specialisms, a tendency that has been pointed out in several empirical studies (e.g. Tight 2003). This dynamic is typically related to new discoveries and adopting new methodologies from other disciplines, but also to the emergence of new problem areas in society. It has been argued that this type of bottom-up change is the most prevalent source of change in academia, often leading to the gradual emergence of new academic communities and thus new academic cultures (Clark 1986, 234–235).

Academic cultures are also shaped by changes in organizational leadership, strategies and practices that are enacted at the level of the university and departments (e.g. Kekäle 1997; Morris 2002). However, it is rare that these are not connected to and influenced by changes in the wider environments of universities and their units, in particular, the policies, funding and legal framework of academic research and higher education (e.g. Clark 1986; Kogan et al. 2000). In many cases, these reforms are – more or less consciously – 'imported' from other countries or supra-national organizations (Clark 1986, 227). The implementation of policy

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[8] Becher's earlier work with Maurice Kogan (Becher and Kogan 1980/1992) discusses change at length but from a different perspective. Their book focuses on four levels of higher education (individual, basic unit, institution, higher education system) and two modes of change (operational and normative).

reforms is delegated to various funding and evaluation bodies and to the central administration of universities. Today, there is also increased emphasis on follow-up and evaluation of whether reforms were carried out successfully (see section 3.1). From the perspective of academic cultures, changes of this kind typically qualify as externally-induced and 'top-down' (Clark 1986, 227).

The reception of externally-induced changes is often negative, especially if carried out by coercion rather than persuasion. As Becher and Kogan note, resistance is most likely to occur when changes conflict with 'strongly held internal norms'. The result may be that individuals and departments, even whole universities, comply merely by 'going through the motions'; that is, carrying out the operational requirements without a corresponding change in values and beliefs (Becher and Kogan 1980/1992, 158). A good example of this would be a national degree reform as a result of which courses in universities and departments are renamed and put in a new order, but changes to course contents and teaching are primarily cosmetic due to reasons such as disapproval by teachers and students.

At the same time, it is important to note that academics are not mere targets of change, but influence society through their research. Some are also able to affect science policy and the allocation of funding, for instance, through membership in research councils and evaluation teams. Such elite academics provide one example of what Clark calls 'boundary people' (Clark 1986, 235). Boundary people are academics who are well connected with other societal actors, not only policy-makers but also businesses, social movements, non-governmental organizations, and the media (cf. Alvesson 2002, 176–180). Through these encounters 'changes creep across [the boundaries of academia] quietly and with little notice' (Clark 1986, 235). Yet, it is important to note that actors in such encounters are seldom on an equal footing when it comes to material and other resources that are needed to achieve their aims, be they related to the maintenance or to the transformation of culture (Alvesson 2002, 190; cf. Delanty 2001). More concretely, professors, PhD students, rectors, policy-makers, and research financiers have varying amounts of legal power, money, information or cultural competence.

We can conclude that change in academic communities is typically the result of several simultaneous and intertwined processes that do not have a single source of origin. Distinguishing between 'internal' and 'external' incentives and pressures for change is often useful for analytical purposes, but this binary division is misguided

in the sense that academic cultures, universities and higher education and research systems are not entities with closed boundaries (see Saarinen and Välimaa 2006). A practical implication of this for empirical studies of academic cultures is that one should remain sensitive to disunity and fractures even when focusing on shared understandings that are the essence of culture. In other words, the analyst of academic cultures should not only seek to find differences between (what she assumes to be) academic cultures but also within them. This applies to studying interpretations of and reactions to externally-induced change: it may lead to the formation of new shared understandings but also to the fragmentation of meanings.

3. Transformation of universities and academic work

Many current contributions in higher education studies and science studies begin with a discussion of 'recent' and 'fundamental' changes in academic science and higher education. The changes – the origins of which are usually located at the end of the 1980s – concern policies and funding systems, the way in which academic research and teaching are organized and managed, as well as the norms and values of academia and the identities of academics. The sources of this change are identified as external, that is, coming from outside science and universities. Typically, change is explained in terms of globalization, the retrenchment of public economies and the increased demand for knowledge as a basis for economic growth. Yet, views on whether the resulting changes in science and higher education should be regarded positively or negatively vary. For some analysts, change is welcome, while others believe that it has caused a crisis that threatens the very core of academia.

There are also some dissenting voices claiming that the transformation has been exaggerated: the elements that are now being presented as new and unprecedented are rather 'old wine in new bottles' (Weingart 1997) since similar elements, such as external research funding, industrial collaboration and policy-relevant research, have been present also in other periods of time. Also other criticisms have been presented. This section begins by providing an overview of the transformation theses and their critiques, then turning to a more detailed exploration of arguments concerning change in academic work and cultures.[9]

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[9] Recent overviews on the transformation debate(s) are provided by Hessels and van Lente 2008; Nieminen 2005; Rinne and Koivula 2005; Tuunainen 2004.

3.1 Towards post-academic science and the entrepreneurial university?

3.1.1 The general transition theses

The beginnings of the current discussion on changes in higher education and academic science can be pinned down to the late 1980s. Until then, in most Western countries higher education systems had been expanding over two or three decades. What is more, since the Second World War, the social contract between the state and universities had allowed universities and academics considerable autonomy both in teaching and research (Martin 2003), even though the concrete forms of academic freedom varied in different national contexts (Ben-David 1973/1992; Clark 1993, 1995).

The general perception of policy-makers in most OECD countries since the 1980s has been that growing competition among states and increasing constraints on public expenditure necessitate a change in the planning, funding and organization higher education and science. As a result, several countries, with the UK, Australia and the USA at the forefront, started to allocate a larger share of research funding on a competitive basis and developed performance-based steering systems of higher education. The aims of such policies have been to improve the efficiency, accountability and social and economic relevance of research and higher education. (E.g. Martin 2003; Slaughter and Leslie 1997.) At the same time, scientific knowledge began to be considered a strategic resource for the national innovation system and thus cuts in university budgets have been accompanied by substantial increases in public investments in research, which have been allocated on a competitive basis. New demands have also been placed on the governance and leadership of universities. The OECD, and later the EU, have had an important role in spreading and reinforcing these developments (e.g. Currie and Newson 1998; Lemola 2002; Peterson and Sharp 1998).[10]

While having fairly concordant views on the sources of change, analysts of science and higher education differ in terms of how they characterize these changes. In higher education studies, the focus of analysis has been on the transformation of

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[10] At a later phase, similar reforms have been carried out also in many Asian countries.

universities as institutions now characterized by 'new public management' and a search for additional income. In science and technology studies, the focus has been on how funding changes have affected the agendas, organizational forms and external connections of academic research. From this viewpoint, universities appear as one type of research organization, now pushed to compete with other knowledge producers. Both strands of research have also brought up the ensuing change in the values of academia and the identities of academics. In this section, the focus will be on those contributions that present integrated scenarios regarding change at the macro-, meso- and micro-levels of academia.[11]

One of the most influential contributions to the debate has been the so-called Mode 2 thesis, introduced in 1994 by Michael Gibbons and his five colleagues from different countries (Gibbons et al. 1994). They argue that the traditional academic mode of knowledge production (Mode 1) is giving way to a new mode of knowledge production (Mode 2), even though the former might not disappear altogether.[12] Mode 1 knowledge is produced in a disciplinary context by curiosity-motivated academic researchers, who submit their finished work for peer review and publication. In contrast, Mode 2 knowledge is generated 'in the context of application', which means that research topics are developed together with the users of knowledge and even the research process may involve the financiers and users of the research. Mode 2 research crosses disciplinary boundaries by mobilizing theories and methods to tackle problems at hand. It does not seek to integrate the new knowledge thus gained into existing disciplinary canons; thus it is transdisciplinary. Accordingly, research is carried out in networks and projects that transcend institutional borders and change shape according to societal and market-based needs. This heterogeneity is reflected also in the ways that quality is controlled in Mode 2: quality assessment is no longer the exclusive territory of peers but the judgment of customers, financiers and users of knowledge count too.

Mode 2 marks a fundamental change also in the way in which academics see themselves and their work: the future academic is primarily an expert who produces knowledge in changing teams, across disciplinary boundaries and together with the

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[11] By macro-level, I refer to the structural level; by meso-level to universities as organizations, and by micro-level to academic communities within universities.

[12] The authors state that Mode 2 'is emerging alongside the traditional disciplinary structure of science and technology' (Gibbons et al. 1994, 14).

users of knowledge. Moving in and out of academia becomes more common, and the security of a traditional academic career loses importance. However, Gibbons and his colleagues recognize that the shift is not easy, since researchers face demands coming from both traditional discipline-based enquiry and the new mode of knowledge production. This means that identities within academia are 'loosened and broadened' and scientific careers become 'more precarious' (Gibbons et al. 1994, 147). In other words, academic identities and the culture of academia become more and more intertwined with elements that traditionally were not considered to be academic.

Similar views have been presented by several authors. For instance, John Ziman (1996, 2000) believes that academic science characterized by the Mertonian norms is being replaced by 'postacademic' science, which is characterized by a close relationship between academia and industry. The Mertonian norm of disinterestedness is replaced by considerations of utility, even though this does not mean that utility is always expected immediately. In postacademic science, the final authority is 'socio-economic power', even though traditional scientific values may not disappear altogether. (Ziman 2000, 173–174.) Like Gibbons and his colleagues, Ziman is concerned about what happens to Mode 2 researchers who 'work in shifting teams, like small firms producing goods for a competitive market'. He reckons that the entrepreneurial insecurity they face is endemic to postacademic science, and the mobile researchers may be demoralized by a 'lack of stable opportunities to establish or exercise their specialized expertise'. (Ziman 1996, 75)

Also Henry Etzkowitz (1998, 2003) believes in the rapprochement of academia and industry. However, he emphasizes that a description of the change must include the government: the three spheres are now overlapping and interacting and losing their boundaries (see also Etzkowitz and Leydesdorff 1997). This development is called the Triple Helix of science, industry and government. Etzkowitz seems to believe that this trend will progress inevitably and produce positive results for citizens and all those who are involved in the Triple Helix. For the universities this means the adoption of a 'third mission', that of economic development, alongside the traditional missions of teaching and research (Etzkowitz 1998). It also signifies a 'profound normative change' accompanied by important institutional and cognitive changes (ibid., 824). Etzkowitz's views on what this means to researchers and research communities are mainly positive: after a period of adjustment, the

'seemingly' conflicting norms of academic and entrepreneurial science can be reconciled by improving organizational practices (Etzkowitz 2003, 116). In other words, there is no real conflict between the old and the new norms.

A much more cautious perspective on the change is provided by Sheila Slaughter and Larry Leslie (1997), who analyze the spread of 'academic capitalism', defined as 'institutional and professorial market or marketlike efforts to secure external moneys' (Slaughter and Leslie 1997, 8). As a result of globalization and cuts in public spending, universities and especially senior academics are compelled to compete for research funding and to make profits at the global market place. One strategy is the establishment of interdisciplinary research centres focusing on 'strategic' or applied research and of technology offices and science parks to ease technology transfer, secure intellectual property rights and make universities more accessible to the potential users of knowledge. In them, academics act 'as capitalists from within the public sector; they are state-subsidized entrepreneurs' (ibid., 9).

Slaughter and Leslie argue that while entrepreneurial activity is still strongest at the 'periphery of the university', it is necessary to ask whether it soon begins to shape the core more definitively (ibid., 210). They also show that different fields and different generations and types of academics are affected by academic capitalism differently: while it provides good opportunities to academics in established positions and in fields characterized by 'technoscience', the case is not the same for academics in lower positions and in the other fields.

Engagement in academic capitalism means that universities as institutions must examine the needs of their customers – students, financiers and other users of scientific knowledge – and develop new 'products' and 'services' to attract their interest.[13] Competition for customers takes place not only in the national and regional context, but also internationally and globally. This, in turn, leads to increased institutional stratification in both arenas (Etzkowitz 1998; Krücken 2003; Slaughter and Leslie 1997). Moreover, universities also compete increasingly with other knowledge producers, such as governmental or private research institutes and think-tanks (Gibbons et al. 1994; Nowotny et al. 2001).

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[13] Slaughter and Rhoades (2004) continue the analysis of academic capitalism by examining more closely the forms in which US public universities network with markets and society. They emphasize that the state plays an essential role in this process. An alternative and somewhat more optimistic analysis of recent changes in US universities is provided by Geiger (2004).

Attention has also been paid to the ensuing changes in the governance and leadership of universities. The central claim is that universities are pushed to adopt the ideology of new public management, that is, practices and values from the business sector, in order to increase efficiency and flexibility of public sector organizations (e.g. Amaral et al. 2003; Clark 1998; Henkel 2000; Marginson and Condisine 2000; Schimank 2005). The typical measures involve devolving budgets to faculties or departments (thus assigning deans or the heads of departments the role of a financially responsible middle-manager); creating an internal market for technical services and premises within the university; adopting an internal steering system based on targets and performance; as well as monitoring employee performance and rewarding desired behaviour. Universities have also adopted comprehensive evaluation systems applying to teaching, research and institutional practices. Furthermore, many European countries have started to emulate the US model where university boards consist mainly of external members rather than representatives of academics. In other words, it seems that the cultivation of a truly entrepreneurial culture in universities is in full flow.

3.1.2 Critiques of the transition theses

Many critics have noted that arguments positing a radical shift taking place in universities are typically scenarios and diagnoses of the era rather than arguments based on consistent empirical findings or theories that could be tested against empirical data (Tuunainen 2004). In many cases, they are based on limited data or their data is not presented in a consistent manner (Deem 2001). This problem is related to neglecting differences in national policies and traditions that shape both the content and pace of transformation in important ways (e.g. Deem 2001; Häyrinen-Alestalo and Peltola 2006; Krücken 2003). It can also be argued that the debate has focused one-sidedly on developments in the Anglo-American world. Thus such themes as the internationalization of science, which is an important themes especially for small and medium-sized countries, is practically invisible in the meta-narratives concerning change in academia.[14]

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[14] This is not to argue that the writer of this dissertation was free of a similar bias, as my reading has been limited to contributions published in English and Finnish.

One of the most common critical arguments is that the general transformation theses have a false starting point in presupposing that in the past there existed something like 'pure academic science' and an autonomous university. Instead, science and higher education have always been practiced in close relationship to society, and the period of relatively high autonomy that academic research enjoyed in many developed countries after the Second World War represents a historical deviation (e.g. Godin 1998; Hessels and van Lente 2008; Weingart 1997). Attention has also been paid to the conceptual weaknesses in arguments for a radical shift in academia: for instance, it has been pointed out that there is a tendency to explain all change in terms of 'globalization', which, however, lacks a clear and agreed meaning and is thus hard to pin down for the purposes of empirical research (Deem 2001). Furthermore, especially the so-called Mode 2 thesis has been criticized for presenting a normatively laden scenario, which is meant to legitimize change rather than describe and analyze it (Hessels and van Lente 2008; Häyrinen-Alestalo 1999; Häyrinen-Alestalo and Peltonen 2006).[15]

3.2 Change in academic work and cultures: entrepreneurial values, double values or a loss of meaning?

Many of the criticisms presented above are based on empirical studies that utilize qualitative data and focus on the meso- and micro-levels of analysis. The main contribution of these studies is to show that local academic communities are shaped not only by elements of change, but that they retain important elements of continuity. Likewise, these studies often point out that the dynamics of change vary across disciplinary and organizational contexts and that there are even counter-tendencies to externally induced changes. In the following, these micro-level contributions will be explored in more detail, with the aim of clarifying the dynamics of the alleged cultural change in academia.

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[15] However, it should be noted that at least all sociological research is 'normatively laden' in the sense that already the formulation of research topics and the choice of concepts always entail judgments that can never be completely 'value-free'.

Many studies claim that academic work and academics are facing a serious crisis (e.g. Allen Collinson 2003; Clark 1997; Currie and Newson 1998; Hackett 1990; Parker and Jary 1995; Rhoades 1998; Smyth 1995; Tight 2000; Trowler 1998; cf. Enders 1999; Harman 2003; Marginson 2002). The main argument is that academics are losing control over their work and suffer from increasingly poor employment conditions as well as increased work loads. Academics are becoming mere knowledge workers, a new type of flexible academic workforce, whose tasks and working pace are determined by others just as in industrial or office work. For instance, Parker and Jary (1995) predict the emergence of the 'instrumental academic'. Halsey argues that 'the don [the British academic] becomes increasingly a salaried and even a piece-work labourer in the service of an expanding middle class of administrators and technologists' (Halsey cited in Currie 1998, 3). This, in turn, is bound to lead to a loss of motivation and meaning, and subsequently to the erosion of the academic profession and academic calling. The problems arising from the increased managerial control of academic work as well as the insecurities created by the expansion of externally funded research have also been brought up in some Finnish studies (Hakala et al. 2003; Nieminen 2005; Räsänen and Mäntylä 2001; Ylijoki 2005; Ylijoki and Mäntylä 2003; Välimaa 2001a).

Furthermore, it has been argued that the academic workforce is becoming more and more internally divided. This means that some academics – usually those in senior positions – continue to retain academic freedom and other privileges traditionally associated with the academic profession, and even to benefit from the new possibilities created by academic capitalism. Others – predominantly the younger and female academics, who lack the security and status still provided by an academic post – will carry the costs of the new regime (e.g. Allen Collinson 2003; Barry et al. 2006; Bryson and Barnes 2000; Hey 2001; Kogan et al. 1994; Slaughter and Leslie 1997). According to Hackett (1990), the same applies to postgraduate students, who easily become a cheap workforce for externally funded projects and thus lose opportunities to develop into independent researchers (Hackett 1990). However, the majority of existing empirical studies do not see particular problems in this respect (Behrens and Grey 2001; Harman 2002; Mendoza 2007; cf. Slaughter et al. 2002). Overall, it is even surprising how little attention change in the process and content of academic socialization has received in the debate on cultural change in academia, considering its importance for the future of academia (Enders 2005).

According to Jacob and Hellström (2000) researchers living in the Mode 2 world – that is, research environments dominated by external funding and temporary contracts – suffer most from the fact that in order to make a career in academia, one must be recognized by academics living in the Mode 1 world. These scholars, however, believe that, with active intervention by universities and (public) research financiers, it is possible to cultivate the more positive aspects of Mode 2 and to solve many of the problems faced by Mode 2 researchers. The situation cannot be remedied by a return to the Mode 1 world, since it is essentially a 'feudal' system of disciplinary strongholds ruled by professors (Raman 2000; see also Jacob 2000).

A somewhat different line of research has focused on exploring how researchers' strategies and behaviour have changed as a result of changes in the funding of research. These studies highlight the capabilities of academics to respond to the externally induced changes. For instance, Morris and Rip (2006) discern four 'interactive strategies', one of which is representing 'science' as an entity of its own will and direction and thus securing funding for basic research. With such strategies, bioscientists have been able to 'modulate and buffer' the impacts of the new policies emphasising accountability and the relevance of research. Similarly, Laudel (2006) finds that German and Australian physicists employ a range of strategies that help to retain previous levels of funding. These include diversifying research topics, avoiding risky research, and learning to present research in more favourable terms to the financiers (see also Calvert 2001). While these strategies help researchers to stay in the business, Laudel argues that they have a multitude of negative consequences for the progress of research. She also points out that German and Australian researchers face different funding conditions and thus choose different strategies and that in Germany top researchers did not need to adapt as much as other researchers.

Furthermore, a study by Albert (2003) shows that policy incentives are often mixed and they allow space for developments that can be considered as counter-tendencies. In the Quebecois economics departments Albert studied, the trend was towards producing international refereed articles and dropping pursuits that benefited the local business environments, although the official science policy of the province put emphasis on increasing the relevance of research. Based on case studies conducted in Finland, also Tuunainen and Knuuttila (2008) show that entrepreneurial activities, which are strongly emphasized in the official rhetoric of

many universities, encounter resistance from several directions. They conclude that entrepreneurially minded researchers could not create new rules in their local communities but had to comply with traditional academic norms – for instance, open communication and the disinterestedness of science – or to leave academia (see also Tuunainen 2004).

Academics' responses to policy-induced changes are explored also by Trowler (1998), who studied a new British university upgraded from a polytechnic in 1992. Trowler discerns four ways of responding to the increase of managerial control over their teaching: sinking (accepting and adapting to a change which is viewed as negative); using coping strategies (working around policies that are found unacceptable, e.g. by cheating or completing only minimum requirements); swimming (grasping new opportunities and utilizing them to one's own benefit); and policy reconstruction (collective measures taken to improve current situation). Trowler's research raises important questions about how existing academic cultures may contribute to the emergence of particular types of responses, for instance, by encouraging people to respond collectively versus individually. Unfortunately, Trowler himself does not develop this theme in his work.

More explicit attention to how macro-level changes in the funding and organization of research and higher education influence academic cultures and identities has been paid by Henkel (2000, 2005). On the basis of a large number of interviews with researchers and teachers representing different generations as well as different disciplinary and organizational contexts, she explores change and continuity in academic values and ideals. She finds that, in general, academic life has become more competitive and especially the younger generation of academics has to cope with a lot of insecurity. At the same time, this generation is pushed to move up the steps of the academic career ladder at regulated intervals and to produce high-quality publications without interruption (Henkel 2000, 181; see also Hackett 1990; Owen-Smith and Powell 2001). This development reflects the fact that the humanities and social sciences have been pushed to adopt many practices that have been typical of the natural sciences (Henkel 2000, 161–164).

Henkel also notes that in all disciplines, departments have become more research-intensive, which has created more pressure to publish. As a result, academic identities built around teaching are contested, especially in the hard fields. This argument is supported by Lucas (1996), who studied more specifically the

impacts of the British Research Assessment Exercise (RAE) in three different disciplines (Biology, Sociology and English). According to Lucas, departmental cultures are heavily influenced by the priorities of RAE, which are set by the disciplinary elites, who conduct the reviews, and mediated through organizational and managerial practices. One of the impacts is that almost all researchers in the three disciplines wanted to be identified as 'research-active', which, in turn, has caused teaching and administrative tasks to have less value than before. Furthermore, Deem and Lucas (2007), who compared Education Departments in Scotland and England, show that gender and the previous backgrounds of academics influence both willingness to and opportunities of engaging increasingly in research activities. (See also Smeby 2003.)

Henkel's main conclusion is that many of the traditional values of academia have still been preserved. In particular, identification with one's discipline has remained strong, also among the younger generation, and the rewards of the profession still centre around the satisfaction gained from creating new knowledge and ideas in the research process. This is also the main conclusion in a study by Ylijoki and Mäntylä (2003), based on interviews with Finnish academics. They show that while academics live amidst many time frames, most of which are dictated or shaped by the changing conditions and funding of research, the deepest enjoyment is found in research that can be pursued on the basis of one's own interests and commitments. Thus it is also the most important source for academic identities. (See also Mäntylä 2007; Räsänen and Mäntylä 2001; Ylijoki 2003, 2005.)

In a nutshell, the empirical studies discussed above do not support to the idea that an entrepreneurial culture is replacing traditional academic culture(s). Instead, some analysts believe that academic work is losing its meaning and becoming 'just another job' and thus posit an academic world that suffers from a loss of values (see Hackett 1990). In other words, the webs of meaning are being torn apart but not replaced by new ones. Academics who do not know how to orient themselves do what they are told to do and seek meaning outside their work. As a 'side effect', both of these arguments seem to predict the disappearance of disciplinary differences.

A more common argument, however, is that today's academics and academic communities have not given up the traditional values altogether but adopted some new values, often described as 'entrepreneurial'. One way to describe this situation

is to say that academics have to function according to two different value sets. However, this description does not give clues as to how choices between the two sets are made in particular situations, unless this is explained by the 'interests' of academics (see section 2). Another way of picturing the situation is to imagine a web, in which new threads are interwoven with the old ones and in which new connections replace old ones. This image is also fruitful in that it allows us to see that different groups within academia may be connected to different corners of the web. It is also possible that the web has ruptures that make it look as if different groups within academia were not part of the same web at all.

It is this image of a web being transformed that inspires my own exploration of change and continuity in academic cultures. Before going to my empirical studies, however, it is necessary to add one important layer to the analysis: the tradition of Finnish higher education and science as well as the recent macro-level reforms, which have been aimed to change it.

4. Academic research in Finland: tradition and reforms

Finns are today among the most educated people in the world. More than 30 percent of each age group goes to university and an even bigger proportion studies in the polytechnics (OECD 2008a, 56, 58). Finland has also invested heavily in research: since 2001 the total expenditure on research and development (R&D) in Finland has been approximately 3.4 percent of the GDP, which is among the highest proportions in the OECD countries (OECD 2008b, table 2). While governmental expenditure on R&D is considerably smaller, comprising approximately 0.9 percent of the GDP, it is also high in international comparison (ibid, table 12).

This general trend is reflected in the 20 Finnish universities in Finland, which have since the 1990s considerably increased their expenditures on research. Money for this has come primarily from the public sector and through two governmental agencies: the national technology agency Tekes and the Academy of Finland, which comprises four research councils. In 2006, the external funding of Finnish universities – which is mainly used for research – amounted to nearly 700 million euros, comprising 39 percent of their total funding. (KOTA database.)

This state of affairs is the result of rapid developments since the Second World War. This section gives an overview of the expansion of Finnish universities beginning in the late 1950s as well as their transformation into mass research institutions during the 1990s, thus highlighting the national context for the micro-level analyses presented in the empirical articles of this dissertation. The section also shows how the increased expenditure on academic research has been tied to various policy objectives aiming to change the structure, organization and culture of academic science and universities more generally. (For a description of Finnish higher education and research system, see Appendix A.)

4.1 Historical overview: from 1950s to 1980s

In 1950, there were 11 higher education institutions in Finland, three of which were universities. Two thirds of all students studied at the University of Helsinki. (Kivinen et al. 1993, 16–19; Välimaa 2001b, 13–28.) The universities were fashioned after the Humboldtian tradition, which was reflected, for instance, in the structure of academic posts, the strong position of professors, and the emphasis on humanistic studies that were considered important for the development of the Finnish nation state (e.g. Eskola 2003; Välimaa 2001a). Until the 1960s, universities were elite institutions and the annual number of new students remained under 5,000 (Nevala 1995, 95).

Things started to change rapidly in the 1960s, when resources and decision-making power were concentrated in the Ministry of Education and the State Science Council, consisting of ministers and representatives of different interest groups, was founded to draw up general policy guidelines. Among other things, the Council had – and continues to have – an important role in transmitting ideas from the OECD to Finland (Lemola 2002).[16] As a result of a number of policy initiatives, a massive expansion of higher education took place in a relatively short period of time, through the upgrading of existing higher education institutions into universities and the founding of new universities. In this period, universities were seen as vital for producing a skilled labour force and contributing to regional development (Kivinen et al. 1993). Following the Humboldtian tradition, research was considered important, and all of the new universities got the right to award doctoral degrees, even though in reality the lack of academic staff and resources made scientific endeavours difficult. New faculties and programmes were also added to existing institutions. This led to the massification of Finnish higher education: the threshold of new students constituting 15 percent or more of their age class was exceeded in the late 1970s (Ahola 1995, 59, 80).[17] This development was accompanied by a rapid increase in academic positions. What is more, a framework law promising

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[16] Finland became a full member of the OECD in 1969, but paid close attention to OECD policies and attended some meetings as an observer already before that (Lemola 2002).

[17] The term massification comes from Martin Trow. He emphasized that the change involved not only an increasing number of students but that their backgrounds became much more varied than in the elitist period of higher education. (ibid.)

universities a steady increase of resources was accepted for the years 1967–1981. (Kivinen et al. 1993, 80–82.)

The 1960s also signified the beginning of attempts improve research training and create opportunities for focusing on research tasks. An important push in this direction was given by the Organization Committee for Science (1959–1964), the chairperson of which concluded that Finnish science could not make progress if aspiring academics and researchers did not get adequate funding but were 'forced to lead a bohemian life' (Laiho 1997, 93). On the basis of the Committee's suggestions, the already existing research councils – whose main role was to provide funding for researchers working in universities – were supplemented with four new research councils. In 1970, all councils were transferred to a new organ, the Academy of Finland, which thus became the most important supporter of basic research in Finland. The number of researcher posts, including posts for research assistants, was increased to 350, and a new category of academy professors was created (15 posts for the most capable senior researchers for 5 years) (Husso 2005, 27). According to Eskola (2003, 76), it was after this reform that a recognizable group of professional researchers emerged in Finland. It was from this group that the majority of professors were recruited to the expanding universities.

In contrast, attempts to develop research training were only moderately successful, if at all. Since the mid-1960s, various committees brought up problems related to the unstructured and individualistic tradition of Finnish doctoral training and proposed alternative models based on examples from countries such as Sweden and the USA. It was also suggested that postgraduate training have two streams, 'professional' and 'scientific'. The need to complete doctoral degrees in a shorter time – four years – was also raised. However, it can be argued that the only substantial change in postgraduate training before the 1980s concerned the structure of postgraduate degrees. When the degrees were renewed in all fields during the latter half of the 1970s, the traditional intermediate degree between the Master's degree and the PhD, called the licentiate, was made optional. (Laiho 1997, 108–113.) Yet, the annual number of PhDs remained fairly low, and the annual number of 400 degrees was not exceeded until 1988 (KOTA database).

The recession of the 1970s kept public investments into research low, with the exception of technical fields, which were now seen as a vital element in developing economy and society, in line with OECD recommendations (Lemola 2002). By the

1980s, Finnish expenditure on research was around one percent of the GDP, which was a low percentage compared to other OECD countries. In this decade, technology policy gained a strong foothold as technology was seen as the key to Finland's success in international economic competition. One indication of this is the establishment of the National Technology Agency (Tekes) under the Ministry of Trade and Industry in 1983. Already in 1986, a larger share of public research funding was channelled through this ministry than the Ministry of Education (Nieminen 2005, 51). Another indication of the new importance given to engineering fields was the renaming of the Science Policy Council as the Science and Technology Policy Council in 1987. The new development law accepted a year before secured basic resources and a 10 percent annual growth in funding to universities and research. This was unusual elsewhere Western Europe, where university budgets experienced severe cuts. (Välimaa 2001a, 68.) Furthermore, like in other countries, external research funding started to increase in importance also for Finnish universities (Nieminen 2005, 54).

The late 1980s brought also a new emphasis to Finnish science policy: internationalization. Before this, international activities were supported, on the one hand, by the ASLA-Fulbright scholarships, which provided opportunities for long-term visits to the USA, and, on the other, by an increasing number of bilateral agreements with other countries on researcher exchange and collaboration (Hietala 2003; Immonen 1995, 281–303). Now internationalization came to be seen as the key to improving the quality of science and success in international economic competition. Thus the aim was to make it an integral part of all research activities. Access to EU research programmes was gained already in 1987, even though Finland did not become a member of the EU until 1995. (Hakala et al. 2003, 146–151.)

4.2   Reforms of the 1990s and early 2000s

During the 1990s, internationally dominating ideas such as performance-based steering of universities, self-regulation, 'new public management' and evaluation became an integral part of Finnish science and higher education policies (e.g. Hölttä 1995; Rekilä 2006). At the same time, policy-makers adopted so-called innovation-

system thinking, which emphasizes increased national investments in research and development, integrated policies for science, technology and innovation, technology transfer and cross-sectoral collaboration (Kaukonen and Nieminen 1999; Miettinen 2002). The severe recession that hit Finland in the early 1990s did not change this policy line but rather reinforced it. For the universities, however, the most visible effect of the recession was large budget cuts between 1992 and 1995, taking place regardless of the increasing number of students (Välimaa 2001b).

Once recovery from the recession begun, several major reforms were implemented in a short period. In 1995, the steering of universities by the Ministry of Education began to be based on targets and performance. The main criteria for funding were the annual numbers of Master's and doctoral degrees.[18] Funding was granted as a lump sum which, at least in principle, allowed universities a larger freedom of manoeuvre. This dimension was strengthened further in 1997, when the Parliament accepted the new Universities Act comprising a smaller number of regulations than the previous set of laws and decrees regulating the activities of universities. Changes in the law reinforced the rector's powers, made it possible to establish new sub-units and nominate professors without approval from the Ministry and upgraded all associate professors to full professors. It also allowed appointing some external members to university boards, which since the democratic reforms of the 1970s mainly consist of three groups: students, professors and other personnel.[19] (Hakala et al. 2003; Välimaa 2001b.)

In 1995 the current system of graduate schools, funded by the Ministry of Education, was also established. By the end of their first year the 69 schools had nearly 1,000 four-year positions (Husso 2005, 13, 56). However, not all schools fill the positions for more than a year or even a shorter period, which means that the original idea was undermined (e.g. Määttä 2001). Another major reform was the establishment of centres of excellence, which are selected mainly on the basis of

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[18] The formula has been relatively stable over the years, so that the number of Master's degrees has accounted for approximately 45 percent and the number of doctoral degrees for approximately 30 percent of the funding. In the beginning, the funding was based on target numbers while the direction was to go toward measuring actual numbers. The use of degrees as the main indicators has been criticized widely, and the Ministry is seeking to adjust the formula e.g. by including publication activity. (Ministry of Education 2004.)

[19] In 2004, universities were required to have at least one external member on their boards, with the maximum being three. At the same time, the so-called third mission – that of interacting with the wider society and promoting the societal impact of research findings and artistic activities – was added to the law to complement the two more traditional functions, teaching and research.

representing 'international quality'. International discipline-based research evaluations had already been carried out by the Academy of Finland since the 1980s, but now the new Universities Act required universities to evaluate their own research and education (e.g. Hakala et al. 2003, 36–37, 41).

Even though universities continued to suffer from low budgets in the mid-1990s, their external research funding increased rapidly due to an additional funding programme that was implemented in 1997–1999. The aim as not just to increase research activity, but also to reinforce the competitiveness, efficiency and socio-economic relevance of research, both in universities and in governmental research institutes. Accordingly, the increase was channelled primarily through two public funding bodies, Tekes and the Academy of Finland.[20] Thus between 1990 and 2001, the universities' expenditure on research from budget funding increased by only 25 percent, but expenditure from external funding grew by as much as 150 percent. Also the balance between these two funding bodies changed: in 1991, the proportion of funding channelled to universities through Tekes was 11 percent and through the Academy 42 percent, but in 2000, Tekes's proportion had risen to 23 percent and the Academy's proportion had decreased to 31 percent.[21] (Hakala et al. 2003, 42–47.)

This development was supported also by Finland's decision to join the EU in 1995. The EU emerged as a significant new financier of research and offered Finnish researchers the possibility of joining EU networks as equal partners. University researchers applied for EU funding actively, and in 1999, the share of EU funding of universities' external research funding reached seven percent. Since then the proportion has grown to almost 15 percent (Statistics Finland 2007), but it can be argued that the main impact of the EU membership is the push it gave to internationalization in general – making it part of everyday academic activities – as well as directing international contacts more towards EU countries (Hakala et al. 2003, 146–191).

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[20] Tekes funding is channelled through technology programmes, and to get funding academic research groups are required to have industrial partners. In contrast, most of Academy funding is allocated to individual researchers and projects without any predetermined agenda. One fifth of Academy funding is granted through its research programmes. (Hakala et al. 2003, 35.)

[21] In the 2000s, however, the share of funding channeled through Tekes has decreased, while the Academy share has remained more constant.

To sum up, the 1990s and early 2000s present a period during which the Finnish Government carried out a multitude of reforms with significant implications for universities. Finland adopted several policies very similar to those implemented in other OECD countries, such as performance-based steering of universities, the centres of excellence policy as well as making international evaluations a standard procedure. However, the increase of public research funding for academic research has been exceptionally high in Finland, and the allocation of the additional funds has been designed carefully in order to make Finnish research culture more competitive, productive, collaborative and international. Some impacts of the new policies, especially those pertaining to the structure of the academic staff and the organization of research training, can be explored in light of statistical data, which also display some important disciplinary differences.

4.3 Changes in the composition of academic staff and research training

The policy reforms and funding changes have influenced in many ways the composition of the academic staff as well as the conditions for engaging in teaching and research in universities. As shown by Table 1, one of the effects of the increasing external funding is that the number of university researchers has grown almost four times bigger since 1990. The table also indicates that the number of academic teaching staff has remained practically intact, although the number of students and degrees has increased rapidly. Since 1990, the number of Master's degrees has grown by over 50 percent, while the number of doctoral degrees has almost tripled.

Table 1. Academic staff, students and degrees in Finnish universities 1990–2005 (KOTA database).

	1990	**1995**	**2000**	**2005**
Teaching staff (work years) *- % externally funded*	7,788 *0*	7,820 *4*	7,877 *6*	8,450 *7*
Researchers (work years) *- % externally funded*	1,890 *79*	3,629 [1] *72*	4,872 *84*	6,500 *81*
Master's level students	93,769	111,441	128,512	126,657
Postgraduate students	10,442	15,927	20,537	22,145
Master's degrees per year	8,423	9,819	11,515	12,920
Doctoral degrees per year	490	765	1,156	1,422

[1] Between 1995 and 1998, graduate school places funded by the Ministry of Education were included in research work years. In 1995, there were 945 graduate school places (Husso 2005, 13), which means that the absolute figure in this box is too high, and the percentage too low. Since 1999, graduate school places have formed their own category in the database.

While practically all researchers are on temporary contracts, ranging from a few months to some years, it can be estimated that the majority of teaching staff – lecturers and the majority of professors – have permanent positions. The teaching staff with temporary contracts, ranging usually from three to five years, consists mainly of academics who can be considered equal to associate professors in other countries. [22] A tenure-track system does not exist in Finland. The longstanding, fairly rigid system of salary categories was replaced in 2006 by a new system emphasizing job demands and personal performance; the aim is also that salary levels were not dependent on the source of funding for them. It should also be noted that the personnel categories are not fully fixed: academics having teaching post can take time off if they succeed in getting external research funding.[23] This rotation provides chances for gaining teaching experience for contract researchers and PhD students. (Välimaa 2001a.)

As to research training, the most prominent feature today is the huge number of PhD students and PhD degrees. Partly this can be seen as a natural consequence of the growth of Master's degrees. Other factors contributing to the increase in the

[22] This estimation is based on the fact that, according to KOTA database, the number of work years done by professors and lecturers is far higher than the number of work years done by assistants and senior assistants. Today, an increasing number of professorships are temporary (5 years), but these positions do not seem to have replaced existing permanent positions, since the number of work years by professors has grown by one thousand between 2000 and 2007.

[23] In many other countries, rules concerning sabbaticals are stricter than in Finland.

number of PhD students include the graduate school reform, the growth of external research funding, as well as the fact that universities receive part of their budget funding on the basis of the annual number of doctoral degrees awarded. It should also be noted that the absence of tuition fees and of limitations on the length of studies tend to keep the number of PhD students high in comparison to the number of PhD degrees. These two issues were brought up in a critical manner in the international evaluation of doctoral education in Finland in 2006 (Dill et al. 2006). However, the evaluation was based on fairly limited data and perhaps even a misunderstanding of the traditions of Finnish doctoral education. For instance, the evaluation report speaks of 'doctoral programmes' and pays no attention to the fact that even graduate schools only rarely offer structured programmes for postgraduate studies, but rather a selection of individual courses to choose from. Funding from the graduate schools, which totalled 114 in 2005, provides a four-year salary for some 1,500 postgraduate students annually. In practice, most PhD students utilize a number of different funding sources, including scholarships from private foundations and project research and other work (see Hiltunen and Pasanen 2006, 42–44).

Thousands of Finnish PhD students are employed in externally funded research projects in universities. Among other things, this means that a large part of academic research in Finland is conducted by PhD students. Evidence for this is provided by Statistics Finland, according to which as many as 77 percent of university researchers had not yet completed a PhD in 2004 (Ministry of Education 2006, 15). Moreover, of all academic personnel working in universities in 2004, nearly 60 percent were under 40 years old. In this group, only 15 percent had a PhD. (Ibid., 16–17.) Even though registering for PhD studies is not obligatory for this group, it is probable that these researchers are PhD students. Since in Finland already Master's level thesis work requires a significant amount of independent research, it is understandable that PhD students may work as 'normal' researchers.

The developments described above have had at least three important consequences. Firstly, the increased number of PhD students and the growing attention being paid to providing them appropriate supervision and other support means more work for senior academics. Secondly, senior academics in permanent posts are also responsible for applying external funding for PhD students (even though this is not the case in all fields, see Article V). Thirdly, the increased number

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of doctoral degrees means that competition for academic posts is harder than ever, and the majority of PhDs need to look for alternative sources of employment. This, in turn, means new challenges to the content of PhD studies, as they should provide skills and knowledge that can be utilized outside universities (see Vuolanto et al. 2006). Presently approximately two fifths of those who earned a PhD degree in Finland during the late 1990s or early 2000s work in universities (Husso 2005, 114–115).

Furthermore, there is evidence that publication activity has not grown as much as the increases in research funding might have led to expect. A recent study based on data from three Finnish universities shows that the number of all types of publications in relation to the number of research work years decreased between 1998 and 2005.[24] The study also shows that full-time researchers publish as much or less than academics in teaching positions, which might reflect the aforementioned fact that most of the researchers are PhD students. (Puuska and Miettinen 2008, 85–86; see also Auranen and Nieminen, forthcoming; Puuska, forthcoming.) Similarly, the international mobility of Finnish academics has shown signs of decrease, although official policies have emphasized the need to strongly increase mobility.[25] This could be the result of increasing workloads at home, but another possible explanation is that EU projects have changed the practices of internationalization toward shorter visits. Also IT-based communication may have reduced the need for physical mobility. (Hakala et al. 2003.)

Finally, it is also noteworthy that the gender structure of academia is changing too. Women have comprised the majority of university students studying for the first degree already since 1985, and the number of female PhD students has risen continuously. In 2005, approximately half of both PhD students and new PhDs were women. Yet, the proportion of women professors is still relatively small, approximately 23 percent and has remained almost the same since 1995.[26] Variation between disciplines is considerable. For instance, in engineering both students and

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[24] However, as the authors of the report note, it could be that more texts are now published in international refereed journals with strict quality control.

[25] The number of long-term visits (more than one month) abroad was highest between 1993 and 1997, after which there has been a significant decrease. The number of short-term visits (2-4 weeks) started to decrease in 1999. (KOTA database.)

[26] In international comparison, however, the proportion of women at top positions in Finnish academia is fairly high (European Commission 2006, 57; see also Husu 2001).

staff are primarily male, while health science represents a female-dominated field, where 85 percent of students were female and 'only' 45 percent of professors were male in 2005. (KOTA database.)

4.4   Disciplinary differences

As indicated by the gender dimension above, the dynamics of change vary among disciplinary groups and disciplines. Table 2 shows that the total number of research years and the balance between externally funded and budget-funded research years has grown in all disciplinary groups but to different degrees. The absolute number of researchers working on external funding has grown particularly strongly in the technical fields and the natural sciences. However, in technical fields as well as agriculture and forestry, the share of externally funded years has remained fairly stable over the years, while medicine, the humanities and the social sciences have experienced a large growth in this respect. (See also Nieminen 2005, 108–114, Table 3.8.)

The table also shows that the situation has stabilized during the 2000s. There has even been a decrease in the absolute numbers and in the proportion of externally funded research years in some disciplines, especially the natural sciences. In the humanities, growth seems to be continuing.

The numbers of completed doctoral degrees are not available by discipline for the whole period, but between 1990 and 2001, the strongest relative growth took place in engineering and the social sciences. In these fields, the number of degrees grew more than threefold. (Husso 2005, 74–75.) However, the average times-to-degree have not decreased to a considerable extent in any of the disciplinary groups. In 2002, the highest average age of PhDs, 40, was found in the humanities, the social sciences and the arts. The average age was lowest in the natural sciences and engineering, but even there it was almost 35. (ibid., 79.) There is, however, some evidence that PhDs who have had national graduate school places graduate at a younger age (ibid., 82).

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Table 2. Research work years in universities according to discipline group (averages counted on the basis of two or three years; university hospitals and polytechnics have been excluded from the data).[1] Source: Statistics Finland.

	1991-1993	1995-1997	1998-2000	2001-2003	2004-2006
Natural sciences	1,887	2,792	4,478	4,703	4,674
- % externally funded	51	56	65	65	63
Technical sciences	916	2,398	3,288	3,586	3,565
- % externally funded	70	71	73	74	73
Medicine and health	1,511	1,764	2,064	2,349	2,710
- % externally funded	39	44	55	60	61
Agric. and forest sci.	284	325	342	334	378
- % externally funded	71	68	74	75	70
Social sciences	1,453	2,008	2,557	2,729	3,089
- % externally funded	43	51	60	61	61
Humanities	773	984	1,174	1,212	1,266
- % externally funded	39	41	51	54	58
Total	6,824	10,271	13,903	14,913	15,682
- % externally funded	49	55	63	65	64

[1] The figures in Table 2 are significantly higher than those in Table 1, because they are calculated on a different basis. Unlike figures in KOTA, they include research done by teaching staff and technical staff as well as (part of) research work done on scholarships.

It is also important to note that the increased funding has come from different sources in different disciplinary groups. Thus they are also subject to different kinds of demands and criteria (see Nieminen 2005, 126–127). Funding by the Academy of Finland provides chances for basic research and enables fairly long projects. All applications are submitted to international peer review. The disciplinary groups most dependent on Academy funding are the humanities and the natural sciences. Funding by Tekes, the ministries and industry has shorter timelines and more fixed aims. Tekes is traditionally the most important financier of research in engineering fields, but it has become a significant financier also in the natural sciences and medicine. Funding from the private sector, totalling approximately 14 percent of external university research funding, goes primarily to engineering and medicine. EU funding, which amounts to approximately 9 percent, is divided more equally among different fields, with the exception of the humanities. Naturally, there are

also important differences within the disciplinary groups. (Nieminen 2005, 94–97; Statistics Finland 2003, 2005, 2007.)

Notwithstanding the University of Helsinki and Åbo Akademi University, the Swedish language university in Turku, universities in Finland do not have any significant funds of their own (Nieminen 2005, 94–95; Statistics Finland 2003, 2005, 2007 [27]). The new Universities Act, which is planned to take effect in 2010, will, if accepted, change this situation at least to some extent, as universities will gain more opportunities for accumulating their own assets (Ministry of Education 2008a).

To conclude, this section has shown that significant changes have indeed taken place in Finnish science and higher education policies and funding and that these changes have had important repercussions for universities and academic communities. However, even though similar tendencies can be discerned in all disciplinary groups, such as the growth of staff focusing solely on research, disciplinary groups differ in terms of dependence on external funding as well as the nature of their funding sources. It is important that these be taken into account when making interpretations concerning the dynamics of cultural change at the level of local academic communities.

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[27] Figures by Statistics Finland indicate expenditures by universities, not original funding decisions.

5.   Data and methods

When the object of analysis is cultural understandings as in this dissertation, the use of qualitative interviews is a consistent choice. It enables the analysis of meanings and values that people attach to their work and life in academia by employing a variety of pre-existing, socially shaped understandings. A part of scholarship in social research, including studies on the social construction of scientific facts in the laboratory, has focused on how meanings are constructed in everyday interaction and what local competencies this construction requires (e.g. Sismondo 2004, 86–96). The emphasis in my dissertation, however, is on what kinds of meanings and identities are constructed and by what cultural resources or cultural frameworks these understandings are informed (Gubrium and Holstein 2000, 497). There is no way of getting 'objective' knowledge on these types of questions: thus my analysis is essentially interpretative. This does not mean that 'anything goes'. As I aim to show in the following, my analysis is based on a careful selection of data as well as a systematic collection and analysis of them. What kinds of generalizations these data enable is an issue that will be brought up in the concluding section.

5.1   The data: three sets of interviews

The data on which my dissertation is based consist of three sets of semi-structured interviews collected in three research projects. The first set of data involves interviews with Finnish academy professors, who can be considered representing the elite of Finnish academics, coming from all disciplinary groups. These data are used in Article 1. The second set of data consists of interviews with 'ordinary' senior researchers in three academic units, each of which represents a distinct discipline. Two of the units are academic departments and one is a research centre. These three case studies are discussed in Articles II and III. The third data set consists of

interviews with junior and senior researchers in four academic units (two research centres and two research-oriented departments), again each representing a different discipline. This data set is utilized in different ways in Articles IV and V.

Table 3. The three sets of interviews used in the dissertation.

	Description	Use
Data set 1	61 interviews with academy professors representing all disciplinary groups	Article I
Data set 2	23 interviews with senior researchers in three units (Dept. of History; Work Research Centre; Laboratories of Surface Science and Semiconductor Technology)	Articles II and III
Data set 3	a) 12 interviews with more experienced junior researchers in four units (Health Research Centre, Electronics Research Centre, Dept. of Regional Studies, Dept. of Biomaterials)	Article IV
	b) 18 interviews with researchers in different positions in two research centres (Health Research Centre, Electronics Research Centre)	Article V

Data set 1

Data set 1, which is utilized in Article I, consists of interviews conducted in 1994–1996 with 61 of the 85 persons who had been selected for a five-year position as an academy professor since the establishment of this institution in 1970 until the end of 1995. [28] The positions are meant for the most successful Finnish scientists to enable a period of intensive research work. The salary level is considerably higher than that of a normal professor, and the appointment guarantees also additional research funding for a research group. The selection is based on past qualifications as well as a research plan for the five-year period. The appointments are made by the Research Councils of the Academy of Finland, which until 1995 totalled six and after that

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[28] The original Finnish term was 'tutkijaprofessori'. In 1995, the term became 'akatemiaprofessori'.

four.[29] Consequently, the professors, and thus the interviewees, represent fairly evenly all disciplinary groups: 12 interviewees from the natural sciences, 13 from medicine, 7 from the humanities, 15 from the social sciences, 8 from technical fields, and 6 from environmental sciences, including forestry and agriculture. A few of the interviewees had had more than one nomination, and four professors had been made permanent academy professors.

The interviewees belonged to the elite of Finnish science, and thus comprised the most international segment of Finnish researchers.[30] They typically had had a long and successful career in their own field: they had extensive networks, they had supervised plenty of PhD students, and they were used to having relatively good resources for their research. Some of them had probably been able to influence science and higher education policy and funding decisions. At the time of the interviews, most of them were above the age of 50 and some had already retired, which means that when answering the questions, they were typically looking back to their whole academic career rather than focusing only on the current situation.

Reflecting the gendered nature of science and scientific elites in particular (e.g. Etzkowitz et al. 2008), only 5 of the 61 interviewees were women. Of the 24 professors who were not interviewed, 5 had died, 6 had an exceptionally short period as academy professors (for various reasons), and 12 were not reached or they refused to be interviewed.

The interviews were conducted by three researchers: Marja Alestalo, Erkki Kaukonen and me. I transcribed 60 tapes verbatim; one interview was conducted by email. The length of the interviews was typically two hours, which provided a possibility to cover a wide range of themes relating to the interviewee's career, research topics, networks, and science policy. The questions on the internationality of science concerned, among other things, the nature and direction of collaboration and contacts, the motivation for internationalization as well as views on where the top level research is carried out in their disciplines and on the significance of Finnish EU membership. Experiences and views on these issues were also brought up by the interviewees throughout the interviews. The interviews were conducted

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[29] In 1995, the six councils were reorganized into four: culture and society; health; the environment; and the natural sciences and engineering (e.g. Eskola 2003).

[30] This is not to argue that it is easy to define the 'scientific elite' (e.g. Laudel 2006). However, in this case the appointment itself can be taken as evidence of being a national elite position.

around the time when Finland became a member of the EU (1995), and thus an important new actor emerged in the Finnish science system, with its own policy priorities and terms of funding.

These data are unique in highlighting the experiences of academics that had a central position in their research fields at a time when Finnish science and higher education had become fairly stable in terms of institutions and funding. The data is also valuable since it enables comparisons across all disciplinary groups. However, it is clear that the data does not enable fine-grained analysis of differences among individual disciplines. It should also be noted that I was mainly interested in analysing the interviews in terms of cultural understandings and disciplinary differences, rather than studying the culture of Finnish scientific elite as such. Yet, I did not want to neglect the valuable facts about the history of Finnish science that these interviews also provided.

Data set 2

The interviews with the elite scientists left me wondering what 'ordinary' researchers think of internationality and the pressures for further internationalization. I was also interested in studying internationalization in the context of local research communities, in contrast to the rather broad temporal and spatial perspective offered by studying the experiences of the academy professors. Joining the project 'University research in transition' offered a fine opportunity to do this in three different units (Article II). Again, internationalization was just one of the themes covered by the interviews, since the overall purpose was to find out how researchers in different research communities had experienced the multiple changes in the funding and organization of research that have taken place in the 1990s. In this sense, our interest in the cases was 'instrumental' and comparative rather than 'intrinsic'. In other words, we were interested in drawing conclusions that go beyond the cases themselves (see Stake 2000).

Also my research interests started to develop beyond the theme of internationalization. The result was an article written with Oili-Helena Ylijoki, in which the data was used for exploring the purpose and audiences of research in the three research communities (Article III). The data has also been analyzed in several

other publications (e.g. Hakala et al. 2003; Ylijoki 2003, 2005; Ylijoki and Mäntylä 2003).

Schofield (2000) argues that when selecting cases for research, one should think of what kind of generalizations she wants to make on the basis of the results. She identifies three domains of generalization: we can attempt to generalize to what is, to what may be (what is likely to happen - projection into future), and to what could be (if we took appropriate measures). Data set 2 addresses the first domain, since it was designed to cover the range and depth of changes in academic cultures that we could – on the basis of the literature on disciplinary cultures – assume to be quite different from each other, but typical of their own 'category'. Unlike Stake (2000, 436), I believe that comparison – and the accompanying, premeditated decisions on what aspects we would like to compare – does not necessarily thwart the attempt to describe specific cultures as such, so that readers can also make their own comparisons (see also Gomm et al. 2000, 106). However, it should also be noted that here interviews were only made with senior researchers and thus we were not able to describe the full range of understandings in the units.

Our selection of the three disciplines and units was based on our interest in analysing differences in the ways that external pressures for change were reacted to in different types of research environments. On this basis, we chose to study units that differed from each other in terms of discipline (using Becher's taxonomies of hard vs. soft and pure vs. applied research), funding patterns (budget vs. external funding; public vs. private sources of external funding) and organizational context (traditional department vs. research centre). We ended up with the following three units.

> **Department of History**
>
> - research is soft and pure
> - highest level of budget funding among the three units; external funding mainly from the Academy of Finland
> - traditional teaching department
>
> **The Work Research Centre**
>
> - research is soft, applied and multidisciplinary
> - relies mainly on external funding from public sources such as ministries, foundations, the Academy of Finland and the EU
> - research centre
>
> **The Laboratories Surface Science and Semiconductor Technology (= SemiLab)**
>
> - research is hard and applied and multidisciplinary and has close connections to industrial product development
> - high level of external funding, both from public (the Academy of Finland, Tekes and the EU) and private sources (industry)
> - traditional teaching department

The first two units were located at the University of Tampere, which is a multi-faculty university, whereas the SemiLab belonged to the Tampere University of Technology. Both universities are medium-sized research universities. The number of personnel was around 40 in all three units. We decided to conduct seven to eight interviews with senior researchers in each unit, which meant that practically all senior researchers in the units – including the heads of units – were interviewed. All had several years or even decades of experience in research work. However, in the SemiLab the interviewees included some researchers at the post-doctoral stage, because the number of seniors was so small. The duties of the post-doctoral researchers, however, were often comparable to those of the senior researchers.

In the history department and the Work Research Centre there was an equal number of female and male interviewees, whereas in the SemiLab all the interviewees were male. This corresponds to the actual gender profile in the units. In each unit, one of the interviewees was a foreigner, working in the unit on a more or less permanent basis. Two of these three interviews were conducted in English. The interviews were carried out between December 1998 and March 1999, and they typically lasted about two hours. Most of the interviews were conducted by me and a few by Oili-Helena Ylijoki. The interviews were transcribed by Sanna Malinen and me.

The interviews covered a wide range of themes concerning research work, such as the interviewee's personal history as a researcher, the organization and funding of research, communication and collaboration patterns, and pressures in research work. The internationalization of research was brought up by the interviewees in connection with these themes, but it was also discussed separately at the end of the interviews. The interviewees were asked about the nature of and rationale for international activities, problems related to them, and the influence of various incentives and pressures for further internationalization.

Data set 3

Data set 3 was collected for the purposes of the project titled 'Dynamics and innovativeness of research communities', which included Erkki Kaukonen, Mika Nieminen, Otto Auranen and myself. The project was designed to study how innovativeness and creativity are defined and what conditions and processes are seen as supportive of innovative research in different types of research environments. Furthermore, we were interested in exploring emerging research fields with close contacts to non-academic financiers and audiences of research. Thus we chose units which engage in both pure and applied research and some academic research centres. This choice reflects our desire to explore units that can be seen as representing the 'leading edge of change' (Schofield 2000, 81–83; see above). In other words, the cases were selected in order to judge whether arguments concerning the future of academic science could be substantiated.

My data covers four of the five units selected for the study: the Health Research Centre, the Department of Regional studies, the Department of Biomaterials and the Electronics Research Centre.[31] Following Becher's taxonomy, the first two fields mentioned can be seen as representing the soft sciences and the latter two the hard sciences. My first article based on these data (Article IV) compares the two research centres, both of which operate mainly on external funding, comparing their modes of research training and socialization of junior researchers.

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[31] The fifth unit was left out of my selection because during the research process we discovered that it focused mainly on basic research. The four units belong to three medium-sized research universities in southern Finland. For a more detailed description of them, see Article V.

> **Health Research Centre**
>
> - research is soft and multidisciplinary; both pure and applied
> - high level of external funding, mainly from public sources
> - personnel structure: professor, two senior researchers, PhD students, a statistician (total: approx. 15 persons)
>
> **Electronics Research Centre**
>
> - research is hard and multidisciplinary; both pure and applied; the unit has close connections to industrial product development
> - high level of external funding, both from public and private sources
> - personnel structure: two professors, post doctoral students, PhD students, research assistants (total: approx. 50 persons)

The comparison was based on interviews with researchers representing different career stages and statuses in these units (see Table 4). Attention was also paid to having a representative sample of male and female as well as Finnish and non-Finnish researchers. In comparison to our case studies in Data set 2, these two case studies are thus closer to the ethnographic conception of case study, where the aim is to describe the local culture as a whole (e.g. Stake 2000; Traweek 1988). While my study of the two research centres was primarily based on interviews, it was complemented by other materials, such as web-page texts, brochures, publication lists and financial information in order to increase the internal validity of the cases (e.g. Schofield 2000, 79–80).

The interviews in Data set 3 were semi-structured, covering such themes as personal background and arrival in the unit; current status, tasks and funding; views on the organization of research activities, research training and the role of graduate schools, collaboration and communication. The questions for junior and senior researchers were slightly different. The interviews typically lasted one and a half hours. Most of the interviews were conducted and transcribed by Marita Miettinen. I did a few interviews on my own and a few with Marita in order to get a personal impression of the units in question. I also participated in transcribing the interviews conducted in English.

Working on questions regarding the socialization of junior researchers led me to a new, but related, research question: What is the meaning of academic work for the new generation of researchers who have personal experience only of today's

university and none of its 'golden past'? This question was partly raised by Oili-Helena Ylijoki's analysis of nostalgia in the senior researchers' interviews (Ylijoki 2005). To study this question, I selected three interviews with junior researchers from the four units. To end up with an even number of interviews from each unit, I chose from each unit those junior researchers who had the most research experience. The minimum research experience was thus 15 months, and the maximum was nearly 9 years, when work as a research secretary or laboratory technician was included. I decided to leave out the foreign interviewees, since it was clear from the interviews that their backgrounds affected to some extent their socialization into the research units as well as their future plans, and analyzing their experiences would require a larger number of interviews. For a summary of how I used the interviews in Data set 3, see Table 4.

Table 4. Description of Data set 3 and its use in Articles IV and V.

	Data collected	Data utilized in article IV	Data utilized in article V
Health Research Centre	Total of 8 interviews: - 3 with senior researchers - 4 with junior researchers - 1 with a statistician Annual reports, web pages, brochures etc.	All interviews and the additional materials	3 interviews with junior researchers
Electronics Research Centre	Total of 10 interviews: - 2 with senior researchers - 2 with postdocs - 6 with junior researchers Annual reports, web pages, brochures etc.	All interviews and the additional materials	3 interviews with junior researchers
Department of Regional Studies	Total of 11 interviews	-	3 interviews with junior researchers
Department of Biomaterials	Total of 9 interviews	-	3 interviews with junior researchers

5.2 Interviewing researchers

Interviewing academics can be tricky business. When conducting interviews for their study on PhD student socialization, Delamont, Atkinson and Parry (2000, 18–33) encountered interviewees who suspected them of having a hidden agenda behind their overt research motives, and sometimes – in case of interviewing researchers from research fields close to their own – even of having inadequate competence for the research. For some reason, similar doubts were extremely rare – or at least not expressed – when we collected the three sets of interviews introduced above. One explanation may be that the interviewees knew that our projects were funded by the Academy of Finland which is known to enable free and critical research. Another explanation is that the climate of British academia may have been more strained than that of Finnish universities during the period when the interviews were conducted, even though most Finnish senior interviewees were quite critical of many policy developments.

The general atmosphere in nearly all of our interviews was amiable, sometimes also collegial. The interviewees seemed to be keen on telling about their experiences and reflecting on their views. They also seemed to find it positive that the interviewers had familiarized themselves in advance with their work (when possible) and their research unit. Often the interviewees would allow more time for the interview than they had initially planned. However, some interviews with heads of units suffered from a lack of time. The same problem did not occur with academy professors, perhaps because they themselves could see that a data set consisting of interviews with all academy professors was going to be unique. Notwithstanding a few interviews conducted at the academy professors' homes, all interviews in the three data sets were conducted in the interviewees' offices. Many interviewees would also show us around their department and laboratories, sometimes we would also ask for a tour.

Delamont and her colleagues (2000, 30) as well as Traweek (1988, 14), who interviewed physicists in various positions, found that senior researchers were typically more guarded in the interviews than novice researchers. This observation does not correspond to our experience either. In fact, we found that interviewing

was toughest with junior researchers from the technical fields, since sometimes they could be quite short-worded, probably because they could not quite understand why their views would be interesting to us. As one of them put it: 'Why don't you ask our professor, he knows best.' Sometimes finding a peaceful place for making the interview presented some problems. In general, however, all the interviewees – but especially the academy professors – were easy to interview since they are used to reflection and to voicing their opinions. In some cases, the interviews seemed to have even a therapeutic dimension in allowing the interviewees to express their concerns to a sympathetic listener. [32]

However, the questions raised by Delamont, Atkinson and Parry (2000) concerning the interviewer's proximity or distance from her interviewees – as well as confidentiality – are most pertinent also in our case. Firstly, it is clear that in any interview the interviewer participates in shaping the answers she receives. This characteristic cannot and does not need to be avoided, even though it is important to ensure that the questions do not steer the answers too much and that all interviewers use the same terminology with all interviewees, whenever possible (e.g. Kvale 1996, 124–159). The interaction present in every interview can be seen also as something positive, since it may provide the interviewee an opportunity for reflection that she may find fruitful in her work. Secondly, to deal with the issue of proximity vs. distance to various disciplines, we tried to learn in advance about those research fields that were furthest from us (especially engineering fields) and to think over our stereotypes and previous knowledge of all fields included in our studies.

Thirdly, we discussed issues of confidentiality with all interviewees. Only a few of them had any concerns in their own minds, and our promise to hide the names and recognizable characteristics of the interviewees was mostly accepted without any further questions. This is a little bit surprising, since in a small country like Finland, where the scientific communities are fairly small, recognising peers may be relatively easy. One explanation for the lack of doubts is that the interviewees generally didn't feel that they were telling us things that would compromise them in

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[32] Somewhat surprisingly, gender and nationality emerged as themes and sources of distinctions in the interviews only rarely. The main differences were that women more often than men would raise issues related to family and discuss their meaning. On the other hand, men with non-Finnish backgrounds mentioned their family more often. Interviews with non-Finnish researchers would also include some discussion of how it is to live in Finland (in the cold weather and with the Finnish language).

some way. In Articles II and III it was thus possible to reveal the names and locations of the units, while concealing the identity of the individual interviewees. In Articles IV and V, I decided to hide also the identity of the units, since the interviewees were mostly junior researchers who were not very used to being interviewed and the interviews involved more criticisms toward academics in the same unit. Finally, a little bit disappointingly, few interviewees seemed very interested in the results of our studies. While discussing my interpretations might have added to the validity of my interpretations, I did not get back to them before publishing my articles and I do not believe that this is an essential flaw in my research (see Silverman 1995, 177). I have sent the publications to the units, and the few comments I have received have been positive.

5.3   Analysing the interviews

As a whole, the analysis of the interviews in my five articles can be characterized as interpretative content analysis. My basic aim was to explore the categorizations and associations that the interviewees themselves were making. In this sense, the analysis was data-driven. However, the initial coding of the interviews proceeded according to broad themes implicit in the interview questions, which naturally reflected my initial research questions. In other words, the analysis was dialogical, moving between two poles: the concepts used by the interviewees and my theoretically informed concepts.[33] However, this opposition is analytical rather than empirical, since, being a researcher myself, I share many of the cultural resources which inform the concepts used by my interviewees.[34]

At the same time, my theoretical resources enabled me to take distance from the cultural frameworks that I share with the researchers interviewed. Another important tool for exploring the distinctions and associations in the texts was comparison. By comparing interviews carried out in different units and disciplines I was able to pay

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[33] Constructs used by the interviewees are called *emic* classifications, and those of the analyst *etic* constructions. However, focusing on *emic* classifications or concepts does not mean that the analyst could only use the same terms (words) that appear in the interviews (see Alasuutari 2000, 67–69).

[34] In my experience, the translation of interview excerpts from Finnish to English and operating with two languages in the analysis and writing were useful for testing ideas and interpretations, since translation always requires an attempt to reach 'the heart of the matter'.

attention to themes, silences, inconsistencies and other clues that I did not anticipate before engaging in the analysis as well as to test my initial interpretations (Schofield 2000, 79–81; Silverman 1995, 179–180). I would also have pursued other axes of comparison, such as gender and nationality, but many of these did not prove very fruitful, requiring perhaps different questions and different data.[35] Furthermore, on the basis of the theoretical resources and my knowledge of contextual factors – discussed in the previous sections of this introduction – I was able to provide explanations as to why interviewees belonging to certain disciplines, units or other sub-groups would make certain types of distinctions in certain contexts. (Alasuutari 2000, 30–33; 67–69; 138–142)

To give an example, in analysing the data for Article IV, I would first create a matrix based on a number of broad themes – e.g. background, research, PhD studies, interests, future – under which I would gather all relevant text excerpts from each interview. As the process advanced, I kept adjusting the themes and adding themes that arose from the interviews. On this basis, I concluded that all the interviews shared four basic questions[36], the answers to which varied depending on the type and context of their work. In general, I have tried to be clear about when a cultural distinction or association is made by all interviewees included in the data or only some of them. As Silverman notes, when bringing up understandings that are not shared by all the interviewees, there is always the danger of 'anecdotalism', that is, generalizing on the basis of a few, purposefully selected 'examples' (Silverman 1995, 237–241).

It should also be noted that even though my analysis typically started by examining each interview at a time, my conclusions do not rest on placing individuals into certain categories. In fact, the analysis was based on the anticipation that each interviewee makes use of a variety of cultural resources, which might even be conflicting. For instance, in Article IV an interviewee could both play down the significance of salary in academic work and later speak favourably about 'real life'

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[35] According to Mason (1992, 150–168), data can be organized either cross-sectionally (same themes and questions applied to all cases) or holistically (cases are analyzed separately). To enable comparisons on different axes, I used both ways. However, in Articles II and V, which are closest to traditional case studies, the emphasis was on holistic analysis.

[36] Of course, had my original research questions been different, I probably would have identified different basic questions from the data. Furthermore, the idea that the interviews might involve *questions* is informed by Charles Taylor's (1989) understanding of identity and its articulation.

outside academia associating it with a 'proper salary'. I have interpreted this type of discrepancy as reflecting two conflicting understandings of the value and meaning of academic work. In Article III, which explores similar questions from a slightly different perspective (the audiences and motives of research), the distinctions and associations made by the interviewees themselves are presented in the article as 'research orientations'. Methodologically these orientations can be characterized as ideal types, since they do not have direct empirical referents in the interviews but aim to capture the different ethoses of research in the units.

Qualitative analysis can rarely be made entirely transparent, and thus the reader is unable to evaluate fully the consistency and plausibility of the interpretations and explanations offered. One way to alleviate this problem is to provide sections of original data so that the reader can follow the analysis and even make her own interpretations. Considering the five articles included in my dissertation, Articles I and III offer relatively few possibilities for this, since the citations in them function more as an illustration of the results. In contrast, Articles II, IV and V include more of the original data and thus enable the reader to better judge the adequacy of my interpretations.

6. Summary of results

This section sums up and discusses the results of the original journal articles, which have been written over a relatively long period of time in connection with three research projects. They focus on different types of policy-initiated change and cover a variety of disciplines and organizational contexts, thus enabling a broad view of the dynamics of cultural change and continuity in Finnish academic communities. Furthermore, while the first two articles explore differences among disciplinary groups and local research communities, the three remaining articles go beyond this by analyzing also their internal dynamics and the formation of academic identities.

6.1 Internationalization of Finnish research: on whose terms?

In recent years, the globalization of higher education markets and the impacts of this process on universities has been the focus of many articles and books (e.g. Currie and Newson 1998; Marginson and Rhoades 2002; Slaughter and Leslie 1997; Välimaa 2004). One basic argument is that globalization pushes universities to internationalize (e.g. Stromquist 2007; van der Wende 2001; see also Teichler 2004). This phenomenon has been studied mainly in the context of the educational function of universities, while the internationalization of research activities – a less recent phenomenon – has not attracted equal attention.[37]

Two explanations for this can be offered. Firstly, internationalization is often considered a self-evident characteristic of all scientific activity, embedded in the Mertonian norms of universalism and communalism (see section 2.1). From this perspective, it does not present a problem or a particular challenge. Secondly, the relatively moderate interest in the topic is explained by the fact that it is primarily

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[37] However, management-oriented studies on internationalization in connection with research that is close to product development can be found in journals such as *Research Policy*.

the concern of small countries – such as Finland and other Nordic countries – where the size of the science system alone is considered to make international interaction and collaboration a necessity (Kaukonen 1990). Furthermore, the majority of existing studies on internationalization are quantitative or bibliometric studies, where the main aim is to measure the increase of international contacts or publications or identifying patterns of international interaction (e.g. Hicks and Katz 1996; Smeby and Trondal 2005; van Raan 1997).

In contrast, Articles I and II analyze the meanings of internationality and internationalization to academics in different disciplinary groups: what counts as 'international' and how the demands for further internationalization by the Finnish science policy-makers are understood and experienced. The articles also examine how scientists view the relationship between internationality and 'quality' – a connection that is taken for granted in science policy documents. As internationality has always been part of academic cultures in some ways (Crawford et al. 1993), the type of change in question here does not raise as much suspicion among academics as reforms that are experienced primarily as managerial and coercive, for instance, the introduction of performance-based salary systems. Yet, as the two articles show, the science policy push for internationalization constitutes an important source of cultural change and of struggles over what constitutes 'good' internationality and when a field or unit has become 'international enough'.

The articles reveal that the meanings attached to 'internationality' and 'internationalization' vary among disciplinary groups and disciplines, in particular, between the hard and the soft fields. In the hard fields, the internationality of science is considered an historical fact as well as an immanent characteristic of scientific activity, the benefits of which include, for instance, access to equipment or building up a critical mass of researchers around a certain topic. Accordingly, the attempts by the Finnish science policy-makers are viewed as somewhat misguided, since these sciences are already international. However, there is little disagreement with the policy-makers that internationality can be used as a sign of good quality, with the exception of more applied hard fields where national relevance is considered to conflict with internationality. In the soft fields, internationalization is seen as a cross-cultural dissemination of ideas that provides an opportunity to think and do things in yet unknown ways. From this perspective, internationalization involves also negative aspects and trends, such as the homogenization of science and the

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increasing dominance of English-speaking countries. The representatives of the soft fields are suspicious of the policy-makers attempts to increase internationalization and to influence the direction of collaboration and contacts, since they feel that policy-makers have a very poor understanding of the meaning of genuine internationalization and the negative implications of externally-imposed internationalization.

Article I analyzes also the 'mental world maps' characteristic of different disciplinary groups. The term is used to designate the orientation to scientists in other countries, in other words, ideals concerning the directions of contacts and collaboration as well as the types of relationships thus created. As most of the interviewed academy professors have played a central role in the development of their own research field, their accounts are particularly interesting. The prevailing understanding is that Finnish science has left the peripheral position it once had and become an equal member of the international scientific community, being now able to contribute to international developments in science rather than merely following them. In this situation, the importance of EU membership and the new possibilities for financing and networks it offers, are considered positive, but not radical.

In the hard fields, the centre of the scientific world continues to be the USA. To get recognition from US scientists and to collaborate with good US research teams is what one should do. To compete with US research teams and to receive visitors from the USA shows that Finnish scientists have reached the 'international top', to employ the phrase used in many Finnish science policy documents but also by the interviewed academy professors. Collaboration with European scientists may help to achieve the top, while scientists from other parts of the world receive only sporadic attention, often with comments on 'cultural differences'. In contrast, the world map of the soft fields is much more diverse and flexible. The scientific world is considered to be in constant flux; in fact, even if it is possible to identify some current centres of scientific activity, it is more valued to seek contacts and collaboration with the rising centres. In other words, it is valuable to do something others haven't done, at least not yet.

In Article II, the focus is on how ordinary academics representing three local research communities experience the pressures for internationalization. It is shown that the 'profiles of internationalization' of these units are shaped to a large extent by the discipline they represent, but a more nuanced understanding of the dynamics

of change and the place of international activities within the academic cultures can only be achieved by examining also their research agendas, funding patterns and local traditions. In the Department of History, external pressures for internationalization are generally regarded with resentment: it is the historians who know best what kind of internationality is needed in the field; to engage in international activities that do not represent 'genuine' internationality can only be deplored. On the other hand, external pressures cannot be ignored, as the main financier of research in this department is the Academy of Finland, which has made internationalization one of its key aims. Thus a debate on the possible merits of international journal articles – in contrast to monographs that have traditionally been the mark of high-quality historical research – has started.

In the Work Research Centre, a unit focusing on problems related to working life and labour markets, resistance toward the demands for internationalization rises partly from values shared with historians, that is, the orientation toward domestic topics and audiences. However, views on internationalization are also affected by the fact that the financiers of work research are interested in knowledge helping to develop Finnish practices, and the project deadlines given by them are tight. Thus there is there is little time for writing international journal articles, which the researchers nevertheless value and which would help improve the image of the centre in the eyes of academic researchers outside the centre.

In the SemiLab, the relationship to internationalization is considered unproblematic. The researchers find their topics universal and feel that their research is already fully international – they are even forerunners in this respect. Hence there is no discrepancy with the policy push for internationalization. This feeling of contentment is supported by the fact that the SemiLab has a multitude of different funding sources, which makes it possible to pursue several lines of research at the same time. On the whole, the three case studies show that meanings associated with internationality and internationalization cannot be distinguished from the overall negotiations among policy-makers, research financiers and researchers on what topics should be studied and how, how the results should be presented and whom the research should benefit.

6.2 Externally funded research: research for whom and for what reasons?

The Mertonian norm of the disinterestedness of science – that is, the imperative that knowledge should be pursued for the sake of knowledge only – may have always been partly a myth, as pointed out in section 3.1.1. Whatever the case, it is evident that the recent changes in science and higher education policies and the funding of academic science have made the question of 'research for whom and for what reasons' even more relevant. This is the case also in Finland, where the considerable increase of research funding since mid-1990s has been channelled in ways that are meant to ensure the quality, internationality and societal relevance of research. What does this change mean in terms of the audiences of research and the motivation of researchers in different types of academic communities? This question is addressed in Articles III and IV.

Article III, which is based on the same three case studies as Article II, explores senior academics' perceptions concerning what they hope to achieve with their research and whom is it intended for. As shown in the previous section, both in the Department of History and in the Work Research Centre, one form in which this question appears is whether research should benefit primarily an (international) academic audience or a domestic audience, for instance, lay people interested in history or policy-makers hoping to solve employment problems. In Article III, this discussion is continued by distinguishing four research orientations on the basis of the data: academic, civil society, state-governmental, and entrepreneurial. Each orientation provides a particular understanding of what kind of research is worth conducting and to whom research should be directed. Each of the three local communities is characterized by more than one orientation.

The academic orientation has as its reference point the international and domestic scientific community. It reflects the traditional academic values according to which research topics should be chosen on the basis of curiosity and individual interest. The knowledge produced has typically a theoretical emphasis, and the main rewards of doing this kind of research are personal satisfaction as well as the recognition of other academics. This orientation is strongest in the Department of History, where academic posts are financed by the university budget and research activities by the Academy of Finland, which gives relatively broad autonomy to researchers even

though it requires that research is done in groups. However, the orientation appeals to researchers in the other units too, even if it is not as strongly emphasized.

The civil society orientation emphasizes that research should serve ordinary citizens so that they can utilize research results in everyday life and cultivate their understanding of the world. The nature of the knowledge is thus practical. This orientation is present in the Department of History and in the Work Research Centre. In both, researchers often give public lectures, appear on television, and write popular texts for newspapers. In the Work Research Centre, this orientation is also reflected in research projects which analyze and develop the practices of local work communities. In both units, these types of pursuits give the researchers deep satisfaction. At the same time they feel the orientation is being threatened by the increasing demands of research financiers to produce more publications and to finish projects on tight schedules. Furthermore, in the Department of History, the time required by increased teaching loads tends to reduce activities related to the civil society orientation, since these do not produce academic merits.

The reference point of the state-governmental orientation is the public sector. Research has an instrumental value for improving current policies and practices, and this type of research is pursued typically in short projects, in which the aims are given by or negotiated with the financiers of research. The results are evaluated by their usefulness and typically published as Finnish-language reports. This orientation dominates the research done in the Work Research Centre, which relies almost entirely on external funding from various public sources.

The entrepreneurial orientation is characterized by commercial considerations, either those of the financier of research or of the researchers themselves, who may, for instance, establish a spin-off company to reap the profits of their research. Thus the main audience of research is markets and customers, who also determine the real value of the research. This orientation is characteristic of the SemiLab, which has specialized in lasers and semiconductors. Its researchers consider this type of research highly rewarding: one can know for sure the value of one's research and be part of an exiting competition with other research groups and businesses over who 'gets there first'.

In the current situation, researchers in all three units believe that the balance among different orientations in their unit is precarious. The main reason for this is that the funding structure of the units favours one orientation, while it would be

important for the motivation of the researchers to be able to pursue research that has other aims and audiences. In particular, it seems that the civil society orientation is relegated to the fringes as it does not have its 'own financier' (cf. Delanty 2001). Problems of motivation arise also when the university and financiers expect academic results while funding is received for projects with fixed aims and schedules, as in the Work Research Centre and the SemiLab. A central problem is that there is no time for academically oriented research, which is valued highly. It is also necessary in order to retain status within the university and scientific community, and to gain merits that are needed for applying for academic posts. In other words, while researchers in each of the three units are willing to serve several audiences, the lack of time for the academic and civil society orientations lead to dissatisfaction and problems of motivation.

Article IV explores further the sources of researchers' motivation and identities by asking whether the 'academic calling' plays any role in the academic lives of junior researchers, who work in research environments characterized by external funding, project work and multidisciplinary research. In contrast to Article III, which shows that opportunities to engage in many types of research are important for the senior researchers, the junior researchers are strikingly unanimous in emphasising the value of 'useful' and 'practical' research. Such research is contrasted with overly academic research that is isolated from reality and not applied to anything. Interestingly, especially the junior researchers representing the soft fields feel strongly about this and consider the latter type of research as uninteresting and even morally suspect, when it could be assumed that 'useful' research was closer to the values of hard and applied fields, here represented by junior researchers from two engineering fields. One possible explanation for this is that the junior researchers in the soft fields feel pressure to justify their engagement in practically oriented research, since in the traditional hierarchy of a multi-faculty university, where their units are located, applied fields have been considered being lower in the hierarchy of sciences than the pure fields (e.g. Becher and Trowler 2001, 81).

A further question presented by Article IV is whether 'useful research' can provide the basis for a new meaningful academic identity. Applying Charles Taylor's philosophical work (1989), traditional academic identity can be understood as a moral framework anchored in such ideals as autonomy, search for truth,

academic calling, and passion for knowledge. This framework enables academics to recognize the meaning and value of their own work and to define who they are and what they should aspire to. Thus the framework functions as a source of empowerment and helps to endure hardships entailed by research and academic career. The article shows that even though the junior researchers reject the 'search for truth' as their main goal and emphasize the usefulness of research, they also recognize the power of the framework. Especially when talking about the best and the worst moments in their research, they recount stories about sacrifices and feelings of insecurity as well as about deep emotional satisfaction and joy when research after long periods of hard work finally yields results. On this basis, it is evident that the junior researchers do not have an 'instrumental' relationship to academic work.

On the other hand, the interviewees also tell that staying in academia after the first degree was not a very conscious choice, but rather a matter of drifting, as one interviewee puts it. A similar attitude seems to apply to their future: research work and an academic career is an alternative, but only one among others. Furthermore, while the junior researchers do find satisfaction in being able to make their own decisions regarding research, they also seem to be quite content with working on research topics that are agreed upon with the financiers of the research. From the perspective of the traditional moral framework, this poses a threat to the researcher's autonomy.

To sum up, the traditional academic framework corresponds with the experiences of the junior researchers only partly (see Aittola 2001). However, the interviews provide few clues as to what could be the alternative moral framework that would resonate more fully with their experiences of academic life and work. One main reason for this, I argue, is that amidst the many pressures posed by short-term contracts, the multiplicity of tasks, and the poor prospects of having an academic career, the junior researchers do not have time to reflect on the conditions and implications of doing 'useful' research or its relationship to more academic research. This of course does not mean that the satisfaction provided by research directed to non-academic audiences should be downplayed or 'explained away'. As shown by Article III, it is important also to senior researchers. Nonetheless, it is evident that the case studies presented in the two articles provide no evidence for the

emergence of an 'instrumental academic' (Parker and Jary 1995) or a loss of values (Hackett 1990).

6.3   Socialization of the next generation: towards a new mode of research training?

In Article V, the experiences and identity formation of junior researchers are analyzed further from the perspective of socialization. As argued in section 2.4, the socialization of students and novice researchers into prevailing academic cultures is essential for ensuring continuity in academia (e.g. Ylijoki 1998; Zuckerman 1977). The forms, contents and outcomes of socialization processes are, however, subject to change just as other elements of academic cultures are. They are influenced by internal developments in science, conscious attempts to develop the practices of doctoral education as well as policy reforms.

Traditionally, Finnish doctoral training has reflected the German tradition, which can be characterized as unstructured and dissertation-centred. In this tradition, PhD students would work fairly independently, and supervision – if available at all – would typically consist of informal discussions 'between two colleagues' rather than a student and a supervisor. Completion times would be long, and the PhD dissertation could remain the most important scientific contribution of an academic during her whole career. All doctoral dissertations would be published – as they are still today – after a rigorous process of examination. (Ahola 2007; Aittola 1995; OECD 1987.) To use concepts provided by Delamont and her colleagues (2000), the Finnish tradition is thus closer to the so-called personal mode of socialization, which is typical of the humanities and social sciences. However, disciplinary differences have not been totally absent in Finland either: especially in the natural sciences and medicine, the socialization has followed the positional mode, where PhD students work on shared topics in hierarchically structured teams. In this mode of socialization, the PhD is typically regarded as one step in the academic career, not the life work of an academic.

With the establishment of the graduate school system in 1995, Finnish policy-makers have aimed to make research training more structured and efficient in all fields in order to increase the number of PhDs and to reduce times-to-degree. This

aim is supported by the steering system of universities, in which the number of PhD degrees is a central criterion for receiving budget funding. Against this background, Article V compares the forms and content of socialization in two academic research centres, the Health Research Centre and the Electronics Research Centre. Both are multidisciplinary and rely on external funding from various sources, thus representing Mode 2 types of research environments. Junior researchers in both centres are simultaneously PhD students. A few of them have received funding from the graduate school or schools in their fields, but project funding and, in the case of the Heath Research Centre, also scholarships, are more typical.

Article V demonstrates that the impact of the graduate schools on the socialization of junior researchers in the centres is small in comparison to that of the funding patterns and personnel structures of the centres. In particular, the lack of long-term funding and the small number of senior academic staff in comparison to the number of PhD students mean that junior researchers largely need to manage on their own and to take on many duties which in the positional and Anglo-American modes of socialization are considered appropriate for senior researchers.

Both senior and junior researchers in the two centres largely agree that the ideal PhD student is a researcher who can solve her problems independently. As a result, regardless of some criticisms concerning the lack of supervision, the junior researchers tend to think that their problems owe to a lack of self-discipline and personal incapability to divide their time between different pursuits, for instance, between project work and PhD studies (see also Article IV). In this way, the Finnish tradition emphasising the independence and self-initiative of PhD students is continued. Thus the completion times of PhD degrees remain long also in these two centres as in Finland in general.

However, the sources and forms of the junior researchers' independence as well as the expectations directed toward supervisors differ between the two centres. In the Health Research Centre, most of the junior researchers are themselves responsible for getting their own funding. Seniors are typically viewed as 'supervisor-colleagues', whose main task is to ensure the quality of the dissertation plan and of the articles that will comprise the PhD dissertation. Taken together, these two facts may account for the fairly strong critical views that some of the junior researchers have towards the Centre's research orientation, which has recently become more academic and international. In the Electronics Research

Centre, the junior researchers' autonomy stems from the technical mastery of the equipment as well as from the engagement in project management, for instance, in the supervision of research assistants. Expecting supervision from the professors, whose main responsibility is to 'run the business', is considered unrealistic. This shortcoming is alleviated, at least to some extent, by the fact that the centre has more critical mass, that is, researchers working on similar topics and using similar techniques. Some of the junior researchers direct their expectations towards post-doctoral researchers, who, however, tend to focus on advancing their own careers.

All in all, the research presented in Articles IV and V shows that the socialization and identity work of the 'researcher-PhD students' is characterized by a host of tensions stemming both from the tradition and the policy reforms in Finnish science and higher education. On the positive side, the variety of tasks conducted fairly independently by the junior researchers means that they learn many social skills, for instance, project management and collaboration skills, that are currently seen as a solution to the employment problems of new PhDs (see Park 2005; Vuolanto et al. 2006). On the negative side, it seems that academia does not present an attractive future workplace for these junior researchers. Even though academic calling has not lost its meaning altogether for this new generation of researchers, they find it difficult to commit themselves to an academic life in which so much depends on chance.

7. Conclusion

The main purpose of this dissertation has been to explore how changes at the macro-level of higher education and science shape norms and practices at the level of academic communities. The context of the study has been the 'mass research university' that has emerged in Finland due to a significant growth in the funding of academic research since the mid-1990s. Only a small proportion of the increased funding has been channelled to universities through their budget funding, while the bulk of it has been allocated through mechanisms designed to increase the competitiveness, internationality and societal relevance of research. In practice, these changes have led to a situation in which a large share of academic research today is conducted by PhD students working in externally funded projects. At the same time, the number of academics in teaching positions has remained constant, regardless of the growth in the number of students and the expansion of responsibilities in attracting and managing externally funded research projects.

The five journal articles comprising this dissertation explore three themes occupying a central place in the Finnish mass research university: the internationalization of research, the impact of increased external research funding on the audiences of research and on the motivation for doing research, and the socialization of junior researchers in research environments characterized by academic capitalism. The analyses show that the recent macro-level trends can be detected in various forms and combinations at the local level, where they have produced a host of conflicting pressures experienced by researchers as frustrating and de-motivating (see Mäntylä 2007; Ylijoki 2005; Ylijoki and Mäntylä 2003). My research also demonstrates that disciplinary differences have not lost their meaning. In particular, the difference between the hard and soft fields emerged as relevant in all of the empirical studies.

Moreover, the articles show that national traditions remain an important factor creating continuity amidst policy-induced changes. For instance, my studies regarding the internationalization of research reveal that resistance to pressures for

further internationalization in the soft fields, such as publishing mainly in international journals, is based on the belief that research in a small country like Finland cannot just follow international trends but needs to pay attention to the particular needs of Finnish society. In the case of academic socialization, continuity has been created by the dominance of the German-originating tradition of doctoral education, which is visible in both the hard and the soft fields although in somewhat different ways. It is noteworthy that the persistence of the emphasis on the PhD student's self-initiative and self-responsibility is supported by some of the current priorities of research and higher education policies, especially the increase of competitive and short-term funding, which makes it difficult to create stable research groups and improve supervision sufficiently. Thus it is not surprising that average times-to-degree have remained long in spite of establishing the graduate school system during the same period.

Accordingly, it can be concluded that change at the level of local research communities is a matter of shifting balances – the emergence of new threads and nodes in the web of meanings and the loosening of old ones – rather than a dramatic transformation from one type of culture to another. At the centre of these shifts is the future of the academic research orientation and the moral framework it provides to academics (see section 6.2): it is not be the only motivating element in academia but it is considered vitally important in all the academic environments studied. Thus my research does not support the thesis predicting the emergence of an entrepreneurial culture (e.g. Etzkowitz 1998, 2003) or an instrumentalized academic, for whom academic work is becoming just a routine job that is done for the salary (e.g. Clark 1997; Parker and Jary 1995).

However, my research does raise important and even alarming questions concerning socialization into academia: while it is clear that research work is satisfying to junior researchers even in those research environments that are most clearly characterized by academic capitalism, there are also a host of elements that push them to opt out of academia (e.g. Jacob and Hellström 2000; Raman 2000). There is reason to ask what Finnish universities can offer to the best and the brightest of the new generation to keep them interested in an academic career when all that they see around them is a few overworked professors who spend their time managing funding and projects (cf. Enders 2005; Välimaa 2001a).

Even though qualitative research is not meant to produce generalizations in the same way that quantitative research does, it is necessary to ask whether and in what ways my results reflect wider developments in Finnish academia. While Article I covered all disciplinary groups, the data used in Articles II-V did not include some important groups of disciplines, namely the natural sciences, medicine, and professionally oriented fields such as law or education. Furthermore, the selection of units for the research reflected my interest in exploring research communities that represent new organizational forms and interdisciplinary settings. Thus conclusions going beyond the cases themselves are not meant to make any definite claims on how things are in Finnish research communities in general, but to capture emerging trends that may become more common over time (see section 5.1; Schofield 2000).

Nonetheless, on the basis of statistical data and previous studies conducted in Finland presented in section 4 (e.g. Häyrinen-Alestalo and Peltonen 2006; Mäntylä 2007; Nieminen 2005; Tuunainen 2004; Välimaa 2001a; Ylijoki and Mäntylä 2003), it is more than likely that similar insecurities and tensions stemming from the increase of externally funded project research and the number of PhD students, as well as the pressures to become more international, are widespread in Finnish academic communities. By contrast, in my case studies the teaching function received little attention, although it is clear that in the traditional departments one of the central issues is the balancing of teaching and research (Snell 2001). As Deem and Lucas (2007) point out, the reinforcement of research in teaching departments has important implications for what tasks are considered worthwhile as well as for the internal hierarchy of academic communities (see also Lucas 2006).

An additional theme to be explored in further research is the alleged change towards managerial practices and values as well as towards stronger strategic leadership in universities and academic units (e.g. Condisine and Marginson 2000; Morris 2002; Slaughter and Leslie 1997). My case studies offered little evidence of such developments, and there were no professional managers in any of the units studied – if professors leading research projects are not considered such. One reason for this could be the persistence of the emphasis on academic freedom and collegial decision-making (see Kekäle 1997). Another explanation is that strategic management is considered too difficult, if not impossible, in units that rely on external and often short-term funding and have only a thin layer of senior academics.

The wider significance of differences detected within research communities in my case studies, especially those between the junior and senior academics concerning the meaning of academic work, is also difficult to judge, since previous research exploring generational differences is scarce in Finland (Aittola 2001). Also internationally empirical research has tended to focus on academics in permanent positions, and more research is needed to evaluate the validity of the scenarios that have been presented regarding the next generation of researchers as well as the alleged fragmentation of the academic profession (e.g. Jacob and Hellström 2000). A particularly interesting theme for further research, in Finland and elsewhere, is whether researchers move from Mode 2 types of research environments to the Mode 1 world, on what conditions and with what implications (see Raman 2000). It is also important to explore how the practices of research training could and should be developed in multidisciplinary settings characterized by close interaction with the users of research (Bruun et al. 2005; Gemme and Gingras 2008).

These questions should be analyzed by taking into account studies focusing on gendered meanings and gender inequality in academia (Asmar 1999; Frank Fox and Stephan 2001; Harley 2003; Husu 2001). The reason why gendered understandings did not come up as sources of distinctions in my data is certainly partly due to the research design chosen. But it is also imaginable that the new generation of researchers is less bound to gendered understandings, such as different expectations and evaluative criteria concerning men and women or the higher status assigned to 'masculine' ideals and practices. Another alternative is that the role of gender becomes visible only at later phases of academic careers. On the basis of this dissertation, it would be fruitful to design a follow-up study exploring what kinds of careers the junior researchers interviewed for Articles IV and V have developed and whether gender played a role in their career choices and opportunities. More generally, it is evident that there is an urgent need for qualitative follow-up studies that include several case studies and cover a longer time period than any of the studies conducted in my dissertation (cf. Saari 2003; Tuunainen 2004; Tuunainen and Knuuttila 2008).

It is also worthwhile to consider more generally the value and goals of the cultural approach and its suitability for analysing change. According to Becher (1990; see also Välimaa 1995), the main contribution of the approach is an understanding of differences within academia. By exploring such differences, we

can reach a better understanding of academia as a whole. Thus we can say that the 'moral goal' of this tradition is to improve dialogue between the different tribes living side by side in universities (Välimaa 1995, 37). However, the internalist emphasis in Becher's work does not make it particularly suited to studying change. A research design following this approach easily turns into one in which macro-level decisions and structures are presented as an 'objective reality' and academic cultures as either victims of change or buffers to change.

The cultural approach also seems to carry with it the assumption that externally induced change is inherently negative, while change stemming from 'inside', for instance, as a result of new discoveries and specialization, is inherently positive. As my research demonstrates, these dichotomies should be regarded with caution, while also recognizing that not all actors – for instance, junior researchers or academic units with only a few potential financiers of research – have equal resources for inducing change or maintaining the existing order. It seems that feminist studies of higher education, science and organizational practices in general (e.g. Deem 2002) provide a good example of research which is not confined to highlighting cultural differences but also analyses critically the values and practices inherent in cultures and makes suggestions as to how to improve both organizational practices and macro-level policies (see also Alvesson 2002; Parker 2000).

Coming back to the recent policy reforms in Finland discussed in this dissertation it can be concluded that there is no reason to doubt that Finnish academics approve of the aims of increasing research activity and making Finnish science more international. However, the implementation of these goals, especially the channelling of research funding mainly through competitive mechanisms, has resulted in conditions that decrease the motivation of researchers, reduce opportunities to address several audiences of research and complicate attempts to improve the practices of doctoral education. The main problems are the imbalance in the structure of academic staff, the rise in the number of PhD students as well as difficulties in making long-terms plans in the conditions of the mass research university and academic capitalism. The reform anticipated for 2010 in the Universities Act, which is meant to give universities more financial and organizational autonomy, can provide some universities and some fields of research opportunities to alleviate these problems. The legislative reform, however, does not remove the urgent need to consider how the current modes of steering universities

and channelling public research financing might allow more space for the academic orientation and the diversity of academic cultures, as well as provide more stable academic environments. Such changes would improve the likelihood that talented researchers at different stages of their academic careers would find academia an attractive place in which to work also in the future.

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Appendix A

Higher education and research institutions in Finland

Universities

The first Finnish university was founded in Turku in 1640, when Finland still belonged to Sweden. After Finland had become part of Russia in 1809, the university was transferred to Helsinki in 1827. The University of Helsinki remained the only university until 1908, when the Polytechnic Institution of Helsinki was upgraded to a university. After independence in 1917, a number of other higher education institutions emerged gradually, mainly in Helsinki and Turku, so that in 1950, there were 11 institutions of higher education. Three of these were universities. The Universities of Oulu and Jyväskylä, the latter earlier a teacher training college, were founded towards the end of the 1950s. In the mid-1960s, three new universities were founded in Eastern Finland (Kuopio, Joensuu, Lappeenranta) and the College of Social Sciences was moved from Helsinki to Tampere and upgraded into a university. Subsequently some existing institutions of higher education have raised their status to universities, but only one completely new institution has emerged. This is the University of Lapland, which was founded in Rovaniemi in 1979.

Since the end of 1980s, there are 17 universities of science in Finland: 10 are multi-faculty universities, three are universities of technology and three are schools of economics and business administration. In addition, there are now four art academies that have university status. All universities in Finland engage in research activities and confer doctoral degrees. In 2003, the Universities Act was modified so that the university's traditional teaching and research tasks were supplemented with the so-called third mission, which involves interacting with society and enhancing the societal impact of research findings.

The number of all students studying for a basic degree in the 20 Finnish universities in 2007 was approximately 152,000. In line with the Bologna declaration, universities adopted the Bachelor-Master degree structure in 2005, with the exception of medicine and dentistry. However, all students still enrol for the Master's degree, and few aim to leave university without completing the Master's degree. In 2007, universities conferred approximately 13,900 Master's degrees and 1,523 doctoral degrees. The number of students working toward a post-graduate degree was nearly 22,000. Between the Master's and PhD degrees, there is an intermediate licentiate degree, which requires a minimum of two years of research. Its popularity, however, has declined considerably since the end of the 1990s.

All universities in Finland have been public since the mid-1970s. Before that, some universities were private, but also they were mainly funded by the government. The planned reform of the Universities Act in 2010 will allow universities more economic and organizational autonomy, and university employees will no longer have the status of civil servants. Performance-based steering of universities by the Ministry of Education will continue. Charging tuition fees will be allowed, but only on trial basis and concerning students coming from outside the EU.

The university reform planned includes the merging of three Helsinki area universities into Aalto University, which has a foundation status. This status is granted also to Tampere University of Technology. Furthermore, the Universities of Kuopio and Joensuu will merge into the University of Eastern Finland, and the Turku School of Economics will be placed under the University of Turku.

Polytechnics

The university system is complemented by a system of polytechnics, which was initiated on trial basis in the early 1990s and made permanent in 2000. The main task of polytechnics is to train professionals in response to labour market needs. They also conduct R&D that supports their instruction and promotes regional development. After two recent institutional mergers, the number of polytechnics is now 26. The polytechnics are governed in different ways: by municipal education consortia, local authorities and private institutions. The total number of polytechnic students in Finland in 2007 was approximately 130,000. In the same year,

polytechnics awarded 20,500 polytechnic degrees and 350 polytechnic Master's degrees. In the English language, the Finnish polytechnics call themselves Universities of Applied Science, regardless of fierce criticisms by the universities.

Governmental research institutes

Research in the public sector in Finland is also carried out in governmental research institutes, which total 21. The sizes of the institutes, which are governed by different ministries, vary considerably. The biggest institute is the Technical Research Centre VTT, the budget of which amounted to nearly 230 million euros in 2007. Other large governmental research institutes include the Finnish Forest Research Institute (Metla), Agrifood Research Finland (MTT) and the National Institute for Health and Welfare (THL). The main task of the governmental research institutes is to do applied research and to support the planning of governmental policies. Nonetheless, as a result of cuts in their budget funding, also these institutes have had to reconsider their roles and to seek external funding. Some 10 percent of PhDs are trained in the governmental research institutes, which, however, cannot confer doctoral degrees.

Sources: Kivinen et al. 1993; KOTA database; Ministry of Education 2008b; Välimaa 2001b; www.research.fi; www.minedu.fi.

Internationalisation of Science
Views of the Scientific Elite in Finland

Johanna Hakala

It is often recalled that scientists have always been international, long before nations were invented. Universal validity as an inherent norm of science is concretised in encounters with those who do things differently from us. Yet, internationalisation of science is also a very current phenomenon, something specific to our times. As such, it is often seen as a consequence of *globalisation*: the emergence of problems that concern the whole humankind as well as the compression of the world as a result of new forms of communication and cheaper and faster travel. More research-specific factors include expensive instruments and the global reach of many research-intensive companies. (Hicks and Katz, 1996: 42)

However, although there is a clear increase in *transnational* and *multinational* (Ziman, 1994) activity – for example, participation in international conferences, publishing in foreign/international journals, collaborating and co-authoring publications with foreign col-

leagues – it would be misleading to say that internationalisation of science equals globalisation of science. As Leclerc and Gagné (1994) have shown, it would be more apt to speak about continentalisation of science, because interaction increases mainly within zones in which countries have traditionally had strong links to each others, mainly Europe and North America.

Denationalisation of science is an equally controversial trend. Although there is a rise in non-domestic and non-governmental funding of R&D, funding remains mainly national and much of it is still allocated on the basis of national priorities (cf. Crawford *et al.* 1993). Outright ideological and political reasons for collaborating with certain nations (cf. Elzinga and Landström, 1996) may be a thing of the past, but states still have an important role in making possible and encouraging (appropriate forms of) internationality. Today, when states encourage internationality of research – as they increasingly do – it is because in-

ternationality is seen as an important instrument of advancing national science (Sörlin, 1994). This is the case also in Finland, where internationalisation of research and development has become one of the top priorities of Finnish science policy in the end of 1980s. Internationalisation is seen as the key to "international quality". And as quality of research is commonly indicated by the degree of internationality, the circle is completed. More internationality brings more international quality: who could disagree?

This article sets out to question these self-evident truths concerning internationalisation. This is done through an examination of how Finnish elite researchers – professors nominated to a special research position by the Academy of Finland – from different fields see the meanings and functions of internationality.[1] Following Becher (1989: 3), it is possible to argue that these researchers "delineate and embody the central values of [their] discipline[s]". This makes their experiences of internationalisation and their responses to the current pressure to internationalise particularly interesting.

Furthermore, an important aspect of mapping the cultures of internationality concerns the notion of international quality and how a small country like Finland may reach it. To make this concept more concrete the professors were asked to define the centre of their field and to locate Finland in relation to it. Further, they were asked how the position of Finnish research (in their field) could be advanced. On this basis – as well as by looking at what they say about their role-relations to researchers in other countries – it is possible to discern different

"cognitive maps" of the scientific world. As the interviews were conducted during a period when Finland became a member of the EU, the data also provides an interesting opportunity to examine attitudes towards the (government-induced) change in the orientation of Finnish research.

Conceptual Framework

Patterns of Internationality

Empirical evidence for the argument that small countries are more active in international collaboration has been presented by bibliometric studies (see van Raan, 1997: 294; Leclerc and Gagné, 1994: 267). Also more specific studies on the internationalisation of research in small countries have been done: for example, Schott (1992) has analysed the "salient environments" of Swedish science, and Kyvik and Larsen (1997) have studied the international travelling, collaboration and publication patterns of Norwegian scientists. These survey-based studies give a fairly good picture of the international activities Nordic scientists from different fields are engaged in, but they do not cover the qualitative and normative aspects of internationalisation. Some important starting points can, however, be found in the above mentioned articles.

Firstly, it is necessary to note that different disciplines have different patterns of internationality. Kyvik and Larsen (1997: 255-261) explain the differences that they found in their survey between "hard" and "soft" sciences in terms of "internal" and "external" factors. Internal factors include, among others, the paradigmatic status of the discipline

(single vs. multiple paradigms), communication language (codified vs. literary), the audience structure (specialist vs. general) and the nature of the topic (local vs. global). The two external, or social, factors they mention are reward structure and publishing traditions. Thus the greater international activity in hard sciences can be explained, for instance, in terms of the universal nature of their research topics as well as the tradition of publishing almost exclusively in international, English language journals. Although the aim of this article is not to test whether these factors (derived from the theories of e.g. Kuhn and Merton) are valid, they provide the background of the current analysis by giving a preliminary idea of along what lines differences can be expected in the subjective valuations of the academy professors.

Secondly, it is important to note that different fields may have contacts and collaboration in different directions, just as different countries typically have more contacts with certain countries (Luukkonen *et al.* 1992; Schott, 1992). Similarly, it can be expected that academy professors from different fields are oriented to different directions and locate the centre of the scientific world differently. It is also possible that they have altogether different *cognitive maps* of the scientific world. Whether such differences may be explained by the internal and external factors listed by Kyvik and Larsen, or whether the historical, economic and geopolitical reasons mentioned by Schott and Luukkonen *et al.* are more important, is an interesting question but beyond the focus of the interviews. Instead, it will be interesting to see in what ways the cognitive maps of

the academy professors from different disciplines differ from each other.

Role-relations between Centre and Periphery

One way of visualising the scientific world is the centre-periphery model. In the centre, one finds "scientific establishments", which hold a "monopoly over the means of orientations in science" (Stolte-Heiskanen, 1987: 189). In practice, this means that ideas and publications flow from the centre to the periphery, whereas physical mobility takes place from the periphery to the centre. As Carlson and Martin-Rovet (1995: 227) emphasise, there are no objective criteria for distinguishing the centre and the periphery: the centre is a place towards which scientists from other – thus peripheral or marginal – countries are attracted. Similarly, it must be underlined that, in this article, the centre and the periphery are not interesting *per se*, but as conceptual tools which help in analysing small country research that is located somewhere between.

Besides asking directly about the location of certain countries (as was done in the present interviews), there is also a more indirect way of analysing the dynamics of centre-periphery. Following Schott (1992: 22-23), it is possible to distinguish between four *role-relations* between colleagues: influence (through publications or interpersonal communication), collaboration, emulation, and salience of recognition from colleagues. How a scientist perceives his or her relationship to a colleague is a counter-part of how s/he perceives his/her own role and position in the world of science. The logic is the same as in the case of the cen-

tre-periphery polarity: one cannot be defined without the other. Thus Schott's typology is useful for an analysis of relations between – and the definitions of – centre and periphery.

A marginal country is, by definition, the one at the receiving end of influence. If the country is very poor, even its access to journals and books may be limited, not to mention travelling to study in other countries. However, in developing countries this is often done with external funding which can cover more than half of the R&D budget (Leclerc and Gagné, 1994: 267). The objects of influence vary from the choice of research problems, methods and theoretical frameworks to how the research is organised or what kind of values are embraced. The counter-part of influence is often, although not necessarily, emulation: scientists from the marginal country typically accept the science of the centre as a yardstick against which their own efforts can be measured.[2]

Seeking the recognition of others is a typical role-relationship between the centre and a more advanced science system or more advanced field. Recognition can be received in the form of publications, invitations to conferences or acceptance as a collaboration partner. In order to collaborate with scientists from other countries, a basic competence is necessary. A certain division of labour may allow for considerable differences in competence, but when the aim is to co-author an article, such differences are not easily tolerated. Similarly, to name someone as a competitor usually means that the other is recognised as one's equal. At the same time, a competitive relationship typically means a challenge to a dominating position, and this makes

it a particularly interesting role-relation to be added to Schott's typology.

It is often believed that through becoming international, researchers from marginal countries (regions, universities, etc.) have a possibility of overcoming their marginality, that is, having more equal role-relationships and thus moving towards the centre. If many scientists and fields do this, the marginal status of the country itself may disappear. However, changes can take place in other ways as well. Moving on the map – from margin to centre, from below to top – is not the only alternative. In fact, it has been suggested that the centre-periphery image is no longer valid. The network image suggests that it is no more easy to figure out where the centre is. Or, alternatively, there may be multiple centres. (Kaukonen, 1990; Alestalo, 1991; Sörlin, 1992) In either case, the hierarchy is reduced – although not abolished – and more actors have a chance for more equitable role-relations, and thus a more central position in the networks.

An even more flexible image is presented by Leclerc and Gagné (1994: 262) who speak of a "sovereign scientific market", which supplants "the general pre-eminence of an omnipotent centre to which states are subjugated". Kyvik and Larsen (1997: 241-242) present a similar idea: the "global research market", which is constituted by several market places, most importantly, scientific journals and publishing companies with world-wide/international readership. Individual scientists try to sell their products (papers, articles, books), and if they are successful, the products are "bought" to improve other scientists' research and "paid" by citations and invitations to

conferences. From the perspective of a marginal or small country, the questions are: Do we have enough "cash" to pay for the products we want? How can we access the market with our own products? How can we increase the attractivity of our own publications and research centres? How can we ensure that the market functions smoothly? Each transaction can be seen as a short-term role-relation, but, on the other hand, collaboration, as well as other forms of internationality, are also instruments of accessing the market and selling better.

Before using these conceptual tools in the analysis of the interviews, the following two sections discuss briefly the developments of the Finnish research system as well as the data of this analysis.

The Finnish Science System and its Internationalisation

The first university in Finland was founded in Turku in 1640. Before this, all Finnish academicians were educated abroad, mostly in France and Germany (Nuorteva, 1997). The Academy of Turku was founded at a time when Finland was still part of Sweden and when institutionalisation and nationalisation of science was starting to take place all over Europe. Because the church never exerted as much power as in Central Europe, Scandinavian universities were under the control of the state right from the beginning. (Crawford *et al.* 1993: 7-11) The Academy of Turku was international since its establishment: for example, the language of the university was Latin. The university may be characterised as provincial because its resources were scarce; however, keeping track with European science in general was always

considered important. (Leikola, 1990) The university was transferred to Helsinki in 1827, and until 1906 it was the only university in Finland.

Since Finland gained independence in 1917, certain disciplines were regarded as of special importance to national development and national identity. After the Second World War, scientific life was still traditional and elitist. Expenditure on research was low: in 1956, it was 0,4 percent of the GNP (Allardt, 1990: 630). In the 1960s, however, the rapid modernisation of the Finnish economy and society was paralleled by fundamental changes in science. Expenditure on research and education was increased significantly and several new universities were founded. The new universities were seen as the key to national and regional development. The end of 1960s marks the beginning of systematic planning of R&D, and international comparisons and the guidelines of the OECD became central in decision making. In the spirit of the Brooks report *Science, Growth and Society* (1971), emphasis was put on the social relevance of science, more specifically, the development of a welfare state. The sciences favoured by the state were mainly soft sciences. (Alestalo, 1993; Kaukonen, 1997)

In the 1980s, emphasis was shifted from soft sciences and societal development to technological development, and also the international orientation of Finnish science changed fundamentally. Whereas science policy documents from the 1970s and early 1980s often emphasise international scientific collaboration as a means of reducing international tension (e.g. Valtion tiedeneuvosto, 1973: 27; 1981: 28) and the frame-

work of collaboration was based on bilateral agreements[3], a decade later internationalisation of science was seen exclusively in terms of developing the "national innovation system" (Valtion tiede- ja teknologianeuvosto, 1990: 37). This change was paralleled by a shift towards European collaboration: Finland joined the EUREKA in 1985 and became an associate member of the European Space Agency in 1987. However, until the 1990s Finland retained its cautious policy towards joining international agreements and research organisations, for both economic and political reasons. In 1991, Finland joined the CERN, and in 1995, it became a full member of the ESA as well as an EU-country. This shift will be discussed in more detail in the end of this article, but here it should be mentioned that Finnish participation in EU collaboration has been very active.

In general, the 1990s has been characterised by emphasis on efficiency through national and international evaluations as well as the establishment of so called "centres of excellence". According to an official strategy, "[i]nternationalisation…increases the pressure to establish research groups representing international quality in Finland" (Valtion tiede- ja teknologianeuvosto, 1990: 37; see also Academy of Finland, 1997) The centres of excellence were nominated for the first time in 1993. Receiving extra funding, the centres are supposed to represent or to reach the "international top" in the selected fields. Not surprisingly, the selected fields have been mainly hard sciences. Among scientists, the reception of this new system has been varied, as is shown also by the interviews under examination. Naturally, the Academy of Finland is keen on

pointing out Finnish success stories, e.g., low temperature physics and research on information and communication technologies (Academy of Finland, 1995).[4]

Against this background, it is interesting to examine how the academy professors from different fields see the path chosen by Finnish science policy makers and how they experience the pressure to internationalise. Before this, however, it is necessary to take a brief look at the institution of academy professors itself.

How the Research Was Conducted

The institution of academy professors was established in 1970. The professors are nominated by the Academy of Finland for a 5-year period[5] during which they get extra funding as well as freedom from teaching and administrative duties. A number of professors have been able to renew their nomination, and since the establishment of the system, there have also been four permanent nominations. The selection of academy professors is based on past qualifications as well as the research plan to be completed during the professorship[6]. The aim is to nominate professors who can make a considerable contribution to Finnish science. More recently, this requirement is qualified so that professors to be selected should already represent "international quality". Thus it is possible to argue that academy professors are the elite of Finnish science by definition and most probably a part of the most international segment of Finnish researchers. (see Alestalo and Kaukonen, 1995; Alestalo, 1994; 1996)

The data consist of semi-structured

interviews with 61 of the 85 academy professors nominated between 1970 and 1995. The interviews were conducted between 1994 and 1996.[7] Among the interviewees, there were 12 natural scientists (e.g. physicists, mathematicians, biologists), 13 medical scientists, 7 humanists, 15 social scientists (including 3 psychologists), 8 technical scientists, and 6 scientists from environmental sciences, mainly forestry and agriculture. The groups correspond to the nominating research councils of the Academy during the period in question[8]. The fact that nominations are made by the research councils has guaranteed a certain equality among fields although this is not a selection criteria in itself. In contrast, there is a heavy concentration of professorships in terms of gender (there are only five women among the 61 interviewees[9]) and geography (most professors come from various universities in Helsinki and Turku, two large cities in southern Finland). In the present analysis, the main interest is in differences *between* the hard (medicine, technical sciences, natural sciences, environmental sciences) and the soft sciences (social sciences, humanities). However, also differences *within* these two groups are highlighted when necessary.[10]

The interviews dealt with several aspects of the professors' own research as well as their views on current science policy issues. The last section included questions on internationalisation, but in most cases, related themes were brought up throughout the interviews by the academy professors themselves. This means that the analysis of the interviews proceeded only partly by examining answers to the preformulated questions, and an equally important part was to follow the themes that were raised by the professors themselves. Furthermore, it should be noted that in most cases, the professors spoke primarily as representatives of their own discipline, but due to their elite position, many of them have often acted as representatives of Finland. This too is reflected in the interviews.[11]

The Pressure to Internationalise

The rapid development of the Finnish science system after the Second World War is evident in the interviews. Many of the research professors started their careers during a time when Finnish science was clearly less developed in comparison to today's situation. Many fields either did not exist or lacked equipment and expertise for central research tasks. For example, a natural scientist tells how his Finnish supervisor suggested that he would do his PhD in Britain and bring new techniques to Finland. He did as suggested and went to Cambridge, bringing back know-how and even smuggling some components on his way back. A physicist says that "if I had not been able to do my PhD in Oxford, I wouldn't have become anything." [12] Also many social scientists studied abroad, mainly in the US, and brought back new methods and theories. As typical for a peripheral country, the main role-relation was that of emulation and mobility was totally one-directional. Furthermore, in most cases travelling would have been impossible without foreign funding, especially ASLA and Fulbright scholarships.

Today, internationality seems to be such an integral part of the research by academy professors that they seldom

mention any specific reasons for being international. It is self-evident that internationality is, in many forms, present in their everyday research activities. However, the pressure to become more international has not gone without notice. A medical scientist voices the common response of the academy professors who represent hard sciences: "[s]cience has always been international. And in Finland, science has been international already in the 19th century." Especially mathematicians seem to be irritated about the pressure to internationalise – for them, mathematics is international in itself:

> There can be no mathematics that is not international. Therefore, to suggest that mathematics should become international is to suggest that it should go from zero to positive.

In other words, doing mathematics within nationally defined boundaries is totally unimaginable to them. (see Alestalo and Kaukonen, 1995) Academy professors from other hard fields, however, are more inclined to admit that their fields have not always been international, or they admit that there exist "national sciences" although theirs is not one of them. Many professors of hard sciences believe that their fields will be genuinely international only when scientists from other countries are willing to come and do research in Finland, whereas representatives of soft fields are more prone to believe that internationalisation is only in the beginning. Therefore even its negative byproducts, such as "scientific tourism" to foreign countries are still unavoidable – they just need to be tolerated.

In the hard sciences, the usual motivation for being international, as in the case of mathematics, is that their research could not be anything else as their topic is international. Or, due to specialisation, there are no Finnish colleagues and this takes researchers beyond the national borders. And as a professor from an eastern Finnish university remarks, a couple of years ago he realised that a flight to Stockholm takes no longer than a flight to Helsinki. Another professor says that it is sometimes easier to get funding for international travel than for domestic. On the other hand, funding for research in general is won with national argumentation, says one medical scientist.

Social sciences and humanities are not very different in comparison to the hard sciences. In the case of humanities, this may be explained by the fact only two of the seven scholars chosen by the humanities council study a topic that has a clear relationship to Finnish society. Thus most of the humanists write for a (highly specialised) international audience. However, considering all representatives of soft sciences, the majority has a more or less direct interest in Finnish society, and for these professors, the main audience is naturally domestic. Whenever they want to write for other audiences, they must think anew both the topic and the language. In other words, in contrast to the hard fields where internationality signifies a common space (dominated by the English language) or a certain style of doing things, in the soft fields internationality is understood as cross-cultural dissemination of ideas. In the words of a humanities professor, internationality is just "a bunch of different nationalities".

Against this background, it is under-

standable that representatives of soft fields are cautious about using internationality as an indicator of quality. There is a danger that the "international" criteria are merely a reflection of the hegemony of some research system or based on a fashion that will soon pass. One social scientist thinks that studies abroad may often lead to excessive specialisation and unhealthy competition because a specialised area of research gets a too dominating position. However, regardless these concerns, the professors do not think that the national and the international exclude each other. On the contrary, a good "national" research problem has its analogies in other countries, and this makes international contacts indispensable. Thus, although Finnish legal science has traditionally been nationally oriented, a legal scientist believes that

> there can be no conflict between nationality and internationality even in legal science, although there may be such between nationality and supra-nationality.

There are also other fields, such as agriculture and forestry, in which research is directed to the domestic audience. According to one professor, "some [of our research problems] interest the international audience, some do not." All professors from these fields voice their suspicions of using internationalisation as an unquestioned standard for all disciplines. They emphasise the fact that if one wants an international career one must concentrate on a narrow field and that this is not necessarily a good thing. In Finland a broad career is valued more, and this means that an individual scientist may face a choice between recogni-

tion abroad and recognition within Finland – where most money comes from. This is also to say that foreign recognition does not necessarily translate into domestic recognition.

One professor from such an applied field argues that sometimes involvement in international collaboration means that "one's own work remains undone". He also adds that if too much funding goes to the kind of "top research" sought by the centres of excellence policy, a situation may emerge where Finland is unable to fulfil its international scientific obligations in applied fields. Another professor agrees: "we just cannot ignore certain fields of research because they are not top research areas". In comparison to social sciences and humanities, in these applied fields there seems to be much clearer (national) priorities regarding the choice of research topics.

Reaching for the International Top

As the previous section shows, there are interesting differences among different fields in regard to how they perceive internationality. In the following sections, the focus is shifted to the cognitive maps of different fields. In the first two sub-sections, professors are asked to locate the centre of their field as well as the place of Finland in relation to it. In the remaining sub-sections, the focus is on the role-relations between the centre and Finnish research, and, in particular, the prospects for change.

Locating the Centre

When the academy professors were asked to name the central countries in their discipline, professors from medi-

cal, natural and technical sciences were very much alike in naming the US as the centre of the scientific world. According to one professor, "the US comes first, second and third". Another says that there are two centres: the west coast and the east coast of the US. However, it is equally common to mention the US together with some European countries: Britain, Germany, France, sometimes the Netherlands and Sweden. Also the list of social scientists looks very similar (with the exception of legal scientists). This is hardly surprising as many social scientists have been trained in the US.

The only groups that differ more are humanities and fields like agriculture, forestry and biology. Almost all humanists disapproved the question itself: they say they cannot name countries, only individuals and institutions. The countries from which the top researchers and institutions come differ much less: the US is mentioned four times, whereas Germany and Britain are both mentioned three times. Scientists representing law and the above mentioned biosciences were alone in mentioning other countries as top countries before the US (e.g. Germany, Britain, the Netherlands, Finland).

Countries outside Northern America and Europe are mentioned seldom, whether as good or bad examples. Natural scientists make an exception: 10 out of 13 mention also other countries (Japan, Australia, India and Russia) and try to evaluate their research. Also some humanists mention Russia. In the hard fields, several professors mention Japan as a rising country but most think that collaboration with the Japanese is difficult because of cultural differences or simply the geographical distance. These remarks are interesting considering the hopes attached to the new information and communication technologies (e.g. OECD, 1998). Nothing decisive can be said on the basis of this data, but it seems that face-to-face contacts are still considered indispensable. Some say this explicitly.

Of all professors, medical scientists are most convinced about the quality of US science. In contrast, especially social scientists are eager to point out that the US has the first place because of its volume, not necessarily because of the quality of its research. Some professors from hard fields agree with this: one biologist says that US is the top because of its volume but research in Britain is the most creative. On the other hand, a medical scientist argues that the US has more groups, but the percentage of top researchers is no higher than in Finland.

Locating Finnish Research

Many professors from the hard fields seem to agree with the natural scientist who argues that "Finland used to be part of the periphery because of the lack of equipment – now that we have the equipment we are on the top as any other country." Especially medical scientists seem to be proud of Finnish achievements: roughly half of the 12 medical scientists think Finland is on the top (although never alone), whereas two say Finland is a semi-peripheral country.

Still others think that Finns can never be quite on the top due to factors such as the decentralisation of the university system as well as the volume of Finnish research. Others believe that things have changed and they can be changed. Ac-

cording to many medical scientists, the place of Finland has clearly changed: earlier Finns went abroad, now foreigners come here. It seems that for many professors, attracting foreign scholars to Finland is the most important challenge at the moment. The ultimate proof of overcoming marginality is attracting American scholars – at least in some fields there are already more than enough students coming from European countries.

Another important channel for influencing foreign scholars is international publications. In the hard fields, publishing internationally is part of everyday research activities, and as one professor emphasises, publishing itself is secondary to the aim of producing results that are meaningful also after 10 years. However, it is not always easy to get one's results published, especially in American journals which tend to favour American scientists. The adoption of certain strategies may help getting results published but this may happen at the expense of quality, for example, if the journal in question favours "fashionable research problems" or publishes only short articles. In other words, there is a paradoxical situation where Finnish researchers can approach the centre's definition of quality by sacrificing their own definition of quality.

In addition to the role-relations of collaboration and the (sometimes unhealthy) competition for publishing opportunities, some professors also mention competition in a very positive sense. For example, a psychologist says that his group has competed with a US group now for 20 years, and although relations have been less friendly at times, the competition has had an important role

in stimulating research. In general, when competition with US researchers is mentioned, it is often done with a certain pride in tone – competition is a role-relation between equals and it means Finnish research can actually challenge US research.

Many professors, however, remind that a small country like Finland should not have too high expectations. Reflecting the variation within disciplinary groups, also the most pessimistic view is voiced by a medical scientist: "I doubt anything noteworthy will ever be achieved here." A more moderate opinion, however, is more common:

> It is by chance, for historical reasons and for a host of other reasons that some field is strong in some country. I think at least a small country should learn that we cannot be strong – as we are so small – but in a few fields. We should aspire to be the top in a couple of fields.

According to one medical scientist, Finns cannot afford following international fashions, e.g. gene research, because it has no special strengths there. Some professors in the hard fields criticise others for adopting things from the big countries too uncritically. Thus the relative unanimity in defining the US as the centre of the scientific world has also its critics. As one professor notes:

> Well, it is true that the US is the number one country here in Finland. Finland is in a curious way, one-sidedly, directed towards the US… This is not the case in Sweden. Not even in Norway… All Finns always want to go to US.

In other words, the emulation of US science is considered as an indicator of backwardness of Finnish researchers. A more advanced country would have

more self-confidence.

Whereas many professors from the hard sciences think that the best way of improving the overall quality of Finnish science is to concentrate on certain fields, several professors from soft fields emphasise that a small country must have basic know-how in all fields; there is no point of sacrificing certain fields for the sake of "international quality" in a few fields.

Social scientists and humanists also find different kinds of strengths in Finnish research. Because their image of the scientific community is more flexible, they also think that there is more than one way of producing good quality. For example, in contrast to many professors from hard fields who generally disapprove any Finnish publications, especially some humanists are proud of their Finnish publication series which frequently publish research also from outside Finland. On the other hand, they believe that a small research community can be more flexible itself. A legal scientist, for example, suggests that Finns can anticipate the emergence of new centres of scientific activity. Another one remarks that as a Finn, he is not attached to any ready-made schools of thought and thus has more freedom for action. In Kyvik and Larsen's vocabulary, he is in a position from which it is easier to utilise all the options offered in the "scientific market".

However, the multi-paradigmatic nature of social sciences and humanities means also that not all researchers are engaged in the same debates. This may have negative consequences from the perspective of "small players": as a sociologist remarks, sometimes researchers from the centre countries bring their internal debates to the international fora with no regard to the interests of researchers from other countries and research traditions.

Gaining Recognition, Increasing Visibility

Recognition by foreign scientists is one way of measuring the quality of Finnish research – a more and more popular way, considering the international evaluations administered by the Academy of Finland, as well as foreign experts used in selection of applicants for research positions. But as mentioned above, getting recognition is dependent also on other factors than quality.

When the academy professors were asked whether being a Finn poses any obstacles for getting recognition in the international context, more than half of the medical and technical scientists thought that being a Finn is an obstacle, whereas natural scientists (e.g. mathematicians and biologists) where more prone to find good sides about being a Finn. Most social scientists, in turn, believed that nationality is irrelevant. Of the seven humanists, two believed it is an obstacle, two thought it is an advantage. To explain the differences between disciplinary groups is not possible on the basis of this data – although they are probably related to the level of competitiveness – and, in fact, it is more interesting to ask *why* nationality matters, either positively or negatively.

Especially some medical scientists argue that because Finland is not considered a high tech country, Finnish inventions do not get international attention. In this, several professors mention Sweden as an example that Finland has

been unable to follow. The experiences of a professor in a technological field in the end of 1980s are not uncommon either in the 1990s:

> [foreign researchers whom I met in conferences] said that it cannot be true that this kind of material technology problems, long known and explored by companies with big money, are being solved in some little place like Finland. There must be something suspicious in your work.

Many professors from the hard fields agree that, in order to get international recognition, a Finn has to work more and achieve better quality because the general visibility of Finland is poor. An exception can also be found: one medical scientist thinks he gets more recognition in the US – in Finland people are just envious. Many add, however, that once one has been able to "access the market" there will be no more problems in getting one's results published[13]. However, even good results are often not cited by Americans who rather make reference to an American secondary source.

On the other hand, one medical scientist believes that in the international scientific community, it is easy to be a Finn: "The work is valued more because others know that it has been produced with lesser resources." A more ambiguous situation is brought up by a natural scientist who says that being a Finn makes things easier because Finns are not regarded as competitors as their funding comes from elsewhere. Finns may also be popular as research partners. As one professor tells, "the French dislike Americans so much that even Finns can do!"[14]

As mentioned before, representatives of humanities point to different kinds of

benefits: as a Finn it is easier to stay apart from restricting schools of thought and to retain one's flexibility. And if s/he is conscious of these strengths, others will recognise them too.

> By being active and sometimes even pushy, it is possible to make people understand that Finland is definitely not a place that just begs for money… In fact, the opposite is true. With the resources we have, a lot can be done.

In other words, a Finn can expect international recognition if s/he goes abroad with the right mind-setting. In contrast, none of the social scientists thinks being a Finn could be a benefit, with the (perhaps not so flattering) exception when a Finn is needed as a representative of his/her country or Scandinavia in general. On the whole, in humanities and social sciences much depends on whether one chooses to publish in English or Finnish, or in some other language.

The "national character" of Finnish people gets also a lot of attention from the professors, especially those representing hard sciences. The problems mentioned correspond to the stereotype of Finns who are more than often seen as excessively modest and shy, and lacking oral skills. One medical scientist traces this characteristic to the absence of a competitive culture. The situation won't change, he argues further, as long as the "social security cushion" remains intact. The only solution at the present is, according to him, "a brain wash" through spending time in a US research group.

Many other professors agree that Finnish researchers need to learn to market their results – as one professor puts it, in the US those who "shout

louder" win the game – but they think this can happen through a systematic training of oral skills, even if this takes time from the actual research. Other suggestions vary from working in international organisations or arranging conferences in Finland to travelling more. However, all these activities take time, and across all disciplines there are also professors who think their influence will be minimal. What most professors agree on is that networking and personal relationships are indispensable. But also here excess is possible. As one professor reminds:

> networks and contacts [are often] slow and bad cooperation. They take money and time…and require compromises. [As a result], people forget how research and thoughts emerge: they require peace and tranquillity.

As mentioned earlier, sometimes success is dependent on factors that cannot be influenced by Finns. For example, in an applied field like forestry, it may happen that new standardisation raises interest in research which was earlier considered irrelevant. This happened when the environmental laws were tightened in the US and Canada: the value of Nordic forestry was recognised immediately. A legal scientist argues that in the long term, theoretical questions will become central again and then Finland will have a good chance. Others suggest that Finns should not rush to those places where others are going but to be more far-sighted and take advantage of long-term changes in the international environment. But such forecasting is difficult: "it often depends on chance what idea pays off."

Raising the Next Generation

The mobility of young researchers is an issue that is brought up by several representatives of hard sciences. Considering that young scientists are the key to a culture of internationality (or, an international research culture), it is an issue worth a side-track.

The criticism voiced most often is – perhaps surprisingly – that too young people are being sent abroad. As one natural scientist puts it, "soon they [the Ministry of Education] will send abroad even children from the kindergarten." [15] Many professors think that basic education, including PhD training, should take place in Finland, because

> when Finnish science reaches a certain level, it is no more right to send people abroad to write their dissertation there; they should go abroad only after the doctorate.

In other words, they believe that, at this point, sending people abroad to learn rather than to collaborate on an equal basis would tell the wrong message about Finland. A physicist adds a more practical reason for opposing mobility at too young an age: doctoral students often need to be part of longer projects than most of the international projects can offer. A biologist believes that those who go abroad before finishing their doctorate may be put into technical work that does not benefit them optimally.

The willingness of students to go abroad is an equally critical issue. According to a professor from a technical field, nowadays many young Finnish scientists do not want to go abroad for longer periods although there are plenty of opportunities. The reason is, he ar-

gues, the harder competition faced by them: they must concentrate on one thing whereas international activities would require extra time they just cannot afford.

Another problem is that it is not always easy to return from abroad. Professors from all fields agree that there are not enough post-doctoral positions. Thus going abroad is risky – sometimes it can be an advantage, sometimes it means losing opportunities. Here one can find an interesting parallel to Carlson and Martin-Rovet's (1995: 215) research on the mobility of young French and American scientists: for example, they found out that French women researchers travelled because it would give them the competitive edge they need in France whereas American women researchers felt they would lose the competition in the US if they left the US to work abroad.

Finally, it is important to note that although family reasons have always been part of researchers' willingness for going abroad, they may be even more important today when an increasing number of researchers are women. As one medical scientist points out, women may not be willing to go abroad because their husbands do not want to sacrifice their own careers – as wives of male researches at least used to do. Of course, in more applied fields people may not be so eager to go abroad at all because they have good employment opportunities in Finland. Whatever the reasons, if international contacts are dealt with solely by the older members of the department there is a danger that socialisation into an culture of internationality is not taking place. On the whole, however, mobility of students has

not decreased, as reflected in the above criticisms towards mobility at wrong age.

European Collaboration

Finnish Membership in CERN

As mentioned earlier, cautiousness about international involvements was, for a long time, an important part of Finnish science policy. This was partly because of political reasons, and partly because of the costs of such involvements. Especially the decision to join the European Laboratory for Particle Physics (CERN) in 1991 was debated widely.

Some academy professors think that the cautious attitude should be retained and that the decision to join the CERN was wrong. The typical argument is that the CERN costs too much in comparison to the benefits: as a biochemist points out, one should not only look at the membership fee itself but the costs it causes at the home front. Finland simply does not have enough good scientists unless extra money is allocated to those fields that may benefit from the CERN. One argument is that Finns should not waste money abroad because then no researchers will come to Finland. Credit from big projects goes to the director of the project, and s/he is usually from a big country.

Not surprisingly, there are also professors – mainly from technical fields and natural sciences – who think that the decision to join the CERN was necessary. A professor representing the technical fields summarises the main arguments:

> We need to be involved in many things. The idea that we could only pick the raisins from the bun does not work … We have to be involved so that Finland

is visible and known to others. This is a basic requirement … If we say that we cannot afford joining the CERN or cannot afford joining the ESA, in the eyes of the international community we classify Finland as a second class country. And this must not be done.

Reflecting the fears expressed by the biochemist cited above, those in favour of CERN membership emphasise that the decision to join means that Finland must now start doing better in order to benefit from its membership. This may be seen as a justification for more funding from national bodies but it also indicates more pressure on the scientists in terms of the quality of their work. As a mathematician puts it, "bad conscience will increase": Finnish scientists will face difficulties in utilising all the possibilities offered by the membership in the CERN (and the ESA) while retaining a broad competence. Little is being said about what Finnish researchers can contribute to the CERN. The explanation is probably that it is too early to evaluate this. Or, as one professor remarks, "if we had realised [earlier] that we could actually contribute to international projects, today our participation in them would be of a different kind."

A special case of European research collaboration is the framework programmes of the European Union. Finnish membership in the EU in 1995 is also the most significant commitment in the field of R&D this far. (However, it should also be noted that Finns were able to participate in the framework programmes also before the year 1995.) Although the interviewees' participation in EU projects is limited, their elite position means that they are well informed about what EU collaboration is. Thus their opinions about how EU research will influence their field and Finnish science in general are interesting.

EU Research Collaboration:
Hard Sciences

The most prevalent opinion among all professors in hard sciences, including those in applied fields, is negative – "Finns should not be forced to become European" – and their list of complaints about EU research is long. For example, half of the medical scientists – who in general seem to be the most pessimistic group in regard to EU collaboration – say they cannot find suitable partners for useful collaboration in EU. Also others think that the EU requires partner combinations that are not natural in their fields. Other common criticisms concern the excessive bureaucracy, the system of evaluating applications as well as the emphasis on applied research. Especially medical scientists highlight these problems by a comparison to the European Molecular Biology Organisation (EMBO), of which they have very positive experiences. A mathematician emphasises that "euro-mathematics simply does not exist. Mathematics is mathematics. And it comprises the whole world." He fears that EU collaboration means that non-EU countries are ignored. Some others say that new things come from the US, and Finland should be careful not to rely too much on EU research.

Taken together, it is clear that there is wide concern that EU collaboration is not efficient and it does not produce quality. As one professor puts it, the problem with the EU is that people go round just for its own sake and don't have a clue about where it is taking them.

No publications result from such activity. He also mentions the danger that Finns become some kind of assistants to foreign scholars. Another professor's comment on EU projects is equally condemnatory:

> 95 per cent of them are pseudo-teams or pseudo-networks put together in order to get money but which get together once a year, for the obligatory meeting. But [all partners] do what they please.

Regardless of his pronounced disapproval of such artificial collaborative arrangements, the same professor has participated in EU collaboration himself and will continue to do so. He explains: "I applied for EU money because Finland pays [the EU] so much. I did it quite reluctantly."

Indeed, in most interviews with professors from the hard fields the concern about getting the money back is expressed side by side with criticisms towards the quality of EU collaboration. For example, five of the 12 medical scientists say, all in almost the same words, that "Finns have to get their money back". Whether or not scientists like it, EU collaboration has become a part of their reality:

> in an ideal system no particular continent would fund the co-operation, it would be world-wide. But naturally, [because of the] realities, we are now looking at this from the viewpoint of European competitiveness.

On the other hand, many professors doubt that Finns could get back the money that Finland pays to the EU. Reflecting the views of many others who criticise the EU for being "political", one professor states: "the whole ideology is designed so that small countries get the benefit. Finland may be among those and it may not be." What is more, the requirement of equality between countries and regions means that it will take a very long time to achieve results comparable to those of the US.

On the other hand, some positive attitudes towards the EU can also be found. Several professors admit that on an "ideological" level it is necessary for Finland to belong to the EU. Whatever the quality of EU collaboration, (also) from the perspective of research, Finland could not take the risk of not joining the EU. One view is that EU collaboration may be beneficial in the long term – even if it now seems useless or even counter-productive – because it helps to overcome the supremacy of the US.

Some professors point out that EU research opens possibilities for co-operation and for the mobility of young scientists. This, in turn, will have the effect that the US will start to perceive Europe as interesting. One professor adds that this benefit, however, will go mostly to Britain, France and Germany – countries that Americans are willing to visit. On the other hand, the EU is at least a partial solution to the image problem faced by Finland. Thanks to EU, Finland may now be a better known country at least to Europeans.

EU Research Collaboration:
Soft Sciences

For academy professors from the soft sciences, Europe is a natural context of contacts and collaboration. Many have positive experiences from the European Science Foundation (ESF). However, a similar attitude of "facing realities" can be found among them. When asked

about the changes effected by the EU, one professor answers: "Well, good or bad, but it has to be so. I would say that [the EU] is a new agent of power, and we are dependent on those who are important."

However, the possibilities offered by the EU for social scientists and humanities are limited. Some interviewees – although not many – think that the EU has nothing to offer to their fields. For example, one social scientist notes that EU has little to do with his field, except for one applied sub-field, and comments: "This is actually good, we are not dependent. Or it is good as long as it does not threaten our position."

A humanities professor, however, is more positive about the possibilities EU could provide for humanists. He says that Finland must work for the establishment of a humanist – as well as a "human" – research agenda in EU. What he worries about is, rather, the attitude with which Finns are going to Europe and the EU. It reminds him of going to European championships thinking "what can we get for ourselves". A sociologist shares this view: "if we go to Europe we must think of what is good for Europe. This requires a new attitude." The contrast to the concern of "getting our money back" is obvious.

Not surprisingly, also social scientists and humanists are concerned about the EU's emphasis on applied science. Furthermore, especially many social scientists point to the problems connected to the emergence of "integration studies", that is, studies concerning Europe defined as the EU. Related to this, a legal scientist sees a danger that EU research produces not proper research but mere reports. Finnish researchers cannot

compete in this area: for "supra-national research we are too small. We have nothing to give to the bureaucrats in Brussels." However, the same professor believes that "in the long term, theoretical questions are bound to…resurface." When this happens, Finns will have their chance because they have a strong theoretical background. Also another important strength of Finnish researchers is brought up in the interviews: the ability to understand the relationship between the East and the West. As one professor remarks, Finns have gained this understanding in the (otherwise less productive) bilateral collaboration, and now its time to reap its benefits and "use the Eastern card in the EU."

Finally, whereas professors from hard sciences are worried about retaining their relations to US research groups, social scientists and humanists are more concerned about a decrease in Nordic co-operation, which they believe is a fact already. A sociologist mentions also the danger that Finnish research communities become divided into those who do EU research and those who engage in other kind of research. However, he does not reveal what kind of hierarchy this will be. One scenario could be that in the future, those doing research with EU funding have more money, whereas others have more prestige.

As mentioned before, the last interviews were conducted a year after Finland had joined the EU. Since then, there has been a significant increase in Finnish participation in the EU programmes, and a recent study on Finnish participation shows that the experiences of EU collaboration have been mainly positive. (Luukkonen and Niskanen, 1998) Whether and how this is reflected in the

valuations of the Finnish elite researchers is an interesting topic for further research.

Conclusions

One of the main conclusions that emerges from the examination of the academy professors' interviews is that the common belief "the more internationality, the better" should not be taken at face value. In many of the hard fields, it seems that the "saturation point" has already been reached, and more collaboration would actually mean fewer results. In soft sciences, there may be a need to internationalise but as the academy professors from these fields point out, the degree of internationality is not necessarily an indicator of quality. However, this does not mean that there is a conflict between internationality and nationality: a good research problem has relevance also beyond national borders. Reflecting the way in which the national and the international are always defined in relation to each other, some professors from applied science believe that concentrating on national problems is an international responsibility.

For most professors from hard sciences, the notion of "international" seems to be unproblematic, whereas professors from soft fields remind that there is a reason to be critical of what actually counts as international: too often international means American. It could be argued that in hard sciences, international has come to mean a common way of doing research, and even if its origin is in one particular country, it is applicable in and the best for all (advanced) science systems. The dangers of homogenisation are recognised in some

interviews, but in general, it is taken as a fact that cannot be challenged. In contrast, soft sciences hold on to internationality as a cross-cultural dissemination of ideas. That what is local or national is bound to change in encounters with others, but it will never become the same as the other. (cf. Carlson and Martin-Rovet, 1995: 247). For both groups, *global* science community, to use Schott's (1993) term, is hardly a reality.

As regards to "international quality", it is still defined mainly by the US. Especially for medical scientists, US recognition is the only way to the top. On the other hand, many academy professors think that quality-wise there are no big problems; a bigger problem is that as a small country it is difficult to get the recognition Finnish research deserves. In the hard fields, change for the better is understandable in terms of "choosing the right route" and thus reaching toward the centre. The cognitive map itself is fixed and remains so unless the EU is able to improve its research performance considerably. In contrast, the cognitive map of social sciences and humanities is less rigid, and the majority of professors from soft fields think that the strength of Finnish research lies in anticipating the emerging centres, rather than in seeking the recognition of the established centre(s). In other words, there is not only a multitude of routes (toward the different centres) to be chosen from, but the cognitive map itself is subject to change.

This difference is reflected in opinions regarding EU collaboration. Typically, professors form the hard fields are critical of EU projects because involvement in them is a side-step from the established route towards the centre. At the

same time, many recognise that in the long-term Finland has no choice, and – as some professors say in a patriotic tone, as if they were sacrificing themselves for a higher cause – Finnish scientists are responsible for bringing back the money Finland pays to the EU. What is more, in the long term there is some hope that the EU is a solution to the image problem that they identify as a central obstacle for getting US recognition.

Although many of the professors from the soft fields share the concerns about EU collaboration, they nevertheless see EU research more positively. It is not only a new possibility for sharing data, theories and methods, but a chance to learn a new attitude towards international collaboration. In addition to doing good research, they see EU collaboration as a way of becoming "truly European", whereas professors from hard fields speak in terms of national interest. In other words, scientists studying "national" topics are not necessarily more "nationalistic" than those studying "universal" or "global" issues – at least not in the case of elite professors. At the same time, it should be noted that just like "international", "national" has many different meanings in the professors' speech. In any case, nation still has relevance for the identity of Finnish elite researchers, and it cannot be disregarded in analysing their role-relations to foreign colleagues.

All in all, it is clear that questions regarding internationality must be studied against the background of disciplinary differences. But this does not mean that conclusions can be drawn on the basis of an abstract definition concerning the nature of the hard and soft fields. As this article has attempted to show, the mean-

ings and functions of internationality are dependent on how scientists perceive the scientific world, its flexibility/rigidity and the strengths and weaknesses of their field, as well as on those loyalties that might supersede immediate gains in the quality and efficiency of research.

Notes

1 This paper is a part of two larger projects, "The Finnish scientific elite: strategies of internationalisation" headed by Marja Häyrinen-Alestalo (University of Helsinki) and Erkki Kaukonen (University of Tampere) (see Alestalo, 1994; 1996; Alestalo and Kaukonen, 1995), and "University research in transition" headed by Erkki Kaukonen.

2 If a country chooses to go its own way and to develop its indigenous knowledge base in isolation, it is absurd to speak of a centre-periphery relationship in the sense I have done.

3 The first bilateral agreement was signed with the USSR in 1971, and thereafter with several socialist countries, but also with France, UK and Austria (Immonen, 1995: 286). The most recent agreement was made with Taiwan in September 1997. Of course, there has always been a lot of Nordic collaboration, and in many fields, working in the US was made possible by Fulbright and ASLA stipends.

4 A recent evaluation report by the Academy of Finland compares the scientific productivity of Finland to that of other OECD countries by proportioning international publications in environmental, natural and technical sciences to the populations in these countries. In such measurements, the Finnish figures are quite comparable to those of e.g. Britain, USA and Japan. (Academy of Finland, 1998) It can also be noted that in past years, funding from abroad has grown significantly. However, as in the case of many other countries, the actual figures are still small: in 1995, foreign funding comprised 2,9% of all research funding in Finland (Tilastokeskus, 1996: table 2).

5 Until the mid-1980s, the professors were nominated for three years.

6 Thus there is a clear difference in comparison to the old system of nominating "academicians", which was more of an honorary title for distinguished scholars already in retirement age.

7 The interviews were designed by Marja Häyrinen-Alestalo and Erkki Kaukonen. Most of the interviews were conducted by Marja Häyrinen-Alestalo, the rest by Erkki Kaukonen and the present author.

8 Since 1994, there are only four research councils: culture and society; natural sciences and engineering; health; environment and natural resources.

9 As it might be easy for the Finnish reader to recognise the female professors, they are referred to with the personal pronoun "he". Furthermore, individual disciplines are mentioned only when there are several representatives of the field so that recognising professors is not possible.

10 It is clear that this typology of disciplines is not unproblematic. For example, two of the three mathematicians have been nominated by the council of technical sciences and one by the council of natural sciences; psychologists are nominated by the social sciences council, although their research is often very much like that of medical/natural scientists (e.g. brain research). (For a discussion of this problematic, see e.g. Becher, 1989)

11 As Allardt (1990: 617-618) points out, Finnish professors have had an exceptionally close relationship to the state: since the independence, many have even held the position of minister and diplomat. In comparison to other countries, professors have always been highly valued by the public.

12 A professor of biosciences tells about the establishment of a new, specialised area of research today. The field in question has strong traditions both in the US and in Europe. In the former, it is a basic science whereas in Europe it is mostly applied science. In Finland, the challenge is to combine and utilise the most suitable parts of these two traditions.

13 Interestingly, some of the professors themselves use the "market vocabulary" suggested by Kyvik and Larsen.

14 It is too early to say whether similar reasons might partly explain the popularity of Finns as partners in EU collaboration, but it is certainly an interesting hypothesis.

15 These criticisms are at least partly related to the critique aimed at the graduate school system which was established in Finland by the Ministry of Education in 1995.

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Internationalisation of research – necessity, duty or waste of time?
Academic cultures and profiles of internationalisation

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Abstract

Studies on the internationalisation of academic research have paid little attention to how the changing disciplinary and organisational contexts of research shape international scientific activities and the meanings assigned to them. Applying the perspective of academic cultures, this article analyses the nature and significance of international activity as well as reactions to pressures for further internationalisation in three different university research environments in Finland. The analysis shows that the international dimension of research cannot be distinguished from the overall negotiations on how research should be conducted and whom it should benefit; nor from the concrete possibilities to engage in international activities and the value of international merits in competition for academic status and posts.

Scientific communication across geographical distances and political borders is a phenomenon as old as the scientific enterprise itself. However, international contacts, publications and projects have increased significantly in recent decades (e.g. Hicks & Katz, 1996; van Raan, 1997), and this has led to growing attention being paid to the nature of inter-national research activity and motives for it (e.g. Crawford *et al.*, 1993). Differences in the

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degree, forms and geographical patterns of international activity have typically been analysed in the context of the centre-periphery dynamics of the scientific world (e.g. Kaukonen, 1990; Schott, 1992; Stolte-Heiskanen, 1987). Also the role of disciplinary differences has been highlighted (e.g. Hemlin, 1991; Kyvik & Larsen, 1997). Furthermore, it has been shown that international scientific relations are shaped by their ideological, political and institutional settings, such as the Cold War climate that prevailed not so long ago (e.g. Elzinga & Landström, 1996) or the European Union research programmes today (e.g. Redclift *et al.*, 2000).

Nonetheless, there have been only few attempts to relate the internationalisation of academic research to other changes currently taking place in the universities of the industrialised countries. These changes include, for instance, the increase of external funding and problem-oriented research as well as the concomitant transformation of criteria according to which research is evaluated (e.g. Elzinga, 1997; Etzkowitz & Leydesdorff, 1997; Gibbons *et al.*, 1994; Slaughter & Leslie, 1997; Ziman, 1994). However, although pressures for increased efficiency, accountability and relevance of research are felt throughout academia, they do not have any mechanical effect on the ideals and practices of research. This is because academia is not internally homogenous but consists of different academic cultures that are structured around different disciplines and shaped by historical and social factors, such as national and organisational contexts (e.g. Becher, 1989). Distinct academic cultures have their own values and norms and codes of behaviour – thus also their own ways of resisting and accommodating change (e.g. Hakala & Ylijoki, 2001).[1]

This article draws on these separate bodies of literature in order to create a more nuanced and integrated picture of the internationalisation of science. The analysis proceeds from the assumption that the nature and significance of international activities – as well as the meaning of the "international" – vary not only according to cognitive factors, but also factors such as funding patterns, the organisation of research and publishing practices. In other words, the presumption is that different academic cultures have distinct profiles of internationalisation. The article asks whether and how internationalisation, as well as the current science policy pressures for internationalisation, change academic cultures and whether such changes result in more variety within the academic cultures – or less. Furthermore, the article aims to elucidate the perspective of "ordinary researchers": What does internationality and inter-nationalisation mean in terms of daily research work and what motivates researchers to engage in international activities? The analysis of these questions is based on semi-structured interviews with senior researchers in three university units in Finland, where

the internationalisation of research has been a science policy priority since the late 1980s. The units represent different disciplines as well as different organisational settings with different funding patterns.

The article proceeds in the following way. Section two lays out the conceptual framework of the article. Section three provides a brief excursion into Finnish science policy for internationalisation and its general impacts. The method is introduced in section four and the data are analysed in the three following sections. The conclusion sums up the results and discusses their implications.

Academic cultures and profiles of internationalisation

The image of a cosmopolitan community of scientists united by common values and norms and undivided by race and nationality (e.g. Merton, 1973) is perhaps a worthy ideal, but hardly a reality. Differences in basic understandings of the functions of science – due to cognitive and social factors as well as outright economic, national and other interests – are reflected in the ways research is carried out and the identities of those doing it (see Crawford *et al.*, 1993; Jamison, 1983; Sörlin, 1994). As a result, the academic world is divided in many ways.

Literature on academic cultures highlights the diversity of the academic world from the perspective of disciplinary differences. According to Becher (1989), disciplines form the basis for different "academic tribes", each having their own norms and values and codes of behaviour. Along the cognitive dimension, disciplines differ in terms of their methods, paradigms and the substance of their research, and they can be divided into hard and soft fields as well as into pure and applied fields. Along the social dimension, disciplines vary according to their specific patterns of communication, the organisation of research, structures of power and status as well as typical career tracks. Thus is it possible, for instance, to discern communities that are well-integrated and tightly bound to common rules and others that are loosely organised and lack a clear sense of identity. (See also Clark, 1987; Traweek, 1988; Ylijoki, 2000.)

Becher underlines that academic cultures are subject to both historical and geographical variation. Disciplines die out only rarely but new specialities and disciplines emerge frequently; simultaneously new identities and cultural practices are formed and old ones are forgotten. The development of new multidisciplinary fields such as environmental studies, which often has close connections to both policy-makers and civil society, is a case in point. On the other hand, a good example of geographic variation is provided by Traweek (1988), whose ethnographic study of high energy physics in the USA

and Japan shows that in the former, the key to academic status is primarily scientific excellence, whereas in the latter, age is equally relevant.

Nevertheless, the current debate on the transformation of research has highlighted the possibility that disciplinary identification is losing its importance. It has been argued that external pressures – for instance, demands for increased efficiency and accountability as well as for greater societal and commercial relevance of research – are permeating the whole of the academic world, albeit to varying degrees, and that such pressures change academic cultures in similar directions. As a result, a growing proportion of research is applied and problem-oriented research carried out by transdisciplinary teams that are reorganised for each project (Gibbons *et al.*, 1994).

Micro-level empirical research, however, has shown that disciplinary communities do not necessarily become more homogenous even when they face similar pressures. Instead, they change in different ways, depending on how external pressures are experienced and what the resources are for accommodating and resisting change (Albert, in press; Hakala & Ylijoki, 2001; Trowler, 1998; see also Calvert, 2000). On the other hand, irrespective of the field, external pressures – which can also be in conflict with each other – typically result in tensions and confusion regarding the values and norms of the disciplinary community (Hackett, 1990). This can also mean that it becomes increasingly difficult to make any clear distinction between the 'internal' and 'external' values and norms (Hakala & Ylijoki, 2001; Slaughter & Leslie, 1997).

From the perspective of academic cultures, it would thus be surprising if the range of international activities as well as understandings of their significance were the same throughout the academic world. Research into patterns of internationalisation in different disciplines confirms that this is not the case. For instance, Kyvik and Larsen (1997) argue that although researchers from different fields engage in fairly similar types of international activities, publication practices differ considerably between the hard fields (i.e. medicine, the natural sciences and technology) and the soft fields (i.e. social sciences and the humanities). According to Kyvik and Larsen, these differences are largely due to "internal" factors such as the paradigmatic status of the discipline (single vs. multiple paradigms), the nature of topics (local vs. global) and the communication language (codified vs. literary). They recognise, however, that these "internal" factors – which could also be labelled cognitive as Becher does – do not explain all variation among disciplines but also "external" factors, such as publishing traditions and reward systems, are relevant.[2]

Patterns of internationalisation and motives for international activity

are also affected by the centre-periphery dynamic of the scientific world. For instance, in a developing country with scarce resources for research in general, researchers from all fields typically emulate research carried out in the wealthier countries and appreciate possibilities to travel there.[3] In contrast, researchers in a country like the USA, which in many research fields is considered the trendsetter and the most attractive place in which to do research, are typically not very interested in developing international contacts and travelling or they are simply unable to invest time for this purpose. As Carlson and Martin-Rovét (1995) show, especially young scientists in the USA often find themselves in a situation where they cannot afford to spend time abroad even when they would want to do so, because at their home laboratories international experience is not considered a merit but rather a waste of time.

In contrast, this type of attitude is much less common in countries located somewhere between the periphery and the centre. International contacts and collaboration, as well as having texts published in foreign publications, are typically regarded as an indication of recognition by others. Thus they are not only seen as opportunities to gain new knowledge and to influence international debates, but also as symbolic capital, which is used in domestic competition for funding and status (see Albert, in press). However, the value of such symbolic capital differs from one academic culture to another, and accordingly also pressures for further internationalisation are interpreted in different ways (see Hakala, 1998). In addition, it should be born in mind that even when researchers share common values and norms regarding internationality and internationalisation, they may encounter various practical obstacles to actually engaging in international activities. These range from funding problems to personal life-situations.

THE INTERNATIONALISATION OF FINNISH SCIENCE: AN OVERVIEW

The internationalisation of science and technology is typically the concern of developing and small countries. Finland is a good example of a wealthy small country that has invested heavily into internationalising its science and technology system. The internationalisation of research became a policy priority in the mid-1980s, and since then Finland has joined many of the international scientific organisations that were considered too expensive – as well as too political – commitments during the Cold War (e.g. CERN and ESA). In 1995 Finland became a member of the European Union, which meant that Finnish researchers gained full possibilities to participate in EU-funded research collaboration (see Hakala, 1998).

The basic rationale for this internationalisation policy has remained

constant: international contacts and collaboration are necessary in order to increase international competitiveness and to ensure the development of the national innovation system. Only through international activity can Finland guarantee access to knowledge and know-how that cannot be produced domestically (e.g. Science and Technology Policy Council, 1990, 2000). Another important argument for the internationalisation of science is to improve the quality of Finnish science. This aspect has been highlighted especially by the Academy of Finland, which consists of four Research Councils and which is the main source of external funding for basic research in Finland. The Academy also underlines the need to increase the visibility and prestige of Finnish science. A good example of this is the Centres of Excellence Programme that was established in the mid-1990s: departments and research units selected for this status need to be at "the international top of their field" or to have good chances of getting there. In addition, nowadays all research evaluations conducted by the Academy are carried out by international panels including eminent foreign scholars. Another important part of the Academy's vision is to support "professional researchers" who are internationally mobile and publish in the top international journals in their field. For instance, it is recommended that all doctoral students should spend at least one semester in another country (Academy of Finland, 1997, 1998, 2000a).

In the activities of the National Technology Agency (Tekes), which is the main external financier of applied research and development, internationalisation has been a somewhat less conspicuous theme. Nevertheless, Tekes maintains a wide range of connections to international scientific organisations such as the EU research programmes, EUREKA and COST, and provides support for researcher teams interested in these (e.g. Tekes, 2001). Also universities have invested in developing their international services, although these apply mainly to student exchanges and EU-funded collaboration. Some universities have also designed separate strategies for internationalisation. However, the internationalisation of research activities is mainly the responsibility of departments and individual researchers.

Empirical data show that science policy pressure for internationalisation and the increased possibilities for international activity have not been wasted. For instance, according to data from universities, research visits from Finland abroad increased throughout the 1990s in all fields. What is more, also visits from abroad to Finland have increased so that today mobility is equally frequent in both directions (KOTA database).[4] Bibliometric data show that in the same period, international publishing by Finnish researchers increased significantly and Finns have done well also according to citation measures (Persson *et al*., 2000; see also Academy

of Finland, 2000b). Moreover, international publications and other merits are increasingly emphasised in selecting project applications and filling academic posts – both in universities and in the Academy. Thus it can be assumed that international publishing and other international activities, such as participation in international conferences and research projects, have increasingly become part of the everyday activities of Finnish academics. At the very least, it is likely that today no Finnish researcher can completely escape the pressure to engage in international activities.

This picture is confirmed by a recent survey on the internationalisation of research in Finnish universities (Hakala, 2001). The questionnaire was sent to all heads of departments and research units and hence the survey covered all disciplines. The results show that the internationalisation of research and influence by the international research community are regarded very positively across all disciplines, and that the great majority of respondents think that possibilities for engaging in international collaboration are good. A particularly interesting result is that respondents consider academic collaboration with foreign partners to be more active than academic collaboration with Finnish partners in all disciplinary groups except for medicine, where international and domestic collaboration are regarded as equally active.[5]

According to the survey, disciplinary differences regarding the motivation to engage in international collaboration are fairly small, whereas there are more differences regarding the forms of international activity. In particular, the degree to which publications are directed to international audiences and the number of EU-funded projects are, as expected, highest in the natural sciences and lowest in the humanities. However, no clear division into (more international) hard fields and (less international) soft fields emerges in the survey: respondents from the social sciences and technology have often surprisingly similar response profiles, although probably for different reasons. On the whole, the survey gives a very positive and fairly unproblematic image of the internationalisation of research at Finnish universities. This can be partly due to the fact that respondents were heads of units and perhaps eager to convey a positive image of their activities, even though they responded anonymously.

In the public, also more critical voices have been heard. Some academics – typically social scientists and humanists – have argued that internationalisation has even gone too far. An excessive emphasis on internationalisation means that only international publications are valued and that Finns are deprived of the means to understand their own society and culture. In the words of one critic: "Finnish science and research has been narrowed down to producing mainly internationally interesting results

for a supranational readership" (Mälkiä, 1994: 245; see also Anderson, 1998; Hakala, 1998; Sipilä, 1998). Hence it seems that there is evidence of increasing international activity as well as discontent with it, but empirical research has thus far focused mainly on those aspects of internationalisation that can be analysed quantitatively. Thus it is important to complement the picture with qualitative data which shed light on the phenomenon at the grassroots level.

Method

The data presented here consist of twenty-three semi-structured interviews conducted in three units in two Finnish universities located in Tampere. The units were selected according to the nature of the knowledge produced as well as the organisational setting of the research. In all three units, the number of personnel is around 40.

The Department of History at the University of Tampere is a traditional university department with both teaching and research functions. In Becher's taxonomy, it represents a soft and pure discipline. The department has a long tradition of specialising in social history. It has two degree options, general history and Finnish history. Its research is financed almost exclusively from budget funding and the Academy of Finland.

The Work Research Centre is also part of the University of Tampere. It represents a new organisational setting concentrating on multidisciplinary research funded mainly by external funding that comes from various governmental and other public sources. Its research can be characterised as soft and applied, as it concentrates on social scientific studies of working life. Researchers in the Centre have diverse disciplinary backgrounds, for instance, in sociology, psychology, education and administrative science.

The SemiLab consists of the laboratories of surface science and semiconductor technology at the Technical University of Tampere. It represents a typical technology-driven university environment with close connections to industrial product development. As regards the cognitive dimension, the research is hard and applied. At the time of the interviews, the SemiLab held the status of a Centre of Excellence in Research, given by the Academy of Finland. Funding for its research comes mostly from the National Technology Agency, various industrial firms both in Finland and abroad, and the Academy of Finland. The SemiLab has established two spin-off firms.

The interviewees were senior researchers who had several years or even decades of experience in research work. However, in the SemiLab the interviewees were typically somewhat younger, reflecting the actual

situation. In the history department and the Work Research Centre there was an equal number of female and male interviewees[6] whereas in the SemiLab all interviewees were male. This corresponds to the actual gender profile in the units. In each unit, one of the interviewees was a foreigner, working in the unit on a (more or less) permanent basis. Thus two of the interviews were conducted in English. The interviews were carried out between December 1998 and March 1999. They lasted about two hours and they were all recorded and transcribed.

The interviews covered a wide range of themes concerning research work, including personal history as a researcher, the organisation and funding of research, communication and collaboration patterns, and pressures in research work. Internationalisation of research was brought up by the interviewees in connection with these themes, but it was also discussed separately at the end of the interviews. The questions concerned the nature and rationale of international activities as well as problems related to them, and the influence of (external) incentives and pressures to internationalise further.

The department of history: defending "genuine" internationalisation

In the Department of History, the interviewees represent either Finnish history or general history. However, the boundary between these two specialisations is not necessarily very strict. In fact, the department is characterised more by its focus on social history and the history of ideas, and traditionally researchers have had fairly close connections to social scientists. The interviewees are typically engaged both in teaching and research. However, it can be hard to find time for the latter, and therefore researchers from time to time apply for funding from the Academy of Finland – sometimes also from other sources – in order to have a chance to focus solely on research.

General history is naturally internationally oriented because, by definition, its topics do not concern Finland. However, Finnish history is also "naturally international" in the sense that Finnish history is closely linked to the history of Sweden and Russia, as Finland was part of both countries before gaining independence in 1917. Interviewees in both sub-fields recount that the internationalisation of research activities in the department started in the 1980s – as was typical of history departments in Finland. One of the researchers looks back on his own student days: "When I was a student, none of my teachers ever went abroad, except maybe to the Soviet Union, as part of official collaboration." At that time, reading foreign literature used to be the main form of international activity.

International activities related to teaching and research have developed side by side. An English-language North American studies programme, which is affiliated with the department, was established in 1984. For over a decade, the department has had a visiting Fulbright professor each year. In the 1990s, teacher and student exchanges grew significantly due to the EU Erasmus and Socrates exchange programmes. Interviewees mention that while teacher exchanges have contributed to more open attitudes towards internationalisation, they are also problematic because they take too much time and energy. At present, there are not always enough teachers and students to go abroad: "We have more international activities going on than we can deal with."

All this means that although no one is forced to take part in international activities, it may be hard to avoid doing so. Besides, there is always the basic fact that "if you work in Finland, you will have to orient yourself from the very beginning so that you actively seek [international] contacts and go to [international] conferences." There may be countries where internationalisation is not necessary, but Finland is not one of them. Accordingly, researchers both in general history and in Finnish history have good connections to historians in other countries – in particular, to colleagues in Sweden, Britain, the USA, France, Germany and Italy. All interviewees have both travelled and published abroad, naturally to varying degrees.

As mentioned above, topics in general history are always "non-Finnish", which means that most researchers have to travel abroad in order to collect data and to meet with the best experts on their subject-matter. In Finnish history, the relationship to internationality is more complex. As one interviewee emphasises, Finnish history – but also history more generally – has a special role in the Finnish society stemming from its role in the making of the Finnish nation. This means that historians have a duty to communicate with ordinary Finns and to increase their historical awareness, thus helping them to understand the current situation in society.

> I think historical studies still have also a national function and it is linked to the fact that it is important to distribute the results from historical studies to a wider audience and to make them popular so that also other people than just the researchers in the field understand them and get knowledge. Finland's own history and also history more generally is an important part in the forming of Finnish identity.

In the past decades, the majority of scholars specialising on Finnish history had very limited international contacts: the prevailing attitude was that Finnish history is our business and no one else's. Today, the situation is quite different, and the international dimension is present in the way research is carried out. The following quote from a representative of Finnish

history illustrates well the current views in the Department of History:

> [Internationality] is a natural state of affairs. So that… that it is reasonable and nice and indispensable for us to be in contact with people in the same field in other countries. And even if we were not, we would still have to think of Finland as a part of a bigger picture.

Even though international interaction is nothing out of the ordinary today, a sense of having a "national task" can be present in international interaction. Thus some of the interviewees feel that when abroad, they are responsible for representing Finland also more generally. On the other hand, often also those Finnish historians who do not study a Finnish topic are expected to represent Finland and tell "how this and that thing is in Finland". This can be amusing – or annoying.

Irrespective of the sub-field, one of the main benefits of international contacts and collaboration is that "you get wiser when you see your own limitations. [The international community] provides a good mirror for what you do yourself". Accordingly, many see international comparisons as particularly fruitful. One researcher argues that Finns are particularly good in comparative research, because they are "prepared to move around", unlike researchers from bigger countries. Another special strength of Finnish historians is that they can offer alternative perspectives and interpretations to international debates which are often dominated by the "superpower perspective", thus correcting too-narrow views. In other words, ideas flow in both directions and Finnish researchers know better than to accept foreign perspectives at face value. Furthermore, research visits to other countries are also valued for the reason that they provide an opportunity to escape teaching duties and the general hustle and bustle in the home department. As one historian puts it, staying abroad means that one can "read and write and do a researcher's work in peace", not needing to "rush from one place to another all the time".

All interviewees agree that international contacts, and especially publishing in international journals, have become more important over the past few years, and that this is at least partly motivated by the overall pressure to be more international.

> [The pressure to internationalise] has an impact on me so that I want my studies to show also this aspect. Partly it has an impact because I think it is fun and nice to do something that is labelled international research. But at the same time I realise that it is also rational to hold to that aspiration.

Some of the historians, irrespective of their specialisation, express a strong dislike of this kind of pressure, seeing it as an attempt to limit

academic freedom and deprive researchers of the opportunity to do good and relevant research.

> As I said, I do think genuinely no-nonsense contacts are important, but I myself don't have them because I don't genuinely have anything relevant to communicate to anyone [abroad] at the moment. […] But it is true that the importance of [internationalisation] has grown and this is why I am irritated by the excesses, especially the idea that it is a separate area of activity.

This researcher thinks that currently international collaboration tends to be too superficial and formal, instead of being focused and deep. S/he hopes that "in ten years they [university leadership and science policy makers] won't count anymore where in the world your contacts are".

However, the image of a world in which national affiliations do not matter still seems distant. In general, the pressure to internationalise is most evident in publishing, and in history this presents several problems. According to one interviewee, the problem is not so much that publishing in foreign or international refereed journals would be "out of reach" for a Finnish researcher, but rather that this means too many compromises for the researcher:

> You can create an international publishing career – also I know how I should have done things if I had wanted to have such career: to publish all the time in one narrow area, and then they begin to ask you to come to all meetings relating to this narrow area. Then you trot out that same thing from one year to another and from one place to another. Many of these people who are so-called renowned researchers, they go around the world telling the same thing. They just go deeper and deeper in the same topic. At least I myself cannot be interested in the same thing endlessly.

On the other hand, some interviewees feel that Finnish research results do not get due attention in international arenas, as foreigners are simply not interested in them. Especially American researchers, and sometimes also Swedish ones, are found guilty of such an attitude – as are international publishers who only think of profits and believe that Finnish books cannot sell well enough. Accordingly, possibilities to influence a foreign audience are often small, and therefore some of the interviewees think it might be better to direct one's energies towards Finnish audiences, including the students in the department:

> You can't influence the foreign audience at large, only some conference audiences or a limited number of readers of some journals who say, ok, it's an interesting paper. It's the only effect. But in Finland you can really have an influence.

Besides, there is also the question of time. In particular, if a researcher has heavy teaching duties and is committed to addressing Finnish audience, it can be difficult to find time produce (more) international publications. As is clear from above, they often require not only writing in a different language, but also a change in style and focus.

An international publishing career is problematic also in another sense. Several researchers emphasise that, despite the rhetoric emphasising international merits, monographs are still valued more in Finland than articles in international, refereed journals. This does not mean that the language of the monographs has to be Finnish, although this often is the case. In this situation, individual researchers have to make difficult choices: If you work for the international market, you should write weighty articles. Internationally traditional monographs are not favoured. But you just have to produce them in order to be eligible for posts here in Finland." In other words, the norms of the international and the Finnish community of historians are in conflict. Science policy gives support to the former, but researchers have to conform to the latter in order to be selected for university posts. Thus, in the words of one interviewee, "when it comes to real business, the talk about appreciating internationalisation, it just fades into the background.

Obstacles to internationalisation – other than those discussed above – are not very many. This can be partly explained by the fact that research funding from the Academy usually includes a handsome travel budget. Funding for international projects is available from the Nordic council, although other international projects are difficult to finance. On the other hand, some researchers also complain about the "basic infrastructure" of internationalisation, namely the fact that, due to budget cuts, the university library has cut down its acquisitions of books and journals. As one researcher asks: "How can we publish in esteemed international publications when we cannot even read them in the university library?" Writing fluently also in foreign languages is important – unlike in many other fields, in history the selection of publishing languages includes at least Swedish, English and German – and therefore there should also be more money available for language checking and translations.

To sum up, in the Department of History the internationalisation of research and teaching have proceeded hand in hand, and today international contacts are part of normal work routines. In general, international connections and activities are seen both as necessary and rewarding. However, many researchers are irritated by what they experience as external pressure to internationalise further – especially to publish more internationally. This can be understood in light of the time pressure faced by the researchers, but even more importantly, as a normative conflict due to the fact that this would force them to focus on certain kinds of topics and reduce communication with their Finnish audiences. Nonetheless some

feel that talk about internationalisation is partly just "empty rhetoric", and when it comes to the evaluation of researchers, international merits are not appreciated. Nevertheless, the interviews also reveal that the historians do not feel they have given in to the external demands very much: there is still space for academic freedom and individualism with respect to the international dimension of their work.

The work research centre: internationalisation as a challenge

The Work Research Centre focuses on applied research mainly concerning Finnish working life. Thus it does not follow traditional disciplinary boundaries, however, the orientation is clearly that of social sciences. The centre has only three academic posts, while all other researchers work in projects that are funded externally from governmental and other public sources. In this sense, the centre represents a relatively new organisational form in academia. The reliance on external sources of funding naturally affects the selection of topics as well as the way in which research is carried out. As the researchers are themselves committed to influencing society and people through their work, this presents no major conflict of interest. At the same time, the work researchers want to belong to the traditional academic community and wish to reinforce the academic orientation of the centre. From all this it follows that one of the most important qualifications of the work researchers is flexibility and the ability to negotiate among different interests.

Research topics in the centre are typically Finnish in the sense that they either concern Finnish working life, or have direct relevance to it. However, theoretical work in work research comes mainly from outside Finland, because the field is still young in Finland.

> My work has not been very international in regard to the results or what I have written. But the basis is [international], for instance the theoretical debates are all fully international. The same concepts are discussed here and everywhere.

The academic literature read is typically Nordic or Anglo-American, and it is in these same countries that the most important foreign colleagues are found. Countries having similar labour markets as Finland are especially important, Sweden in particular. The communication language is typically English, although some prefer to speak Swedish in Nordic contexts.

Almost all interviewees emphasise the importance of international conferences and research visits as providing valuable possibilities to connect

oneself with the more established research communities and to learn from them "new ways of perception and thinking". Like the historians, also work researchers think it is important to see Finnish phenomena "in proportion", either as part of a bigger picture or in comparison to similar phenomena or systems in other countries. What is more, inter-nationalisation has convinced many of the interviewees of the fact that the level of Finnish research is quite good and Finns can contribute to the international debates on working life: "We are actually quite good at what we do."

For the majority of interviewees in the Work Research Centre, internationalisation presents a positive challenge. One interviewee says it is her/his "dream" to become international, another says s/he is "exploring the possibilities to internationalise". A third "has plans to go to international arenas" and a fourth has "tried to take an interest in internationalisation". These interviewees admit that their aspirations have been affected by the policy emphasis on internationalisation, but they do not see it as a negative influence:

> I haven't felt that I have been forced to travel abroad – I go willingly. Many of my own interests and the more general programmatic interests [of the unit and science policy makers] coincide. But I think that two or three years ago I would have given a different answer. I think I would have answered that I feel there is too much pressure and that it is exaggerated. And it can still be so, but I think I would have been more critical in the past.

These researchers' willingness to engage in international activities often reflects the desire to gain academic merits but also the wish to feel part of the international research community. However, the pursuit of theoretical questions and writing academic articles for good international journals is seldom possible within the tight project schedules and usually requires funding from the Academy of Finland, which is not easy to get.

Internationalisation is not only the business of individuals but also some collective efforts have been made. One of these is the recent application for the status of Centre of Excellence in Research which encouraged – and perhaps even forced – the researchers to consider their international activities. The Centre did not receive the status but continues to pay attention to this dimension of its activity: today, "in all the new projects, we discuss their international aspects [and] how close they are to the top international level. We ask all research groups to think about this." On the other hand, in order to acquire EU funded projects, it is important that the Work Research Centre also develop its institutional networks with European universities and research institutes.

The centre already has a fair amount of experience of EU projects, many

of which have been obtained due to the efforts of the German professor in the unit. Attitudes toward EU collaboration are somewhat critical – but again, pragmatic. EU funding provides good possibilities for comparative research, which many work researchers consider the most productive type of international collaboration. However, many find the projects somewhat frustrating and too time-consuming in comparison to the results. In addition, there is not enough time to prepare academic publications. In other words, while EU projects certainly produce internationally interesting results and reinforce international contacts, they do not automatically lead to publications in international refereed journals.

Some researchers say that although internationalisation is important, the priorities of the current projects as well as their time frames mean that international activities – other than reading – are not very frequent. As one researcher puts it:

> I think it certainly is relevant to become more international, but – let's just say simply that I don't have time for it. Its interest value has not passed the threshold so that I would think that also [international activities] are worth undertaking in addition to everything else.

Those who have decided to internationalise their activities experience sometimes difficulties. The biggest problems are created by the lack of two interrelated things: money and time. The following excerpt illustrates this fundamental concern:

> When everything I do is done with funding coming in bits and pieces, it's difficult to internationalise. It requires time because there won't be any immediate results. I know from experience that [international projects] require a lot of time and there is no guarantee that the result will be good. In this sense it is always a risky business.

Reports to financiers form an important part of publishing activity and extra time for developing the reports into academic articles is difficult to find. […] Also funding for conference trips and research visits can be a problem. Often funding has to be applied for separately.

Attempts to internationalise can also fail, largely for the same reasons that were mentioned by some historians.

> Well, I have tried to engage in internationalisation too, and I must say it is really hard in this field […] Finland must be the worst place to write about anything. If you write about the Midwest of the US, you can easily write without remembering that the whole world is not the same as the American Midwest. Or if you write about, for instance, transition economies – that is a topic that has a very good market value in international publications today. But a second-rate periphery like Finland…

The interviewee falls silent with a sigh. Others have more moderate views and think that certain Finnish phenomena, such as the information society and gender issues, do get attention also abroad. However, they agree that international journals do not want articles that are "too Finnish". Thus selecting the right topic and style is essential if one wants to have international success. However, like the historians, the work researchers are wary of limiting their research interests according to the demands of the international publication market. This is partly because they want to write for Finnish audiences, and partly because they have no alternative: there is no guarantee that financiers appreciate traditional academic merits and the number of academic posts is very small in comparison to the number of people working in the centre.

In a nutshell, the applied nature of the research in the Work Research Centre means that the researchers do not have very much freedom of choice regarding their topics, even though they sometimes succeed in "selling" their own ideas to the financiers. This means that topics usually have some direct relevance to Finnish working life. It also means that a narrow specialisation – which would perhaps make an "international career" easier – is a practical impossibility. However, the theoretical debates followed by the work researchers are international and also international comparative work is appreciated highly.

In comparison to the Department of History, where forms of inter-nationalisation are well established and no major changes are expected in near future, many of the work researchers are still exploring their possibilities. They are open to the idea that international activities might actually improve their research and are prepared to direct more of their energies into them. This is usually connected to the desire to gain academic merits (in particular, through international publications) as well as to reinforce the academic orientation of the centre as a whole. Some researchers express more negative views and feel that international activities and publishing is overrated. All the researchers are well aware that the project-based organisation of the centre creates limitations to the inter-nationalisation of research activities: writing results and texts so that they would interest foreign (academic) audiences requires time that is simply not available.

The semilab: scaling up research efforts

The laboratories of surface science and semiconductor technology – here called the SemiLab – concentrate on highly specialised and equipment-dependent research, which has many commercial applications. At the time of the interviews, the unit had produced two spin-off firms, one of which

had recently been sold to Americans. However, although the share of applied research has grown since the 1980s, the laboratories have a strong background in basic research. This is also illustrated by the fact – proudly brought forward by the interviewees – that in 1995 the SemiLab was nominated as a Centre of Excellence in research. The status is given by the Academy of Finland to research units considered to be at the "international top" in academic research.

Due to the specialised nature of research in the SemiLab, connections to other physics departments in Finland are not considered very fruitful. As one researcher puts it: "if you want to collaborate at all in our field, you have to collaborate with foreigners." Also the subject matter of the research is thoroughly international. In fact, researchers find questions about the purpose and significance of international activities somewhat absurd: research in the SemiLab is "self-evidently" international or "immensely international", and the issue "needs no special attention." Thus it is also self-evident to the researchers that their writing language is English. It is revealing that one of the interviewees commented on a recently published PhD in philosophy, written in Finnish, saying that there must be something wrong with it – otherwise the author would have written it in English and thus submitted it to the scrutiny of an international readership.

Thus it is understandable that, unlike in the other two units examined here, questions regarding the nationality of the audience do not have much relevance in the SemiLab. Academic texts are published in international peer-reviewed journals, which have a very clear ranking order. However, it should also be noted that due to the commercial aspects of the research, some results can not be published at all, or at least not immediately. At least in theory this means fewer publications, but none of the interviewees considers it a problem. Furthermore, as the field is characterised by rapid development, conferences have an important role in mediating the latest research results. They are also forums for meeting the manufacturers of scientific equipment.

Accordingly, the SemiLab's international collaboration partners come not only from academic institutions but also from industry. The current emphasis on applied research has had some influence on the balance between these two, as pointed out by one of the senior researchers:

> In the beginning, it was very common that we had foreign researchers coming here and presenting their results. But the more this has become a commercially sensitive field, the less we have had international academic contacts.

On the other hand, a fairly recent change is that academic collaboration with European researchers has increased thanks to EU-funded collaboration.

According to one interviewee, today academic collaboration takes place primarily within Europe, whereas industrial collaboration is more typical with Northern American partners. This can be related to the fact that in this field EU projects are generally considered to be ambitious and of good quality.

Whereas in both the Department of History and the Work Research Centre the basic motive to internationalise is to gain different perspectives on one's topic, the main incentive in the SemiLab is to precipitate and rationalise the research process. A central aim is to acquire specialised knowledge that cannot be produced in Finland due to the small volume of research. As one interviewee puts it, the most important benefit of international collaboration is that "we get more resources to do the research". Sometimes it is also important to have access to equipment located in a foreign laboratory. However, as in the other two units, international contacts are also connected to the desire to feel part of the international academic community:

> I myself feel that this research should lead to such results that I could be proud of them and that the community of researchers in this field would notice them. It is important to experience that this work would have something to give to other research teams in the world.

International collaboration is based on a clear division of labour, and every team does its own share. The fact that researchers and research teams are located in different countries does not mean that the research groups would represent different research traditions. Thus, whereas the historians and work researchers draw inspiration from differences created by geographical distance, researchers in the SemiLab experience distance primarily as a hindrance:

> The distance itself is a problem – I mean, if we all were in the same lab, we would have such a powerhouse that I bet my own project would proceed at least twice as fast. It is one of my personal problems that now I have to reinvent the wheel over and over again, because I do not have any obvious expert nearby.

However, the world of applied physicists contains also diversity that is not connected to the volume and material conditions of research, and therefore some researchers are able to point out differences from which Finns can learn something. To the question "what type of things can you learn from abroad?" one researcher answers, with a sigh and a laugh:

> Well, we can learn that money speaks. To be blunt, Americans have certain good characteristics: they are open to new ideas, they have good internal networks within the US and they have many good teams that collaborate with each other. — We can learn [from them] that we should

invest more in collaboration. The Americans, if they find a good partner, they can collaborate effectively. And this is facilitated by the fact that they have so much money at their disposal.

In the SemiLab, one of the most acute problems in regard to the functioning of the unit is the lack of competent personnel, which is mainly due to the fact that industry provides better-paid jobs for applied physicists. Internationalisation presents partly a solution to this problem – in the form of foreign researchers who come to work in the SemiLab. Unlike in the other two units studied here, the SemiLab has post-doc positions for which it is easy to recruit young researchers from abroad. Job advertisements are put on the Internet, and "applications come from all over the world, from as far as China". However, due to the commercial aspects of the research, the SemiLab does not want just "anyone" to come for a research visit. On the other hand, it can be difficult to attract well-known foreign physicists to Finland, even though the quality of research is not a problem. As the interviewees laughingly point out, Hervanta (the suburb where the university is located) and Finland may not be the most attractive places in which to live.

On the other hand, the lack of personnel presents an obstacle for those in the SemiLab who would themselves like to spend some time abroad. This dilemma is presented in the following citation:

> We have not had many researchers going abroad for the reason that we don't really have any personnel to send away – already we have too few. We would prefer to see foreign researchers coming here to strengthen our own resources.

Especially the coordination of projects at home requires that the senior researchers are present. In applied physics it can take months to familiarise oneself with the equipment or solving a single problem in it, which means that visits have to be planned carefully. What is more, researcher exchange always includes the possibility that Finnish researchers may decide to stay abroad.

In accordance with the Mertonian imperatives, the researchers in the SemiLab insist that the nationality of researchers has no role whatsoever when researchers from different countries meet and collaborate. One researcher tells how he was actually surprised at how respectfully a Polish researcher with poor language skills and a worn-out suit was treated in an international conference. National and cultural differences seem to matter only in one case: with Japanese partners cultural differences are so big that they affect all interaction.

To sum up, in the SemiLab, internationalisation is seen as a matter of course. Unlike in the other two units, there is no conflict between domestic

and international audiences for research. Internationality means primarily more manpower and specialised knowledge that cannot be produced in the SemiLab due to the limited volume of research. Problems regarding internationality are mainly practical in nature, concerning, for instance, the availability of foreign research personnel. Likewise, it is clear that there is no discrepancy between the science policy emphasis on inter-nationalisation and the researchers conceptions of the international dimension of their research – even though the researchers are not blind to the fact that foreign visitors and collaborators also look good in applications for funding and in evaluations of research. From the perspective of individual researchers in the SemiLab, international activities are neither more demanding nor more rewarding than other research activities, they are simply "business as usual".

Conclusion

The comparison of the three units gives support to the argument that the soft and hard fields have a fundamentally different conception of what 'international' means and why international activities are needed. In the Department of History and in the Work Research Centre internationality means, above all, exposure to differences that help to see one's own topic and approach in a new light. Being part of an international community of researchers does not mean that there are commonly agreed standards for what constitutes good quality research and topics worth studying. On the contrary, if pretensions toward such standards exist, they are easily labelled as imperialistic. In contrast, researchers in the SemiLab see the international rather as an extension of the local, utilized for gaining specialised knowledge that cannot be produced in Finland due to the limited volume of research and thus for making research more effective (see Carlson & Martin-Rovét, 1995; Hakala, 1998).

This fundamental difference is reflected in the fact that although both the SemiLab and the Work Research Centre rely on external sources of funding and have a strong, although not exclusive, focus on problem-oriented and applied research, their profiles of internationalisation are quite far from each other. This is mainly due to the fact that the SemiLab's research is applicable all over the world and funding for it comes from many different types of sources (international and national, public and private), whereas the Work Research Centre is heavily dependent on domestic public financiers interested in research that has direct relevance to Finnish working life. This is reflected, for instance, in the fact that although both units have been fairly active in EU collaboration, the projects have a different significance for

them. For the physicists, participation in ᴇᴜ collaboration provides a good opportunity to do high-quality academic research; from the perspective of the work researchers, ᴇᴜ projects are often problematic but also a source of funding that they cannot afford to ignore (cf. Hakala *et al.*, in press).

On the other hand, the comparison of the Department of History and the Work Research Centre shows that the fact that the former represents a basic research orientation and the latter an applied orientation does not mean that their basic motivations regarding internationalisation were very different. Nonetheless, this distinction has influence – in the form of different funding patterns and organisation of research – on the possibilities to engage in international activities as well as on the form of these activities. For example, in the history department the internationalisation of research has been developed side by side with teacher exchanges, whereas in the Work Research Centre international activities always need to be coordinated with project activities. Thus all three units have unique internationalisation profiles.

Accordingly, also science policy pressures toward internationalisation are experienced and reacted to in distinct ways in the three units. In the SemiLab, such pressures can be to a large extent ignored, as they are fully compatible with their own conceptions regarding the degree and forms of international activity, as well as with the practices that actually exist. This compatibility is manifested in the fact that the SemiLab was nominated to be a Centre of Excellence in Research by the Academy of Finland. Naturally, the researchers are aware that they should continue in the same way also in future.

Researchers in the other two units have a much more complex relationship to external demands for increased internationalisation. These units are also internally more heterogeneous in this respect. In the Department of History, these pressures are experienced primarily as a normative issue: a question of who can determine what topics are important, how research should be carried out and where the results should be published. On the other hand, some of the historians are ready to accept practices that are also promoted by the current science policy – in particular, the prioritising of international articles over monographs – and find the traditional values of the Finnish community of historians outdated. Thus it seems that external pressures toward more internationalisation have given impulse to an internal debate among the historians about their values and practices.

Critical attitudes toward the science policy push for internationalisation can be found also in the Work Research Centre, the research of which is directed mainly to Finnish audiences. However, in contrast to the historians, the majority of work researchers have a fairly pragmatic view on this

issue. On the one hand, this can be explained by the fact that they are used to responding to external expectations and to reconciling their own interests with those of others. On the other hand, international activities and publications are seen as an acceptable and rewarding route towards professional development and a more academic status, both individually and collectively. The problem is that it is difficult to find the time and resources to realise this aspiration.

The cases of history and work research highlight the fact that when researchers in the social science and humanities are encouraged to produce more international publications, it is usually the domestic public audience that suffers most. Especially researchers with heavy teaching duties or tight project schedules cannot afford to spend any time on tasks that are not rewarded by status and funding, and thus they may be forced to make decisions that are in conflict with their commitment to contribute to the development of Finnish civil society (cf. Albert, in press; Hakala & Ylijoki, 2001). At the same time, it may still be unclear what the actual value of international academic credentials is. As a consequence, individual researchers find themselves in a situation where there are no clear codes of behaviour (cf. Hackett, 1990).

Furthermore, orientation toward international academic audiences in the soft fields can be problematic also for the reason that success in the "international markets" requires a narrow specialisation. Topics that are considered "too Finnish" do not sell. From the perspective of individual researchers this is frustrating, especially as they themselves are proud of the quality of Finnish research. From the perspective of Finland as a whole, it can be asked – as it has been done in the public debate – whether increased internationality in the form of international publications is a worthwhile objective, especially when at the same time there are demands on science to be more accountable to taxpayers and to society at large.

To conclude, the analysis of the three research environments shows that international activities and the meanings assigned to them are deeply intertwined with the substance of research as well as the ideals and practices of the academic culture in question. In other words, the international dimension of research cannot be distinguished from the overall negotiations on how research should be conducted and whom it should benefit; neither can it be abstracted from the concrete possibilities to have the time and other resources for engaging in international collaboration and publishing. Thus, even though the science policy push for further internationalisation has a certain homogenising force on academic cultures, especially in the soft fields, it is encountered by normative resistance as well as practical impediments that sustain variety.

Notes

1 To a large extent, the debate on the transformation of academic science has been dominated by Anglo-American scholars. Thus it is understandable that the internationalisation of research activities, which is typically the concern of small and peripheral countries, has not figured as a particularly important question in it. The same applies to literature on the effects of (economic) globalisation on academic science and universities (e.g. Currie & Newson, 1998; Slaughter & Leslie, 1997).

2 It should also be noted that disciplinary groups and disciplines can be internally heterogeneous in this respect, due to both "internal" and "external" factors. For instance, so called behavioural psychology shares many characteristics associated here with the "hard fields".

3 However, it should be noted that in recent years there have been attempts to develop "indigenous science" which relies (more) on local knowledge (e.g. Hill, 1995).

4 However, a saturation point in the number of visits was reached in 1996 after which there has been even a slight decrease.

5 This result concerns collaboration with departments and units in the same research field. Collaboration with units in other fields was significantly less active both domestically and internationally.

6 When these two cases are discussed in the text, the gender of the interviewees is hidden by the usage of the pronoun form 's/he'.

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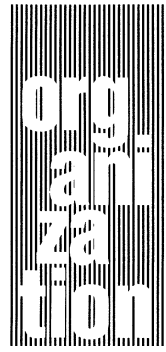
Research for Whom? Research Orientations in Three Academic Cultures

speaking out

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In recent years, it has been argued that the organization, values and practices of university research are undergoing fundamental changes. One of the most prominent arguments has been presented by Gibbons and his co-authors (1994) who claim that traditional academic research is giving way to new forms of knowledge production. This transformation entails that research is increasingly funded by external sources instead of budget funding; that traditional, discipline-based individual research is being taken over by transdisciplinary projects; and that the purely basic research orientation is being replaced by working with problem-oriented applications. It has also been argued that this transition leads to the emergence of new kinds of academic values, ideals, orientations and identities (see also Etzkowitz, 1997, 1998; Ziman, 1996).

In these arguments, university research is typically portrayed as a homogenous activity, while the main empirical referent is natural and technical sciences. However, studies of disciplinary cultures have pointed out that academia is not a coherent entity but consists of a variety of 'small worlds' (Clark, 1987) or 'academic tribes' (Becher, 1989) which are structured primarily around disciplines. According to Becher (see also Clark, 1986), disciplines differ in terms of the cognitive nature of knowledge (hard–soft, pure–applied) as well as in social dimensions (working styles, publishing traditions, career paths, etc.). Thus, from this viewpoint, the university consists of a variety of academic cultures, each with different aims, values, norms and basic beliefs (e.g. Evans, 1988; Traweek, 1988; Ylijoki, 2000).

This micro-level perspective leads us to believe that general statements about changes in university research may not tell the whole truth. On the basis of our field research, which consists of interviews with senior researchers in three academic units in Finland—the Department of History, the Work Research Centre, and the Laboratories of Surface Science and Semiconductor Technology (called the SemiLab)[1]—we are able to

Table 1. The four orientations of research

Orientation	Audience	Knowledge	Motive
Academic	Scientific community	Theoretical	Gaining reputation
Civil society	Ordinary people	Practical	Improving practices
State-governmental	Decision-makers	Instrumental	Supplying information
Entrepreneurial	Market forces	Commercial	Making profit

provide a more nuanced picture of what is happening within academia. We explore changes in academic cultures by focusing on one fundamental issue: research orientations, which we define as different answers to the question 'for whom is research done?' We argue that an analysis of research orientations and, in particular, the tensions among them within research communities is the key to a better understanding of the current dynamics of university research.

Research Orientations

Drawing upon our interviews, we discern four orientations of research: academic, civil society, state-governmental and entrepreneurial (see Table 1). These orientations are comprised of different conceptions regarding the primary reference group of research. In each orientation, the audience for the research, the nature of knowledge produced, as well as the motive for doing research, are different.

The academic orientation has as its reference point the scientific community, which is the main audience to whom researchers want to address their results. This orientation reflects traditional academic values and norms, such as academic freedom and a curiosity-driven choice of research topics. The nature of knowledge is theoretical and researchers' main motive in their work is to achieve recognition within the scientific community.

The academic orientation is strongest in the case of the Department of History, which, unlike the other two units, is not dependent for its existence on external funding. The historians closely follow international debates that define which topics, methods and theories are relevant and up-to-date and they choose their topics according to their personal commitments to problems they consider fascinating and puzzling. Publication in refereed journals as well as monographs are valued highly, and it is on the basis of these publications that the historians' reputations and career prospects are constituted.

However, even if the academic orientation is strongest among the historians, it appeals to researchers in the other two units as well. Working on intellectually challenging research topics, contributing to one's field and achieving academic merit within the scientific community are regarded as important values in all research units. The following quotation from a researcher in the SemiLab illustrates well the characteristics of the academic orientation:
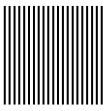
> I myself feel that this research should lead to such results that I could be proud of them and that the community of researchers in this field would notice them. It is important to experience that this work has something to give to other research teams in the world.

The civil society orientation emphasizes that research should provide instruments for ordinary people to understand society and to better command their lives. The audience for the research is lay people and the core motivational force to do research is to somehow improve society and the prevailing practices—and, if that is not possible, some fraction of them. The nature of knowledge is thus practical. This orientation is essential in the cases of the History Department and the Work Research Centre.

In the Department of History, the dominance of the academic orientation does not mean that the historians isolate themselves into an ivory tower. On the contrary, they feel that the study of history involves a kind of civilizing task stemming from its important role in the development of the Finnish society. To fulfil this task, the historians see it as their duty to communicate through media and public presentations with ordinary people and in this way to increase the historical awareness of the public, thus helping people to better understand the current situation in society and to anticipate the future:

> I think historical studies still have also a national function and it is linked to the fact that it is important to distribute the results from historical studies to a wider audience and to make them popular so that also other people than the researchers of the field understand them and get knowledge. Finland's own history and also history more generally is an important part in the formation of Finnish identity.

In the case of the Work Research Centre, the motivation to do research often stems from the wish to change working life. Although project reports are in most cases written for the financier of the research, they are also addressed directly to the people who work in the area that has been studied. Furthermore, the researchers may be involved directly in developing the practices of a certain work community, and, like the historians, many of them are used to giving public lectures or writing popular texts.

The state-governmental orientation underlines the instrumental value of research for policy-making and measures. The audience for the research is the financiers and decision-makers, typically some governmental body for which researchers collect and analyse data concerning some acute societal problems. This means that research is mostly applied or problem-oriented and its aim is to produce information for the needs of governance and administration. The results are typically published in report series, the quality criteria of which are not academic but emphasize usefulness for political decision-making.

The state-governmental orientation is manifested most clearly in the Work Research Centre, which is focused on doing contract research for

various governmental bodies. Therefore, research topics do not necessarily arise from the researchers' own interests but rather from the needs of financiers:

> The steering group of some project of the Ministry of Labour can say that it is absolutely necessary to examine what effects some reform has had on people's job seeking behaviour, if it has succeeded in increasing people's activity to find jobs. It may be that this question is not the first one on my priority list, but I have to examine it. But this doesn't affect the results I will get.

The entrepreneurial orientation highlights the commercial value of knowledge production. Research is carried out in order to gain such applicable results—mainly new products and instruments—for which there is market demand and through which it is possible to make profit, for example by establishing spin-off firms. Thus, the nature of knowledge is commercial and the audience for the research is potential customers (companies and consumers) whose needs the researchers aim to anticipate and satisfy. Accordingly, it is the market forces that in the end determine the quality of the research.
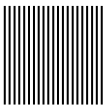
The entrepreneurial orientation is manifested in the SemiLab. It has very close relationships with industry and it has established two spin-off companies. The laboratory has been commercially highly successful and the researchers point out that their field is 'a hot market' and 'an aggressively growing area'. This is one reason why the SemiLab has inclined more and more towards product development:

> Well, we know the lasers . . . We develop, we plan, we simulate, we build those lasers right up to the instrument ready for use. And then we say to the firm that look, this comes when you do it this way . . . We give this knowledge for money to anybody.

Tensions between Orientations

As reflected in our interviews, the three units are characterized by different research orientations. The dominant position of one orientation, however, does not mean that others do not exist—there is variety also within the 'small worlds' at the university. Rather, our argument is that, although the research orientations may co-exist harmoniously within one research environment, it is common that there are tensions among them. For example, the academic and civil society orientations can come into conflict in terms of publishing preferences. Writing to an international audience and gaining academic credentials, which are basic features in the academic orientation, may be in tension with the aim of participating in the development of the Finnish society. Addressing both audiences is difficult not only because of language—English vs Finnish—but also in terms of relevant topics as well as appropriate writing style and publication channels.

It is also evident that at present two types of tensions are particularly acute, because of the fact that there are external pressures favouring a

shift towards those orientations that are most directly shaped by the needs of financiers of research.

First, even though it is possible that the academic and entrepreneurial orientations exist in good balance, attempts to combine them are often problematic (cf. Etzkowitz, 1998). This is the case in the SemiLab where earlier the commercialization of results took place side by side with academic work, but more recently the space for the academic orientation has become more and more restricted because of the altered funding structure. The main reason for this type of tension is that these two orientations entail a wholly different rationale and time-span: whereas the former appreciates theoretical work and allows for risk-taking, the latter puts weight on direct utility and commercial benefits in a shorter time-span. Moreover, the entrepreneurial orientation approves of keeping some important results secret, whereas making results public forms an essential norm in the academic orientation.

Second, the state-governmental orientation and civil society orientations, which are seemingly harmonious in emphasizing the societal utility of research, are in practice often in conflict with each other. This happens when government-financed projects are tightly scheduled and researchers just 'churn out report after report' and have no time for actually communicating with either the general audience or the people whose lives they have studied.

Researchers' experiences of the tensions are primarily negative (cf. Hackett, 1990). This is because they feel that they are forced to work within the confines of only one orientation while their motivation continues to stem from more than one orientation. However, it is also important to note that, in different research environments, researchers have different ways of interpreting these tensions and reacting to them. For example, in the Work Research Centre, where external pressures push the researchers towards adopting the state-governmental orientation as their only orientation, many of the researchers continue to have their own, more academic, topic in addition to their project work—even when this means a lot of extra work hours. It could even be argued that the researchers' wish to gain academic credentials has made the academic orientation stronger in the centre over the past years. In contrast to this, researchers in the SemiLab, who face the tension between the academic and entrepreneurial orientations, often choose to leave the university— why not do the same thing for a higher salary in industry?

Conclusion

With regard to the orientations of research, each unit in our study is characterized by a different combination of orientations and constitutes its own academic culture. This means that, even though there are common external demands, such as the pressure to engage in 'academic capitalism' (Slaughter and Leslie, 1997; see also Clark, 1998) in order to attract more external funding, these demands are interpreted and reacted

to in different ways. It seems that the units have, to a large extent, preserved their unique features, ideals and moral commitments. On this basis, we argue that it is premature, if not wrong, to talk about a new mode of knowledge production in the singular form.

However, in the current situation, the critical question for the future of university research is whether the external pressures towards the entrepreneurial orientation—and to some extent towards the state-governmental orientation—will overshadow or even push aside the other orientations. This applies particularly well to research environments that are dependent on external funding, as increasingly many academic units are. From the perspective of individual researchers, the situation is problematic: for those who do research work, the question is how to find time and funding for research that is not only 'do-able' but which they personally can also consider 'worth doing' (Ziman, 1981).

In addition to highlighting the diversity of university research, our case study shows that academic core values—like autonomy, freedom and personal commitment—and academic prestige still appeal strongly to researchers in all three research environments and form one essential motivational force that gives meaning to the research work. Likewise, it is important to note the crucial role of the civil society orientation as a motivational force in two of our cases, in the History Department and the Work Research Centre. Like the academic orientation, it is at risk because of constantly increasing time pressure in project work and growing demands for effectiveness. The question is, then, who would, or could, pay for this kind of research, and should the contributions to civil society and to the public also be taken into account when assessing the quality and efficiency of research.

To conclude, we want to emphasize that all four research orientations have an important role to play in university research and, especially, that a balance between them is necessary to ensure that the university can continue to attract motivated researchers in the future. Furthermore, we think it is important to understand that external pressures for change do not have any mechanical effect on research practices and ideals, as they are always filtered through the historically, socially and cognitively constructed stock of values, norms and codes of behaviour (e.g. Becher and Kogan, 1992; Trowler, 1998). This means that the cultural elements act as a 'buffer' that to a certain extent can save university research from being a mere target of the external steering by economical and political actors. We believe that they can sustain internal variety at the university and preserve some autonomy for long-term research work—even creating space for some counter-trends to the prevailing societal forces. Change takes not only one form, but many.

Note

1   The Department of History is a traditional university department with both teaching and research functions, and it represents a soft and pure discipline.
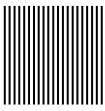
The Work Research Centre represents a new organizational setting concentrating on multidisciplinary research funded mainly by external public agencies. Its research can be characterized as soft and applied, as it concentrates on social scientific studies of working life. The SemiLab represents a typical technology-driven university environment with close connections to industrial product development. As regards the cognitive dimension, the research is hard and applied. The interviews totalled 23.

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The future of the academic calling? Junior researchers in the entrepreneurial university

Johanna Hakala

Abstract This article explores what motivates junior researchers to engage in academic work and what questions are central for their academic identities. The context of the study is the entrepreneurial orientation of today's university, which according to many leaves little space for the academic calling. The main argument is that the identity work of the junior researchers interviewed revolves around four key questions: What kind of research should I do? What kind of tasks should I prioritize? Am I good enough at what I am doing? What would be the right place for me in the future? Their answers to these questions show that while some elements of the traditional academic identity continue to appeal to the junior researchers, they also search for new interpretations and sources of meaning.

Keywords Junior researchers · Entrepreneurial university · Academic calling · Work motivation · Identity work · Postgraduate training

Introduction

In 1918, the sociologist and political economist Max Weber expressed deep concern about the integrity of the academic profession and the poor career prospects faced by "a graduate student who is resolved to dedicate himself professionally to science in university life". Weber claimed that the Americanization of the German university meant that younger scholars would face "the same condition that is found wherever capitalist enterprise comes into operation: the 'separation of the worker from his means of production'" (Weber 1985, p. 131). Whether they have opportunities to advance from this position is mostly a matter of chance. Whatever the case, in Weber's view only through strict specialization and passionate devotion can the scientific worker wish to accomplish anything worthwhile (ibid.).

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Ninety decades later, this article asks what is happening to the academic calling and identity among junior researchers in the present-day university, which is characterized by an entrepreneurial orientation, that is, competition for external research funding, increased emphasis on efficiency and contributions to economic and social development, as well as attempts to commercialize research results (e.g. Etzkowitz 1998; Slaughter and Leslie 1997). Even though some senior academics have succeeded in benefiting from the new circumstances and adopted an entrepreneurial identity, it has been claimed that the younger generation of academics is condemned to the role of "knowledge workers". They form a cheap and flexible academic workforce, having little or no hope of entering the traditional career path leading to a permanent academic position (e.g. Kogan et al. 1994). Yet, in most industrialized countries the number of PhD students is rising and the competition for academic positions is harder than ever. The question is: what is the attraction of today's university for junior researchers? Is it the force of academic calling, the financial promises linked to entrepreneurial science, or something else?

Micro-level empirical studies on change in academia have often focused on how established academic staff and administration have experienced, accommodated to and resisted the macro-level changes in the funding and organization of universities since the early 1990s (e.g. Henkel 2000; Trowler 1998; Ylijoki 2003). In contrast, empirical studies on new groups within academia, such as contract researchers and part-timers, are few and mainly focused on the British context (Allen Collison 2003). Furthermore, while it has been noted that the structural changes have also influenced the socialization of post-graduate students (Hackett 1990; Gumport 1993), very little has been said about their self-understandings and future orientations, except for a few studies focusing on engineering fields (e.g. Harman 2002; Mendoza 2007). Yet, these questions are vital for the ability of academia to attract the most talented juniors to stay even after finishing the PhD (Enders 2005).

The article sets out to examine the academic identity of junior Finnish researchers, who work in four relatively new academic fields, in which research is mostly externally funded and projects are often conducted in collaboration with non-academic partners. The junior researchers, all of whom are also engaged in PhD studies, represent a new generation of researchers, who have no personal experience of university life before the big structural changes since the 1990s. In this article I explore what kind of relationship they have to academic work and what kind of future they envision for themselves. Do their academic identities and motivation for academic work revolve around those ideals and rewards that dominate the traditional image of the academic profession—for instance, autonomy, the search for truth, and the academic calling—or have they given way to new values and ideals? Following Charles Taylor's philosophical work on moral identity (Taylor 1989), I will also ask whether the emerging ideals amount to a new moral framework that can give meaning to the experiences of the new academic generation.

University research, researchers and doctoral education in Finland

Since the 1990s, Finnish universities have undergone several reforms aimed at increasing their efficiency and accountability. At the same time, their research activity has grown significantly. As in many other countries, the biggest increase has taken place in applied or "strategic" research, which is funded from public and private external sources (Nieminen 2005). As shown in Table 1, between 1990 and 2005, the number of researchers working on external funding grew more than threefold, while the number of teaching staff remained

Table 1 Academic staff (work years), post-graduate students and doctorates in Finnish universities 1990–2005 (Source: KOTA database 2006)

	1990	1995	2000	2005
Teaching staff (work years)	7,788	7,820	7,877	8,450
Percent externally funded	0	3.5	6.2	7.2
Researchers (work years)	1,890	3,629	4,872	6,500
Percent externally funded	79.2	71.7	83.8	80.9
Postgraduate students[a]	10,442	15,927	20,537	22,145
Graduate school positions	–	–	1,404	1,597
Number of doctorates per year	490	765	1,156	1,422

[a] This category overlaps with the previous categories

practically the same. Consequently, a significant proportion of academic personnel are now working on a temporary basis, whereas the holders of academic posts form a minority (see also Välimaa 2001).

During the same period, the number of postgraduate students more than doubled, while the annual number of PhD degrees almost tripled. One reason for this is that, since 1995, the annual number of doctoral degrees has been a criterion according to which the universities get their budget funding from the Ministry of Education. As a result, universities have started to pay more attention to the quality of research training and supervision. Another important factor is the system of graduate schools established by the Ministry of Education in 1995. However, the number of graduate school places is small in comparison to the number of PhD students. The majority of PhD students thus have to find other funding sources (Ahola 2007; Välimaa 2001).

Thousands of Finnish PhD students are employed in externally funded research projects in academia, which means that a large part of academic research in Finland is conducted by PhD students. Evidence for this is provided by Statistics Finland, according to which as many as 77% of university researchers had not completed a PhD in 2004 (Ministry of Education 2006, p. 15). Moreover, of all academic personnel working in universities in 2004, nearly 60% were under 40 years old. In this group, only 15% had a PhD (Ibid., pp. 16–17). Even though registering for PhD studies is not obligatory for this group, it is probable that these researchers are PhD students. However, it should be noted that in Finland already Master's level dissertation work requires a significant amount of independent research, and thus comparison to other countries is complicated.

One explanation for the high number of PhD students engaged in contract research is that public research financiers favour PhD students as the workforce of research projects. The stated objectives of research projects often include the advancement or even completion of the PhD. However, in practice, it depends on the project leader and the researchers how seriously this aim is taken, as the other objectives and schedule of the project need to be considered as well. The length of research projects varies from a few months to 4 years. There is no obligation to hire researchers for the whole length of the project, although this is often recommended. This means that junior researchers aiming to earn a PhD can rarely rely on just one financier, but apply also for scholarships from public foundations. In addition, funding in many graduate schools is divided into shorter periods than the intended 4 years.

The large number of new doctorates has led to increasing concern about employment opportunities. As in many other European countries, the suggested solution is to increase

the attractiveness and attainability of non-academic careers. Today, approximately two fifths of those who earned the PhD degree in Finland during the late 1990s or early 2000s work in universities (Husso 2005, pp. 114–115). The question is whether academia can attract the best and most suited junior researchers to an academic career in a situation where competition for academic posts is harder than ever, and university salaries are relatively low. This is naturally the aim of national and EU science policy makers, who are keen on securing an adequate supply of high-quality researchers to satisfy the needs of universities and the "knowledge-based society" (Commission of the European Communities 2003).

Academic identities in change

Academic identities have mostly been analysed from the perspective of disciplinary differences and institutional backgrounds (Becher and Trowler 2001; Clark 1987). Since the 1990s, the focus of many empirical studies has been on how macro-level changes in the funding and organization of higher education have transformed traditional academic identities (e.g. Henkel 2000; Ylijoki 2003). It has been shown that some senior academics have been able to benefit from the increase of external funding and from networking with non-academic partners and that they identify themselves as research managers or academic entrepreneurs (Etzkowitz 1998, 2003; Slaughter and Leslie 1997). Others—allegedly more often women than men (Barry et al. 2006)—struggle with the increased workload and pressures related to accountability, performance measurement and external evaluation. The result is often confusion or a crisis of identity rather than the emergence of a well-defined new identity (e.g. Henkel 2005; Ylijoki 2005).

Attention has also been paid to the emergence of new categories of academic personnel, such as contract researchers and part-time academic staff (e.g. Kogan et al. 1994; Rhoades 1998). These categories are often dominated by young persons, who work on temporary basis and have little hope of ever achieving a permanent academic post. Thus they form a "flexible academic workforce", which satisfies the needs of the entrepreneurial university but receive little in return (Allen Collison 2003; Bryson and Barnes 2000; Jacob and Hellström 2000). Furthermore, while the literature discussing the academic knowledge workers is curiously silent about the significance of doctoral studies and the PhD degree for this group, there are some studies focusing on the relationship between industrial funding and doctoral education in engineering. For instance, Harman (2002) concludes that PhD students in Australian industry-university cooperative centres are more satisfied with their studies and employment opportunities than those in traditional university environments in related disciplines. Similarly, Behrens and Gray (2001) and Mendoza (2007), who analyse the situation in the USA, argue that external funding causes no particular problems for PhD studies and academic freedom (for an opposite view, see Slaughter et al. 2002).

To sum up, our knowledge about the sources of motivation, ideals and identities of today's junior researchers is very limited. Some more general scenarios are, however, applicable. Clark (1997, p. 36), who examines academic profession in the USA, fears that the ongoing changes in academia mean that academic work is becoming "just a job and a routine career". When this happens, intrinsic rewards and motivation, such as the satisfaction gained from the work itself, decrease and "such material rewards as salary are placed front and centre". Terms such as academic calling or identity cease to have any specific meaning (see also Parker and Jary 1995). Hackett (1990) has voiced similar concerns regarding junior researchers. He argues that externally funded project research

with strict timetables and an applied orientation provide fewer opportunities for the novices to develop into independent researchers. Moreover, senior academics are often unable to prepare the newcomers to an academic world which is very different from the one they entered in their youth. This means that the ideals and role models they offer are obsolete and even misguiding. The new generation of researchers is left on its own to figure out the meaning of their work and the orientation they should choose (see also Owen-Smith and Powell 2002).

A more positive scenario of the future of academic work and identities is presented by Gibbons et al. (1994). They argue that academic knowledge production is undergoing a fundamental shift from disciplinary-based, curiosity-motivated research (Mode 1) towards transdisciplinary, application-oriented research done in teams involving both academic and non-academic partners (Mode 2). This signifies a fundamental change also in the way in which academics regard themselves and their work: the future academic is primarily an expert who is able to produce new knowledge across disciplinary boundaries and together with those who eventually use the knowledge. Moving in and out of academia becomes more common, and thus the security of a traditional academic career loses importance. However, the writers recognize that the shift is not easy, since researchers face demands stemming both from traditional discipline-based enquiry and from Mode 2 knowledge production. Accordingly, identities within academia are "loosened and broadened" and scientific careers become "more precarious" (Gibbons et al. 1994, p. 147). In other words, gradually—even if not easily—academic identities become more and more intertwined with elements that have not been traditionally thought of as academic. The attraction of a university career is not necessarily diminishing, but it is changing.

Identity work in academia: searching for a new moral framework?

The bottom line of the above arguments is that the formation of academic identities is linked to structural changes, such as those in funding patterns and organizational forms. However, it has also been shown that macro-level changes do not determine how they are interpreted and acted on and what kinds of self-understandings emerge (e.g. Trowler 1998). In other words, macro-level changes do not automatically translate into certain types of identities. Instead, identities are constructed in the midst of change and permanence. The latter is provided by powerful images concerning academia and academics, and, no less importantly, the values, norms and practices specific to disciplinary communities as well as national and local settings (e.g. Becher and Trowler 2001; Traweek 1988; Ylijoki 2003, 2005).

Practically all scholars exploring academic identities emphasise their socially constructed nature. Yet, the concept of identity often remains underdeveloped. For this reason, this article turns to Charles Taylor's work on modern identity and its moral sources (Taylor 1989). According to Taylor, the ways in which we define ourselves are deeply connected to our understandings of what is good and valuable (ibid., p. 4). Our choices and the ways in which we make sense of our desires and feelings are influenced by a moral framework, which gives us a sense that "some action, or mode of life, or mode of feeling" is higher than others and worth striving for (ibid., p. 19). In other words, it gives us an orientation (ibid., pp. 29–34). However, the frameworks often remain implicit and unarticulated, and thus fail to empower us (ibid., pp. 21, 24, 92–95). Our frameworks can also prove inadequate for making sense of ourselves and the world, which means that we should find a new framework which better reflects our experience (ibid., pp. 97, 204). This is not easy,

since new frameworks do not exist independent of language and history. They need to be created, and this articulation can only takes place in relation to—often in opposition to—frameworks that are already available to us.

Applying Taylor's views, it is possible to argue that the traditional understanding of academic identity, associated with concepts like search for truth, autonomy, academic calling and passion for knowledge, provides a powerful moral framework. It offers a vocabulary through which those engaged in academic work can recognize the meaning and value of their work and make sense of the hardships entailed in it. In other words, the framework helps academics to define who they are and what they should aspire. However, as shown above, there are reasons to believe that the traditional framework for understanding academic work and identity is rendered invalid by the ongoing changes in academia. An increasing share of academics—the knowledge workers—face conditions in which the vocabulary of the old framework does not help make sense of their experiences. From the Taylorian perspective, the question is whether we can find the beginnings of a new moral framework or frameworks that would help the new generations orient themselves in the academic world. Or are we left with mere confusion (Hackett 1990) or "just another job" (Clark 1997), which no longer has any meaning and value in addition to material rewards? This would mean that Max Weber's worst fears have come true.

While Taylor's work is primarily concerned with the grand lines of western philosophy, it is compatible with qualitative social research that emphasises the importance of understanding people's thoughts and actions in local contexts. In the context of academic working life, the existential questions presented by Taylor appear in a more mundane form, when academics ask themselves, for instance: Is it worthwhile to do this work? Am I able to succeed in what I do? Should I go on doing what I do now? Research on socialization into academic work has shown that the identity construction of junior researchers—the formulation of this type of questions and the answers to them—is influenced most by their immediate social environment, in particular, supervisors and peers. They also provide the first chance to reflect on the hopes and beliefs that encouraged one to engage in academic work in the first place. As experience and independence increases, also other contexts, such as scientific conferences and collaboration partners, provide arenas for reflecting on who one is and what one wishes to be in the future (e.g. Delamont et al. 2000; Tierney 1997). Thus identity work is a continuous and complex process, fuelled by encounters among persons and ideas. Also a research interview, such as those conducted for this study, can be seen as a site for identity work.

Data and method

The data of this article consist of interviews with junior researchers collected in 2002–2003 for the purposes of a larger research project studying creativity in different fields and research environments. The interviews were conducted in four university units, which represent four relatively new research fields: regional studies, health science, electronics, and biomaterial science.[1] Following Becher's classic categorization of disciplines into hard and soft (Becher and Trowler 2001), the first two fields mentioned represent soft sciences and the latter two hard sciences. However, Becher's second axis of categorization, that of pure versus applied research, is not equally suitable for characterizing these four fields and

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[1] Interviews were also conducted with senior researchers in these units. In this paper, these interviews have been used to provide background information on the units, together with annual reports, www-pages, etc.

units. While research in them is mostly conducted in the context of application, they also engage in basic research when this is made possible, for instance, by receiving funding from the Academy of Finland (the Finnish research councils).

All four units selected for the study are research oriented. Two of them (the units engaged in research on health and electronics) focus solely on research, whereas the other two (the units engaged in research on regional science and biomaterials) are also involved in teaching activities. In all of these units, research is funded mainly from external sources, such as the Academy of Finland, the national technology agency Tekes, cities, ministries, foundations, and the EU. The biomaterials and electronics units receive considerable funding from industry and Tekes, which requires that projects have industrial partners. Both units have established spin-off firms. In the smallest of the four units—the Health Research Centre—the total number of personnel was approximately 15. In the biggest of the units—the Electronics Research Centre—the number of personnel was at the time of the study approximately 50 and the only academic posts were two professorships. All four units are characterized the fact that the number of academic posts is very small, typically only two or three; the academic personnel consists mainly of researchers who are also PhD students.

The four units belong to three medium-sized research universities in Southern Finland. In 2003, these universities had between 10,100 and 12,400 students studying for the Master's degree and 1,700–1,900 students engaged in doctoral studies. The two universities hosting the soft science units selected for this study are multi-faculty universities, whereas the university hosting the two hard science departments is a technical university. In the technical university, the proportion of external funding of all research funding in 2003 was 56%; in the two other universities it was 46% and 47% (Statistics Finland 2004, Table 18). Like most Finnish universities, the three universities do not have own funds besides the budget funding received from the Ministry of Education. As a result, they have limited possibilities of forming effective institutional policies, even though they now increasingly encourage the commercialization of research, especially in the technical university. This means that departments and research centres seek external funding fairly independently, even as "quasi-firms" (Etzkowitz 2003).

In each unit, three junior researchers were interviewed. Eight of the interviewees were women and four were men. All interviewees were working as researchers and studying for the PhD degree, but the extent to which they could focus on their PhD studies varied. The minimum research experience was 15 months while the maximum was nearly 9 years, including work as a research secretary or laboratory technician. This means also that the term "junior" does not refer to physical age, but status within academia. In the technical disciplines, the funding of the interviewees was typically a mixture of project funding and graduate school funding. Many of the interviewees did not know where their funding came from, as this was managed by the seniors. In the soft fields, the junior researchers were experienced in applying for funding also on their own. Funding from graduate schools and projects was often complemented by personal scholarships from foundations.

The interviews were semi-structured, covering such themes as the background of the interviewee, research topic and funding, motivation and satisfaction, views on the organization of research in the unit, and future plans. The interviewees were also encouraged to bring forth other themes that they considered relevant for their work and studies. The length of the interviews was typically one and a half hours. All interviews were taped and transcribed.

Methodologically, the analysis was based on an interpretive approach focusing on cultural distinctions that are made by the actors themselves, in contrast to those made by the

researcher (Alasuutari 2000, pp. 63–69). Attention was paid to recognizing such themes and categorizations that were brought up repeatedly by the interviewees in different phases of the interview. From this, the analysis proceeded to the identification of key metaphors and contrasts used and created by the interviewees when they spoke about themselves, their work and future (ibid., pp. 67–68). This resulted in the identification of four key questions, shared by all the interviewees (see Silverman 2005, pp. 237–241). The second part of the analysis aimed to discern the diverse ways in which the junior researchers answer these questions and thus define their identity. Finally, I asked whether the junior researchers' accounts point toward a new moral framework, that is, a vocabulary through which they can make sense of their experiences and give meaning to academic work in today's university.

Identity work of junior researchers: four key questions

What kind of research should I do?

The academic identity of the junior researchers interviewed in this study is closely related to what kind of research they are doing. Their accounts concerning their work tasks and motivation for research emphasize that research should be "useful" or "practical" in order to be worthwhile. This type of research is contrasted with research that is isolated from reality and not used by anybody. The latter is regarded as uninteresting and even morally suspect.

What is common to all of the interviewees is that the usefulness of the research is a major source of motivation for work.

> [The motivating thing] is the closeness to practice, that [the research] will be applied to something. I know what kind of use the results will have and why the research is done. That is what keeps me interested.

According to a male interviewee, whose work is directed at developing public administration, a primary example of useless and unmotivating research is academic dissertations:

> It would feel somehow stupid, that the end result [of my research], would be 200 pages on the book shelf that nobody would read except out of pity. What I find rewarding […] is that it is applied to something, which I can think of as significant development projects.

In other words, research results should not be "just stored away" but be put in use. Only this way research is significant and meaningful. For the research process, this means that the starting point of research must be a real life problem or phenomenon, not disciplinary traditions and theories. This way the research object can be approached "for real [and] in reality". In the soft fields, this means that the researcher must "go out to the field" and "keep in touch with the field". As a female interviewee from regional studies puts it: "Nobody can be a good researcher for a long time if you stay in your tower and read books."

The wish to dissociate oneself from research that is not useful is particularly strong among interviewees from regional studies and health science, who describe the shortcomings of "ivory tower research" at length. In their view, such research is embedded in academic traditions that are hard to resist or escape, even when working in a unit where most of the research is applied. A possible explanation for the intensity of this tension is that these junior researchers often come from more traditional departments and feel that

they compete with fields with a more theoretical emphasis. It could also follow from the traditional hierarchy of academia, in which applied fields have been considered to be at a lower level (Becher and Trowler 2001, p. 81).

While the junior researchers from the technical fields make a similar distinction between useful and useless research, they do not feel equally strongly about it. Thus the interviews include also many positive comments about "theoretically oriented research". As one junior researcher from electronics puts it, "theory should not be forgotten in the sense that the basis is there. There are interesting phenomena in theories, which can be utilized in applied research". In other words, the relevance of the research for the end-users does not need to be immediate: also basic research is valuable if it will lead to useful results at some point in future. While this is difficult or impossible to judge at the present time, this definition serves as a convenient way of alleviating the tension between applied and basic research (cf. Calvert 2000). Furthermore, while conducting both basic and applied research is found difficult, it is also experienced as a positive challenge:

> Combining the two [basic and applied research] is pretty difficult. Sometimes I think that it would be nice or easier to work either directly for the scientific community or directly for the people in the field. Being in-between means you have to balance all the time. On the other hand, it may be more meaningful that way.

All in all, it is evident that the junior researchers have a keen interest in the content and implications of their work, which they experience as particularly challenging. For them, the significance and meaning of work stem primarily from the hope that research results can be put into use and that they benefit also non-academic people. This does not mean that personal interest in one's topic would not matter. On the contrary, it is reinforced by knowing that the work has a wider meaning.

What kind of tasks should I prioritize?

The second key question in the junior researchers' accounts of their daily work is how they should divide their time between their "own work" and "other tasks". The former refers primarily to dissertation work, while the latter includes other research tasks, teaching, and in the technical fields, also the maintenance of equipment. Other work can also refer to popularizing science (e.g. public lectures) or giving advice to colleagues and students working in the unit. In the soft fields, it also means getting funding for one's own research.

On the one hand, many of the interviewees feel that only the dissertation work gives visible benefits: "The dissertation will show that I have actually accomplished something." In other words, here the question is what kind of work will be useful for oneself, for instance, rewarded in terms of a career. Furthermore, there is an overlap with the first question in the sense that other work is often closer to the ideal of useful research, while the dissertation must follow academic traditions and address mainly an academic audience. According to some of the interviewees, focusing solely on the dissertation and post-graduate studies would be harmful, since that way "you would know so much less about reality, about how research is done".

In combining dissertation work with project research, which is done on a different topic and often according to a tight schedule, the main problem is the lack of time. Doing both can simply be too much, and one begins to feel exploited:

> I do interesting stuff and I do a lot of things that benefit others, but, in the end, why should you get so much involved, when it is not that beneficial to yourself? I don't

mean that I am here only to write my dissertation, that I should be allowed to focus on it entirely. On the contrary, it is good that I can be involved in many things. But there should be some limits to that.

Those who have time for dissertation work often compare themselves to others who do not have such a good situation. These interviewees consider themselves "lucky" and "privileged".

> I know people who conduct research here, do projects that take all your time except perhaps some sleeping hours, and so I can say I am in a privileged position in that sense, in terms of my research.

Not having enough time for one's own work is sometimes attributed to poor management and the division of labour in the unit, or simply a lack of funding for research that would benefit the dissertation. However, these factors are mentioned in passing, while problems in personal time management and self-discipline are talked about at length. A female researcher from electronics says that her dissertation research has not advanced for a long time because of other work tasks, and continues: "It is really to a great extent my own fault. I should have said, no, I won't do this, now I'll do my [own research]." Saying no is difficult, because the other tasks are also interesting and inspiring—and because doing them is expected. These problems are summed up in the following citation:

> Well, I must say that part of it is that this other job is so interesting that it sustains itself. On the one hand, I am not satisfied with the situation, and on the other hand, it is quite nice to do [those things]. Sometimes I feel a little bit that I am angry about not getting [the dissertation work] done.

In the health sciences and regional studies, time and energy for one's own research is limited by writing funding applications. Funding periods are short and competition for funding is hard. Again, those who do not have to apply for their own funding, including some interviewees in the technical fields, are conscious of their good luck:

> Of course one should always know where the funding comes from, but on the other hand it is good if you don't have to use your resources for applying for funding very actively all the time. Many people spend so much time [preparing applications]. In that sense, we are in a very fortunate position.

As mentioned before, the main solution offered for problems stemming from the multiple commitments is to improve one's self-discipline and to constantly avoid getting involved in things that take time away from the dissertation. For some, such determination has emerged after years of different types of research jobs and the slow progress of dissertation work. For some, the focus has been clear from the beginning. For instance, a female health scientist, who has been working mainly on scholarships, says that she has been cautious about project research. She tells about her decision to participate in only one externally funded project:

> The funding, yes, and that they offered interesting work. I smelled a good opportunity. But I have kept to my own line. I have not committed myself to anything that would be too far from my topic.

On the whole, it seems that the junior researchers have taken the responsibility for time management and priority setting on their own shoulders and expect little, if anything, from their seniors. What is at stake is a choice between two less than perfect alternatives. One

the one hand, one can choose to develop broad expertise by doing other work at the cost of the dissertation. On the other, one can focus on the dissertation, which is the most solid and visible sign of having accomplished something, but risk ending up with an excessively narrow range of skills and knowledge and poor prospects on the job market. On top of this, some female interviewees feel that they really do not have a choice, but simply have to keep things running in the unit: "if I don't do this, nobody else will".

Am I good enough in what I am doing?

When the interviewees were asked to tell about the best moments in research work, they would tell not only about succeeding in work but also about experiences falling short, that is, times when they could not accomplish what they wanted or were expected to. Both experiences were brought up also in other parts of the interview. On this basis, the third key question structuring the identity work of the junior researchers is whether they will be able to live up to the expectations they face. At the same time, they have to learn to judge what amounts to succeeding or failing. The sensitivity and importance of these issues is reflected in the emotional language employed by the interviewees in this context.

Finishing an article or presenting a paper at a conference is regarded as an obvious sign of success. Such achievements make one feel happy and satisfied with oneself:

> They are great moments when they let you know that your article is accepted and will be published. We always have coffee and cake then. For a week I feel, oh, it is really great, this researcher's work, it's lovely.

However, such moments are relatively rare and this makes the satisfaction gained from the work itself equally important. Feelings of satisfaction connected to the daily work at the laboratory bench or the desk are described with a similar sense of enthusiasm and emotional charge as those arising from more official recognition of one's work. Furthermore, it is important that these experiences can be shared with colleagues: "Somehow I just feel that now I really have to tell [somebody] that, fancy that, I myself came up with this [idea], can you believe it!" In many cases, other people's presence and contribution are essential for the emergence of new ideas and realizations, which then give rise to satisfaction.

> [My experiences of creativity] are connected to occasions where you are meant to produce new ideas. And then it is so that other people's research is easier to comment on creatively than your own [laughter]. In those situations I have felt that … that wow! Didn't I come up with an interesting idea and perspective from that!

However, it is also in the daily work that experiences of self-doubt and frustration are present. The interviewees often link these to personal characteristics and poor self-discipline. For instance, a female interviewee worries about being efficient enough: "Sometimes I feel that I am a terrible dabbler, that I won't get this right". And even if one works hard, good results are not guaranteed. The following citation reflects the common feeling of not making progress as one should: "You try to do [something] and it doesn't lead anywhere. You make a million small corrections and you feel you haven't got anything done."

In order to keep going, one has to learn that "this road, it is always up and down. Sometimes you are very very excited and sometimes you have no motivation." Often the much valued aha! experiences come after a long period of hard work and disappointments. Consequently, the moment of getting something right, for instance, getting the equipment

to function again, trying a new measurement and finding out that it works, or finishing just one troublesome paragraph in the article manuscript, is even sweeter.

> We are making measurements and then we are looking and we see that the curve is rising to heaven, well, wow! […] It is so that when you toil hard for a long time and then you get results, it really is like … yes!

On the other hand, a recurring theme in the interviews is disappointment stemming from the lack of support and recognition from supervisors and other senior researchers. It cannot be replaced by the positive feedback coming from the field or from seeing research results being applied. Especially those junior researchers who have fewer years of experience hope that even smaller advances would be somehow noticed by the seniors in their unit: "It is really nasty when you think that you have accomplished something, and then nobody pays any attention. When you thought that you had made a fine discovery."

On the other hand, the more experienced interviewees bypass this problem by emphasizing that only one's own judgment counts: "You have to find the motive from within. At least personally, I no longer wish for anybody's encouragement." Becoming a judge of one's own work—that is, knowing when there is reason to be satisfied and when there is a reason to be concerned—is part of becoming an independent researcher (cf. Delamont et al. 2000, pp. 176–178). The other side of the coin is that one must also learn to cope with the fact that the desired feedback and encouragement is not available. The solution is to stop wishing for it or finding it elsewhere, among peers, family or the users of the research.

Overall, the accounts of success and failure show that the experiences of work have little resemblance to a "routine job", that is, work done without passion, solely for the sake of money and other external rewards. On the contrary, the accounts are often very emotional, showing a strong commitment to work and a deep concern about progress in it.

What is my professional future?

The majority of the interviewees had started their research career right after their Master's degree, or, especially in the technical fields, even before that as research assistants. Some interviewees had also been working elsewhere either before their studies or between finishing the Master's degree and starting their PhDs. Knowledge about working life outside university is also conveyed through contacts with non-academic research cooperation partners or colleagues who have transferred to other jobs.

Especially in the biomaterials and electronics units, the appeal of research and development work in industry is strong. Most of the interviewees there had considered working in industry as an alternative to engaging in postgraduate studies. When asked about their plans for the future, the majority replied that they would most probably leave the university after finishing the PhD. In addition to curiosity about how it is to work elsewhere, the main reason for this was better salaries, especially in comparison to the amount of work required.

> Companies usually have regular working hours, whereas here you easily work nights too. When there are projects that should be finished and there are no results, we work like maniacs, night and day, to get the results. And you do this on a monthly salary. It is like you get no compensation whatsoever.

The idea that life and work outside university is more real comes up in many interviews regardless of the disciplinary background of the interviewees. One of the interviewees

says: "Once I get [the dissertation] finished, then I will get a real job. It somehow feels that this is not real work." This idea is mostly connected to the insecurity stemming from short contracts and the lack of career prospects: in such circumstances, leading a "real life" seems impossible.

Even though some representatives of the soft fields feel that academic conventions may prevent one from focusing on the truly important things, for the majority the appeal of academia is the freedom to do research. Especially the interviewees from technical fields emphasize this. Typical comments include: "In industry, you cannot focus on your own thing as much" and "life may be easier elsewhere, but it is not as interesting". It seems that they have considered more concretely the two options, probably because alternative careers in industry are well-paid and easy to find. Moreover, research in industry is often fairly similar to that conducted in university. Accordingly, the decision can wait and one can "live one day at a time".

If the choice is university, the realities are harsh for people in all fields. All depends on the availability of research funding: "If there is no money, you cannot do any work either." Only one of the 12 interviewees even mentions the possibility of aiming for and having an academic post in the future. Generally, the junior researchers believe that even if one desires to continue academic work after having finished the dissertation, the prospects of being able to do so are bleak.

> Sometimes I feel almost that, ok, once you have finished the PhD … you either [apply funding] for your own project again on your own or something like that or you start to look elsewhere. The university cannot really invest in giving you a secure future in the university, or in this unit.

From this perspective, investing in an academic career is a risky endeavour, which is likely to fail. Furthermore, these "realities"—the lack of funding and academic posts—may encourage or compel one to leave academia even before finishing the dissertation.

> Every time the funding is coming to end, you feel, well, do I get another job or shall I [apply for research funding and] continue here full-time. That is the general rule. As far as I know, it is not the fault or weakness of our department, because [the situation] is the same everywhere.

All in all, when talking about future plans, the interviewees mostly talk about not being able or not wanting to make such plans. As shown earlier, they are concerned about acquiring the right skills and appropriate knowledge in addition to the PhD degree, but it seems that they do not believe that these choices matter in terms of career. In particular, the possibility of having an academic career is considered to be beyond one's own control: there is no mention of fast graduation or other academic achievements as contributing towards such a goal (cf. Slaughter and Leslie 1997, pp. 165–173). Perhaps this is one reason why life in academia is not seen as "real life". Furthermore, it should be noted that while money is often mentioned in the interviews, financial gains related to academic research in these units are not brought up. They are not considered interesting—or attainable.

Discussion

The purpose of this article was to explore what motivates junior researchers in new academic environments to engage in academic work and whether the traditional academic

calling still appeals to them. The main argument based on the empirical analysis was that the identity work of all junior researchers interviewed revolved around four key questions, which reflect the entrepreneurial nature of their research environments and the multiplicity of demands they face. Each question was answered in distinct ways, depending not only on individual backgrounds and preferences, but on the disciplinary and organizational context in which the interviewees work. In particular, the answers differed between junior researchers representing the soft fields and those representing the hard fields.

The study also showed that the junior researchers' identity work typically proceeded by creating contrasts, for instance, "useful" versus "useless" research, "own" versus "other" work, "real job" versus "academic work", and positioning oneself in relation to them. However, not all questions were answered with equal emotional charge. Moreover, only few interviewees answered to the four questions in ways that would be fully compatible with each other. Thus, during one interview, an interviewee could express a deep personal commitment to academic work *and* state that s/he would choose to opt out from academia for the sake of a higher salary. Discrepancies like this can be understood against the argument that identity building is always in process, never finished. However, there is reason to believe that a more stable research environment would create possibilities for more coherent identities.

The interviewees also spoke at length about how they have to balance between different alternatives and how they have learned to do that. For instance, the interviewees thought that the only way to moderate the tension between their "own work" and other tasks is to improve self-discipline and personal time management. This emphasis on self-responsibility seems to exclude demands for better supervision and changes in the division of labour, that is, solutions that would turn attention away from oneself and perhaps lead to collective action (see Trowler 1998, pp. 113–135; Ylijoki 2008, pp. 83–85). Yet, the demands they place on themselves are understandable against the background that they are well aware of funding problems and the workloads of the senior researchers.

What about the future of academic calling and the moral framework in which it is embedded? The empirical research shows that some elements of the traditional conception of academic identity continue to appeal strongly to the junior researchers, while some others are explicitly rejected or not mentioned at all. The interviewees also brought forth new elements of identity. However, it seems that these elements do not amount to an alternative moral framework, which could give a new meaning to academic work and identity. To illuminate the interplay among the traditional and new elements of identity, each of the four questions is examined once again.

The answers to the question regarding meaningful research indicate that most interviewees do not feel comfortable with the idea that knowledge should be pursued for the sake of knowledge itself. This is not surprising considering that these junior researchers are used to doing research in the context of application, and many of them have had positive experiences from seeing how their research has produced concrete benefits. But how to explain the strong reaction this question roused in the junior researchers representing the soft fields? As Taylor (1989) points out, the articulation of new moral frameworks often takes place in opposition to existing ideals. Thus the empathetic rejection of academic tradition by the interviewees in these fields may actually indicate the persistence of the traditional ideals, for instance, among the senior researchers in their units and in other departments in related fields. In contrast, the disciplinary culture of technical disciplines has a stronger applied orientation, which thus does not need to be defended.

The study also shows that the traditional academic framework has a strong resonance with some important aspects of the junior researchers' experience, as indicated by answers

to the question regarding success and failure in academic work. When the interviewees described the agonies and joys of research work, they actually described the cultivation of self-discipline and persistence, virtues that are deeply embedded in the traditional under-standings of academic work. They expressed in multiple ways the passion they have for knowledge and research work, and the enjoyment it gives to them. They also told how they had worked long hours and endured periods during which the hard work seemed to produce no gains. They did this with few regrets, because the work itself was experienced as rewarding.

One of the key questions was how time and energy should be divided between dissertation work and other tasks. The question was difficult, because both types of work were experienced as meaningful and important. The choice involves two dimensions. On the one hand, one can focus on advancing her/his personal interest (the dissertation) or work for the benefit the whole research community (e.g. project work, advising research assistants, teaching). On the other hand, the choice has repercussions in terms of the skills and abilities one can develop and the future one can have: dissertation work will lead to specialized knowledge, while other tasks can provide multiple social skills and broad knowledge on a variety of topics (see Scott 2006). While the traditional framework of academic identity does not provide much help for making these choices, it is also hard to detect signs of a new framework here, unless we consider a conviction to develop only skills that benefit a career outside academia to be such.

However, as the answers to the fourth question regarding the professional future of the interviewees showed, most interviewees did not wish to leave academia after finishing the PhD—but they felt forced to do it. Academic positions are not available, and continuing to work on temporary contracts was considered too demanding and insecure (see Välimaa 2001). The appeal of academic work—whether based on the "old" or the "new" elements described above—is simply not enough, especially as useful research can be conducted elsewhere and even in better conditions, for instance, in governmental research institutes and industry.

The confusion and dissatisfaction of the junior researchers is a sign of serious problems in present-day academia. This does not mean that academic work is becoming "just another job", as feared by Weber 90 years ago and by many others ever since. Rather, it reminds us that the internal and external rewards of academic work should be in balance: the lack of security, low salary level and poor career prospects cannot be substituted by satisfaction provided by the work itself (see Amabile 1994). If success in academia cannot be influenced by choices and actions, but depends on pure chance—a condition also brought up by Weber in his essay—only those with the highest tolerance for stress can engage in academic work. It is hard to believe this would be the way to attract the most talented students and researchers (cf. Barry et al. 2006).

In Finnish universities, characterized by intense competition for external research funds and an unusually high number of PhD students in comparison to senior academics, the situation is alarming. Firstly, it is evident that junior researchers do not get enough support from the senior researchers. In other words, the problem is not so much that the seniors would guide the novices to a wrong direction but the lack of guidance altogether (cf. Hackett 1990), which is due to the lack of academic posts. The junior researchers learn to accept that the best one can do is to survive. It is hard to see how this would increase the quality and relevance of Finnish university research or fasten the graduation of PhD students, and thus support the stated aims of Finnish science and higher education policies. Secondly, there is a danger that talented researchers opt out from academia and that recruitment problems—which currently concern only some technical fields—become more

common (cf. Huisman et al. 2002). From the perspective of academia, it would be a great loss if all or most of the junior researchers in the new research environments leave the university after finishing their degrees. This endangers the continuity of research in these fields and reduces opportunities for a fruitful cross-fertilization of applied and pure research—in terms of both people and ideas. There is also a danger that the applied orientation becomes so strong in these fields that interaction takes place mainly with the financiers and users of the research, and connections to the international academic community remain or become thin. In such cases, there is not enough time and other resources to critically think about what actually constitutes "useful" research, whom the research should benefit, and what kind of quality criteria it should satisfy (Elzinga 1985).

Although this study covered only a small number of junior researchers, it gave a vivid picture of the complex identity work they are engaged in. It is also likely that many of the problems brought up by this study—in particular, the difficulties related to short-term contracts and the multiplicity of demands faced by the junior researchers—are shared by a large number of today's PhD students and project researchers, in Finland and elsewhere (e.g. Enders 2005; Scott 2006; Shove 2000; Ylijoki 2003). It is evident, however, that there is an urgent need for follow-up studies that cover a longer time period and explore the identities and socialization processes of junior researchers in different types of academic research environments and in different national contexts. Unlike this article, such studies might also reveal gender patterns which could help explain why the increase in the proportion of female PhD students and doctors has not led to a noticeable increase in the proportion of female professors (e.g. Bagilhole 2002; Husu 2001) and reveal possible variations in this respect among different academic contexts.

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