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Seite

Knowledge Asymmetries

Eds. Marianne Grove Ditlevsen & Peter Kastberg

Articles / Aufsätze

Reviews / Buchbesprechungen

Bibliography / Bibliographie

Editors' Preface

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In the global knowledge economy, societal wealth does no longer primarily stem from manipulating material, but primarily from processing, refining, optimizing and customizing knowledge. But knowledge growth at the rate and of the dimensions needed to assure the existence of a knowledge society implies that "knowledge asymmetries" tend to emerge at a rate corresponding to the growth rate of knowledge. The existence of such knowledge asymmetries is *per se* not a new phenomenon. As early as 1945 Vannevar Bush stated: "There is a growing mountain of research. But there is increased evidence that we are being bogged down today as specialization extends". Generally speaking, knowledge asymmetries have probably always been a by-product of specialization in general and education and training specifically. Knowledge asymmetries, however, are not limited to the prototypical ones between social classes, between institutionalized social roles such as 'expert' and 'layman' or political institutions of power such as 'authority' and 'subject'. Increasingly they also emerge within institutions themselves, between 'experts' from different fields, and increasingly 'experts' with different agendas or of different persuasion – political or otherwise. Traditionally such knowledge asymmetries would be seen as an obstacle to an ideal of unhindered knowledge flow. Knowledge asymmetries would thus be seen as an indicator that the knowledge potential of society is not synthesized and exploited as well as it (ideally) could have been. If they are indeed a hindrance, then – to a knowledge society – knowledge asymmetries are not merely one among many issues, they are probably *the* issue. This, in turn, implies that the predominant challenge of the knowledge society is – and will continue to be – how to transform ever more specialized knowledge into interactions in order for that knowledge to gain value outside of itself (this argument is developed further in Kastberg 2007). This is exactly where this thematic section of *Fachsprache – International Journal of Specialized Communication* sets in.

The five articles in this thematic section all stem from the 3rd international conference in the 360° Conference series at the Aarhus School of Business, Aarhus University (now Business and Social Sciences, Aarhus University) in May 2010, organized by the Research Group for Knowledge Communication. In this conference, knowledge asymmetries were explored from three main perspectives: communication, representation and construction. (On these three perspectives of knowledge communication, see Ditlevsen forthc.) From a communication perspective, the conference explored communicative events in which knowledge asymmetries manifested themselves as well as the influence of knowledge asymmetries on communicative action. From the point of view of representation, the conference investigated how and to which extent knowledge asymmetries are represented in texts, and which strands of texts, genres, or discourses seem to favor the development, the maintenance, or the deconstruction of knowledge asymmetries. Last but not least, knowledge asymmetries were analyzed from the viewpoint of construction (or learning). Here the focal points were discussions as to the measurability of knowledge asymmetries as well as to which features and parameters could be said to have an impact on whether or not knowledge asymmetries were overcome (or not). As will become evident for the reader when reading the five articles appearing in this thematic section, each article draws on these perspectives in different ways, each shedding a unique light

on the phenomenon of knowledge asymmetries. The multiple perspectives not only expand our understanding of what knowledge asymmetry is; the multiple perspectives are themselves also a convincing testimony to the fact that knowledge asymmetry is both a valid and highly interesting field of research for the LSP community.

The first article in the thematic section is **Peter Kastberg**'s "Knowledge Asymmetries – Beyond 'To Have and Have not'". From the viewpoints of asymmetry, knowledge and communication, Peter Kastberg (re)conceptualizes our understanding of what a knowledge asymmetry is. Based on this (re)conceptualization the article proposes a (re)evaluation of knowledge asymmetries beyond the proverbial "have and have not" perspective. The article thus lays the foundation for a novel and potentially very productive research perspective for Knowledge Communication and LSP alike. The article ends by addressing pertinent research questions emerging from the re(conceptualization) and (re)evaluation of knowledge asymmetries. In their article, "The Paradox of Scientific Expertise: A Perspectivist Approach to Knowledge Asymmetries", **Hugo F. Alrøe** and **Egon Noe** focus their attention on the fact that the growth of knowledge in modern societies necessarily leads to fragmentation of knowledge and thus to knowledge asymmetries of various kinds. The article gives a theoretical account of the perspectival nature of all scientific knowledge and uses this insight to reinterpret cross-disciplinary knowledge asymmetries. The article ends by suggesting a general framework for working across disciplinary perspectives in science and for using different kinds of scientific expertise in society. The third article in the thematic section is "An Extended Model of Knowledge Communication: The Situational View of Dealing with Asymmetries" by **Hanna Risku**, **Eva Mayr**, **Florian Windhager** and **Michael Smuc**. Here the authors investigate some of the far-reaching consequences of knowledge asymmetries in highly complex, real-life professional communication environments. The article focuses on describing and discussing various knowledge asymmetries between professional communicators, e. g. translators and visual information designers, and non-professional parties involved in text production processes. Derived from the scenarios discussed, the authors are able to propose a model for knowledge communication in which transactivity is stressed. In their article "Wissensasymmetrien, Interaktionsrollen und die Frage der ‚gemeinsamen' Sprache in der interdisziplinären Projektkommunikation", **Nina Janich** and **Ekaterina Zakharova** deal with knowledge asymmetries in interdisciplinary project communication and seek to answer the question of which impact knowledge asymmetries have among project participants from a communicative point of view. The study, which is part of the DFG[1] project "Die diskursive Aushandlung von Transdisziplinarität. Projektkommunikation im Spannungsfeld von transdisziplinärem Anspruch und disziplinären Rahmenbedingungen", is based on interviews with the entire group of participants in a research project in which researchers from the political sciences and physics work together. In their article "Climate Change Discourse: Scientific Claims in a Policy Setting", **Kjersti Fløttum** and **Trine Dahl** are concerned with the text as a result of knowledge asymmetries and analyze the nature of knowledge claims and the use of polyphonic constructions in IPCC's Summary for Policymakers of the Fourth Assessment's Synthesis Report (2007).This is done in order to show how climate change discourse may be characterized and interpreted by linguistic and discursive features from both scientific and political discourse. ◆

Notes

[1] DFG (Deutsche Forschungsgemeinschaft) is the central, self-governing research funding organization in Germany.

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Knowledge Asymmetries – Beyond "To Have and Have Not"

Peter Kastberg

Abstract In this article I begin by presenting what may count as examples of intuitively accepted notions of knowledge asymmetries from a wide variety of research disciplines. I go on to state that knowledge asymmetries are prototypically seen as unwanted aspects of human interaction. Responding to that stance, I propose to look at knowledge asymmetry from the viewpoint of another and less confrontationally oriented ideology in the hope that another perspective may lead to other insights and hopefully new avenues of research within LSP, Public Understanding of Science, Science Communication and related disciplines. In this article I therefore aim at opening a discussion of how knowledge asymmetry may be understood conceptually and how this understanding may be evaluated and applied within a wider framework of Knowledge Communication research. In order to do so, I (re-)conceptualize knowledge asymmetry from the viewpoint of three perspectives: asymmetry, knowledge and communication. In their synthesis, i. e. as communicatively salient knowledge asymmetry, the three perspectives are then discussed and elaborated upon and theoretical implications are drawn.

Keywords knowledge asymmetry, asymmetric relation, knowledge, communication

1 Introduction

In this paper the object of study is knowledge asymmetry; and analogous to the laconic stipulation in Luhmann's seminal work on systems theory (1995 [1984]: 2), that "there are systems", it is quite obvious that "there are knowledge asymmetries". From the examples below it is equally obvious that knowledge asymmetry is a term used to cover and evaluate phenomena ranging from geo-politics to communicative practices and Knowledge Management.

From the point of view of Knowledge Management, Eppler (2006: 195) focuses on the knowledge asymmetry between domain expert and decision maker and sees it as a hindrance for optimal knowledge transfer inside the organization. When it comes to the field of Knowledge Management the success of knowledge transfer is often depicted as a function of to what extent knowledge asymmetry or knowledge symmetry may be said to exist between the "source" and the "recipient" of knowledge (Sun 2009). Apart from the specific field of Knowledge Management, which in many ways has emerged as an organizational answer to knowledge asymmetries, knowledge asymmetries are also much debated within the larger field of organizational studies. According to Coff and Lee (2007: 72) it is a truism that "[k]nowledge asymmetries are at the root of many organizational dilemmas". In a study by Rönkko and Mäkelä (undated) knowledge asymmetry is defined as a "condition that is created when different people or different organizational units possess different stocks of knowledge". They detected such knowledge asymmetries between the engineering and the marketing division of a software development company. In this particular case there was an asymmetry in terms of an understanding of what could be produced (represented by the engineers) and what could be sold (represented by marketing). Inter-departmental knowledge

asymmetries of this kind potentially pose problems for organizations in as much as they may give rise to misunderstandings, increased communication costs, hinder coordination efforts, etc. (op. cit.). Within organizational studies and Knowledge Management, it seems to be generally accepted that the size of the knowledge asymmetry between crucial organizational units, functions or personnel is understood to be inversely proportional to how profitable a company may expect it to be. Knowledge asymmetries are, however, also to be found outside of the organization proper. For instance in international business where knowledge asymmetry may be talked about as "structural holes" (Oliver/Garrigós/Porta 2008) or blind spots within global value chains. In their capacity as structural holes, dealing with knowledge asymmetries means to fill them, as it were, if the company in question wishes to profit and prosper. But not only is the world of business fraught with knowledge asymmetries of various kinds, the geo-political landscape, too, features knowledge asymmetries. The proverbial North-South divide, for instance, may also be seen as an expression of a knowledge gap (Evers 2002). According to a study by Nair and Menon (2002) the "failure of past development efforts" may be examined in the light of knowledge asymmetries between North and South. Again, such knowledge asymmetries are to be "rectified". Knowledge asymmetries are, however, by no means limited to the relative abstract levels of international relations, business & industry, organizational studies or Knowledge Management. Knowledge asymmetries are also to be found at the mundane level of day-to-day communicative interaction – for instance between the knowledges of the expert and the layperson with regards to a specific knowledge domain (Beatty 2006). Knowledge asymmetries can also give rise to misunderstandings in intercultural communication due to the fact that "[t]he social stock of knowledge of various societies differs significantly" (Günthner/Luckmann 2001: 57).

Based on the above examples, which are in fact but a few excerpts from a highly prolific research literature spanning a multitude of fields, schools, and paradigms, it seems obvious that the notion of knowledge asymmetry is indeed a fixture in many research fields. Knowledge asymmetries seem to exist between people, between organizational units or functions, between companies, between different strata of society and even between nations or continents. And different though the examples may be they seem to resonate with a wish to overcome, to fill, to reduce, to rectify whatever knowledge asymmetry is in question. Talking about knowledge asymmetry in this manor, i. e. applying it as a metaphor to designate an unwanted aspect of human interaction, is in tune with much current sociological and communicative research dealing with asymmetries in as much as it seems to be drawn to (or from) a particular ideology; an ideology cast in an almost Hemingwayian mold of "have and have not"[1].

Traditional knowledge gap models (e. g. Thunberg et al. 1982) assume that one party in a communicative event has relevant and sufficient knowledge (the "have" position) whereas the other does not (the "have not" position), and that this gap tends to widen over time (e. g. Bensaude-Vincent 2001). Within the research community of the Public Understanding of Science movement (e. g. Durant/Evans/Thomas 1989 et passim) a congenial framework led to the canonizing of a "deficit model" (e. g. Bauer/Allum/Miller 2007), i. e. a frame of reference in which the lay person would be seen as being in a knowledge deficit contrasted with the knowledge surplus of the expert (in casu the scientist)[2]. And even if political, societal or other authorities or agents would try to diminish the gap or reduce the deficit by means of, say, education, the "haves" would also benefit from said education – and probably even more so than the "have nots". This leads to a permanent (if dynamic) knowledge asymmetry;

something which has given rise to a critical evaluation of knowledge asymmetries. Looking at knowledge asymmetry not only as a statement of fact but from this critically evaluative have vs. have not perspective, a transition can be followed from mere metaphor to fully fledged allegory; i. e. talking about knowledge asymmetry seems to evoke an entire evaluative discourse of have vs. have not. Whereas I do not in any way shape or form disregard the research productivity of this discourse, it has also proven to be somewhat hegemonic (in the sense of Laclau/Mouffe 2001) in as much as this evaluative stance seems to obscure (or even subdue) other perspectives on knowledge asymmetry. This has prompted me to look into the phenomenon of knowledge asymmetry from the viewpoint of another and less confrontationally oriented ideology. I am, hereby, neither overlooking nor discarding of the phenomena of oppression and exploitation carried out by the powers that be in late capitalist societies. I am merely advocating that a change of perspectives may lead to new insights and hopefully new avenues of research – insights and avenues that may prove productive to future research into LSP, Public Understanding of Science, Science Communication and related disciplines.

By way of summing up the above introductory remarks, I hold that whereas there is no lack of taking the idea of knowledge asymmetry for granted and applying it to a wide variety of expressions, so far little research – if any – has been done toward understanding the concept itself. I also maintain that prototypically the phenomenon of knowledge asymmetry is evaluated as an unwanted state of affairs. Taking these as my points of departure, the following pages aim at opening up a discussion of how knowledge asymmetry may be understood conceptually and how this understanding may be evaluated and applied within a wider framework of Knowledge Communication research.[3] Acknowledging that there can be no "immaculate conception" when it comes to research design (Sullivan/Porter 1993), I do not propose that the ensuing analysis and discussions of knowledge asymmetry are neutral. I can, however, say that for the purpose of this article I explicitly do not adopt the evaluative stance introduced above; hence the subtitle of this paper.

Needless to say, one may look at any phenomenon, including that of knowledge asymmetry, from a myriad of perspectives (Ortega y Gasset 1961 [1923]: 90). Adhering, however, to the notion that conscious "perspective taking" is a prerequisite for systematic analysis (Perner/Brandl/Garnham 2003: 358), I have found it – for the purpose of this article – to be the obvious choice to look at a (re-)conceptualization of knowledge asymmetry from these perspectives:

- from the point of view of basic assumptions of asymmetry (section 2),
- from the point of view of basic assumptions of knowledge (section 3),

Speaking with Linnell and Luckmann, however, I further hold that "[…] asymmetries of knowledge are important only when they are made communicatively salient" (1991: 5), which has lead me to add a third perspective to my conceptual analysis, namely to examine knowledge asymmetry:

- from the point of view of basic assumptions of communication (section 4).

In their synthesis, i. e. as communicatively salient knowledge asymmetry, the three perspectives are then discussed and elaborated upon and theoretical implications are drawn (section 5).

2 Knowledge Asymmetry from the Point of View of Basic Assumptions of Asymmetry

As an intuition pump, and in order to introduce the concept of 'asymmetry', I take my point of departure in a geometrically-oriented understanding of the concept. This, in turn, is in line with the defintion offered by *Webster's Encyclopedic Unabridged Dictionary of the English Language* (1989 edition), where the following definition of being asymmetric is offered: "not identical on both sides of a central line". Conducting a rudimentary analysis of this definition we may say that asymmetry is a relation that is established when a single-plane distinction is made between two entities, allowing a certain position (or an observer) to appreciate them as being non-identical[4].

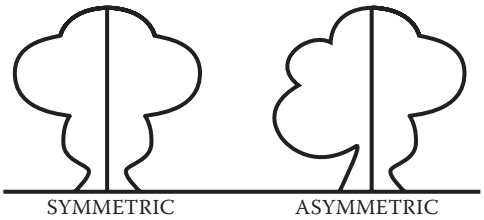

Figure 1: Symmetric and asymmetric, a single-plane distinction.

First of all this implies that the asymmetric relation does not merely emerge, but is produced by the position or observer who makes the distinction; regardless whether the entities appreciated are natural or a man-made. Returning to the definition proper, it is striking, if not surprising, that asymmetric is defined along the lines of its negation, of what it is not, i. e. *not* featuring symmetry. And even if the above definition does not contain an openly evaluative stance, the negation itself does, however, give rise to an intuition that symmetric is the basic or neutral state, and its opposition the marked state. Lexico-semantically speaking, this intuition is to a certain degree warranted if we compare asymmetry to other compounds featuring the Latin prefix 'a', e. g. amoral, asocial, etc. Here, too, this prefix generally qualifies the main word, often framing the concept behind as not conforming to norm and, therefore, sometimes even undesirable. If we focus on asymmetry, 'the lack of' in question is the lack of balance or of equilibrium – which, consequently, is to be found in its opposition, symmetry. And it is probably in this comparison, its underlying assumptions and evaluative stance, that we find the metaphorical roots for the critical interpretation of asymmetry (section 1). But, as introduced earlier, my approach to the (re-)conceptualization of asymmetry is agnostic or naïve (in the sense of Schutz 1976 [1969]) and as such I am neither informed by the underlying assumptions nor by the evaluative stance of the comparison.

Taking an agnostic, naïve look specifically at the two entities making up the asymmetric relation there is yet another qualification to be noted. In the asymmetric relation, which – geometrically speaking – can only come about when both entities are present and both are taking part in forming said relation, it is evident that the entities feature a mutually obligate interdependence. An interdependence which makes it clear that neither entity may be said to supplement the other in forming the relation; they do in fact complement one another. The complementary relationship (or mutually obligate interdependence) in turn makes it evident that no one entity holds an apriori hegemonic position. Asymmetry – in the geometrical sense – is first and foremost a relation, not first and foremost an evaluation.

Returning to the distinction between symmetry and asymmetry – and being informed by geometry – what we may say, evaluatively speaking, about the distinction is that it seems to feature a certain absoluteness. Absolute in the sense that even the slightest deviation from symmetry leads to asymmetry. Due to the fact that the two entities of the symmetric relation are eo ipso identical, the symmetric relation is in fact a tautological one. Contrary to that, asymmetry may be placed on a continuum of 'asymmetricalness'. And since differentness is an attribute significant to asymmetry, an examination of the nature of this differentness will now be conducted. Perceptually, the two entities constituting the above asymmetric relation are different, and we may even say that their differentness is a "difference that makes a difference" in the Batesonian sense (1972: 448 ff.); i. e. their differentness is formative for our perception. But the fact that they are different, and that we call this difference asymmetry, does not per se allow us to distinguish between asymmetry and other kinds of (single-plane) differentness. Turning to Hegel (1970 [1813]), differences between two entities may be divided into dissimilarity (in German: "Verschiedenheit") or contradiction (in German: "Gegensatzpaare"). In the case of dissimilarity the distinction is made on the basis of "simple difference" (Kjær 2006: 72) – that is, based solely on external features; an elephant and a pen are examples of two entities that are dissimilar in this respect. Contradiction, on the other hand, or "inner difference" (op. cit.), is a relation established when the two entities in question are different yet interdependent. Hegel would refer to them as "in einer Identität verschiedene" entities (1970 [1813]: 60). Prototypical examples of such relations would be positive-negative, man-woman, etc. In figure 1, the asymmetric relation does not come about along the lines of an elephant-versus-pen dissimilarity; the image leaves no doubt as to the interdependence of the two entities. With this we have yet another piece of qualification: asymmetry is a relation in which the entities juxtaposed, contradictive though they may be, have a cohesive common denominator, a sortal of sorts[6], which serves as a means of identification. In the geometric example above this would be one of form[7].

In summing up the viewpoint of general assumptions of asymmetry, we may say that asymmetry is a relation not an evaluation. It is a relation of two entities, which feature not merely differentness, but differentness under a specific sortal: differentness per se does not make an asymmetry. The two entities of the asymmetric relation in fact also feature a mutually obligate interdependence, which in turn renders them complementary. Due to the fact that the sortal, which identifies knowledge asymmetries, is not one of form – as in figure 1 – but one of knowledge, the (re-)conceptualization now turns to basic assumptions of knowledge.

3 Knowledge Asymmetry from the Point of View of Basic Assumptions of Knowledge

Due to the fact that the concept of knowledge has been pondered upon since even before the "Theaetetus", I cannot – for obvious reasons – present a literature review with any claims to representativeness. Congenial with van Dijk I would sum it up like this:

> The theory of knowledge has been the object for thousands of years of epistemology in various cultures, and of psychology and the social sciences for many decades, and it is therefore impossible to summarize the most important results of so much reflection, theory and research […]. I shall therefore merely state my own position in a very long and complex debate […]. (Dijk 2005: 75–76)

My own position, as it were, is in many ways a reaction to the cognitivist approach (see below). Even if the cognitivist approach to knowledge may no longer be *comme il faut* in current epistemological theory it is nonetheless still a widely-accepted school of thought – especially within Knowledge Management[8]. A summary of von Krogh's rendering of the dominant cognitivist position reads like this:

> The "cognitivist perspective" is the most firmly established and well known [*view on the nature of knowledge*] […]. Knowledge was considered to be representations of the world that consists of numbers of objects or events […]. Knowledge was universal. […] [K]nowledge was explicit, capable of being encoded and stored, and easy to transmit to others. (Krogh 1998: 134)

To much of the classical cognitivist perspective, knowledge – or the lack of it – is a matter of representation. Since knowledge is a matter of representation "most cognitivist approaches equate knowledge with information and data" (Venzin/Krogh/Roos 2000: 38). Equating knowledge with representation quite naturally leads cognitivists to the perception that knowledge is context-free and subsequently that cognitivism "simulates a knowledge without knowers" (Barth 2002: 2). To illustrate this anecdotally, knowledge asymmetry (or symmetry), as seen through the cognitivist lens would be a matter of comparing the bits and bytes of one's database(s), the capacity of one's (internet) resources, the number and/or length of books and reports in one's storage facility, at one's command, etc. with the corresponding quantity belonging to somebody else (with whom one would like to make a comparison). Asymmetries in this sense would indeed be measurable in a positivistic, quantitative sense. To constructivism, however, the school of thought[9] within which I find my position, such asymmetries would (merely) be asymmetries of data or of information, not knowledge; and as such quite uninteresting for the purpose of this article. This statement, quite naturally, impels me to elaborate somewhat on the critical distinctions between knowledge, information and data. According to constructivism, knowledge is neither a matter of one's representation of the world (in books or elsewhere) nor the degree to which this representation may or may not correspond to the world. With a general reference to Kant (and the strand of constructivism of which he is the founding father) we cannot appreciate the world ("das Ding an sich"); what we may be able to do is to appreciate our sense impressions of said world ("das Ding für uns")[10]. Sense impressions, which – in a process of individual selection – are transformed into perceptions. These perceptions, in turn, are molded – in a process where the governing principle according to Kant is one of functionality – into concepts. Davenport and Prusak's (1998) analytical distinction between data, information and knowledge (which, in its essence is Kantian, even if this is not recognized by the authors) mirrors this underlying idea: Data would be phenomena which we register with our senses (sense impressions); information would be phenomena which we relate to other phenomena (perceptions); whereas knowledge would be phenomena which we integrate and evaluate – one way or the other (concepts)[11]. Embracing this position, knowledge is not an entity, which one may store externally and retrieve at one's leisure. In stark contrast to the classical cognitivist perspective, the constructivist position holds that knowledge is "somehow a product of a knower" (Glasersfeld 1974 et passim), i. e. never context-free, never mere representation. From this point of view, knowledge is basically a matter of the knower constructing knowledge, of collating experiences and integrating these according to his or her ability to infer (Russell 1961 [1948]: 9).

Since knowledge, from a constructivist perspective, is somehow a product of a knower's collated experiences and inferences, gauging knowledge is indeed less straightforward than measuring, say, data or information in a textbook (as would be the case in the classic cognitivist position). But even if we cannot positively gauge the knowledge of the 'alter', we may, however, be able to appreciate it. Returning to Kant, what we are left with is an appreciation of knowledge as a "Ding für uns". Evoking the philosophical credo of Niels Bohr, himself a neo-Kantian, that "we are suspended in language" (Petersen 1963), human communicative interaction is the medium in which we may appreciate knowledge (see also Stacey 2001: 197) as well as knowledge asymmetry. What remains for us, then, is to approach knowledge and knowledge asymmetries as discursive constructions. The research strands of constructionism (Gergen 2001 et passim), which in turn draw extensively on a Foucauldian appreciation of discourse and knowledge and a systems theory approach to communication (e. g. Luhmann 1992), are strong testimonies in support of this claim.

Summing up, we may say that in order to gain access to and appreciate knowledge asymmetries we need to enter into the flux of communication. This position consequently leads me to turn to some formative ideas regarding the role of communication in establishing the asymmetric relation in question.

4 Knowledge Asymmetry from the Point of View of Basic Assumptions of Communication

One may approach communication studies from a variety of different angles (e. g. Beebe/Beebe/Ivy 2004, Cragan/Shields 1998, Windahl/Signitzer/Olson 2002 to mention but a few recent publications); but there seems to be a sort of common acceptance of a trajectory in the history of ideas of current research into the nature of communication. This trajectory progresses along the lines of three phases, each with a different dominant focus:

> The shift in focus in these phases is quite revealing: *From* communication as a matter of "the sender" sending (communication seen as transmission or signaling) *via* communication being a matter of "the sender" adjusting to feedback from the "receiver" and/or the environment (communication seen as interaction, typically from a cybernetics' point of view) *to* the idea that communication is basically a cooperative enterprise (Tomasello 2008) calling for the equal involvement of both "sender" and "receiver" – explicitly perceived of as communication partners (Rogers and Kincaid 1981) – in a joint meaning making process (communication as transaction, typically based on a systems theory approach). (Kastberg 2011: 3)

According to the third phase, also called the transactional or convergence view of communication (Kincaid 1973), the communication partners not merely engage in a process of discursively constructing meaning. They are also simultaneously and mutually engaged in a process of discursively constructing one another. One of the main claims in the work of Alfred Schutz is the appreciation that the other (or 'alter') – mutatis mutandis – is like me ('ego') (Schutz 1976 [1969])[12]. While this notion is highly problematic (and for many different reasons), it is also *not* altogether untrue. Because even if mirroring the 'other' on oneself may be said to be a sort of sociological reductionism, the act of intuitively doing so is nevertheless sensible in order to be able to navigate in a world full of, well, others. In order, however, to further qualify the concept of the 'other', I turn to Mead who would speak of the "generalized other", i. e. a result of a proc-

ess in which the 'ego' is "[…] taking the attitudes of others towards himself, and […] crystallizing all these particular attitudes into a single attitude or standpoint which may be called that of the 'generalized other'" (Mead 1934: 90). And although the concept of the "generalized other" reveals much of the inherent complexity of communication (and communicators) as seen from the transactional point of view, it is due to the Parsonian notion of "double contingency" that we are able to appreciate the 'other' as a dynamic and relational entity. Double contingency is basically an elaboration on the relational phenomenon that when interacting with the other, I recognize the other and at the same time I recognize that the other recognizes me. What double contingency brings to bear on the understanding of this interactional relationship is the fact that in the recognition of the other there are also mutualistic expectations; i. e., I have expectations towards the other but at the same time I expect that the other has expectations towards me (Parsons/Shils 1951: 105 et passim). However, from this rendering of double contingency it becomes clear that Parsons' understanding of communication is probably interactional rather than transactional in as much as it is centered around the perspective of 'ego' or the sender, as it were. In the transactional view, however, where both parties are equally recognized as communication partners, not merely one communicator mentally establishes a double contingency. From a transactional point of view both communication partners perform that task, in effect making it a *double* double contingency.

In a transactional understanding of communication, knowledge asymmetry is part and parcel of this *double* double contingency. In a pre-operative interview, for instance, surgeon and patient alike establish a *double* double contingency of reciprocal expectations. And one very important aspect of this *double* double contingency is made up of an imbedded knowledge asymmetry. Under the sortal of, say, clinical knowledge a knowledge asymmetry – mutatis mutandis – comes into existence between surgeon and patient during this pre-operative interview – presumably (or hopefully) in the surgeon's favor, as it were. The surgeon expects to be in command of expert clinical knowledge pertaining to the operation at hand; she also expects that the patient expects so. The patient on the other hand expects the surgeon to be in command of expert clinical knowledge and expects that the surgeon expects that the patient expects so, too, etc. Under the sortal of, say, welding or gardening knowledge the tables may very well have been turned – albeit not necessarily. Speaking from a transactional point of view, the idea of the *double* double contingency in turn leads to a further qualification of the concept of knowledge asymmetry. As was the case in the *double* double contingency, any knowledge asymmetries 'lived' by 'alter' and 'ego' feature a similar reciprocity of expectations. Analogous to the *double* double contingency, the knowledge asymmetry is then, in fact, a *double* knowledge asymmetry to the concrete and actual participants of communication, 'alter' and 'ego', in casu surgeon and patient.[13] To a third party, however, who – for whatever reason – is not engaged in the communication as a participant, but who (merely) observes the communication the idea of an observed (or general) knowledge asymmetry remains. As hinted at, the perspectival difference between these dimensions of knowledge asymmetries may metaphorically speaking be coined as 'lived' versus 'observed' knowledge asymmetries respectively.

But where, less abstractly speaking, in this web of expectations of expectations (of expectations) do we appreciate knowledge asymmetries? When may we say that they are communicatively salient? Speaking from the transactional viewpoint, a knowledge asymmetry becomes communicatively salient when it is discursively constructed.[14] Deeply ingrained in the transactional understanding of communication is that its *telos* is mutual recognition (Honneth 2003) and mutual understanding[15] (Rogers/Kincaid 1981). Ideally (or indeed, ideologically) as com-

municators we are naturally inclined to try and understand the 'alter' or to foster understanding in the 'alter' respectively.[16] In this flux of communication aiming at mutual understanding and recognition, knowledge asymmetries emerge when a "perturbation" is generated (Glasersfeld 1989: 11). Verbal indications of perturbations (in this case: knowledge asymmetries) could be questions as to understanding and meaning, it could be conversational repair mechanisms, statements of doubt, utterances of disagreement, etc. Such perturbations trigger endeavors on behalf of one or both communicators to re-establish communication as a transactional meaning making interaction, to re-establish the cooperative equilibrium of the communication flux.

Derived from the above discussions, we are now able to further qualify the concept of knowledge asymmetry. Communication, as seen from the transactional perspective, is a mutualistic meaning making process. Building on the refinement of Parsons' idea of double contingency, we may say that where a third person would 'observe' knowledge asymmetry between 'alter' and 'ego', 'alter' and 'ego' themselves would 'live' double knowledge asymmetry. Knowledge asymmetries – be they lived or observed – become communicatively salient when they are discursively constructed; i. e. when perturbations are generated and acted upon.

Having thus discussed and (re-)conceptualized knowledge asymmetry from the three perspectives proposed in the research agenda of this article, I go on to conduct a theoretical synthesis of these perspectives as well as point to some theoretical implications of the (re-) conceptualization.

5 A Synthesis and some Theoretical Implications of the (re-)Conceptualization of Knowledge Asymmetry

Informed by the discussions carried out in the three previous sections, I am now able to substantially enrich what was initially a rudimentary analysis of asymmetry seen from a geometrically oriented viewpoint. The condensed synthesis reads: Knowledge asymmetry is a relation, which is produced in communication. The discursive construction of knowledge asymmetry is observable via perturbations. Knowledge asymmetry becomes communicatively salient where a single-plane distinction is observed between the knowledges of 'alter' and 'ego'. The distinction is one which allows one or more positions to appreciate the knowledges of 'alter' and 'ego' as being non-identical under the same sortal.

In terms of theoretical implications of this (re-)conceptualization of knowledge asymmetry, I have summarized them under three main headings, i. e. position, knowledge, and evaluation.

The position that makes the distinction in question may be engaged in the communication proper ('alter' and 'ego') and/or s/he may be a third party, an observer. For 'alter' and 'ego', who are engaged in the mutualistic process of meaning making, the knowledge asymmetry is not an 'observed' one, but a 'lived' one. From the viewpoint of transactional communication this makes the lived knowledge asymmetry a *double* knowledge asymmetry. This understanding leaves us with the valuable insight that knowledge asymmetry is lived from the inside, yet as researchers we observe it from the outside. Perspectivally speaking, the lived double knowledge asymmetry of 'alter' and 'ego' must thus differ from the one observed by the observer. This, however, does not mean that 'alter' and 'ego' have a common perception of the knowledge asymmetry they are living – with all probability they do not. In stark contrast to the one-sidedness of much research into knowledge asymmetries we may safely conclude that – based

on the above (re-)conceptualization – there are multiple positions from which to perceive of and evaluate knowledge asymmetry; each being a valid position in its own right and as such each worthy of further investigations. Systematically addressing each position could lead to a perspectivally nuanced appreciation of the phenomenon of knowledge asymmetry.

Secondly, holding that knowledge is somehow a product of a knower, i. e. his/her experiences and ability to infer, the knowledge asymmetry between 'alter' and 'ego' may not be measured (in the classic cognitivist sense), but it may be appreciated as a discursive construction. The medium, in which we may appreciate knowledge asymmetry, is, consequently, human communicative interaction. In order to become communicatively salient, knowledge asymmetries generate perturbations in the flux of communication. As seen from a transactional view of communication such perturbations motivate endeavors to re-establish the equilibrium of the cooperative communication flux – provisional though it may be. This, in turn, implies that the idea underlying the metaphor of the 'gap to be filled' can no longer be upheld when talking about knowledge asymmetry. Seen from the (re-)conceptualization there is, quite simply, no gap to fill. Speaking with Günthner/Luckmann (2001: 63), we may indeed turn the tables and say: were there no knowledge asymmetry, there would be no motivation for meaning-making endeavors in the first place. The (re-)conceptualization of knowledge asymmetry warrants that we appreciate asymmetry not exclusively as an upholder of an unwanted status quo, but rather as a potent motivational device, and – in that capacity – as one of the prerequisites for communicating in the first place.[17] Consequently, mediating across knowledge asymmetries between, say, expert and layperson in this sense cannot be a matter of filling gaps, of perceiving of the 'alter' as the target of one's transmission of knowledge. Such notions reflect a radically different understanding of what counts as communication (section 4) and what knowledge is (section 3). Congenial with a transactional understanding of communication and its emphasis on the *double* double contingency and – derived from that – the *double* knowledge asymmetry, lies a fundamental shift of perspective: from communication understood as 'communicatio' (as "message") to communication understood as 'communis esse' (as "togetherness"). Addressing this shift could give rise to a re-interpretation of many a truism in research fields ranging from Public Understanding of Science via Science Communication and LSP to Knowledge Management – just to mention the most obvious. The archetypical truism, or at least the one, which first springs to my mind, is that of the 'good' text; a panacea to heal all interactional ailments. But since a message that may be deemed 'good' by one individual, may be offensive, patronizing, untrue, or simply unintelligible to another individual, the 'good' in the good text cannot – from the transactional point of view – first and foremost be a matter of 'communicatio'. Rather it is first and foremost a matter of 'communis esse' (see also Kastberg 2007: 12–13); something which, in turn, stresses the importance of further investigating 'good' mediational communication from the viewpoint *not* of text, but of context. Of taking into serious consideration the intricate web of demo-, socio-, psychographic and other relevant sociological and communicative variables of the communicators who are 'living' the double knowledge asymmetry when carrying out research into this phenomenon.

Last but not least, returning to the distinction, we saw that it is a distinction stating that the knowledges of 'alter' and 'ego' are non-identical yet under the same sortal. This means that whereas differentness per se is a necessary qualifier in order to establish knowledge asymmetry it is not a sufficient one. The garden knowledge of the trained gardener and the engineering knowledge of the trained engineer are, thus, not asymmetric, even if they are undoubtedly different. In a knowledge asymmetry the knowledges of 'alter' and 'ego' do feature differentness,

but under the same sortal. This implies that knowledge asymmetry is a phenomenon which can only come about if the two entities in unison form a relation under a sortal. And being under the same sortal, the two knowledges in fact feature mutually obligate interdependence. In as much as both are referring to the same sortal, they are complementary in forming and keeping up this relationship. Strictly speaking, then, knowledge asymmetry is a relation, and not an evaluation. Viewing knowledge asymmetry as a relation in this sense implies that neither of the constituting knowledges may be said to hold a hegemonic position. This less confrontational and admittedly rather dialectical view of the relationship is quite compatible to Engeström/Engeström/Vähäaho's laconic statement that, "[i]f you take away patients and illnesses, you do not have hospitals" (1999: 170). In other words: without domain laymanship there would be no domain expertise – and vice versa. If indeed expertise and laymanship feature such a figure-ground-like relationship then complementarity and *not* disparity would be a novel lens through which we may look at this relationship. Turning to systems theory a similar thought has already proven fruitful. Here it is commonly accepted that the system and its environment(s) feature asymmetry. However, it is equally accepted that the two are interdependent, and that in fact the two entities in many ways can be said to live off one another. Such a notion could add another layer of reflection to the expert-layman relationship within specific research strands such as, say, the "democratizing knowledge production" (McCormick 2007) or "upstream engagement" in the knowledge production process (Kurath/Gisler 2009). And, speaking in more general terms, such a take on the knowledge asymmetry between expert and layperson could also question the archetype of the privileged position of expertise.

In accordance with what I set out to do in this article (section 1), I have challenged the hegemony of the "have vs. have not" discourse when talking about knowledge asymmetry. As stated, my aim in doing so was to open a discussion of how knowledge asymmetry may be understood conceptually and how this understanding may be evaluated and applied within a wider framework of Knowledge Communication research. To this end I made use of a two-step approach. First, I (re-)conceptualized knowledge asymmetry from three core perspectives: i. e. asymmetry, knowledge and communication (sections 2, 3 and 4). Secondly, I synthesized these perspectives and – based on that – went on to discuss pertinent theoretical implications of this (re-)conceptualization (section 5). Based on this (re-)conceptualization, a strong theoretical impetus has emerged for venturing beyond the "have vs. have not" discourse. Applying, testing and challenging this (re-)conceptualization of knowledge asymmetry could very well spur a productive and prolific strand of future research. ◆

Notes

[1] As in the 1937 Hemingway novel *To Have and Have Not*.

[2] Even if the research community dealing with Public Understanding of Science has criticized and distanced itself from the deficit model its legacy nevertheless still lingers on (e. g. Miller 2001).

[3] For my definition of Knowledge Communication see Kastberg (2007); for a discussion of the relationship between Knowledge Communication and LSP see Kastberg (2010a and 2010b).

[4] I do not overlook the fact that asymmetry may indeed be multisided and the distinction may indeed be a multi-plane one, for the sake of the conceptualization, I do, however, refrain from widening the scope, as the general concept of asymmetry developed here is able to encompass these additional features.

[5] I will come back to this notion in section 4.

[6] For the purpose of this paper, I understand *sortals* with reference to Locke's etymologically based notion that it is "evident that things are ranked under names into sorts or species, only as they agree to certain abstract ideas, to which we have annexed those names, the essence of each genus, or sort, comes to be nothing but that abstract idea which the general, or sortal (if I may have leave so to call it from sort, as I do general from genus), name stands for." (Locke 1975 [1690]: Book III, Chapter III: 15). I thereby explicitly refrain from entering into the ongoing philosophical debate as to the nature of sortals; for a relative recent review of that debate see Grandy (2008).

[7] A similar relation is to be found within semantics (e. g. Levin 1974); here the antonym would be an example of such a relation.

[8] Venzin, von Krogh and Roos (2000) give an in-depth presentation of the cognitivist perspective, of its history as well as point to the fact that it is (still) a perspective which is widely accepted.

[9] Or, rather, constructivism is a family of schools of thought.

[10] For obvious reasons I cannot go into Kantian constructivism in this article, but would like – for those who might be interested – to refer to the preamble to the 2nd edition of his "Critique of Pure Reason" („Kritik der Reinen Vernunft" 1787 [1900]) where Kant introduces what to his followers later would be refered to as Kant's Copernican Turn („Kants kopernikanische Wende").

[11] A prototypical integration/evaluation in this sense would entail an implication along the lines of "if so – then so"; see also Kastberg et al. (2007) for further discussions as well as examples of this analytical distinction.

[12] Naturally, Schutz did qualify this statement; see Schutz (1976 [1969]) for further elaborations of this particular concept.

[13] Naturally, there may be – and often are – more than two communication participants, but since the number of participants does not per se alter the theoretical foundation of this (re-)conceptualization, I refrain from widening the scope at this point.

[14] For a concrete analysis carried out within a "discursive construction of" framework, see Kastberg/Ditlevsen (2010).

[15] Mutual understanding in this sense also implies that 'alter' and 'ego' may agree to disagree.

[16] An ideology which leaves little doubt as to its Habermasian legacy; I have discussed the relationship between the Habermasian legacy and Knowledge Communication elsewhere, see Kastberg (2007).

[17] As well as for learning, see Tange/Kastberg (2011) for a discussion of and a case study regarding knowledge asymmetries and learning in tertiary education.

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The Paradox of Scientific Expertise: A Perspectivist Approach to Knowledge Asymmetries[1]

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Abstract Modern societies depend on a growing production of scientific knowledge, which is based on the functional differentiation of science into still more specialised scientific disciplines and subdisciplines. This is the basis for the paradox of scientific expertise: The growth of science leads to a fragmentation of scientific expertise. To resolve this paradox, the present paper investigates three hypotheses: 1) All scientific knowledge is perspectival. 2) The perspectival structure of science leads to specific forms of knowledge asymmetries. 3) Such perspectival knowledge asymmetries must be handled through second order perspectives. We substantiate these hypotheses on the basis of a perspectivist philosophy of science grounded in Peircean semiotics and autopoietic systems theory. Perspectival knowledge asymmetries are an unavoidable and necessary part of the growth of scientific knowledge, and more awareness of this fact can help avoid blind and futile struggles between scientific perspectives, and direct efforts toward more appropriate ways of handling these fundamental knowledge asymmetries. Concretely, we show how different kinds of scientific knowledge, expertise, disagreement and learning can be correlated to the perspectival structure of science, and propose how polyocular communication based on (second order) observations of the observations made by specialised perspectives can be used to handle such perspectival knowledge asymmetries. This can help overcome the observed problems in carrying out cross-disciplinary research and in the collective use of different kinds of scientific expertise, and thereby make society better able to solve complex, real-world problems.

Keywords Science, differentiation, specialisation, knowledge asymmetries, expertise, cross-disciplinary, perspectivism

> Perspective is one of the component parts of reality. Far from being a disturbance of its fabric, it is its organizing element. … Every life is a point of view directed upon the universe. Strictly speaking, what one life sees no other can. … Reality happens to be, like a landscape, possessed of an infinite number of perspectives, all equally veracious and authentic. The sole false perspective is that which claims to be the only one there is.
> (Ortega y Gasset 1961 [1923]: 90 f.)

1 Introduction

The ever-increasing production and usage of specialised knowledge is an indispensable condition for a knowledge society, but the mere production of specialised knowledge will not bring society to thrive and prosper; specialised knowledge needs to be communicated in such a way that it can be utilized, enter into democratic processes and decisions, and create societal value (Kastberg 2007). Kastberg states that "knowledge asymmetries" tend to emerge at a rate corresponding to the growth of knowledge, and that asymmetries "are no longer limited to the prototypical ones between social classes, between institutionalized social roles such as expert and 'layman' or political institutions of power such as 'authority' and 'subject'. They also emerge within institutions themselves, between 'experts' from different

fields, and increasingly 'experts' with different agendas or of different persuasion, political or otherwise." (Kastberg 2007: 9)

Furthermore, Kastberg suggests that knowledge asymmetries are an indicator that the knowledge potential of society is not synthesized and exploited as well as it could (ideally) have been, and that this is probably *the* issue for a knowledge society.

This is where the present paper takes its starting point. In Kastberg's list of knowledge asymmetries there are not only different asymmetries, but different forms of asymmetries, which lead to different types of problems for society (though we do not presume that knowledge asymmetries are always problematic). The first type is ordinary *problems* of knowledge asymmetries, such as the differences between experts and laymen that are well known in the context of knowledge transfer (e. g. Ko/Kirsch/King 2005). These problems may be difficult, but can be solved by the same measures that lead to the asymmetry: the layman must gain more knowledge to 'catch up' with the expert. The second type is *dilemmas*, asymmetries between authority and subject such as the power asymmetries between principals and agents in business exchanges (Sharma 1997). These problems cannot be resolved only by the measures of knowledge transfer or 'learning what the other knows', since this leads to the other horn of the dilemma, increasing the conflict that is involved. The third type of problems is *paradoxes*, which are connected with the burgeoning number of asymmetries between experts with different focus and different agendas that Kastberg (2007) pointed out. The paradox of this form of knowledge asymmetries is that the growth of knowledge in modern societies necessarily leads to fragmentation of knowledge. One cannot solve this kind of problems by way of the means and distinctions that constitute them, this will only reinforce the paradox; generating more knowledge will only increase the fragmentation of knowledge and create more asymmetries. To resolve a paradox you need to transgress the framework in which the paradox exists.

Based on pragmatic philosophy, we suggest that knowledge cannot, and should not, be separated from its basis in learning, cognition and inquiry (e. g. Dewey 1991 [1938], Alrøe 2000). The task for the present paper is therefore to analyse the cognitive and perspectival structure of scientific learning, as a basis for investigating *the paradox of scientific expertise*: that the growth of scientific knowledge leads to a fragmentation of scientific knowledge. We explore how the differentiation and specialisation of science and expertise leads to what we call *perspectival knowledge asymmetries*, and what this means for the communication of scientific knowledge, and we provide a framework to understand and handle such perspectival asymmetries and the resulting communication failures and scientific disagreements. The practical aspiration is that this pluralist and perspectivist (but not relativist) framework can serve as a helpful basis for working across disciplinary perspectives in science and for using different kinds of scientific expertise in society.

2 Background: The differentiation of scientific knowledge

According to the German sociologist Niklas Luhmann modern society is differentiated into independent, communicative function systems, such as the economic system, the political system, the legal system, the scientific system and the religious system (Luhmann 1995, 1997: 707 ff.). The functionally differentiated systems are autopoietic and operationally closed through self-referential processes, and each system functions as a media for communication and forms a distinct perspective for observation in society. Parallel to the functional

differentiation of society, there has been a differentiation of scientific disciplines (Stichweh 1992, Luhmann 1990: 446 ff.). Over time, science has differentiated from the unspecialised natural philosophy of the past into specialised disciplines like physics, biology, psychology, economics and sociology, and the disciplines are continuously differentiating into more specialised sub-disciplines or different 'schools of thought.' Furthermore, new disciplines are still being formed based on the academisation of professions in society like nursing, and the emergence of new technologies like biotechnology.

The differentiation of science is both an answer to the growing complexity of society and a source of new complexity that poses a challenge to the use of science and expertise in society. When society is faced with a complex problem like climate change, environmental pollution, sustainable food production or life style diseases, there is a need to draw on a range of different disciplines spanning the conventional distinctions between natural, social and human sciences. There has therefore been a rising call for cross-, multi-, inter- or transdisciplinary science as a tool to solve complex real-world problems, and increasing attention to the combined problem of the differentiation of science and the increasing complexity of the systemic challenges to modern societies (e. g. Pennington 2008, Pohl/Hirsch Hadorn 2008).

However, in the scientific literature there is also a growing recognition that cross-disciplinary cooperation is very difficult to perform successfully, in particular when the disciplines focus on very different aspects of the problem such as causal mechanics, flow processes, signs, values and social relations, or have very different agendas. This confirms our own experiences. The different disciplines involved do not agree on solutions to the problem, or even on what the problem is, and often they disagree on essential questions such as what is scientific and what is good science. In spite of good wills and many ambitions to the contrary, there are fundamental problems in communicating and mediating between different scientific disciplines, in particular where there is no common theoretical framework, and often the cooperation is constrained by the hegemony of one discipline at the cost of the others (e. g. Miller et al. 2008, Bracken/Oughton 2006, Harrison/Massey/Richards 2008, Pennington 2008). The more ambitious the collaboration is, in terms of using and integrating very different scientific perspectives in solving real, complex problems, the more difficult the task.

Differentiation increases the complexity that science can handle overall, by reducing the observational complexity that each perspective must handle. This marginalisation of complexity makes differentiation a very powerful mechanism in science; the specialised perspectives offer consistent, effective and accurate knowledge in the context of their particular, delimited research world and refined tools of observation. This is the reason why a genuine reintegration that 'un-differentiates' scientific perspectives is, in general, neither possible nor desirable – the strength of independent scientific perspectives is needed. There are of course many examples of theoretical syntheses in science, like the neodarwinian synthesis and relativity theory, but such local syntheses do not negate the general processes of differentiation and the overall disunity of science (Kitcher 1999). Indeed, the limited reducibility of theories leads to a pluralistic epistemology of science with complementing truths on different cognitive levels (Rohrlich 1988).

On this background we claim that perspectival knowledge asymmetries are an unavoidable and necessary effect of the growth of scientific knowledge. And we suggest that the issue of perspectival knowledge asymmetries can be analysed philosophically by investigating the perspectival nature of science. In the following three sections we will pose three hypotheses

on the relation between scientific knowledge and perspectives, explain what they mean, and examine whether and how they can be substantiated.
The three hypotheses are:

1. All scientific knowledge is perspectival.
2. The perspectival structure of science leads to specific forms of knowledge asymmetries.
3. Such perspectival knowledge asymmetries must be handled through second order perspectives.

3 The perspectivist approach to science and cognition

The first hypothesis is that all scientific knowledge is perspectival. This means that scientific knowledge is always created in perspectives, and that a perspective is not only a means of observation, but also an 'apparatus for learning'. The differentiation of science is not only a differentiation of social systems, but also a cognitive or epistemic differentiation into specialised scientific perspectives, and the first step in our examination of this hypothesis is to investigate science as an observation and learning process (cf. Alrøe 2000).

3.1 The cognitive and perspectivist view of science

There is a growing recognition that the context established by scientific disciplines, schools and methodological approaches is decisive for the focus and the kind of observations that can be made by science. This contextual and pluralist conception of science has been nurtured by the ideas about the incommensurability of successive scientific theories launched by Paul Feyerabend and Thomas Kuhn. In recent years there has been a rising interest in cognitive approaches within philosophy of science, where the focus is on scientific models and representation rather than theories and truth (e. g. Giere 1988, 1994, 2004, Cartwright 1999, Fraassen 2008). And lately, Ronald Giere (2006a, 2006b) has developed this cognitive understanding of science into a 'scientific perspectivism' proper.

Perspectivism has had a long but marginal presence in philosophy with roots in Kant and Nietzsche (e. g. Palmquist 1993, Anderson 1998, Hales/Welshon 2000). But Giere was the first to develop a fully perspectival philosophy of science. While Giere has mainly developed the perspectivist approach in the context of natural science, we here explore it as a general approach to science in its wider continental sense, which includes natural, social and human sciences. The perspectivist view of science can be characterized plainly in a few sentences: There is no outside perspective on the world. All knowledge comes from a certain perspective. All learning happens in concrete perspectives on the world, which are part of the world, and which can themselves be made objects of observation. This fairly banal insight contains strong implications for how we think about scientific expertise, scientific disagreement and the role of science in society, and for our ideas about scientific norms.

A discipline, or more often a subsystem or 'school' within a discipline, is an example of a scientific perspective. A scientific perspective harbours certain concepts, theories, classifications, instruments, problems, etc. that delimit and focus the observational field, and make possible the observation of certain phenomena and aspects (Figure 1). The defining characteristic is that a scientific perspective is an autopoietic system that is reproduced and refined through internal processes (Alrøe 2000). Tacit knowledge in form of implicit values, embodied knowledge and practices are part of what makes up a scientific perspective (cf. Collins 2010), and they are tacit precisely because this is part of what makes a scientific per-

spective effective. In order to explore these tacit cognitive and perspectival structures, we need to observe scientific perspectives as perspectives and not as abstract theories or social groups of scientists.

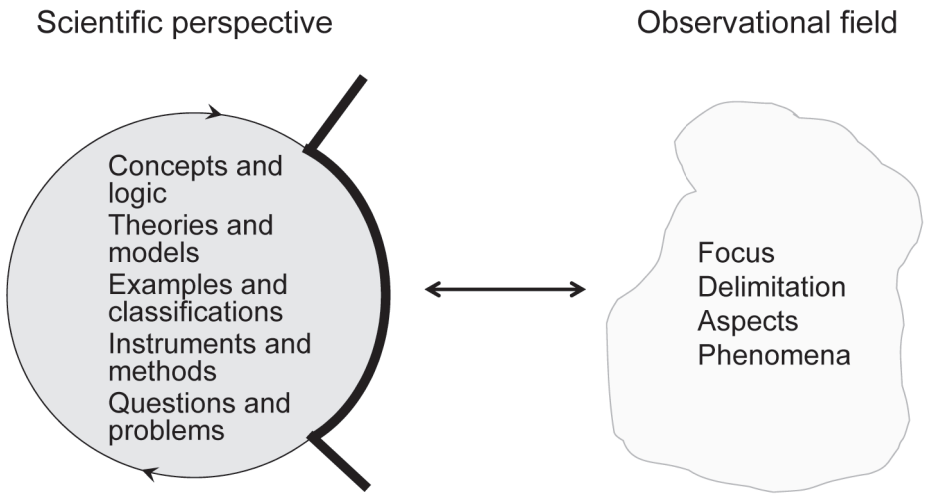

Figure 1: A scientific perspective is characterised by specific concepts, instruments, problems, etc., which delimit and focus the observational field.

The perspectivist view of science implies that there are many scientific truths about any complex problem, and from a philosophy of science point of view the question is not how to select the correct one, but how to appreciate and use the non-unifiable plurality of partial knowledges (Longino 2006). All ontological claims are interwoven with the epistemological conditions for observation and the built-in values and norms that apply in the perspective where it is grounded (Alrøe/Kristensen 2002). Truths are perspectival, but this does not imply that any truth can be as good as any other, or that there is no difference between expertise and taste. The distinct, collective-learning character of science is manifest in the foundational methodological ideas, open inquiry, systematic observation and critical approach, which establish the excellence of science in the production of knowledge.

3.2 The semiotic understanding of scientific perspectives

The perspectivist approach described here builds on a thoroughly semiotic understanding of a scientific perspective (and in this respect it goes beyond Giere's scientific perspectivism). A key element in this approach is the distinction between phenomena and noumena that Kant established in modern philosophy. Phenomena are things-for-us, things as they appear to us. Our knowledge is of phenomena and our objects reside in our phenomenal world. Noumena are the unknowable things-in-themselves. Scholars have long disagreed on this distinction between phenomena and noumena, but as Palmquist (1993, App. VIII) argues, Kant's distinction between the noumenal and phenomenal realms is properly regarded as a

perspectival distinction. The noumenal is not found as an object of experience, but only by its possible effect.

In Charles S. Peirce's semiotics we find the same distinction in an elaborated theory of representation and interpretation, which is readily applied in a perspectivist view of science. According to Peirce, a sign is something that stands to somebody, the interpretant, for something, the object, in some respect or capacity. And in his later works he stresses the semiotic relation between the immediate object as the sign represents it and the dynamical object or really efficient object that the immediate object refers to (e. g. Peirce 1998 [1908]: 482, CP: 8.343).

Figure 2 illustrates the fundamental elements of scientific observation in form of a semiotic model of a scientific perspective observing (what it calls) a dairy cow. The model builds on Peirce's theory of semiotics, the later development within biosemiotics (e. g. Uexküll 1982, Hoffmeyer 1997), and Niels Bohr's epistemological lesson from quantum physics: "Not only, of course, have we learnt that every observation involves a disturbance of the phenomena; we have furthermore realized that the whole concept of observation requires a separation between the object and the means of observation." (Bohr 1931, cited in Favrholdt 1999: 521).

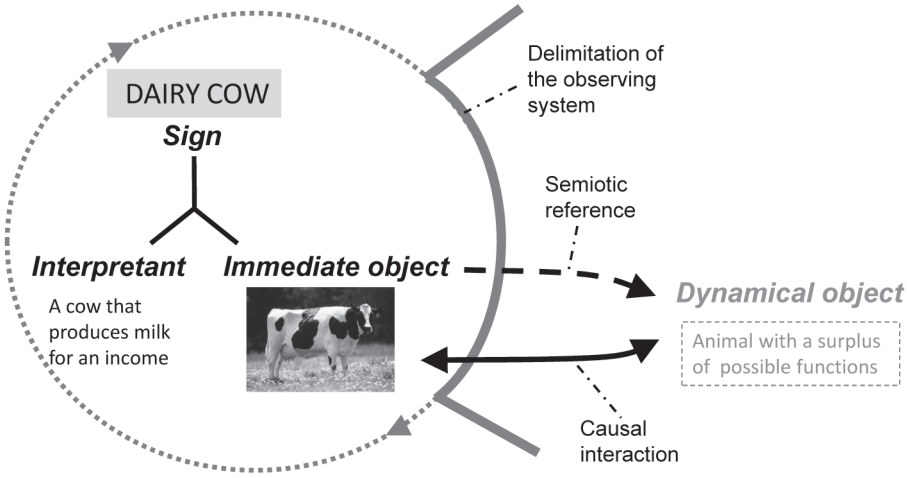

Figure 2: A semiotic model of a scientific perspective observing (what it calls) a dairy cow, showing the distinction between immediate and dynamical object and three key conditions for observation: the separation of the observer from the observed, the semiotic reference to the dynamical object, and the causal interaction with the dynamical object (Alrøe 2000 modified).

It is important to stress that, in Peirce's sense, there is no position from where we can observe the dynamical object as such; every perspective only adds to the number of immediate objects that refer to or point at the dynamical object. This is of course very different from a traditional realist conception which takes the thing in itself as the immediately present object. The representations of science can be tested by establishing observational situations

(systematic observations, interventions, experiments) where the dynamical objects may 'kick back' (cf. the causal interactions in Figure 2). But a dynamical object has a surplus of possibilities for observation, and any immediate object is, by necessity, a reduction based on a certain perspective.

3.3 Communication across scientific perspectives

By definition, it is a condition for cross-disciplinary science that the different perspectives observe the same thing, so to say, and the model in Figure 2 therefore points to a two-layered problem of communication across scientific perspectives: There is a need to point directly at some 'real' dynamical object to be shared in cross-disciplinary work, but we can only communicate signs (names, categories, models, etc.).

The first layer is thus that the specialised languages of scientific disciplines and schools are not generally shared. Some perspectives are closely connected and share methods, models, theories and classifications, others are widely different and closed to each other. When one perspective speaks of 'sustainable development,' 'soil quality,' 'farm,' or 'cow,' it does not necessarily mean the same as when another perspective uses the same term. To take a simple example, the common name 'a cow' can be generally shared but reveals fairly little of the dynamical object referred to. More specialised, perspectival names such as dairy cow (for production), year cow (for accounting), prize animal (for cattle shows), livestock unit (risk of eutrophication) and grazing pressure (for landscape conservation) point to different aspects of the dynamical object of a cow.

The 'rock bottom' basis for cross-perspectival communication is the 'common, everyday language' (though this is still conditioned on common daily lives and therefore prone to cultural differences). *The communicative paradox of cross-disciplinary science* is thus that the common language is not sufficiently precise to handle the immediate objects of specialised perspectives, but more precise and specialised communication moves us away from the common language with which we can communicate across perspectives. This is a lesson to be learned from Peirce's semiotics, and an idea that has been radicalized by Niklas Luhmann (1995: 143, emphasis in original): "The fact that understanding is an indispensable feature in how communication comes about has far-reaching significance for comprehending communication. One consequence is that communication *is possible only as a self-referential process*." Communication across perspectives depends on structural couplings being established, and the differentiation and specialisation of scientific perspectives reinforces this key condition.

The second layer of the problem is that since the same dynamical object will be observed and represented in different ways in different perspectives, it is not possible a priori to determine whether different scientific perspectives observe the same dynamical object, even though this is presumed. Built into the conditions for observation there is a linkage between ways of interacting with the world and ways of representing the world, which makes it difficult, and in principle impossible, to share a common reference to a dynamical object across perspectives.

Obviously, these deep-seated problems of communication do not mean that one cannot perform cross-disciplinary work, but they do mean that cross-disciplinary research is not a trivial matter.

4 The perspectival structure of scientific knowledge and disagreement

In the previous section we elaborated a fundamentally perspectival model of scientific observation and cognition that substantiated the hypothesis that all scientific knowledge is perspectival. The second hypothesis in this paper is that the perspectival structure of science leads to specific forms of knowledge asymmetries. This means that we are to expect different types of scientific knowledge, expertise, disagreement, and learning depending on how they relate to the perspectival structure.

Scientific disagreements are productive knowledge asymmetries, because they contribute to testing and developing scientific ideas. But the confusion of different kinds of scientific disagreement is not productive. By creating a better overview of what kinds of disagreement can be *expected* between different scientific perspectives, due to their perspectival differences, we can establish a better basis for assessing and handling other forms of scientific disagreement, which are due to scientific dishonesty, political spin, disciplinary hegemony, bad science, etc., and point out a route to overcome some of the pitfalls of cross-disciplinary research.

In the following section we look at a few well known philosophical and sociological approaches to scientific disagreement and expertise, which we suggest can be understood as elements in a perspectivist understanding of science.

4.1 Some well-known approaches to asymmetries in scientific knowledge and expertise

Thomas Kuhn (1996 [1962]), in his Postscript to The Structure of Scientific Revolutions, suggests the term 'disciplinary matrix' as a more precise term for 'paradigm' as it is used in his highly influential book. In this sense, Kuhn's paradigms are examples of perspectives in our understanding. The disciplinary matrix includes symbolic generalizations (theories and laws), metaphysical paradigms (models, analogies, and metaphors), values, and exemplars (concrete problem-solutions), and these are similar to the elements of a scientific perspective that we have outlined. However, Kuhn and the rich tradition following Kuhn have a historical, diachronic focus, where the paradigms of normal science are interrupted by scientific revolutions or paradigm shifts within a single scientific field, whereas we in this paper focus on the synchronic disagreements and knowledge asymmetries across disciplines and perspectives in line with Maruyama (1974). The Kuhnian tradition generally focuses on theories and language, though there are some who take a more cognitive approach (Chen 1997, Andersen/Barker/Chen 2006). Our approach here differs from the main tradition in having an explicit cognitive focus on what can broadly be called 'the observational apparatus'. Kuhn's views on the incommensurability between consecutive paradigms correspond to the problems in integrating and communicating across perspectives in cross-disciplinary work that we have described in this paper. But where Kuhn uses a language metaphor, talking of the untranslatability between different paradigms (Chen 1997), our approach points out that the reason why it is in principle impossible and in practice more or less difficult to communicate across perspectives, is because each observational perspective has its own phenomenal world – its own representation of the world entailed in theories, models, concepts, classifications and examples. This is a deeper reason than language, tied into the specific observational apparatus and the specific forms of interaction provided by it. Despite the common features, our synchronic and explicitly perspectivist approach leads to other questions and other answers than Kuhn's.

Harry Collins and following him a number of other researchers have investigated what scientific practice means for expertise, and what scientific disagreement means for the role that expertise has in society (e. g. Collins 2004, Collins/Evans 2007). However, this work concerns in particular the opportunities for individual researchers to obtain expertise in a different field than their own, and not the general perspectival structures that are in focus in the present paper. Collins distinguishes between *contributory expertise*, possessed by those who participate in everyday activities and development of the field (and who therefore possess the necessary tacit knowledge to contribute, cf. Collins 2010), and *interactional expertise*, which is characteristic of those who can communicate fully with the field, based solely on explicit knowledge, but who are not able to actually take part in and contribute to the field. There is in general some degree of interactional expertise among scientists (especially within each of the main areas of science), which helps make the cross-disciplinary cooperation not impossible, but merely difficult. But in general, it takes a long time to obtain interactional expertise in a new field, and due to the differentiation and specialisation of science it is hardly possible today to become a 'modern renaissance man' with interactional expertise in a range of widely different fields. Interactional expertise therefore cannot be considered a general solution to the cross-disciplinary conundrum. Neither can the 'trading zones' of Galison (1997: 803 ff.), which refer to scientific communities and not individuals, because the focus here is on language and not on scientific perspectives as a whole.

Thomas Gieryn (1983) investigates the actual delimitations of science from non-science that specific sciences use in the pursuit of their professional goals. Such boundary-work can be a problem in cross-disciplinary work, because some scientific perspectives are marginalized as non-scientific by other, more esteemed and powerful perspectives. See e. g. Hinrichs (2008) for a discussion of boundary work in agrifood studies.

4.2 A perspectivist framework for types of knowledge, expertise, disagreement and learning

The perspectivist understanding of science provides a common framework for discussing the existing approaches to handling different forms of asymmetries in knowledge and learning.

In Table 1 (line 1–3) the paradigms and scientific revolutions of Kuhn, Collins' contributory and interactional expertise, and the boundary-work of Gieryn are placed in a perspectival framework together with a number of other differences between types of scientific knowledge, disagreement and learning. For example, the kinds of disagreement to expect within a perspective are the normal converging disagreements of science (line 1); when a perspective is being transgressed, we expect to see diverging disagreements that may transform or split up the perspective (line 2); whereas forms of unconnected 'blind' disagreements and communication failures are to be expected between different perspectives (line 3).

This linkage of existing approaches to a comprehensive perspectivist framework may be helpful in itself, and it substantiates the hypothesis that the perspectival structure of science leads to specific forms of knowledge asymmetries. But the really novel in the perspectivist approach is that it points to structures beyond these existing approaches. It is only in a thoroughly perspectivist understanding of science that the possibility of a fourth form of knowledge, disagreement and learning shows up: second order perspectives based on observation of observation (Table 1: line 4); an idea that builds on constructivist and perspectivist approaches in second order cybernetics and social systems theory (Foerster 1984, Luhmann 1993). A second order perspective can potentially transcend the incommensura-

bility of perspectives that are blind to each other (bearing in mind, however, the significance of tacit knowledge). Perspectival disagreement and reflexive expertise are thus based on the handling of contextual knowledge from first order perspectives in a second order learning process, which we call polyocular communication. In the next section we describe how second order perspectives can be used to handle perspectival knowledge asymmetries.

Table 1: Types of knowledge, disagreement and learning in relation to the perspectival structure of science.

	Type of knowledge and expertise		Type of disagreement	Type of system learning process
1. Within a perspective	Embodied and tacit knowledge, Paradigm, Contributory expertise	Orthodox knowledge	Converging disagreement	Socializing, Reproducing and refining, Normal science
2. Transgressing a perspective		Heterodox knowledge	Diverging disagreement	Differentiation of science, Scientific revolution
3. Between perspectives (of first order)	Acontextual knowledge, Interactional expertise		Unconnected 'blind' disagreement, Communication failure	'Learning the language,' Hegemony, Boundary-work
4. In a second order perspective	Contextualised knowledge, Reflexive expertise		Perspectival disagreement	Second order polyocular communication

5 Second order observation and polyocular communication

The third and final hypothesis in this paper is that the perspectival asymmetries in Table 1, line 3 and the ensuing problems in the communication of scientific knowledge must be handled through second order perspectives. This means that there is a need for new forms of scientific perspectives and learning processes that aim to observe the world by observing the observations of a range of specialised perspectives. A key question is then how these second order perspectives may look like, where they can be realised, and how they may be applied to the problems of knowledge asymmetry. In the following we will show how the hypothesis can be implemented in cross-disciplinary research and discuss the broader implications for the paradox of scientific expertise.

5.1 The case of cross-disciplinary research

In the first part of this paper we indicated the problems of carrying out cross-disciplinary research due to problems with asymmetries in communicating across different scientific perspectives with different immediate objects in form of theories, models, taxonomies and entities; uncertainties as to whether those immediate objects actually refer to a shared (dynamical) research object; and, possibly, different understandings of common concepts, different logics and rationales, different criteria of science and different societal and intentional contexts in form of values and interests.

Figure 3 shows an example of such a problematic cross-disciplinary research project with four different specialised disciplinary perspectives on a farm enterprise (ignoring the second order perspective for now). In this (obviously simplified) example, agronomy is con-

cerned with food production and observes yields on the farm, biology is concerned with nature and observes biodiversity in and off the fields, economy is concerned with markets and observes commodities from the enterprise, and sociology is concerned with culture and observes human interactions in and around the farm. In a concrete cross-disciplinary investigation of, say, nature quality in a farmed landscape, these disciplinary perspectives represent different interests in nature quality with very different ideas about what nature quality means, they have different methods for how nature quality is best investigated, different geographical and conceptual boundaries of farms and landscapes, and in the end they draw different conclusions based on different rationales.

A common way to try to ensure the co-ordination of such cross-disciplinary research projects is to require that all the disciplines work on the same geographical study area. But a shared study area cannot ensure that the different perspectives observe the same dynamical object. Each discipline has its own immediate objects, and one cannot force a disciplinary perspective to observe what it is not able to observe. In the example above, the biological perspective will look for nature quality in the small biotopes in hedges and ditches, where biodiversity in form of rare and threatened species may be found, and the agronomic perspective will look in the fields, where biodiversity in form of robust and plentiful species may support soil fertility and crop growth (cf. Tybirk/Alrøe/Frederiksen 2004).

Another way to ensure co-ordination is to require that the disciplines establish a common pool of data, but this is a misguided method, since data are always observations from a certain scientific perspective. Treating data as context-free observations is therefore prone to generate misunderstandings and loss of insight; for instance all data may be interpreted from the perspective of one hegemonic discipline.

A range of different approaches have been suggested to, in some more fundamental way, re-unite science or (re-)integrate scientific disciplines in cross-disciplinary work, such as systems theory, complex modelling and various holistic frameworks. These efforts are often commendable, but we don't think any of them provide a general approach to solve the fundamental problems of using very different kinds of science in an integrated way to solve complex real-world problems. Some approaches ignore the power of differentiation and pluralism in science, and seek to re-unite science by promoting selected specialised perspectives as fundamental and sufficient in themselves, in a reductionist and hegemonic way. Others introduce a new holistic perspective, which ignores the specialised perspectives and the possibility of other holistic perspectives, and therefore is itself a kind of reductionism. For instance, Pohl and Hirsch Hadorn (2008) consider 'systems thinking' a constituting conceptual basis of an overall transdisciplinary research perspective. But there are a range of different systems frameworks; each system theory has its own perspective on complexity that observes certain types of problems; and the different system theories will leave different imprints on the answers gained (see e. g. Ramage/Shipp 2009, Midgley 2003). The choice of systems framework is not innocent.

A disciplinary integration proper may be a relevant target in specific cases where the objective is to create an integrated perspective on a technological field such as nanotechnology (Johnson 2009). Here, a new, separate perspective is established, where specific theories, models, values, logic and exemplars are selected and the research field determined. However, the idea of transdisciplinary integration of a first order, without the selections and delimitations inherent in the formation of a new specialised scientific perspective, is incongruous. As a general solution, first order (re-)integration of specialised scientific disci-

plines is neither possible, nor desirable. In order to establish a general framework for solving real-world problems through cross-disciplinary research, we need to look at second order perspectives and how they may be implemented.

5.2 Separate, second order perspectives for polyocular communication

But where, then, may such second order perspectives be placed, what do they look like, and what is their function? First of all, we argue that there is a need for a separate, second order research process which observes the first order observations in their perspectival context (as illustrated in Figure 3). The specialised disciplines are generally not able to both reproduce and refine their own perspective and carry out second order observations of the different perspectives that are employed in cross-disciplinary work (including their own). It is fine to utilize and extend the interactional expertise, in Collins' sense, that each researcher brings into the work, but while such individual cross-cutting expertise is helpful, it is not enough to underpin cross-disciplinary work.

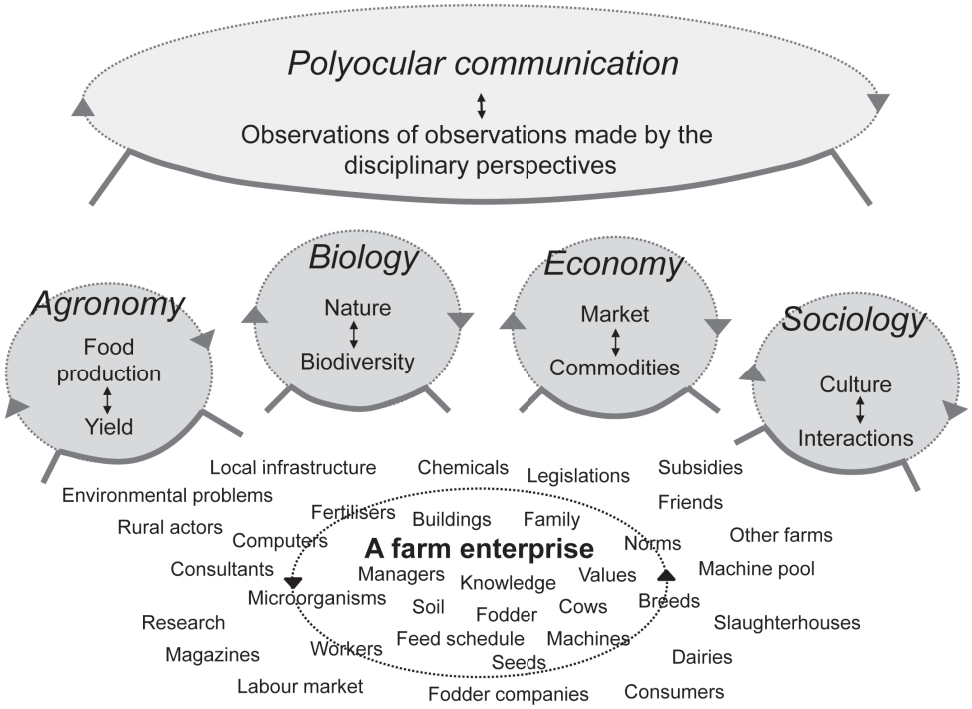

Figure 3: An example of a second order perspective on a farm enterprise based on (second order) observations of the observations of specialised disciplinary perspectives, and thus providing a basis for polyocular communication and learning (Noe/Alrøe/Langvad 2008 modified).

Using a term first used by Magoroh Maruyama (1974, 1978, 2004) in cross-cultural and organization studies, we characterize such second order learning processes as *polyocular communication*. That is, a second order perspective does not directly observe the research object; it performs second order observations of observations made by the different first order scientific perspectives involved, and in this sense it manifests a multi-perspectival or polyocular view of the object, which can unfold a multidimensional space of understanding. The key activities in the second order research process is thus to 1) illuminate the involved perspectives and their conditions for observation, communication and learning, in order to 2) enable a contextualised communication of observations and analyses, which exposes how they are influenced by their perspectival and cognitive context and thus helps overcome perspectival knowledge asymmetries, and thereby 3) provide for a polyocular communication of the research results. The second order perspective is on the one hand a scientific perspective like any other, residing in a research group or a wider research community, but on the other hand it operates at a meta-level compared to first order scientific perspectives, and does not directly observe the research object.

There is a need for separate resources to perform such second order research processes in practice. Concretely, this could for instance be organized in form of a separate work package in a cross-disciplinary research project, with its own funding and human resources. This does not mean that this process would necessarily be carried out by other researchers. It may well involve researchers from the different disciplinary perspectives, with the aim to utilize their intimate experience with their own perspective and to increase their awareness of the imprint that their perspective leaves on their observations, analyses and conclusions.

6 Conclusions and prospects

In conclusion, we need to resolve the fundamental paradox that the growth of science leads to a fragmentation of scientific expertise and growing knowledge asymmetries, in order to be able to establish a general framework for solving real-world problems through cross-disciplinary research; and to resolve the paradox we need to transgress the first order structure of scientific perspectives and incorporate second order perspectives.

Scientific knowledge is perspectival, and scientific perspectives can provide consistent, effective and precise knowledge, but only on the basis of differentiation and specialisation. Perspectival knowledge asymmetries are therefore an unavoidable and necessary part of the growth of scientific knowledge. More awareness of this fact can help avoid futile struggles between scientific perspectives, and direct efforts toward more appropriate ways of handling these fundamental knowledge asymmetries, such as the second order, polyocular approach to cross-disciplinary research that we have outlined here. This goes beyond the typical non-integrated multidisciplinary approach, but it does not seek to integrate the different disciplines involved, nor form a new, integrated scientific perspective, even though it does bring some kind of integration in form of polyocular communication.

This is not to say that polyocular communication cannot lead to new and more integrated models of the research object, or that the involved scientific perspectives cannot learn from the process and transform their own approach accordingly (and indeed, such second order learning processes are bound to promote interactional expertise among the involved researchers). But the successful application of a polyocular approach does not depend on such changes. In fact, the approach depends on clear and distinct perspectives where the

context of observation can be unambiguously described (taking due account of tacit knowledge). At the same time, polyocular communication can only happen with reference to a shared dynamic object that, it is agreed, can be observed in different ways; and we must expect it to sometimes bring forth mutually excluding representations of the research object (complementary phenomena in Niels Bohr's sense).

Second order perspectives in some form can be of use not only in cross-disciplinary science, but wherever very different strands of scientific knowledge are used to help solve complex problems in society, and whenever different types of scientific expertise are used in education, business development, democratic debate and political decisions. Polyocular learning processes could help us overcome the paradox of scientific expertise by enabling us to handle perspectival knowledge asymmetries, and thus contribute to a more reflexive expertise and a less fragmented basis for democratic processes and societal decisions. ◆

Notes

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An Extended Model of Knowledge Communication: The Situational View of Dealing with Asymmetries

Hanna Risku, Eva Mayr, Florian Windhager, Michael Smuc

Abstract In this paper, we examine the consequences of knowledge asymmetries in complex communication scenarios, looking especially at those situations in which professionals – in our cases translators and visual information designers – are required to manage communication for other parties, produce texts and design information. After describing the general knowledge communication setting in information design processes, we will discuss the knowledge asymmetries and diversities which characterize this scenario. We base our arguments on conceptualizations of knowledge as constructive and situative. This constructivist, situational perspective on knowledge confronts us with new challenges for translators and visual information designers. To overcome these challenges, we propose an extended model of knowledge communication and different strategies for addressing the changes in information design and translation practice that result from a situated view on knowledge communication. This novel conceptualization of the knowledge communication setting manifests itself in four changes to the information design process: a changed view on user knowledge as situated, on artefacts as enriched, of target users as innovators, and of information designers as situation designers.

Keywords knowledge asymmetries, information design, knowledge communication, translation, visual information design, situated cognition

1 Introduction[1]

Imagine the following situation: you buy a new smartphone, turn it on, but find you cannot use it (a situation two of the authors found themselves in only recently). You consult the operating instructions, but after a quick look, you become aware that you don't understand them. Why? You might lack the necessary knowledge of the subject matter. Or the author might have used terms you do not understand. Your knowledge and that of the author are not symmetrical. Such knowledge asymmetries often present barriers in communication processes. Overcoming them is the task of those people who mediate between suppliers and their customers: information designers, translators, interpreters, technical communicators, etc.

In this paper, we examine and try to explain the consequences of knowledge asymmetries in complex communication scenarios, looking especially at those situations in which professionals – in our cases translators and visual information designers – are required to manage communication for other parties, produce texts and design information and thus overcome the various communication barriers that confront non-professional communicators.

Information designers use "pictures, symbols, colors, and words to communicate ideas, illustrate information or express relationships visually" (Tactical Technology Collective 2008). Their aim in doing so is to augment cognition. In our cases, translators use mainly verbal means to communicate information, whereas nonverbal, visually designed information is a dominant factor in the work of information designers. Since texts and visual elements can be combined in many ways, we will address both forms of information design in this paper in order to adequately cover the middle ground in enriched artefact design.

After describing the general knowledge communication setting in information design processes, we will discuss the knowledge asymmetries and diversities which characterize this scenario. We base our arguments on conceptualizations of knowledge as constructive, individualistic, and situative. Taking a constructivist, situational view on knowledge influences the way we conceptualize knowledge communication: cognition – and, consequently, also communication – is a context-dependent process in which the interplay of social environment, scaffolding artefacts, the brain, and the body form an extended network of activity (Ziemke/Frank 2007, Hutchins 1995, 2010). Therefore, knowledge asymmetries arise not only on a cultural, but also on the individual, community and situational levels.

This constructivist, situational perspective on knowledge confronts us with new challenges for translators and visual information designers which have not been previously addressed systematically. To overcome these challenges, we propose a number of different strategies which can be applied in the process of creating mediating artefacts – be they translations, information visualizations, or other designed artefacts.

2 General Setting of Knowledge Communication

Common depictions of knowledge communication usually involve a knowledge source (A), targeted individuals or groups (C), and – in the case of professional knowledge communication – a mediating party (B) who strives to transfer specific content or information from A to C (see Figure 1).

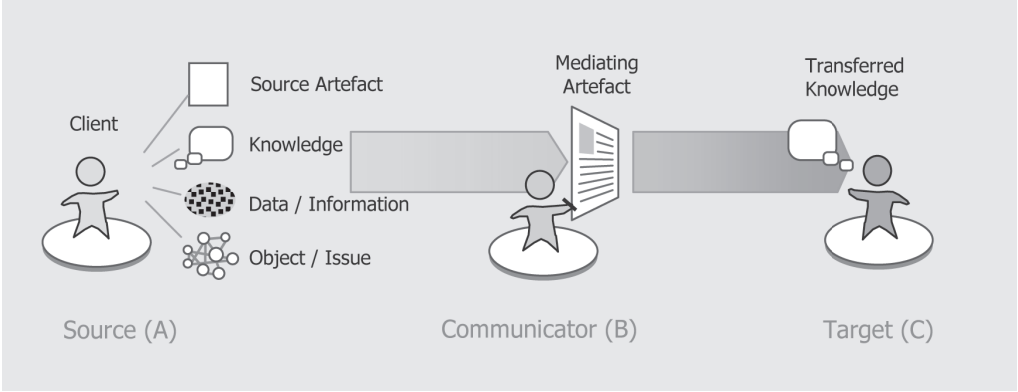

Figure 1: Traditional model of knowledge communication

Classic communication models (Shannon/Weaver 1949, Hollnagel/Woods 2005) only rudimentarily cover scenarios of knowledge communication 'in the wild'. Such settings and the aspired 'transfer process' from A to C are highly complex and can involve a number of asymmetries and barriers which form formidable challenges for all sides. The traditional way to deal with these challenges is to entrust the matter to agents who are (or have been) part of both the source and the target community and should thus be able to handle the transition by bridging the two worlds with mediating activities and artefacts. A classic example is the assumption that any person sufficiently proficient in both the source and the target language will be able to translate a text, i. e. viewing translation as a linguistic process of decoding and encoding an invariant, text-inherent meaning.

Knowledge communication can be defined as the "(deliberate) activity of interactively conveying and co-constructing insights, assessments, experiences, or skills through verbal and non-verbal means" (Eppler 2006: 317). This includes a change of perspective away from trying to communicate knowledge from A to C (as in the classic model above) towards a view of a dialogical, transactive process of co-construction (Kastberg 2010, Peschl/Fundneider 2010, Risku/Peschl 2010). Co-construction is most easily accomplished in direct face-to-face communication situations. In all other situations (particularly those involving media-based or mass communication as is often the case in translation or information visualization) this transactive situation has to be consciously reproduced (this is the overall goal situation as depicted in Figure 5; however in practice, trade-offs often have to be made, as shown in Figures 2–4). Some of our approaches therefore build on a classic communication model and only become transactive through their supplementation with other approaches. In this article, we seek to discuss the range of opportunities that can be used to make the process partially or fully transactive.

In this process, visual information designers and translators – as managers of this communication process – have to adapt their activities and products to the target community (see functional theories on translation; Vermeer 1989, Holz-Mänttäri 1984, Nord 1997). In other words, they have to take into account the knowledge held by senders and recipients and the asymmetries in this knowledge. Clark and Murphy (1982) refer to this adaptation to the target group as "audience design". In the absence of detailed information on the recipients' knowledge, communicators may make use of heuristics, e. g. assume that the target group's knowledge is similar to their own (Nickerson 1999) or that the target group is part of a specific community with a specific knowledge background (Clark/Murphy 1982). However, in practice, the situation is more complicated.

3 Asymmetries, Challenges and Barriers in Knowledge Communication

A highly simplistic view on knowledge regards it as 'transferable', i. e. as an object that can be easily conveyed from one person to another. However, knowledge is not a 'mailable' product (Risku/Peschl 2010); it has to be actively reconstructed by the receiver based on the information provided by the sender. This reconstruction is not an isolated activity in the human brain, but emerges instead "from multiple domains and systems, including the environment, perception, action, affect, and sociocultural systems" (Barsalou 2010: 325). This means that (1) understanding is always embedded in the meaning and reference systems of the different *individuals*, (2) information is interpreted according to the values and knowledge systems of the relevant *cultures* and *communities*, and (3) knowledge construction and communication are dynamic processes which adapt to the actual *situation* (see theories on situated cognition, e. g. Suchman 1987, 2007, and cognitive ecology, e. g. Hutchins 1995, 2010). Consequently, we will now take a closer look at these three sources of knowledge asymmetries and diversity.

3.1 Individual Asymmetries

It is common knowledge that people differ in their attitudes, personality, abilities, and numerous other aspects. However, the fact that these differences affect the way a person reconstructs the knowledge drawn from an artefact (e. g. a text or an image) is often neglected in the design and translation of information. In a knowledge communication context, prior knowledge, ex-

pertise and experiences are particularly relevant examples of such individual attributes. Classic text comprehension theories (Kintsch/van Dijk 1978) assume that bottom-up, artefact-driven and top-down, prior-knowledge-driven processes interact when a text is processed. Prior knowledge also influences the way we process information visualizations (Schnotz 2002). In communication situations involving subject matter experts, the influence of prior knowledge on comprehension rises from the fact that their knowledge is organized more efficiently than that of laypeople (Bédard/Chi 1992): expert knowledge is organized according to meaning, not superficial characteristics, with more connections between the single units. Accordingly, experts can build on a more structured knowledge base when they process new information and understand this information differently to their lay counterparts.

Creating an artefact which accommodates users with different attitudes, skills, and knowledge (Shneiderman 2000) poses a difficult challenge to information designers. For an artefact and its communicative function to be understood, the former has to meet the user's prior knowledge to some extent. Consequently, the designer has to establish a certain level of common ground with the user (Chen 2005).

Similarly, translations are meant to be read and interpreted by members of the target culture, whose understanding is grounded in their individual expectations, interests, and prior knowledge. Thus, the end result of the intercultural knowledge communication process is influenced by the individual transformations carried out by the target readers.

But these are not the only interpretations and transformations included in the process. Before a translated text reaches the reader, it has already been transformed by the translator. Translators try to understand texts for a specific reason and in a specific situation: they read a text in order to use it as source material for another text in another situation and for another culture. In doing so, they activate numerous patterns and use different interpretations, simultaneously trying to anticipate the possibility of integrating target relevant contents in the target cultural situation. Each translator's know-how, experience and prior knowledge of the source culture affect the way he/she understands. The picture of understanding that emerges here is one of a prospective interpretation process based on the individual knowledge of the translator as a communicator with a job to fulfill (not a subject independent decoding of a linguistically transparent meaning). Depending on their level of competence and the complexity of the job, translators in their capacity as mediators might use learned checklists or various individual, systematic text analysis routines (involving extra-textual aspects such as place, time, sender, receiver, and medium, and intra-textual aspects like word order, verbal and nonverbal signs; see Nord 1991). The actual aspects which are given most attention in a specific translation project depend on the job itself and the anticipated function of the target text (i. e. the translation).

3.2 Community and Culture-Based Asymmetries

In addition to individual factors like prior knowledge, membership in a group, culture, or community also influences how an artefact is understood. In a work context, employees can be members of *communities of practice* (CoPs), i. e. "groups of people informally bound together by shared expertise and passion for a joint enterprise" (Wenger/Snyder 2000: 139). In addition to their individual knowledge, CoP members have a shared knowledge system that includes both socio-technical systems and conceptual frameworks (Fischer/Ostwald 2003, Lave/Wenger 1991). Information is interpreted with reference to this knowledge system, which

serves as common ground for knowledge communication (Clark/Brennan 1991), thereby enabling members of the community to communicate effectively, but at the same time acting as a barrier to people outside the community who do not share this common ground.

Interactive communities of practice share many characteristics with cultures and can thus be seen as subcultures, i. e. parts of larger cultural frameworks. Chiu and Hong (2005: 490) emphasize the dynamic and agentic aspects of culture:

> In this view, culture consists of a network of knowledge and practices that is produced, distributed, and reproduced among a collection of interconnected people; […] because cultural knowledge in a delineated population is not perfectly shared, cultures are not homogeneous monoliths.

Thus, the concept of culture is closely linked to the concept of knowledge. The cultural anthropologist Fredrik Barth (2002: 1) refers to knowledge as "all the ways of understanding that we use to make up our experienced, grasped reality". According to Barth (2001: 1), "knowledge provides people with materials for reflection and premises for action" and "action becomes knowledge to others".[2] Cultures are characterized by partly shared value and knowledge systems that result from interaction, common experiences, and specific cultural (mental and physical) artefacts. As an essential element of culture, languages are interpreted within these value and knowledge systems. Unlocalized icons and product names, for example, often acquire unprecedented meanings in a target culture. Similarly, a technical translation may need to be written and designed in a fundamentally different way to the source text in order to achieve a similar function or impact in the target culture as the original did in the source culture.

In contrast to members of communities of practice or cultures, the members of a *community of interest* (CoI) cannot base their communication on a shared knowledge system. When members of different communities of practice come together with a shared goal (e. g. to gain insights from a translated text or an information visualization), they build a community of interest. Yet, the members of a community of interest lack a shared understanding (Fischer/Ostwald 2003), and knowledge asymmetries and diversities are likely. Since "communities are emergent […] in the process of activity" (Brown/Duguid 1991: 49), they cannot be easily defined and characterized, but must instead be analyzed on a situational level.

3.3 Situational Asymmetries

Communication happens in the here and now. When readers and users look for meaning, try to make sense of an artefact and act, they draw on a number of environmental cues, starting with situational factors like the occasion, task at hand, aim, physical environment, what has been said before, and actual people involved (Risku 2002). More or less by accident, even the smallest environmental factors can play a crucial role for (or against) understanding. We thus rely on specific, prevailing spatio-temporal circumstances as a fundamental source of understanding: successful communication is dependent not only on knowing preconceived meanings and conventions, but also on designing for the contingencies of the target situation (Suchman 2007).

According to the situated action approach, one of the main reasons for our intelligence is that we delegate knowledge to our environment. By doing so, we reduce the need to store, search for, and process this knowledge in our brains. When we need information, these exter-

nal aids, like the artefacts in our communication scenario, are used as scaffolds (Clark 1997) and serve as teaching, learning, and organizational aids ('plan as resource'). A mediating artefact can support – or hinder – knowledge communication, depending on how well its design matches the situation and the user's individual and cultural knowledge. To communicate knowledge effectively and sustainably, the target audience, communities, and situations have to be analyzed and profiled accordingly (see Chapter 4).

Even though prior knowledge does not totally determine action, it does play an essential role in communication. In complex situations such as translation, where at least two different communication situations have to be grasped, prior knowledge allows us to make good use of the resources at our disposal and to interpret the situation and its verbalized components in a way that makes sense. However, prior knowledge can also be highly misleading: the sense the readers and users thus construct might follow a line of thinking that stems from another context or relies on prior information that is not adequate for the situation in question. This can be seen and experienced for example when new concepts and/or technologies are introduced: knowledge of mechanical machines might not apply in the PC world, while computer literacy might not suffice for interaction with the location-sensitive software on the touch screen of a handheld.

Figures 2–4 illustrate different asymmetries discussed in this article. They should be viewed as detail elements of the overall situation shown in Figure 5. In other words, the unidirectional arrows in Figures 2–4 only represent the middle main arrow in the overall model (Figure 5) in zoomed out or simplified form. All the bidirectional and interactive transactions in Figure 5 remain intact and also applicable to Figures 2–4 (including the iterative and participative loops).

Figure 2 provides an overview of the communication asymmetries described above. One of the major problems in information design is the knowledge gap between source and target (a), which is more severe when different target groups and receivers come into play. In these cases, the communicators have to deal with different knowledge levels (b), community and culture induced reception differences (c), and the effects of different situations (d). In the next section, we will introduce and illustrate different strategies that can be used by information designers and translators to take these knowledge asymmetries into account.

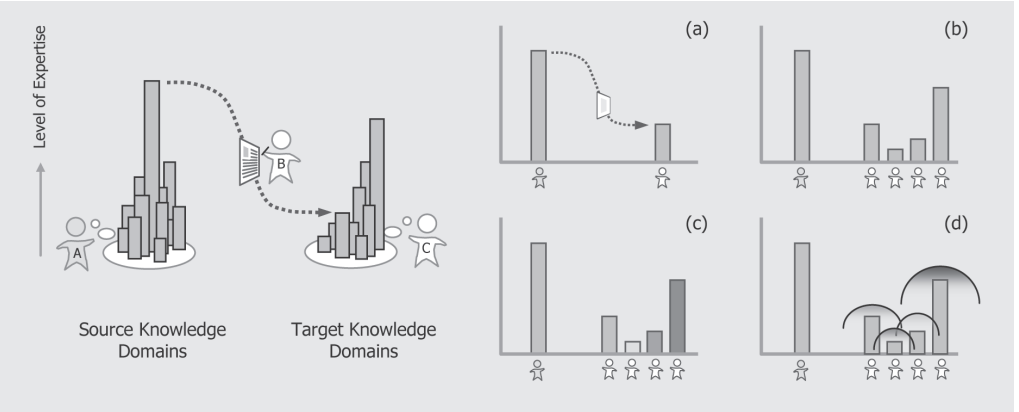

Figure 2: Knowledge communication as mediating activity between various levels and asymmetries of domain knowledge: (a) knowledge gap, (b) differing knowledge gaps of various individuals, (c) differing individual and community induced knowledge styles, (d) differently situated knowledge domains. This illustration is intended as a detail element of the extended model of knowledge communication shown in Figure 5.[3]

4 Overcoming the Challenges of Knowledge Communication

If knowledge is considered to be constructive and situative, this not only means that artefacts are received differently by each target person, but also that they have to be created differently: translators and information designers have to take into account the knowledge asymmetries and diversities shown in Figure 2 in the process of designing mediating artefacts. This affects not only the actual design of the artefact (Section 4.4), but also the information which needs to be gathered in advance (Sections 4.2 and 4.3), the participants in the process (Sections 4.1 and 4.7), and the support provided to receivers when they actually use the artefact (Sections 4.5 and 4.6).

4.1 Participative and Iterative Design

There are many approaches to bringing users or receivers into the communication design process. Ortlieb and Holz auf der Heide (1993) structured these based on the users' role, activity and temporal integration in the process by asking the following questions: (1) Who are the participants? This could be either the users themselves or representatives of the users. (2) How do the users participate? Users can be passive contributors or active co-decision makers (along with other stakeholders). Users are most active in so-called *user driven design*, where they can be viewed as (co-)creators. (3) When do the users participate? Users can be integrated during the whole process or only at specific times.

In contrast to closed and unidirectional artefact development processes, iterative development cycles permit information designers to consult the users more frequently. The major advantage of constant user participation (and usability testing) is the possibility it offers to obtain feedback on early versions and prototypes of an artefact, to observe artefacts in direct use in authentic situations, and to adapt the artefacts to the different ways they are used. Nearly all the examples in the following sections build on this iterative approach.

4.2 Information Analysis

As a precondition for translation or information design activities, communicators approach the source topics and facts, generate a deeper understanding of the source content, structure, and meaning, and identify which (prior) knowledge is required to understand or make use of them. Methods for analyzing verbally structured information include content analysis (Krippendorff 2004), close reading, discourse analysis, and heuristic approaches; corresponding methods for information design include document or data analysis, visual analysis and exploration, and workshops with experts.

Nord's model of translation oriented text analysis (Nord 1991) has become a text book approach in translation studies: the model shows translators how to situate the source material in its extra-textual situation and carry out a detailed intra-textual analysis in order to produce a translation that does justice to the original in those aspects of the text that are relevant for the target group. For example, when translating instruction manuals (for a similar purpose and function in the target culture), intra-textual characteristics such as lexis and text composition might have to be changed to accommodate knowledge levels and cultural conventions in the target culture.

In many translation projects, it is crucial to try to retrace the understanding of the source text receivers. Vannerem and Snell-Hornby (1986) and Kußmaul (2007) implement Fillmore's (1977) model of scenes and frames to explain the experiential basis of text comprehension. Source text writers and source text readers activate their individual and culture specific scenes in line with their experience. Depending on the communicative purpose of the translation, it may be necessary to try to find the nearest possible scene or else resort to trying to evoke different, yet communicatively adequate scenes in the target culture.

Since information design projects also rarely start from scratch, preparatory information analysis plays a crucial role here, too. From a practitioner´s perspective, there are several challenges to be overcome in the interplay between the communicator and the client. These can range from knowledge asymmetries about the domain to a lack of understanding of the client's intentions. All too often, the data basis is compellingly large, complex, and interrelated, and/or the contents are over- or under-documented. Alongside classic solutions to overcoming these barriers (like glossaries, executive summaries, or document analyses), pre-processing information for restructuring purposes can also be of valuable benefit. For example, in one of our recent research projects (Smuc et al. 2009), the clients had to deal with hundreds of different statistical graphs to analyze their time-dependent data. The research team restructured the data by generating a 'theme park' of the complete collection of graphs on a single poster, using the visual metaphor of a river to represent the flow of time, and the operations on this river (e. g. reservoirs) for data aggregation. In the course of the project, these and other metaphors facilitated communication between the project partners by providing a common frame of understanding.

4.3 User and Situation Analysis

Indispensable insights can be generated by getting to know the (many different current and potential future) users and analyzing their (prior) knowledge, most important tasks, or (collective) activities in their own specific environments. Methods of doing so include in-depth interviews (the most common method), as well as ethnographic approaches (e. g. contextual

inquiry; see Beyer/Holzblatt 1998) in which the interviewer assumes, for example, the role of a trainee learning the job or tasks to be redesigned. Other, less user and/or situation invasive methods based primarily on estimations of representative users include target group definitions or user and task analysis (DIN EN ISO 9241 1997, DIN EN ISO 13407 1999), scenario techniques, and the persona method (Cooper 1999).

There is also an emphasis on user/reader and situation analysis in translation studies. The above mentioned extra-textual factors in Christiane Nord's analysis model (1991) are a case in point. In addition, Nord (1991: 38) stresses that the starting point in a translation process is not the source text and its analysis, but the analysis of the translation brief/order, including the prospective target communication situation.

Theoretically, professional translators could be expected to already be well equipped for target situation and target group analysis. Translators are aware of the situative aspects of knowledge communication. They also analyze target groups, target situations, and source texts. However, empirical evidence suggests that translators lack competence in target group and situation analysis. In a series of interviews conducted by Hanna Risku, one of the interviewees (six former translators now working in the field of technical communication) expressed her feelings when first faced with the challenge of target situation analysis as follows: "I felt totally out of my depth, like a complete moron" (Risku 2004: 187). The interviewees found target analysis and maintaining the user perspective when talking to subject matter experts to be the most important and difficult tasks. To some extent, however, they felt unprepared to systematically assess user/reader knowledge levels. When they did manage to assess the target group, they did not know how to carry out task analysis (i. e. research the environment, actions, and needs of the user/reader), and thus lacked the necessary criteria to select the content and structure of the target text. As translators, they had learned to concentrate on linguistic and terminological research, whereas in technical communication, they had to determine, select, and structure argumentation and content. One of the interviewees suggested that attending training courses for users might be beneficial to understanding their needs and issues. Currently, however, there are signs that the roles of translators and technical communicators are partly converging (see Gnecchi et al. 2011), with translators attending technical communication training courses and vice versa, thus overcoming at least in part the traditional boundaries between the two domains.

In the realm of visual information design, user and task analyses are carried out, for instance, in a complex visualization software development context. Even in challenging settings in which innovative prototype software has to be developed with only vague ideas of potential future user groups, user and situation analyses are conducted by bringing together prospective users with partial expert knowledge. This was the situation in one of our current research projects, ViENA (Visual Enterprise Network Analytics), where we brought together prospective users with expertise in one of the two main application domains: process and network visualization. The findings of these analyses guided the development of an integrative framework (Windhager/Zenk/Federico 2011, Zenk et al. 2011) for the design of the technical requirements.

4.4 Design of Mediating Artefacts

Creating mediating artefacts is one of the core processes in knowledge communication and includes the steps of planning, creating, developing, evaluating, and refining texts, information

visualizations, software tools, interfaces, etc. Although 'monomodal' artefacts do exist (e. g. pure textual or pure visual information coding) and can be created using our approach, we recommend the development and implementation of 'enriched artefacts', i. e. combining verbal and visual coding methods (text/image/sound/haptics) and integrating passive perception and interaction in knowledge communication. This recommendation builds on empirical evidence of the advantages of the complementary use of additional perception and information processing channels (such as dual coding, Paivio 1986, or multimedia learning, Mayer 2001).

Designed artefacts act as boundary objects, i. e. they create a shared context for knowledge communication (Clark/Brennan 1991, Fischer/Ostwald 2003). To ensure that the artefact corresponds to the target users' (diverse) prior knowledge and builds on common ground, there are three different (re-)design strategies that can be applied (see Figure 3).

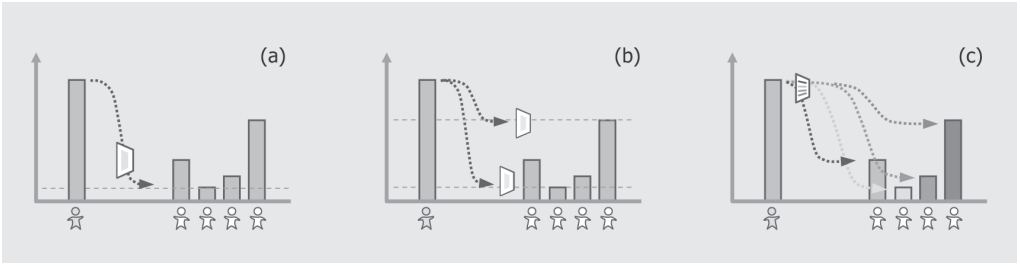

Figure 3: Some typical strategies as combinable patterns to overcome knowledge communication barriers: (a) designing a single ('universal') artefact with reduced complexity ('one-fits-all' approach), (b) designing multiple artefacts, and (c) designing adaptive and situation-aware artefacts. This illustration is intended as a detail element of the extended model of knowledge communication shown in Figure 5.

(a) *Designing a single artefact with reduced complexity*. Translators and information designers can orient themselves on the target user with the lowest level of prior knowledge and design one artefact that all users can understand (see Figure 3a). The aim of this strategy is to create one low threshold artefact for all. This is feasible (and sometimes indispensable) if a text is to be translated for a broad audience or information designed for public use. A common fear here is that this lowest common denominator will be useful for some, but not most users (Shneiderman 2000). If the artefact is too simplistic, it might not meet the requirements of expert or power users. As Einstein once suggested, things should be made as simple as possible, but not any simpler. Especially in situations in which every user has to act fast and accurately, parsimony and simplicity are often seen as desirable design goals. Although empirical research in traffic safety has long contributed to designing communication elements that are universally comprehensible and not too demanding for drivers, there are still a number of notable research gaps. In the recent IN-SAFETY project, for example, we studied the effects of individual skills, culture, and context on the comprehension of variable message traffic signs, with the goal of testing novel pictogram variants which would be comprehensible across the entire European transport network. Our results showed a clear need for low threshold artefacts in this time critical area of public use: in contrast to the findings of classic memory and recognition experiments (Miller 1956), only a strikingly low number of pictograms could be recognized and correctly memorized in test settings designed to be similar to real life driving situations.

Furthermore, our results showed that pictograms with many information elements should be avoided, while animated traffic signs were too demanding and raised critical safety concerns. In further experiments, we found that contextual information could (at least to some extent) improve user performance (Siebenhandl et al. 2008). In the design of verbal artefacts, language-specific concepts like plain English suggest using the corresponding strategy of creating a single artefact with reduced complexity. In an international context, the use of so-called 'international English' is an attempt to find a common denominator by reducing the complexity inherent in native language use (see Snell-Hornby 1999: 104 for a discussion on 'McLanguage'). For literary translation, the topic of writing for an international audience is discussed by Tymoczko (1999: 32) in the post-colonial literature context.

(b) *Designing multiple artefacts which meet different user needs*. If it is not possible to create a single artefact for all users, multiple – or at least two – artefacts can be designed for different users (user groups) and situations (Shneiderman 2010). We are currently working, for example, on a research project in which we have designed an innovative rail ticket vending machine. In the user analysis, we identified users with low technological self-efficacy who were reluctant to use a ticket machine at all. A ticket machine with a step-by-step purchase process in which each question has to be answered separately would allow tickets to be bought in a similar manner to conventional ticket counter sales. But 'power users' want to purchase tickets with two clicks and would reject such a step-by-step interface. Consequently, two different modes of purchase are potentially required to meet the needs of both user groups (Schreder/Siebenhandl/Mayr 2009; see Figure 3b). In intercultural knowledge communication, instead of trying to create a text that is comprehensible to all users (Figure 3a), a corresponding strategy of designing for two 'extremes' (Figure 3b) would be to write one version of a company newsletter for staff at head office and an adapted version for subsidiaries in other countries (leaving out specific information only relevant to head office staff, yet still keeping international staff up to date on key developments and events).

(c) *Designing adaptive and situation-aware artefacts*. Advanced interactive artefacts can be designed to adapt to and be 'aware' of the user's current situation (see Figure 3c). These either adapt to explicit user input (e. g. the level of expertise indicated or choice of settings) or implicitly to user behavior or the actual context (see Mayr/Zahn/Hesse 2007). In the case of artefacts that adapt implicitly, the user's current location (identified, for example, via GPS or IP address data) or activity can serve as user information. Examples of such artefacts include satnavs which adapt maps to the current location or websites and search engines which are automatically translated to the default language for the user's home location (based on the IP address). Similarly, a hypertext could be adapted to a user's assumed level of knowledge level by 'observing' how often the user looks up technical terms in a glossary (for example, a user who consults the glossary frequently could be shown a version of the text designed for users with lower terminological fluency). A drawback of situation-aware artefacts is their dependency on technology. Along with the multiple artefacts that have to be designed (e. g. a website in different languages), program adaptation algorithms are also required. This cannot be achieved by a single translator or information designer, as we will discuss in Section 4.7.

4.5 User and Community Design

If it is not possible to create multiple artefacts, and the lowest possible threshold does not meet the needs of some users (e. g. those with low linguistic capabilities or low prior knowledge), it may ultimately become necessary to design a medium-level artefact and allow for comprehension issues by training some of the users. This procedure is often the last resort if the subject matter to be communicated is simply too complex: you adapt the users to the artefact after doing your best to adapt the artefact to the users.

While user design might, at first glance, seem to exceed the sphere of duties of knowledge communication experts, given our guiding paradigm of situated cognition, this strategy and further situation-aware approaches are obvious next steps (see Figure 4).

The aim of user design is to change the users' prior knowledge and thereby reduce existing knowledge asymmetries (see Figure 4d). This knowledge can be changed by designing additional artefacts (e. g. manuals, glossaries, and guides for beginners) or collective training measures (e. g. preliminary or further education courses or seminars). An example of such measures in the field of intercultural training can be found in Denman-Maier (2004), in which she conducted a contextual study and requirements analysis in preparation for designing web-based training modules for culturally heterogeneous user groups sharing the same professional background (helicopter pilots and technicians).

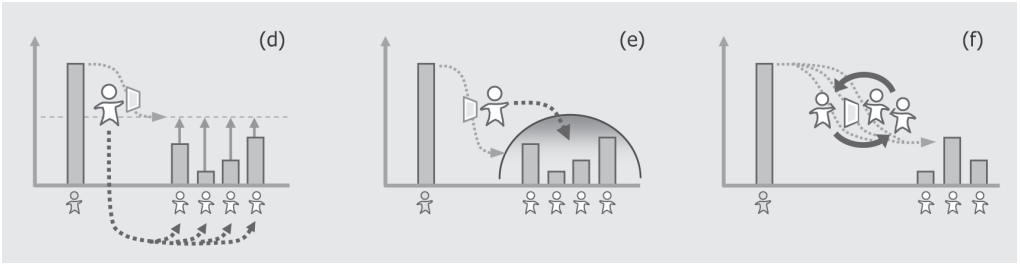

Figure 4: Further strategies to overcome knowledge communication asymmetries: d) user and community design, (e) creating enabling user situations, and (f) collaborative information design (see also Figure 5). This illustration is intended as a detail element of the extended model of knowledge communication shown in Figure 5.

4.6 Situation Design

In the situational view on cognition and communication, insights into the decisive role of the receivers' environments ultimately lead to the question of how such environments can themselves be designed or developed to enable processes of knowledge (re-)creation. Examples here include situation adaptation (e. g. designing situation-aware artefacts which in turn influence the situation), change in workplace layout (e. g. 'getting rid of distractors', Risku/Mayr/Smuc 2009), knowledge-intensive workplace design (Meusburger/Funke/Wunder 2009, Sailer 2006), and the design of 'enabling spaces' (Peschl 2007, Wiltschnig/Peschl 2008). The aim behind designing enabling spaces is to support knowledge work and processes of innovation, knowledge construction, and knowledge creation on the individual and collective levels. To reach this goal, communicators direct their attention to enhancing situative factors like the participative optimization of physical and architectural spaces, the technological infrastructure, the reflec-

tion and discussion of social, epistemological and emotional framework conditions, and the collaborative use of virtual space(s).

Translation projects can frequently include the production of presentation materials for scientific and technical communication purposes. In these cases, the source material often only exists in fragmentary text form, as the presentation or lecture will only be given in the target language and there is thus no need for a source presentation. Such source material can be made up of technical specifications and product descriptions or annual reports and public relations texts, with the target text taking the form of presentation slides and a manuscript. For such projects to be successful, the client (i. e. the future speaker) and the translator have to work closely together and exchange detailed information about the required materials and the target setting and design.

4.7 Collaborative Design

When complex source and target artefacts are involved, the measures and strategies to cope with communication barriers described above cannot be mastered by one single person. A task as complex as the design of multilingual or multimedia information products, be they technical, medical or scientific in nature, requires extensive cooperation between many qualified experts. It is this collaboration between editors, translators, localization experts, graphic designers, and developers (and the combination of print and electronic media) that makes professional text design possible in the first place (Risku/Pircher 2006). The immediate transfer of documents and texts made possible by technology means projects can now be handled by global teams. Communication and translation projects can now be realized by virtual teams distributed around the world in new forms of collaborative work where the participants have to meet high demands in terms of work pace, productivity, and availability (Risku/Dickinson/Pircher 2010).

Accordingly, translation can be seen as a good example of computer-supported cooperative work (CSCW – in itself an interdisciplinary field of study in technology development and systems design). Meeting with experts to gather information, coordinating teams, researching subject matter, creating, managing, and distributing documents and glossaries, working with project or translation management systems, networking with colleagues around the globe, and providing consulting services to customers are now very much part of the day-to-day work of many writers and translators (Risku 2007).

Computer-supported collaborative visualization (CSCV, see Wood/Wright/Brodlie 1995) can be viewed as a subfield of CSCW and has undergone some dynamic developments in recent years. The emergence of various web-based collaborative visualization networks allows in particular for a new collaborative way of handling complex datasets, which can be jointly discussed, explored, visualized, evaluated, and refined by many experts (Heer 2008).

These developments have been enabled and enforced by major trends in knowledge communication. In a recent participative observation study of working practices in a translation company by Risku et al. (2010; see also Risku 2010), the changes observed were grouped into four key areas: (1) increased standardization of processes and communication, (2) increased dependence on translation specific information and communication technologies (including a shift towards screen-based work and an increased proportion of indirect, electronic communication), (3) increased professionalization and specialization in work distribution (including a shift in competences, such as the reduction in the linguistic and cultural ties in translation

management), and (4) increased relevance of networking and external cooperation partners. In short, a higher level of professionalization and specialization can be observed in the distribution of work, along with more networking and greater use of digital technologies.

5 Conclusion and Outlook

Knowledge communication is often conceptualized as the transfer of (some) information from a sender to a receiver. In this paper, we have delineated how the view on this knowledge communication setting changes when knowledge is considered as constructive and situated. Consequently, professionals like translators and information designers, who manage knowledge communication processes by designing mediating artefacts, have to adapt their design processes and strategies to take into account the ways different users might (re-)create knowledge. This change in perspective can be described as a shift from a classic form of knowledge transfer (see Figure 1) to an extended model of knowledge communication (see Figure 5). In our graphical illustration of this extended view, we seek to emphasize transactivity and co-construction by showing multiple communication paths in both directions and expanding the scope of attention from knowledge to situations and communities, thus avoiding the directional transfer view from "source" to "target".

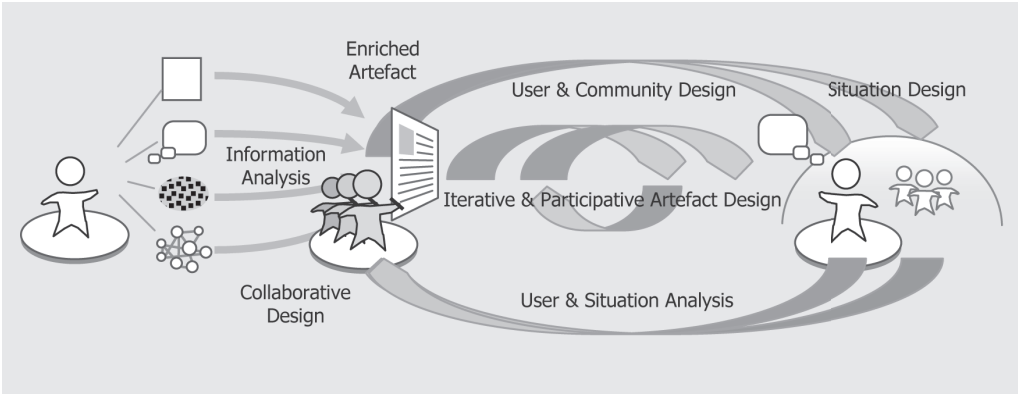

Figure 5: Extended Model of Knowledge Communication

This novel conceptualization of the knowledge communication setting manifests itself in four changes to the information design process:

(1) *Changed view on user knowledge as situated*. If we dismiss the classic notion that knowledge can be transferred like a mailable product from the sender to the receiver in favor of the idea that knowledge is reconstructed by the receiver (Risku/Peschl 2010), we have to consider factors which influence how this reconstruction is actually achieved. In this paper, we have emphasized three factors relevant for knowledge communication: individual prior knowledge, common knowledge of the receiver's (sub)cultures and communities, and the situation in which the mediating artefact is used. Consequently, knowledge differs not only between cultures, but also between individuals, and even within individuals! A receiver will re-create knowledge differently when using the mediating artefact in another situation, in another environment, with another task in mind, and with other people involved. To cope with the situatedness of knowledge in information

design processes, it is very important to gain an in-depth understanding of the target group during the user and situation analysis: their potential individual differences in expertise, relevant cultural influences, typical situations, and the resulting knowledge asymmetries.

(2) *Changed concept of artefacts as enriched*. From this situated, constructive view on knowledge, it seems problematic to regard knowledge communication as mass-medial, where one artefact is interpreted equally by all users in all situations, and where all users (re-) construct knowledge in a similar manner. We therefore emphasize the option of designing enriched artefacts, i. e. artefacts which combine different modes of presentation. For example, if a text is complemented with information visualizations, these illustrations can make it accessible to further user groups who are less familiar with the subject matter. Situation awareness can also enrich an artefact, as it supports the user in an ongoing situational activity and adapts to situational needs and reference frameworks.

(3) *Changed roles of target users as innovators*. In our view, the target users are no longer bystanders in the design process, who are only involved afterwards. Instead, they are repeatedly consulted during the design process. The target users are thus no longer passive 'mailbox-like' receivers; they become co-designers and innovators of the design process (Risku/Mayr/Smuc 2009). In open design communities (e. g. Wikipedia), they can become even more involved and blur the borders between the design team and the users (Fischer/Ostwald 2003). As Kastberg (2010: 68) notes, we could "look upon knowledge asymmetry not as a barrier but as a vehicle for change".

(4) *Changed role of information designers as situation designers*. To enable efficient information design within the knowledge communication scenario (with its diverse knowledge asymmetries), we recommend that information designers and translators focus not only on the design of the artefact, but also on the design of the situation: There might be the option that the receivers themselves be "designed". In other words, it might be possible to train them to (re-)create knowledge from the artefact in a way that is more coherent with the intended knowledge (which would in fact lead to convergences between the fields of technical communication, translation, training and development). The option of designing the situation in general might also be available. For socially disadvantaged target groups, for example, this would mean making the newest version of the technology accessible and including it in training and further education programs. In this way, we could change the context in which the artefact is used, so that the actual activity is more similar to the one intended. These are options that go beyond designing the artefact in a way that supports the users' situated activities. They open new doors for further research worth looking at more closely in future projects (see also Peschl/Fundneider 2010).

In this paper, we have focused primarily on knowledge asymmetries within the target group and between the target group and the sender. However, if we develop the ideas presented further, we see that knowledge asymmetries also exist within the sender (e. g. depending on his/her situation and/or active membership in communities) and within the design team. The strategies and communication model should be further enhanced to also allow for these asymmetries.

We have promoted a situated view on cognition and knowledge which has a strong impact on how a knowledge communication setting is conceptualized and how practitioners (like translators or information designers) can manage this process. We have also presented an extended model of knowledge communication and different strategies for addressing the chang-

es in information design and translation practice that result from a situated view on knowledge communication. Of these, we emphasize the value of designing or translating information in a collaborative team setting. However, we are aware that it is often not feasible to implement all these strategies, especially in small communication projects. Nonetheless, we hope to have provided an overview of the multiple sources for the complex, critical phenomenon of asymmetries in knowledge communication. Even if only some of these strategies are systematically applied in practice, taking them into account will certainly put us in a better position to manage the challenges of global knowledge communication. ◆

Notes

[1] This paper is a result of four years of collaboration and intensive discussions between the authors. It brings together and integrates views from cognitive science, translation studies, philosophy, cognitive psychology, information design, and usability.

[2] The increased dynamics and ephemeral nature of the current concept of culture have rightfully even raised the question of whether this concept is still feasible in a scientific context (Gürses 2003).

[3] We are aware that these diagrams are interpretable and may thus raise more questions than they are able to answer. However, we feel that it makes sense to probe the power of visualizations in a paper on the present topic and hope that they serve to illustrate the relevant aspects and inspire further discussion. The arrows in Figures 2–4 are only intended as simplified representations and should not be confused with a traditional sender-receiver model. Complex transactive and interactive processes can take place around these arrows (hence the use of dotted lines) as indicated in Figure 5.

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Wissensasymmetrien, Interaktionsrollen und die Frage der „gemeinsamen“ Sprache in der interdisziplinären Projektkommunikation

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Abstract The goal of the present discourse analysis is to report on the initial results of a DFG project on communication in interdisciplinary projects. Based on a case study, the following questions were investigated: 1) at what times or phases of a project communication problems occur, 2) what kinds of problems occur as a result of knowledge asymmetries, and 3) which interactive and discourse roles do participants take on when facing such problems? Three main conclusions can be drawn from the findings; first, that linguistic-communicative problems occurring in interdisciplinary projects are not simply a result of attempts to find a “common language”, but are grounded in issues of contextual, methodological, organisitory, and socio-pragmatic agreements. Second, these communication problems arise during the initial, preparatory phases of a project, earlier than social scientific process models suggest, i. e. as early as the writing and submission of the project proposal, as opposed to when the project work actually begins. Third, that these problems, induced by the inevitable presence of knowledge asymmetries among participants, must be resolved not only through active and consistent meta-communication, but also through meta-meta-communication. Evidence for these findings was gathered by means of interviews with project participants in which they reflected on the phase of jointly writing their project proposal from the perspective of their respective disciplines.

Keywords Wissenschaftskommunikation, Interdisziplinarität, Diskurslinguistik

1 Einleitung

Die moderne Forschungspraxis ist heutzutage ohne Projekte nicht mehr vorstellbar, weshalb bereits vereinzelt von einer „projectified society“ die Rede ist (Lundin/Söderholm 1998: 13). Die unterschiedlichsten Exzellenzinitiativen auf Bundes- und Landesebene sowie die Ressourcenverteilung innerhalb der Universitäten in Abhängigkeit (u. a.) vom Erfolg in der Drittmitteleinwerbung haben zu einem ständigen Wettstreit innerhalb der und zwischen den Disziplinen sowie den einzelnen Forscherinnen und Forschern darum geführt, wer die meisten und/oder bestfinanzierten (Drittmittel-)Projekte vorweisen kann. Viele Universitäten wie auch Förderinstitutionen deklarieren in diesem Wettstreit zusätzlich die Interdisziplinarität als forschungspolitisches Ideal (z. B. DFG 2008: 17–18, 150–151, 205–207, vgl. auch Laudel 1999: 9 f.). Dabei bleiben die methodischen, kommunikativen und nicht zuletzt auch strukturellen Probleme interdisziplinären Arbeitens jedoch meist unreflektiert. Dass eine solche Reflexion aber nötig wäre, zeigt die Begutachtungs- und Entscheidungspraxis vieler Geldgeber: Größere interdisziplinäre Projektgruppierungen haben es sehr häufig sehr schwer, sich erfolgreich durchzusetzen – eben weil die Gutachterperspektive (ebenso wie übrigens die über Projekte laufende Qualifikation des wissenschaftlichen Nachwuchses!) in der Regel eine disziplinäre ist. Dementsprechend stehen sich forschungspolitisches Ideal und die Faktizität disziplinärer Orientierungen in der Ausbildungs- und Bewertungspraxis spannungsreich gegenüber. Dies führt nicht sel-

ten zur Desillusionierung vieler WissenschaftlerInnen, was die tatsächlichen Möglichkeiten interdisziplinärer Kooperation betrifft.

Das forschungspraktische Spannungsverhältnis zwischen Disziplinarität und Interdisziplinarität fordert zu einer stärkeren wissenschaftlichen Reflexion interdisziplinären Arbeitens und insbesondere derjenigen Kommunikationsprozesse auf, die interdisziplinäres Arbeiten im Sinne der Drittmitteleinwerbung ermöglichen und im Sinne der Projektarbeit begleiten. Rahmenfragen für eine solche Reflexion sind aus unserer Sicht:

- Was ist unter ‚interdisziplinärem Arbeiten' in der Wissenschaft zu verstehen?
- Wer kann unter welchen Bedingungen interdisziplinär forschen?
- Welchen Anforderungen müssen interdisziplinäre Forschungskooperationen genügen (aus wessen Perspektive), und d. h. auch: Wer kann z. B. interdisziplinäre Forschungsprojekte angemessen beurteilen?
- Vor welchen konkreten kommunikativen wie arbeitspraktischen Herausforderungen stehen interdisziplinäre Forschungskooperationen im Einzelnen?

Diese Fragen werden in den folgenden Abschnitten (bes. 1.2 und 1.3) sprachwissenschaftlich konkretisiert und zugespitzt, um einen ersten Teil dieser Fragen nach einer begrifflichen Klärung (*Wissen*, *Nichtwissen*, *Interdisziplinarität*; Abschnitt 2) zuerst sozialwissenschaftlichen Perspektiven gegenüberzustellen (Abschnitt 3) und dann anhand einer Fallstudie zu beantworten (Abschnitt 4).

1.1 Forschungsstand

Es gibt zu diesen Fragen eine reichhaltige anwendungsorientierte Literatur mit Handbuch- bis Leitfadencharakter (z. B. Bergmann et al. 2005, Blanckenburg et al. 2005, Kawall/Schramm 2006, Bergmann et al. 2010). Diese Publikationen dienen in der Regel der **Unterstützung** erfolgreicher interdisziplinärer Forschungs- und Transferpraxis. Sie verfolgen im Gegensatz dazu aber keinen grundwissenschaftlichen Anspruch in Bezug auf die **Erforschung** interdisziplinärer Praxis. Ansätze dieser Art bieten bislang vorwiegend die Sozialwissenschaften (vgl. z. B. Laudel 1999, Loibl 2005, Böhm 2006, Neumeier 2008, Bergmann/Schramm 2008; zur Frage der Beschreibung einer „transdisziplinären Kompetenz" vgl. z. B. Perrig-Chiello/Arber 2002). Dezidiert sprach- und kommunikationswissenschaftliche Zugänge zum Thema fehlen dagegen jedoch, die sprachwissenschaftliche Erforschung interdisziplinärer Wissenschaftskommunikation stellt bislang erstaunlicherweise ein Desiderat dar. Zwar gibt es zahlreiche Studien zu Fragen der *inner*fachlichen oder der fach*externen* Kommunikation (vor allem im Kontext der Fachsprachen- und Wissenstransferforschung), kaum aber der *inter*fachlichen. Arbeiten aus dem Kontext der „Functional Grammar" beschäftigen sich zwar mit interdisziplinären sprachlichen Registern (z. B. Teich/Holtz 2009), aber nicht mit pragmalinguistischen Fragen der konkreten Arbeitsorganisation, der interfachlichen Abstimmung oder der diskursiven Überwindung von Wissensasymmetrien im Rahmen kollaborativer Textproduktion.

Linguistische Arbeiten zum kollaborativen Schreiben (z. B. Pogner 1999 und 2005 zu beruflichen Kontexten, Lehnen 2000 zum studentischen Schreiben) oder zum kooperativen Arbeiten (z. B. Tiitula/Piitulainen/Reuter 2007 für den interkulturellen Kontext) sind demgegenüber nicht auf interdisziplinäre wissenschaftliche Kontexte bezogen.

Diesem Desiderat will sich der vorliegende Beitrag widmen.

1.2 Projektkontext und Rahmenfragestellung

Die folgende Fallstudie steht im Kontext eines DFG-Projekts mit dem Titel „Die diskursive Aushandlung von Transdisziplinarität[1]. Projektkommunikation im Spannungsfeld von transdisziplinärem Anspruch und disziplinären Rahmenbedingungen" (2009–2012). In diesem Projekt geht es um die Frage, wie interdisziplinäres wissenschaftliches Arbeiten in kommunikativer Hinsicht „funktioniert", konkretisiert in folgenden Teilfragen:

- Wie wird Interdisziplinarität als Anspruch in der Antragsphase wie dem Genehmigungsprozess formuliert und während der Projektdurchführung von den Beteiligten diskursiv ausgehandelt? Welche Interaktionsrollen und Diskurspositionen nehmen die Projektbeteiligten dabei jeweils ein?
- Wie wirkt sich Interdisziplinarität auf die sprachliche Konstitution, Argumentation und Distribution von Wissen aus, d. h. vor welche besonderen Herausforderungen sehen sich die Projektbeteiligten unter der Perspektive der interfachlichen (wie unter Umständen auch fachexternen) Wissensvermittlung gestellt?
- Welchen Einfluss haben interdisziplinärer Anspruch einerseits, disziplinäre Rahmenbedingungen andererseits auf den Kommunikationsverlauf in interdisziplinären Projekten, d. h. auf die schriftliche und mündliche Begleitkommunikation und insbesondere die gemeinsame Textproduktion in den verschiedenen Projektphasen? Wie lassen sich insbesondere kooperative Textproduktionsprozesse im Kontext interdisziplinärer Forschung näher beschreiben?
- Wo in der interdisziplinären Projektkommunikation sind ggf. Konfliktpotenziale, wo Synergieeffekte auszumachen und welche Gründe lassen sich dafür identifizieren?

  Diese Fragen werden an einer Fallstudie bearbeitet, genauer: an einem Forschungsprojekt zwischen Politikwissenschaft und Physik (im Folgenden PolPhy-Projekt), das zeitlich um ein Jahr vorversetzt zum sprachwissenschaftlichen Begleitprojekt läuft (im Folgenden DFG-Projekt), aber von Projektbeginn an unter sprachwissenschaftlicher Beobachtung stand. Beide Projekte laufen zum Zeitpunkt des Redaktionsschlusses noch. Das derzeit vorliegende Korpus, mit dem im DFG-Projekt gearbeitet wird, besteht aus:
- 22 Versionen des PolPhy-Projektantrags aus unterschiedlichen Phasen seiner Entstehung sowie den Präsentationen und Fachgutachten aus der mehrstufigen Antragsphase,
- der gesamten E-Mail-Kommunikation der Projektbeteiligten aus der Antragsphase,
- leitfadengestützten Interviews mit allen Projektbeteiligten (drei Projektleitern und zwei Mitarbeitern) über ihr Interdisziplinaritätsverständnis sowie ihre rückblickende Wahrnehmung und Bewertung der Antragsphase sowie
- Protokollen und zum Teil Aufnahmen der Projektsitzungen seit Genehmigung des PolPhy-Projekts im Herbst 2008.

Mindestens zwei der drei Projektleiter des PolPhy-Projekts haben langjährige Erfahrungen in der interdisziplinären Forschung, der Mitarbeiter der Politikwissenschaft ist diplomierter Physiker und bringt somit von seiner Ausbildung her gute Voraussetzungen für interdisziplinäres Forschen mit.

1.3 Ziel des vorliegenden Beitrags

Der vorliegende Beitrag, der nur einen Teilaspekt des DFG-Projekts bearbeiten kann, konzentriert sich auf das Material der Interviews über die Antragsphase und geht anhand der Selbst-

und Fremdeinschätzungen der Befragten der Frage nach, welche kommunikativen Folgen Wissensasymmetrien bei den Projektbeteiligten haben. Diese Frage lässt sich durch folgende Teilfragen konkretisieren:

- Wann genau kommt es zu welchen kommunikativen Problemen zwischen den Beteiligten?
- Inwiefern werden diese Probleme von den Beteiligten auf Wissensasymmetrien zurückgeführt?
- Welcher Art sind diese Wissensasymmetrien (begrifflich, fachlich etc.)?
- Wie gehen die Beteiligten mit diesen Problemen um, d. h., wie positionieren sie sich selbst im Kommunikationsprozess, im Projekt und in Bezug auf ihren disziplinären Status?

Nach notwendigen Begriffsklärungen (unter 2) und einer sozialwissenschaftlichen Kontextualisierung dieser Fragen (unter 3) erfolgt im vierten Abschnitt ihre Beantwortung. Da beide Projekte noch laufen, sind die hier skizzierten Ergebnisse zwangsläufig vorläufig, verweisen jedoch bereits auf zentrale Zusammenhänge zwischen Projektkommunikation und Projektverlauf.

2 Notwendige Vorklärungen

2.1 Wissen und Wissensasymmetrie

Da es hier um ‚Wissen im Diskurs' geht und nicht etwa um die Frage, was an Fakten über Objekte wahr ist, übernehmen wir die Unterscheidung von Warnke zwischen *knowledge by acquaintance* („Wissen aus unmittelbarer sinnlicher Erfahrung", Warnke 2009: 123) und *knowledge by description* („diskursiv konstituiertes Wissen", Warnke 2009: 137). Wenn es im Folgenden um Wissensasymmetrien geht, steht Letzteres mit seinen durch spezifische Diskursregeln bedingten Eigenschaften im Vordergrund:

> Die sprachlichen Dimensionen [des diskursiv vermittelten *knowledge by description*; N. J./E. Z.] sind *Konstruktion*, *Argumentation* und *Distribution*, die den Zwecken der *Herstellung von Faktizität*, der *Rechtfertigung von Wissen* und der *Durchsetzung von* Geltungsansprüchen [sic] entsprechen und mit den Mitteln *Wahrheitsanspruch*, *Argumentation* und *Regulierung* erscheinen. Die so erzeugte Wirklichkeit und das Wissen über diese sind kein Phänomen der realen Welt, sondern eine Konzeptualisierung von Wirklichkeit. Mithin referieren Aussagen im Diskurs auch nicht auf semantische Fakten, sondern auf das, was Sprecher annehmen und folglich konzeptualisieren. (Warnke 2009: 125; Hervorhebungen im Original)

Wissensasymmetrien liegen demnach vor, wenn die Diskursteilnehmer unterschiedlich gut darüber informiert sind, welches Wissen in der eigenen oder einer fremden Diskursgemeinschaft bereits als argumentativ gerechtfertigt, als gültig und damit als „faktisch" gilt. Dies bezieht sich unmittelbar auf sprachliche Aspekte, da das diskursiv konstituierte Wissen einer Spezial-Diskursgemeinschaft auch an sprachlichen Routinen, zum Beispiel an der verwendeten Fachterminologie und an der Art und Weise ihrer Verwendung, festgemacht ist. Ein ‚Nichtwissen' bei einzelnen am Diskurs Beteiligten kann sich damit sowohl auf Wahrheitsansprüche, Argumentation und/oder Regulierung beziehen als auch als ‚sprachliches Nichtwissen' in einem engeren Sinn (= fehlende terminologische Kompetenz) niederschlagen. Im

Folgenden ist darauf zu achten, ob und welche Wissensasymmetrien vorliegen bzw. wie damit von den Beteiligten diskursiv umgegangen wird.

2.2 Multidisziplinarität – Interdisziplinarität – Transdisziplinarität

Der heutige Forschungsalltag ist durch eine Vielzahl neuer Kooperationsformen und -konzepte geprägt. „Cross-", „multi-", „pluri-", „inter-" oder „transdisziplinäre" Kooperationen scheinen den Wissenschaftsbetrieb zu erobern. Besonders die stark verbreiteten Ausdrücke *Inter-* und *Transdisziplinarität* werden begrifflich sehr uneinheitlich verwendet, so dass eine Klärung angebracht erscheint. Nicht nur chronologisch lässt sich hinsichtlich der Verbreitung der Begriffe eine Art „Evolution" von der Multi- über die Inter- bis zur Transdisziplinarität nachzeichnen, was die Ansprüche an die Kooperation der Beteiligten betrifft (vgl. auch die Überblicksdiskussionen bei Balsiger 2005: 135–188):

- Unter **multidisziplinär** verstehen wir mit Blanckenburg et al. (2005: 17), dass verschiedene Disziplinen eine gemeinsame Problemstellung aus ihrer jeweils eigenen disziplinären Perspektive bearbeiten, um über die auf diese Weise ganz unterschiedlichen methodischen Zugänge strittige Punkte und wichtige Forschungsfragen aufzudecken. Eine Synthese erfolgt additiv, durch Zusammenführung und gegenseitige Validierung der jeweils getrennt erzielten Ergebnisse. Der *disziplinäre* Erkenntnisgewinn und die entsprechende Akzeptanz der Ergebnisse in der jeweiligen engeren Fachcommunity werden hier als am höchsten eingeschätzt (siehe auch Balsiger 2005: 151–156).
- Unter **interdisziplinär** (in einem problemorientierten, weniger forschungspolitischen Sinne) verstehen wir idealiter, dass die Forschung „zwischen" den Disziplinen stattfindet, dass sich das Problem also nicht von einer Disziplin alleine lösen lässt, sondern nur in enger Kooperation verschiedener Disziplinen (Balsiger 2005: 173). Das Merkmal ‚interdisziplinär' bezieht sich damit sowohl auf die Teamzusammensetzung als auch „auf den Forschungsgegenstand, [...] die gewählten Methoden und das neue Wissen" (Blanckenburg et al. 2005: 16). In der Realität findet notwendigerweise dennoch häufig eine Arbeitsteilung statt; die interdisziplinäre Integration wird dann in gemeinsamen Projektbesprechungen und -diskussionen geleistet (ebd.).
- Unter **transdisziplinär** verstehen wir mit Bergmann et al. (2005: 15; ähnlich Balsiger 2005: 185), dass nicht nur unterschiedliche Disziplinen kooperativ an einem lebensweltlichen Problem arbeiten, sondern auch Partner aus der Praxis in den Forschungsprozess miteinbezogen sind. Das zu bearbeitende Problem wird also aus der Praxis in einen (interdisziplinären) Wissenschaftskontext getragen, wobei die Praxis ein genuines Interesse an praxisrelevanten Handlungs- und Lösungsstrategien hat. Die Ergebnisse werden demnach sowohl in die jeweiligen Fachcommunitys als auch in die Praxis kommuniziert.

Das hier untersuchte PolPhy-Projekt stellt in diesem Sinne von seinem Anspruch her ein interdisziplinäres Projekt dar: Physiker und Politikwissenschaftler untersuchen in diesem dreijährigen Projekt die Möglichkeiten und Risiken einer möglicherweise waffenfähigen Zukunftstechnologie im Bereich der Energieversorgung, wobei das gemeinsame Problem im Vordergrund steht, wie sich unterschiedliche Grade der Proliferationsresistenz in unterschiedlichen idealtypischen Governance-Strukturen und -maßnahmen niederschlagen könnten/sollten. Von ‚interdisziplinärer Kooperation' wäre demnach in diesem Fall zu erwarten, dass es zwar Aspekte der Forschungsarbeit gibt, die arbeitsteilig disziplinär bearbeitet werden, dass die zentralen

Fragen des Projekts aber nur in enger Abstimmung miteinander beantwortet werden können (z. B. physikalische Datengrundlage für politikwissenschaftliche Governance-Überlegungen, die auf die technischen Modellierungen unmittelbar zurückwirken). Vorauszusetzen ist daher, dass von der Vorbereitung der Antragstellung an eine enge Kooperation der Beteiligten und ihr intensiver fachlicher Austausch nötig sind.

2.3 Methodischer Rahmen der Fallstudie

Entsprechend dem hier gewählten Wissensbegriff erfolgt auch die Auswertung des Interviewmaterials[2] nach qualitativen diskursanalytischen Methoden, und zwar in Anlehnung an die Vorschläge von Warnke/Spitzmüller (2008). Im Vordergrund stehen die Akteure, ihre (nachträgliche) Reflexion und Metakommunikation bezüglich der gemeinsamen Textproduktion sowie ihre Selbst- und Fremdpositionierungen im konkreten Kommunikationsprozess, im Projekt an und für sich sowie im disziplinär-interdisziplinären Spannungsfeld. Es sollen die für den Projektzusammenhang relevanten Diskursrollen rekonstruiert werden und mit vorhandenen, unterstellten oder eingestandenen Wissensasymmetrien in Beziehung gesetzt werden.

Adamzik (2002) unterscheidet folgende Rollen, die von Interaktanten in der Kommunikation (meist sich überschneidend) eingenommen werden können:

Tab. 1: Mögliche Interaktionsrollen im Diskurs (nach Adamzik 2002)

Interaktionsrolle	**Beispiel**
Interaktanten als Akteure der illokutionären Rolle	*Befehlender, Fragender, Antwortender*
Interaktanten als Funktionsträger	*Prüfer, Kommissionsleiter, Projektleiter*
Interaktanten als Diskursakteure	*Anhänger/Befürworter/Gegner von x*
Interaktanten als Individuen, die unterschiedlich bereitwillig obligatorische oder freiwillige Rollen übernehmen	*Individuelle Übernahme der Rolle des Funktionsträgers, des Diskursakteurs, der Privatperson*
Interaktanten als Mitglieder der Sprach-/Kommunikationsgemeinschaft	*Muttersprachler, Nichtmuttersprachler, Fachmann, Laie*
Interaktanten als Kommunikanten (Beteiligungsrollen)	*Autor, Sprecher, Hörer, Leser*

Diese Kategorisierung wird für den größeren Projektzusammenhang noch zu modifizieren bzw. zu schärfen sein, weil es hier vorrangig um die interne Kommunikation zwischen Projektbeteiligten geht und nicht um größere Diskursgemeinschaften. Rollen wie *Diskursakteur* oder *Funktionsträger* sind voraussichtlich selbst in hierarchisch organisierten Projekten durch „weichere" Merkmale charakterisiert als im gesellschaftspolitischen Spannungsfeld, zum Beispiel wenn es um Rederecht/medial-strukturelle Äußerungsmöglichkeiten oder um Diskurspositionen geht. Interessant bleibt aber auch hier die Frage, wer (z. B. Professoren vs. Mitarbeiter) sich wann in welcher Form einbringt/einbringen darf/gehört wird, sich in welcher Weise disziplinär/interdisziplinär verortet und welche Probleme der interdisziplinären Kooperation wie

bewertet, kurz: wie die einzelnen Akteursrollen jeweils ineinandergreifen und sich während der Zusammenarbeit dynamisch immer wieder verschieben.

Im Hinblick auf die Diskurspositionen wird im größeren Kontext des DFG-Projekts vor allem interessieren, wer welchen interdisziplinären Anspruch wie und in welcher Projektphase thematisiert oder gar einfordert, wie die Gruppe angesichts unterschiedlicher fachkultureller Hintergründe und Machtverteilungen damit umgeht und wie die jeweilige Selbstpositionierung der Beteiligten dabei (affirmativ, defensiv oder aggressiv) zwischen disziplinär und interdisziplinär changiert.

Um rekonstruieren zu können, wer im Rückblick auf die Antrags- und damit die interdisziplinäre „Findungsphase" wem welche Rollen zuschreibt, werden in den Interviewaussagen unterschiedliche sprachliche Kategorien untersucht:

- **Formen der Selbst- und Fremdreferenz** (z. B. *ich als physiker*; *die politikwissenschaftler*) und ihre verschiedenen Funktionen (z. B. Integration vs. Abgrenzung: *jetzt haben wir* [gemeint ist die ganze Gruppe] *dieses Thema, das habt **ihr*** [gemeint sind die Professoren] *beantragt*),
- **Verben des Sagens und Meinens, Heckenausdrücke, Partikeln oder andere Formen der Modalität**, die den Geltungsanspruch eigenen Wissens indizieren, aber auch eine Diskurshaltung (aggressiv, offensiv, defensiv u. a.) ausdrücken können (z. B. *tut mir leid, das ist jetzt halt so reiner physikerkram*),
- **Sprechhandlungen der Zustimmung, der Ablehnung, der Entschuldigung, der Verteidigung**, die auf geteiltes Wissen einerseits, auf unterschiedliche Geltungsansprüche andererseits verweisen können (z. B. *da hast du recht; das seh ich anders; ich muss mich entschuldigen, es ist etwas kritisches, was ich sagen will; ich bin nicht so blöd, dass ich …*)
- **(weitere) metakommunikative Äußerungen**, erstens über wahrgenommene Diskurseigenschaften der eigenen und fremden Fachkultur, zum Beispiel im Umgang mit Terminologie (z. B. *also physiker haben einfach nicht die sensibilität dafür, wie bedeutsam begriffe in sozialwissenschaftlichen disziplinen sind; für die politikwissenschaftler, die eher theoriegeleitet arbeiten*), zweitens über die unterstellte Relevanz des Diskutierten für die verschiedenen Disziplinen (z. B. *das ist nur für irgendwelche physiker interessant, die …; vielleicht für irgendwelche politischen szenarien wichtig*).

Vor allem die letzteren beiden Kategorien bieten Raum für mehr oder weniger explizite Verweise auf anderen unterstelltes oder selbst eingestandenes Nichtwissen. In den Interviews spielen die Sprechhandlungen allerdings vorwiegend in nachgespielter direkter Rede eine Rolle und sind daher nicht so häufig anzutreffen wie in der mündlichen Projektkommunikation (die hier aber nicht Gegenstand der Untersuchung ist). Umso wichtiger ist daher für die folgende Auswertung die letzte Kategorie metakommunikativer Zuschreibungen.[3]

3 Sozialwissenschaftliche Prozessmodelle interdisziplinärer Projekte als Möglichkeiten der Verortung von Wissensasymmetrien?

Die Sozialwissenschaften haben sich schon intensiver und vor allem anwendungsorientiert mit interdisziplinärer Projektarbeit beschäftigt. Da hier bereits viele (sich stark überschneidende) Prozessmodelle zum interdisziplinären Arbeiten vorliegen, sollen die unter 1.3 skizzierten sprachwissenschaftlichen Fragestellungen vor dem Hintergrund soziologischer oder psychologischer Projektverlaufsmodellierungen, wie sie im Folgenden kurz vorgestellt wer-

den, diskutiert werden – zu erwarten sind aus der vorliegenden Fallstudie demnach auch Erkenntnisse für eine weitere Ausdifferenzierung solcher Modelle.

In idealtypischen Modellen zu inter- und transdisziplinären Projekten, wie sie zum Beispiel von Bergmann et al. (2005), Jahn/Keil (2006) oder Böhm (2006) vorgeschlagen wurden, werden häufig drei Phasen der Projektarbeit postuliert (hier dargestellt nach Bergmann et al. 2005: 17–19):

1. eine Einstiegsphase „Projektkonstruktion und -formulierung, Akteure und Akquisition", in der sich ein Team findet, das sich über den zu bearbeitenden Gegenstand, d. h. über die Fragestellung, Formen der Kooperation und Fragen des Zugangs einigen muss;
2. eine Phase „Projektdurchführung und Methodik", die meist von Arbeitsteilung und inhaltlich-methodischer Ausdifferenzierung geprägt ist;
3. eine Abschlussphase „Ergebnisse, Produkte und Publikationen; In-Wert-Setzung" der inter-/transdisziplinären Integration.

Blanckenburg et al. unterscheiden im Vergleich dazu insgesamt *vier* grundsätzliche Verlaufsphasen: „Vorbereitung, Konstituierung, Durchführung und Abschluss" (Blanckenburg et al. 2005: 27), die jedoch je nach Projekt unterschiedlich aufgebrochen werden können (z. B. durch Anschlussprojekte, Subprojekte oder Überführungen in die Praxis; Blanckenburg et al. 2005: 29). Durch die moderne Organisation des Wissenschaftsbetriebes kommt der ersten Phase eine besondere Bedeutung zu: Die Vorbereitungsphase reicht in der Regel von der ersten Idee bis zur Genehmigung des Projektantrags und wird deshalb von Blanckenburg et al. (2005: 28) auch als „Subprojekt des Forschungsprojektes [begriffen], das ebenfalls eine Vorbereitungs-, Konstituierungs-, Durchführungs- und Endphase durchläuft". Auch Böhm (2006: 113) trennt daher bewusst (1) die „Ausgangssituation interdisziplinärer Projektarbeit" von (2) dem eigentlichen „Beginn der gemeinsamen Arbeit" und (3) den „ersten Versuchen interdisziplinärer Zusammenarbeit". Wie sich die Phasenmodelle zueinander verhalten, ist im Überblick in Tabelle 2 dargestellt.

Tab. 2: Sozialwissenschaftliche Prozessmodelle inter- und transdisziplinärer Projekte im Vergleich

<table>
<tr><th>Bergmann et al. 2005</th><th>Blanckenburg et al. 2005</th><th>Böhm 2006</th></tr>
<tr><td rowspan="2">(1) Projektkonstruktion und formulierung, Akteure und Akquisition</td><td>(1) Vorbereitung</td><td>(1) Ausgangssituation interdisziplinärer Projektarbeit</td></tr>
<tr><td>(2) Konstituierung</td><td>(2) Beginn der gemeinsamen Arbeit</td></tr>
<tr><td rowspan="2">(2) Projektdurchführung und Methodik</td><td rowspan="2">(3) Durchführung</td><td>(3) erste Versuche interdisziplinärer Zusammenarbeit</td></tr>
<tr><td>(4) ...</td></tr>
<tr><td>(3) Ergebnisse, Produkte und Publikationen; In-Wert-Setzung</td><td>(4) Abschluss</td><td>...</td></tr>
</table>

Aufbauend auf empirischen Ergebnissen, postuliert Böhm für ihre Phase (2) das Merkmal „Euphorie", was die Stimmung der Projektbeteiligten betrifft. Bereits in Phase (3) folge dagegen

„Ernüchterung". Dieses Zusammenspiel von Euphorie (über ein interessantes gemeinsames Projekt und die erfolgreich beantragte Finanzierung) und Ernüchterung (durch die tatsächlichen Schwierigkeiten interdisziplinären Zusammenarbeitens) kündigt sich schon durch die Ausgangssituation interdisziplinärer Projekte an: Diese wird von Böhm charakterisiert durch Ressourcenknappheit, die Formulierung (unrealistisch) hoher Ziele, einen unterschätzten Aufwand an interdisziplinärer Zusammenarbeit, hohe personelle und strukturelle Komplexität mit der Folge möglicher Stereotypisierungen sowie hierarchisch geprägte Diskussions- und Entscheidungsstrukturen (Böhm 2006: 116–129, im Überblick 113). Zu vermuten ist, dass ein weiterer wesentlicher Grund für die Ernüchterung die Wissensasymmetrien in diesen Projekten sind.

Als Psychologin interessieren Böhm im Folgenden vor allem die Ursachen, Bedingungen, Strategien und Konsequenzen einer geringen vs. eine hohe „vertrauensvolle Verständigung" in den drei von ihr postulierten Anfangsphasen interdisziplinärer Projektarbeit. Sprachwissenschaftlich und für die vorliegenden Fragen interessant ist ihre Feststellung, dass die „Ernüchterung" in Phase (3), also wenn interdisziplinäres Arbeiten konkret erprobt wird, auch zustande komme durch das „Ringen um ‚gleiche Sprache' als Suche nach Sich-Verstehen und Verständigung" (Böhm 2006: 113).

Die Einzeldisziplinen bedienen sich aufgrund sinnvoller wissenschaftlicher Arbeitsteilung höchstentwickelter, oft gar formaler, nach außen hin jedenfalls meist esoterischer Fachsprachen, die sowohl für die Vertreter der anderen Fächer als auch für die Laien kaum zugänglich sind (Ropohl 2005: 29) und die damit auf einer fachlichen wie einer rhetorischen Ebene zu Kristallisationspunkten von Wissensasymmetrien im oben beschriebenen Sinn werden können (siehe 2.1). Außerdem verfügen die jeweiligen Disziplinen über distinkte Denkstile und unterschiedliche wissenschaftliche Arbeitsmethoden, kurz über unterschiedliche Regeln im Hinblick auf die diskursive Konstitution von Wissen. Heterogenität und Diversität verschaffen den Disziplinen zwar ihre Identität in Abgrenzung zu anderen, doch erweist sich die **interdisziplinäre Kommunikation** dadurch als kompliziertes Vorhaben. Daher wird im Folgenden im Spiegel der Interviewaussagen auch untersucht, welche Relevanz die unterschiedlichen Diskurskulturen der Physiker und der Politikwissenschaftler in der Antragsphase hatten.

4 Wissensasymmetrien und ihre kommunikativen Folgen

Im Folgenden werden auf Basis der Interviews die verschiedenen Konfliktebenen der Projektkommunikation herausgearbeitet, über die die Projektmitglieder rückblickend reflektieren.

Anhand dessen können erste Feststellungen über die jeweils aktualisierten Interaktionsrollen in diesem „Mikrodiskurs" und den Zusammenhang mit diskursiven Wissensasymmetrien getroffen werden. Folgende Hypothesen, die sich aus dem zugrunde gelegten diskursiven Wissensbegriff ergeben, sollen dabei geprüft werden:

1. Zwischen den Beteiligten interdisziplinärer Projekte gibt es Wissensasymmetrien. Diese sind mindestens zwischen den Fächern als zwei unterschiedlichen Spezial-Diskursgemeinschaften mit unterschiedlichen Diskursregeln zu erwarten, die ihr Interesse auf unterschiedliche Wahrheitsansprüche, Argumentationen und Regulierungen richten. Wahrscheinlich liegen solche aber auch zwischen den beiden Hierarchieebenen Professor und Mitarbeiter vor, einerseits aufgrund unterschiedlich langer Sozialisation im Spezial-Diskurs, andererseits aufgrund ihrer unterschiedlichen Rollen als Interaktanten im Diskurs.

2. Eine aktive „Suche nach Sich-Verstehen und Verständigung" (Böhm 2006: 113) setzt (notgedrungen) schon früher ein (nämlich so früh wie Kommunikation schlechthin) als in den sozialwissenschaftlichen Modellen angenommen und betrifft aufgrund des diskursiven Charakters von Wissen (als *knowledge by description*) längst nicht nur die Ebene einer „gemeinsamen" Sprache.

Die erste Hypothese wird im Folgenden geprüft, indem gezeigt wird, wie die Projektbeteiligten versuchen, zu einer gemeinsamen Sprache zu finden (4.1), und welche Rollenstereotypisierungen und Positionierungen im eigenen Spezial-Diskurs bzw. dem gemeinsamen interdisziplinären Diskurs damit einhergehen (4.2). Dadurch lassen sich sowohl die Fragen nach der Qualität der Asymmetrien (bes. 4.1) als auch die nach ihrer Einschätzung und Bewertung durch die Beteiligten (bes. 4.2) beantworten.

Die unter 4.3 skizzierten Probleme, die sich beim kooperativen Schreiben ergeben, verweisen weniger auf spezifische Merkmale interdisziplinären Arbeitens als vielmehr auf Probleme, die sich **in Gruppen** ergeben. In ihnen spiegeln sich jedoch auch noch einmal sowohl die zuvor analysierten Wissensasymmetrien als auch die unterschiedlichen Rollen der Interaktanten im Diskurs.

Hypothese 2 (und damit die Frage danach, wann die Asymmetrien diskursiv wirksam werden) wird geprüft (bzw. beantwortet), indem hier – wie unter 1.3 beschrieben – erst einmal nur die Antragsphase in ihrer nachträglichen Reflexion durch die Beteiligten im Interview in den Blick genommen wird, d. h. die Phase, die am Beginn jeglicher konkreter Kooperation steht.

4.1 Das Ringen um eine „gemeinsame" Sprache

Eine funktionierende „gemeinsame" Sprache in einem interdisziplinären Projekt würde bedeuten, dass mindestens terminologische Wissensasymmetrien überwunden werden konnten. Je weiter die Fächer auseinander liegen (und Politikwissenschaft und Physik liegen als Sozial- und Naturwissenschaft fachkulturell weit auseinander), desto mehr müssen jedoch auch wechselweise Asymmetrien in Bezug auf die Kenntnis spezifischer Diskursregeln ausgeglichen werden. Dass solche existieren, zeigen die metakommunikativen Fremd- und Selbstzuschreibungen in den Interviews zum jeweiligen Umgang mit politikwissenschaftlichen bzw. physikalischen Schlüsselbegriffen.

(1) und da hab ich eben gesehen, dass ja da manchmal die kooperation mit anderen disziplinen bisschen schwierig ist, weil sie nicht die sensibilität haben, also physiker haben einfach nicht die sensibilität dafür, wie bedeutsam begriffe in sozialwissenschaftlichen disziplinen sind; wie wichtig es ist, dass man damit sorgsam umgeht, sauber umgeht und ja und da das war halt, das war nicht ganz einfach (Pol2[4])

(2) weil, ich meine, physiker benutzen die begriffe wie ‚kernfusion', ‚masse' und und und ‚neutron' und darüber gibt es eigentlich keine großen semantischen streitigkeiten (Phy2)

(3) ich hatte das gefühl, dass im verlauf der antragstellung, und das hat sich zugespitzt gegen ende unserer ausarbeitung hin, dass tendenzen gab seitens Pol1 und auch seitens von Pol2, es tendenzen gab der abgrenzung zu sagen: wir machen politikwissenschaft, wir sind die experten von politikwissenschaft, es gibt ein begriffssystem, dieses begriffssystem ist konstitutiv; und ihr seid die physiker (Phy1)

Die Zitate (1) und (2) zeigen, dass sowohl die Politikwissenschaftler als auch die Physiker eine konkrete Vorstellung davon haben, welche Bedeutung Terminologie in ihrem Fach hat und inwieweit sie ein (mehr oder weniger fragiles) Ergebnis diskursiver Aushandlungsprozesse darstellt: *wie bedeutsam begriffe … sind/wie wichtig es ist, dass man damit sorgsam umgeht, sauber umgeht vs. darüber gibt es eigentlich keine großen semantischen streitigkeiten*. Zitat (3) beweist, dass das „Recht auf die eigene Terminologie" grundlegend für das Selbstverständnis von Disziplinen ist (*es gibt ein begriffssystem, dieses begriffssystem ist konstitutiv*). Beim anderen werden diesbezüglich Wissensasymmetrien zumindest unterstellt – Geltungs- und Regulierungsansprüche im Hinblick auf Wissenskonstitution werden daher zurückgewiesen (*wir sind die experten von politikwissenschaft; … und ihr seid die physiker*). Die eingenommenen Interaktionsrollen sind eindeutig die der Teilnehmer einer Kommunikationsgemeinschaft, nämlich fachspezifischer Diskursgemeinschaften.

Der gemeinsame Anspruch, interdisziplinär zusammenzuarbeiten, bringt jedoch die Erkenntnis, dass manche Schlüsselbegriffe so zentral für die Formulierung des Antrags sind, dass es nicht genügt, sich auf die jeweilige disziplinäre Position zurückzuziehen:

(4) aber wo es dann so richtig noch, ich würde sagen fast: einen streit gab, war dann wirklich um begriffe, die – also bei mir war es nur ein streit um worte, es ging über den begriff der proliferationsresistenz, der ist zentral für das projekt [...], das war schon ein richtiger konflikt, weil so fast in letzter minute kam dann so so der wunsch, das doch ein bisschen weicher zu formulieren, mehr angelegt an den an den begrifflichkeiten der internationalen atomenergie-organisation, der IAEO, die eigentlich den begriff so lädt: es gibt die technisch-intrinsische seite und es gibt die extrinsische, eher regulative auf der ebene der regulierung; eine möglichkeit, diesen begriff zu füllen, und ich hab das immer so verstanden als eine eine umdefinierung von dem, was die proliferationsresistenz im kern ist (Phy3)

Hier werden die von Warnke (2009) thematisierten Verfahren und Mittel diskursiver Wissenskonstitution geradezu prototypisch veranschaulicht: Wahrheitsanspruch (*fast in letzter minute kam dann so so der wunsch*) und Argumentation (Autoritätsargumentation durch Verweis auf Autorität der IAEO, *die den begriff so lädt*) von Seiten der Politikwissenschaftler; bei den Physikern gegensteuernde Argumentation (*ich hab das immer so verstanden als eine eine umdefinierung von dem, was die proliferationsresistenz im kern ist*), dann aber doch offensichtlich Zugeständnisse im Hinblick auf die Regulierung (IAEO-Variante *als eine möglichkeit, diesen begriff zu füllen*). Interessant ist hier die Erkenntnis der Beteiligten, dass es selbst für vermeintlich disziplinäre Schlüsselbegriffe im interdisziplinären Kontext plötzlich offenbar keine unumstrittene Deutungshoheit mehr gibt (bzw. dass der Anspruch darauf aufgegeben werden muss): Die Physiker müssen sich mit einem konkurrierenden Begriffskonzept „ihres" Terminus der Proliferationsresistenz bei den Politikwissenschaftlern auseinandersetzen, die Politikwissenschaftler offensichtlich mit den Positionen der Physiker zu Begriffen wie ‚Gerechtigkeit' (siehe Zitat (5)) oder – an anderer Stelle thematisiert – ‚Effektivität':

(5) [die Politikwissenschaftler sagten:] uns interessiert überhaupt nicht, ob es eine grundsätzliche idee von gerechtigkeit gibt, das lassen wir außen vor, dann haben wir gesagt, dass, nee, dazu möchten wir eine meinung haben, mindestens das darf nicht außen vor bleiben, und wir glauben schon, dass man auch bestimmte regelung dafür untersuchen muss, ob sie grundsätzlichen, grundsätzlicheren gerechtigkeitspostulaten genüge tun oder nicht (Phy3)

Schon aus den bisherigen Ausführungen und Zitaten wird klar, dass die Frage der „gemeinsamen" Sprache nicht von inhaltlichen und methodischen Fragen zu trennen ist, eben weil insbesondere Fachsprache bereits Ergebnis von Diskursprozessen der Wissenskonstitution ist. Dies zu erkennen, ist offensichtlich für Einigungsprozesse zentral: Der in Zitat (4) beschriebene Konflikt um den Begriff der ‚Proliferationsresistenz' wird zunächst zumindest von Seiten des Physikers nur als sprachliches Problem gesehen (*also bei mir war es nur ein streit um worte*), dann aber doch als tiefer gehender Konflikt erkannt (*das war schon ein richtiger konflikt*; ganz klar dann in Zitat (6)):

(6) und ist es auch die frage, ist das jetzt nur der streit um begriffe, und was ist politikwissenschaftliche arbeit und was nicht, es geht auch um inhalt, es geht um alles mögliche gleichzeitig (Phy3)

Höchst relevant für die weitere Zusammenarbeit erscheint die sich daraus ergebende Erkenntnis auf beiden Seiten (siehe (7) und (8)), dass es genau dieses spannungsreiche Voneinanderlernen, diese Auseinandersetzung nach neuen und erst zu erprobenden Diskursregeln ist, was Interdisziplinarität ausmacht: Interdisziplinäres Arbeiten bedeutet, sich auf gemeinsame Formulierungen und Begrifflichkeiten einigen und von unbedingten Ansprüchen auf wahres und geltendes Wissen und auf Regulierungsmacht im Diskurs abrücken zu müssen:

(7) da sind noch diskussionsprozesse nötig und die sollen dann auch im projekt stattfinden (Phy3)

(8) das war die anfangsphase, weil da ich im grunde eigentlich zum ersten mal mit den physikalischen fachbegriffen konfrontiert war, und das hat sich auch nicht durch die kurzen passagen, die im antragstext dazu dann erläuternd standen, erledigt, sondern im grunde hat sich da … mein verständnis ist immer noch nicht vollständig, ja da hat sich mein verständnis eher in diskussion, die wir dann in der runde hatten, [entwickelt]; dann hatten wir den vortrag von Phy3, glaube ich, wo mir dann so stück für stück quasi auch die verständigung oder das verständnis von fachbegriffen aus der nuklearphysik dann überhaupt erst deutlich geworden sind; also das, denke ich, ist noch ein laufender prozess, also ich bin mit den begriffen jetzt etwas befreundeter, aber noch lange nicht, ich kann nicht sicher mit denen umgehen (Pol1)

Schließlich spielt es für erfolgreiche Zusammenarbeit sicherlich eine Rolle, wie die Diskursakteure ihre Haltungen kommunizieren, d. h., in welcher sprachlichen Form sie als Akteure der illokutionären Rolle aktiv werden: ob sie Änderungen fordern oder wünschen, ob sie Verständnis zeigen oder auf Konfrontation gehen usw. Die zahlreichen Modalitätsmittel, die in den Berichten verwendet werden (*das war nicht ganz einfach; ich bin mit den begriffen jetzt etwas befreundeter; Phy3 und ich gewissermaßen wurden in die dann eher in die physiker-schublade gesteckt; ich hatte zuweilen das gefühl, dass es also ein gerangel, einen kampf, aber natürlich ein freundlicher kampf, ein kampf um terrain gibt*), obwohl in der Sache durchaus harte Auseinandersetzungen geschildert werden (*es gab immer wieder schwierigkeiten; das hat durchaus in der tat zu einer krise geführt; das war schon ein richtiger konflikt*), zeigen eine grundsätzliche Bereitschaft aller Beteiligten, sich zugunsten des gemeinsamen Forschungsinteresses zu einigen und in der Auseinandersetzung um

Deutungs- und Zielsetzungshoheiten keine verbrannte Erde zu hinterlassen. Hier lässt der noch ausstehende Vergleich mit den E-Mails der Antragsphase spannende Vergleichsmöglichkeiten erwarten.

4.2 Inter-disziplinäre Stereotypisierungen und disziplinäre Selbstbehauptung

Die bisherigen Interview-Zitate deuten schon an, dass die von Böhm (2006; siehe unter 3) festgestellten Stereotypisierungen der jeweils anderen Disziplinen hier eine Rolle spielen, was von den Betroffenen auch entsprechend erkannt wird (vgl. Zitat (3): *wir sind die experten von politikwissenschaft; … und ihr seid die physiker*. Im Interview folgt darauf die Unterstellung einer entsprechenden stereotypen Fremdzuschreibung: *Phy3 und ich gewissermaßen wurden in die dann eher in die physiker-schublade gesteckt* (Phy1)).

Gegen solche Stereotypisierungen, die nicht selten als unzulässige Vereinnahmungen interpretiert werden, fanden in der Antragsphase zum Teil offensichtlich heftige Abwehrreaktionen statt, denn der Antrag stellt das Stadium dar, in dem erstmals Forschungsziele und Erkenntnisinteressen definiert und methodische Zugänge festgelegt, d. h. die Disziplinen zueinander ins Verhältnis gesetzt werden müssen. Die folgenden Interview-Zitate zeigen demnach auch sehr deutlich, wie die Konflikte wahrgenommen wurden: zum Beispiel als fremddisziplinäre Eingriffe in eigendisziplinär zu treffende Entscheidungen aus Sicht der Politikwissenschaft (z. B. in (9): *wir quatschen euch nicht rein in dem, was ihr da physik und simulationen machen wollt, quatscht uns bitte nicht rein, in dem, was wir im bereich politikwissenschaft machen wollen*), als Zurückweisung wichtiger Fragen und unnötig unkooperatives „Claim abstecken" aus Sicht der Physik (10). Nie scheint es hier um fachliches Wissen im Sinne der Objekte und ihrer Eigenschaften zu gehen, sondern immer um Diskursmacht und konfligierende Regulierungsansprüche. (Dass dies die Physiker mehr überrascht und die Politikwissenschaftler mehr verärgert, liegt möglicherweise an den unterschiedlichen Gegenständen und Fachkulturen der Natur- vs. die Sozialwissenschaft.)

(9) und dann ging's hin und her, das heißt, wir haben dann [einen Vorschlag] gemacht, und dann kam, die haben dieses gelesen, haben gesagt: oje, oje, was wollt ihr da machen, oh nein, und dann: mach doch so, und dann haben die uns mehr oder weniger versucht, also das war, auch wir haben immer versucht zu kommunizieren: leute, lasst uns arbeitsteilig vorgehen, wir quatschen euch nicht rein in dem, was ihr da physik und simulationen machen wollt, quatscht uns bitte nicht rein in dem, was wir im bereich politikwissenschaft machen wollen, weil wir wissen ja, [Prof.-Name] weiß, hat er eben gesagt: schau, ich weiß, wenn ich gewisse sachen hereinschreibe, dass das gut, dass das gut ist, dass das, wenn das ein gutachter auch liest, sagt: o.k., stand der forschung, das ist aktuell, das sind aktuelle debatten, und er hat gemeint, dass es dementsprechend, es ist ihm auch halt wichtig, dass das drinnen ist (Pol2)

(10) ich hatte zuweilen das gefühl, dass es also ein gerangel, einen kampf, aber natürlich ein freundlicher kampf, ein kampf um terrain gibt, dass ein kampf existiert um terrain, dass die politikwissenschaftler das gefühl hatten, quasi ihre disziplin so zu definieren und abzuschotten; und das hat durchaus in der tat zu einer krise geführt [...] und weil es doch noch reste von von von, sagen wir mal, von von, reste der tendenz gab, also, um die eigene disziplin eine kleine mauer aufzubauen (Phy1)

Vergleicht man diese beiden Zitate mit den sehr versöhnlichen Zitaten (7) und (8) zu wechselseitigen Lernprozessen, dann zeigt sich, dass letztere zwar notwendig, aber keinesfalls hinreichend für eine erfolgreiche inhaltlich-methodische Zusammenarbeit sind. Dabei ist allen bisher angeführten Zitaten gemeinsam, dass trotz des erklärten Interesses beider Disziplinen an einer interdisziplinären Kooperation fast durchgehend aus einer strikt disziplinären Perspektive argumentiert wird (ganz deutlich in Zitat (9) durch den Verweis auf die Gutachter und die nur disziplinär mögliche Einschätzung ihrer Beurteilungskriterien: *schau, ich weiß, wenn ich gewisse sachen hereinschreibe, dass das gut, dass das gut ist, dass das, wenn das ein gutachter auch liest, sagt: o.k., stand der forschung, das ist aktuell, das sind aktuelle debatten*). Diese „disziplinäre Identität", die im interdisziplinären Kontext durch die gemeinsame Problemorientierung nicht schwächer, sondern eher stärker wird, zeigt sich ungebrochen in zahlreichen Äußerungen auch bei dem politikwissenschaftlichen, aber zugleich physikalisch ausgebildeten Mitarbeiter, bei dem zumindest eine physikalische Teilidentität nicht überraschend gewesen wäre. Damit wird deutlich, dass die Interaktionsrolle als Mitglied einer Kommunikationsgemeinschaft (nämlich der Physiker vs. die Politikwissenschaftler) im Hinblick auf die interdisziplinäre Austarierung eine ausschlaggebende ist, aus der sich meist direkt eine hohe Relevanz der Rolle des Diskursakteurs ergibt (z. B. bei der Frage, wer darüber bestimmt, welches die primären und welches die sekundären Projektziele sind):

(11) es lief am anfang nicht reibungslos und es gab immer wieder schwierigkeiten, wobei ich meine, es hängt damit zusammen, dass vielleicht erstmal von allen beteiligten bestimmte ziele in unterschiedlicher reihenfolge in diesem projekt eine rolle gespielt haben; und da ist, da muss man sich erst, weil es vielleicht auch nicht von anfang an allen klar war, wer welche ziele damit verfolgt, da gibts ja primäre und da gibt's auch sekundäre. (Pol1)

4.3 Kooperatives Schreiben

Doch auch der Interaktionsrolle Funktionsträger kommt eine gewisse Bedeutung zu (und dies auch in einem Projekt mit einem unserer Wahrnehmung nach wenig ausgeprägten Hierarchiedenken), nämlich wenn es um die Durchsetzungsfähigkeit im Rahmen der gemeinsamen Textproduktion geht (siehe unten). Dass die Hierarchie insgesamt jedoch eher flach ist und die Momente, in denen die Beteiligten zu Funktionsträgern werden, selbst für die Involvierten eher überraschend kommen, zeigt die Tatsache, dass es kaum unterschiedliche Beteiligungsrollen gibt: Die Mitglieder aller Hierarchiestufen sind gleichermaßen an der Textproduktion beteiligt, es gibt keine Unterschiede zum Beispiel zwischen verantwortlichem Autor oder gar Auftraggeber und „bloßem" Redakteur (oder gar nur Leser).

Die nachvollziehbaren Probleme nun, die sich ergeben, wenn eine gemischtfachliche Gruppe von fünf Personen einen Projektantrag schreibt, werden sehr deutlich in einer zusammenhängenden Interviewpassage eines Mitarbeiters. Hier zeigt sich, dass zu den skizzierten inhaltlichen, methodischen und sprachlichen Problemen zusätzlich organisatorische, mediale und wie gesagt auch gelegentlich Probleme unterschiedlicher Diskursmacht hinzutreten können. Es sind dies im Einzelnen:

- das Problem des parallelen Arbeitens am Text und eine fehlende systematische Koordination unterschiedlicher Versionierungen sowie (implizit anklingend) auch die Reduktion der Kommunikation auf E-Mail-Kommunikation: *also es war schwierig, sag ich ganz offen,*

es war schwierig und die kommunikationsform war im wesentlichen e-mail, und zwar kompliziert, weil, man musste immer, einer schreibt an alle und dann war nicht ganz klar, wer ist jetzt an der reihe; man muss ja immer, hat irgendwie immer neue versionen des antrags, welche sind gültig?

- die Gefahr der Gesichtsverletzung bei zu großen Eingriffen in Geschriebenes: *ich weiß nicht, ob Sie das kennen: Sie schicken mir ein word-dokument, ich fang da an, dem word-dokument die sachen auszustreichen und sachen neu dazu schreiben; jetzt ist sachen ausstreichen immer eine sehr sensitive angelegenheit, wenn man eine gruppe ist, ja weil Sie schreiben was und ich streiche eine halbe seite aus, weil es ist total uninteressant, und schreibe von mir soo viel text drunter, schick Ihnen das zurück, Sie sagen, was soll der quatsch, warum macht er das, ja das sind Sie, Ihre persönliche animositäten; und in dem hin und zurück;*
- das individuelle Bedürfnis nach einem „gerechten" Verhältnis zwischen den wechselseitigen Fremdkorrekturen: *ja, muss ich eben sagen, waren wir, war ich nicht sehr glücklich, wie das gelaufen ist, und zwar war das so, dass, ich habe von dem was die andere seite geschrieben hat [...] relativ wenig geändert, weil ich ich hab 'n paar sachen vielleicht sprachlich versucht zu verbessern; alle meine verbesserungsvorschläge wurden abgelehnt, gleichzeitig ist halt viel, was ich selber dazu gemacht habe oder oder was wir mit [Prof.-Name] dazu gemacht haben, nicht immer so angenommen worden, wie wir das gerne gehabt hätten;*
- und schließlich doch auch die unterschiedlichen Durchsetzungsmöglichkeiten von Professoren und Mitarbeitern: *meine erfahrung war halt auch, die muss ich auch ganz ehrlich sagen, dass, ich hab halt gemerkt, dass das wort eines professors mehr zählt als das eines wissenschaftlichen mitarbeiters oder eines doktoranden.*

Die hier angeführten Probleme verweisen darauf, wie wichtig eine vorherige Klärung nicht nur wesentlicher inhaltlicher und damit zusammenhängender begrifflicher Fragen, sondern auch der sozialen und strukturellen Organisation des Schreibprozesses selbst ist.

5 Fazit

Die Reflexion der Antragsphase durch die Projektbeteiligten zeigt trotz des reflexiv-rückblickenden Charakters, dass das Bemühen um gegenseitiges Verstehen und um eine „gemeinsame" Sprache von den ersten Anfängen der Kooperation an einsetzt. Sozialwissenschaftliche Prozessmodelle, in denen Wissensasymmetrien und Übersetzungsleistungen von einem Diskurs in einen anderen meist erst in den Phasen der konkret einsetzenden Projektarbeit verortet werden, müssten dementsprechend nicht nur weniger idealtypisch konstruiert, sondern unbedingt auch durch eine ausdifferenzierte kommunikativ-sprachliche Achse ergänzt werden. Erste Hinweise dazu liefern die vorliegenden Ergebnisse.

Der hier gewonnene Überblick über die verschiedenen möglichen Konfliktebenen in der allerersten Vorbereitungsphase interdisziplinärer Projektarbeit bis zur Fertigstellung des Antrags zeigt, dass es auch aus sprachwissenschaftlicher Sicht um viel mehr geht als nur um die Überwindung von disziplinär zwangsläufig unterschiedlichem fachlichem Wissen. Die Frage der „gemeinsamen" Sprache ist nicht zu trennen von der Notwendigkeit, auch methodisch, diskursiv und organisatorisch-sozial zusammenzufinden, soll interdisziplinäre Forschung gelingen und erfolgreich sein. Zu überwinden sind die disziplinären Diskursregeln zugunsten einer Aushandlung neuer, nämlich gemeinsam geteilter Regeln. Die Erkenntnisse aus den In-

terviews und den sich anschließenden Projektsitzungen zeigen, welchen zentralen Stellenwert eine beständige Metakommunikation über Terminologie und diskursiv konstituiertes Wissen in interdisziplinären Projekten haben sollte (vgl. z. B. die in diese Richtung weisenden Empfehlungen bei Blanckenburg et al. 2005). Viel mehr noch: vor allem und ganz wesentlich erscheint eine projektbegleitende reflexive Meta-Metakommunikation notwendig und hilfreich, d. h. Gespräche über Diskursregeln, über die Art, wie disziplinär Wissen konstituiert wird, Begriffe ausgehandelt und Konflikte gelöst werden – und wie dies konkret im jeweiligen interdisziplinären Kontext geschehen sollte. Voraussetzung ist natürlich, dass dem ausreichend Zeit eingeräumt werden kann und wird – das wiederum hat zur Voraussetzung, dass *erkannt* wird, wie wichtig die Offenlegung von Konflikten und ihre konstruktive gemeinsame Lösung für das weitere gemeinsame Arbeiten sind (vgl. auch Blanckenburg et al. 2005: 116–120). Wenn beobachtende Linguisten diesen Erkenntnisprozess als „nützliche Linguisten" (Schmidt 2009) konstruktiv unterstützen könnten, hätte das DFG-Projekt ein wesentliches Ziel erreicht. •

Anmerkungen

[1] Zur begrifflichen Unterscheidung zwischen Inter- und Transdisziplinarität siehe unter 2.2. Dort wird auch begründet, warum im vorliegenden Artikel durchgängig von „Interdisziplinarität" gesprochen wird, trotz des titelgebenden Begriffs „Transdisziplinarität" im DFG-Projekt.

[2] Es handelt sich dabei um fünf leitfadengestützte Interviews mit allen Projektbeteiligten ein gutes Jahr nach der Antragsformulierung. Gefragt wurde nicht nur nach dem jeweiligen Interdisziplinaritätsverständnis, sondern auch nach der rückblickenden Wahrnehmung der Antragsphase, insbesondere nach Problemen oder Konflikten in dieser Phase.

[3] Höchst interessant ist natürlich gerade der hier angesprochene Unterschied zwischen (1) Gesprächen/E-Mail-Kommunikation innerhalb der Gruppe einerseits und (2) Äußerungen in den Interviews andererseits, die einzeln und ohne Beisein anderer Projektmitglieder geführt wurden. Auch ist bei metakommunikativen Zuschreibungen zu unterscheiden zwischen (a) Selbstbezügen und (b) Fremdbezügen: So stammen die beiden Aussagen (a) *das ist nur für irgendwelche physiker interessant, die* und (b) *vielleicht für irgendwelche politischen szenarien wichtig* von einem Physiker; der Unterschied zwischen Selbstbezug (a) und Fremdbezug (b) äußert sich sprachlich in dem Modalwort *vielleicht*, wodurch für (b) keine letztgültige Beurteilungskompetenz beansprucht wird. Dieser Vergleich der verschiedenen Kommunikationsebenen und Texte/Gespräche im Projekt bleibt jedoch anderen Publikationen zum DFG-Projekt vorbehalten.

[4] Die Physiker werden mit der Signatur *phy* versehen (insges. drei Personen), die Politikwissenschaftler mit *pol* (insges. zwei Personen).

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Climate Change Discourse: Scientific Claims in a Policy Setting

Kjersti Fløttum & Trine Dahl

Abstract The scientific knowledge associated with the phenomenon of climate change is presented and circulated in a variety of text and talk aimed at audiences with different knowledge backgrounds and agendas. Language is crucial in the presentation of scientific issues, but to date few climate change studies have taken a point of departure in linguistics. This paper explores some linguistic and discursive features of a text from the IPCC, the *Summary for Policymakers* of the *Fourth Assessment*'s *Synthesis Report* (2007). This document is based on scientific papers but addressed to policymakers, something which we argue makes it an example of knowledge asymmetry. It represents the formally agreed statement of the IPCC concerning key findings and uncertainties regarding climate change. We consider how this discourse is constructed, being situated somewhere between scientific and political discourse. We focus specifically on two features: the nature of knowledge claims and the use of polyphonic (multivoiced) constructions. Climate change knowledge is characterised by complexity and uncertainty. The discussion of knowledge claims takes its point of departure in these characteristics and focuses primarily on how the uncertainty aspect is mediated to a non-scientific audience. In the polyphonic analysis, we explore to what extent the linguistic form is multi-voiced, which voices are included, and to what extent the sources of the voices are made explicit. The purpose is to explain how claims and voices orient the discursive argumentation in climate communication.

Keywords scientific discourse, political discourse, complexity, uncertainty, knowledge claims, knowledge asymmetry, polyphony, voice

1 Introduction

In the current paper we undertake an explorative analysis of some important linguistic and discursive features of climate change communication, with a special focus on the presentation of knowledge claims and the manifestation of voices. The text we analyse is produced by the Intergovernmental Panel on Climate Change (IPCC), a panel that reviews climate change knowledge and presents it to policymakers and other interested parties. The term *climate change* refers to a scientifically very complex and long-term phenomenon which is global in nature, but which is experienced locally. This results in knowledge claims that are typically marked by a certain level of uncertainty. Climate change has repercussions for many aspects of human and social development (Giddens 2009, Hulme 2009, Malone 2009), and the complexities and uncertainties of climate science are presented, circulated and interpreted in a large variety of text and talk. In order to get a better understanding of the climate debate it is necessary to study both the production of climate change texts and their interpretation and reception in different contexts. This requires an interdisciplinary research approach. At present several research initiatives exist that combine insights from various disciplines (e. g. the Tyndall Centre for Climate Research in the UK). However, little such research seems to include linguistics-based studies (Nerlich/Koteyko/Brown 2010). The present study represents an attempt to address this gap by investigating what linguistic analysis of rhetorical and argumentative features of climate texts can contribute to a fuller

understanding of the climate change debate. This debate is particularly complex and multi-faceted, causing a range of communication problems.

Communication about the climate issue involving groups outside the science environment is currently much focused on by climate scientists, something which is reflected in the following quote from *Science*:

> […] it is imperative that we improve the exchange of information between scientists and public stakeholders […] we urge the broader science, communication, and funding community to support large-scale projects to translate scientific assessments into simpler, more useful terms. (Bowman et al. 2009: 36)

Surveys of the public's understanding of climate-related concepts (e.g. the one commissioned by Språkrådet, the Language Council of Norway, in cooperation with the Bjerknes Centre for Climate Research in 2010) and research into risk communication (e.g. Leiss 2004, Patt/Schrag 2003) have shown that even when the scientists define complex concepts and explain implications, the general public interpret them from their general knowledge of the language and the world (see also section 4 below). This may lead to interpretations which are not in accordance with the science.

In addition to the complexity and uncertainty of the science, the high number of stakeholders – climate scientists, economists, politicians, representatives of non-government organisations (NGOs), new and traditional media, as well as people in general – is a key characteristic of climate discourse (e.g. Weingart/Engels/Pansegrau 2000). In the current work, we therefore focus on two main issues: the scientific knowledge claims and voices representing various points of view in the texts. Our intention is to explain the status of the claims in terms of the level of uncertainty associated with them and to what extent other voices than the IPCC are present. The overall aim of our analysis is to explain how the interaction of claims and voices orients discursive argumentation related to the climate phenomenon.

The text we analyse is the *Summary for Policymakers*, part of the *Synthesis Report* of the IPCC's 2007 *Fourth Assessment Report*. The IPCC represents one of the most important (if not *the* most important) scientific actors in the climate debate.[1] The panel undertakes work to provide "a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts", at the same time aiming "to reflect a range of views", in a manner which is "policy-relevant and yet policy-neutral, never policy-prescriptive" (www.ipcc.ch/organization/organization.shtml).

Before going into the linguistic analysis, we relate our work to knowledge communication involving non-scientific audiences[2] (section 2). In section 3 we present our material and methods, while section 4 focuses primarily on knowledge claims, but also briefly considers policy issues. Section 5 deals with the phenomenon of voices. Section 6 sums up our findings with a focus on the interaction of claims and voices in knowledge communication which involves science, politics and the public at large.

2 Knowledge communication

As already indicated, there have been many calls for clearer and better science communication. One key approach to the relationship between the world of science and society at large is the Public Understanding of Science approach. Within this 'movement', the deficit model was for a long time the dominant one in conceptions and discussions of the communication of

knowledge. This model assumes (degrees of) scientific illiteracy in the general population and a one-way flow of information from scientists to the general public (Burns/O'Connor/Stocklmayer 2003). A later model is the contextual approach, a more complex model that instead focuses on the interaction between science and the public (Burns/O'Connor/Stocklmayer 2003, Gross 1994).

The calls for better science communication still often carry a flavour of the deficit model (see also Frewer et al. 2003, Nerlich/Koteyko/Brown 2010, Zehr 2000). We see reflections of this when expressions like "translate scientific assessments into simpler, more useful terms" are used, as in the quote from *Science* in the Introduction. In the same vein we find advice given in Hassol (2008: 106), for instance "stop speaking in code" and "[c]learly state the settled scientific conclusions. Do not overdo 'weasel words' and caveats" (Hassol 2008: 106). Hence, simplification is here the suggested solution to better knowledge communication to audiences that lack scientific expertise.

A concept that is also relevant for science communication is knowledge asymmetry. The notion is well known in business contexts, denoting situations where different levels and divisions within organisations have to interact, or where external professional assistance is required (e. g. Sharma 1997). Buy-sell transactions may also be characterised by asymmetrical information, where one party in a transaction has more or superior information than another. The notion is negative in nature and implies uneven distribution of both information and power (Sharma 1997). In its strictest sense, asymmetry implies lack of symmetry between two parts on either side of a dividing line. In the context of scientific knowledge communication, it might then be argued that the concept of knowledge asymmetry fits well with the deficit model approach, assuming a division between scientists and their (complete) scientific knowledge and a lay public with less or no scientific knowledge. However, even if we adhere to a contextual approach with a richer and more complex, non-linear and non-dichotomised communication model, we find the notion useful. It calls forth an image of imbalance, a feature which in our view is present in all knowledge communication involving discourse participants outside the original context for the knowledge (see also Dahl forthcoming). In the present case the asymmetrical situation arises from the communication about science-based knowledge between scientists and (primarily) policymakers. Knowledge in the shape of scientific research papers and reports serves as input to the IPCC assessment reports. The main audience specified for these reports is policymakers from all over the world, but even broader audience groups are indicated in the presentation of the reports on the IPCC website (www.ipcc.ch).

3 Material and methods

As stated in the Introduction, the text we have selected for our analysis is part of the IPCC's most recent assessment report, the *Fourth Assessment Report* (2007). These assessments consist of three reports produced by three Working Groups (WG I–III) and one *Synthesis Report*. The *Synthesis Report* starts with a 22-page *Summary for Policymakers*, and it is this *Summary* that we look at here (www.ipcc.ch/publications_and_data/ar4/syr/en/spm.html). This text represents the most condensed summary of current understanding of scientific, technical and socio-economic aspects of climate change. It is based on scientific documentation, and prepared by scientists from both natural and social sciences, government representatives and politicians, and is addressed primarily to policymakers. The text in this way represents an important link between science and politics in the climate debate.

The authors and reviewers of the IPCC assessment reports make selections from the primary sources (scientific articles and reports) through an extremely thorough negotiation process, described in detail on the IPCC website. In addition to this negotiation process, the information in the reports is adapted to a non-scientific audience. Textual evidence of the adaptation process is, for instance, explanatory comments, definitions and footnotes, as well as user guides, glossaries, lists of acronyms, chemical symbols and scientific units, all provided to "facilitate use of [the Fourth Assessment] report by as wide an audience as possible" (Annex I, User guide). Commendably, much attention is also given to the language of presentation, as witnessed e.g. by the document *Guidance Notes for Lead Authors of the IPCC Fourth Assessment Report on Addressing Uncertainties*, intended to help the authors, coming from different scientific traditions, to handle uncertainties in a consistent way across the full *Assessment Report*. Three approaches are established to convey the status of claims in terms of uncertainty (see section 4).

We focus on the body text of the 22-page *Summary*. For reasons of space, tables, figures, illustrations and footnotes have not been included in the analysis. They are important components of the complete information provided by the IPCC, but would have required a different approach from the one undertaken here. The body text of the *Summary* consists of sentences extracted verbatim from the *Synthesis Report* as well as condensed information from several statements. In the *Summary*, reference (in curly brackets) is given to the section of the *Synthesis Report* where the information is found, as in example (1):

(1) Mountain glaciers and snow cover on average have declined in both hemispheres. *{1.1}*

These references have been deleted in the examples we discuss, as they were not considered to be relevant for the present analysis.

In our discussion of the knowledge claims (section 4), we focus primarily on the interlinked aspects of complexity and uncertainty – both key characteristics of climate knowledge – in an adaptation perspective. What is the status of the claims which have been selected for inclusion in the *Summary*? Since this text represents the most condensed form of current knowledge, are they all claims which can be posited with a high degree of confidence, or do we also find claims associated with more uncertainty or disagreement in the scientific community? We also briefly consider the policy issue. Are the statements policy neutral, as intended by the IPCC, or are there lexical traces of position taking?

The *Summary* represents the collective voice of the IPCC. Is this the only voice heard in the text or are there traces of other voices as well? This question will be addressed by means of a linguistic polyphony analysis based primarily on the ScaPoLine theory (section 5).

4 Knowledge claims

Knowledge claims may be considered as mental constructs which are verbalised in speech or writing and which relate to a specific field of knowledge. Knowledge claims are not necessarily epistemological in nature. They may also be individual and experience-based (e.g. Jakubik 2007). In the current context, we consider knowledge claims in the shape of research findings presented by the IPCC.

As already indicated, the special nature of the phenomenon of climate change makes it particularly relevant in discussions of climate communication involving non-scientific audi-

ences to consider how complexity and uncertainty are dealt with. In order to illustrate these two aspects, let us look at an example from the *Summary*:

(2) There is observational evidence of an increase in intense tropical cyclone activity in the North Atlantic since about 1970, with limited evidence of increases elsewhere. There is no clear trend in the annual numbers of tropical cyclones. It is difficult to ascertain longer-term trends in cyclone activity, particularly prior to 1970. (p. 2)

This passage is in fact very typical of climate change knowledge and the forms used to express it. Along with clear results come uncertainties which may be due to an insufficient number of investigations, as well as references to the continuous development of new models and the long time perspective needed to establish clear trends. The linguistic structure of the claims, *There is …*, is seen in many of the examples given below, indicating an 'objective' and impersonal presentation.

As mentioned in section 3, in order to ensure uniform handling of uncertainty across the Working Groups, the IPCC in their *Guidance Notes for Lead Authors* suggested three different approaches – two quantitatively based taxonomies and one qualitative taxonomy of predefined scalar expressions – to describe knowledge claims in the reports (see below). This is an issue which is linked to the knowledge asymmetry aspect of the communication. Defined levels of uncertainty may potentially make it easier for non-scientific readers to assess the exact status of the claims. The scalar expressions appear in italics in the text, an added typographical effect to indicate their special status. The Working Groups involved in the *Fourth Assessment Report* chose different approaches to uncertainty. WG I (reporting on the physical science) and WG II (reporting on impacts, adaptation and vulnerability) used the quantitatively-based approaches, while WG III (reporting on the mitigation of climate change) used the qualitative approach. More specifically, WG I and WG II used mainly risk assessment expressions in the form of an 8-step scale, ranging the likelihood of outcomes which can be estimated probabilistically, from *virtually certain* (> 99%) to *exceptionally unlikely* (< 1%), and a 5-step confidence interval scale, expressing the confidence in the correctness of a result: *very high–very low confidence*. Here are four examples of the quantitative approaches:

(3) Average Northern Hemisphere temperatures during the second half of the 20th century were *very likely* higher than during any other 50-year period in the last 500 years and *likely* the highest in at least the past 1300 years. (p. 2)
(4) Human influences have […] *more likely than not* increased risk of heat waves, area affected by drought since the 1970s and frequency of heavy precipitation events. (p. 6)
(5) There is *high confidence* that neither adaptation nor mitigation alone can avoid all climate change impacts; however, they can complement each other and together can significantly reduce the risks of climate change. (p. 18)
(6) There is *medium confidence* that other effects of regional climate change on natural and human environments are emerging, although many are difficult to discern due to adaptation and non-climatic drivers. (p. 3)

This kind of standardised language to describe risk has been criticised (e. g. Leiss 2004, Patt/Schrag 2003). Patt/Schrag (2003: 18) claim that laypersons' subjective understanding of prob-

abilities depends on contextual factors, such as e. g. objective probability and the magnitude of the described event. For instance, while the probability of relatively infrequent events is overestimated, the probability of relatively frequent events is underestimated in lay audiences. Patt/Schrag (2003: 29) conclude that

> [t]he strategy of using specifically defined language to describe the probabilities of climate change risks achieves important objectives, but may also introduce bias into policy-makers responses. Intuitively, people use such language to describe both the probability and magnitude of risks, and they expect communicators to do the same. Assessors need to emphasize that the IPCC's use of this language departs from people's expectations. Unless policy-makers appreciate this fact, their response to the assessment is likely to be biased downward, leading to insufficient efforts to mitigate and adapt to climate change.

Similar conclusions have been drawn by Budescu/Broomell/Por (2009), who found large differences in people's understanding of the verbal probability terms used by the IPCC. Through various psychological experiments, they show that these terms may lead to confusion and in many cases to underestimation of the magnitude of problems. One of their findings was that it was easier for non-experts to understand such probability terms when numerical values were added.

In WG III, a qualitative two-dimensional, 3-step level-of-understanding scale expressing agreement and evidence was used. The level of agreement in the literature on a particular finding was ranged, from *high* to *low agreement*. This was combined with a ranging of the amount of evidence, from *much* to *limited evidence*. Examples (7) and (8) illustrate this approach:

(7) There is *high agreement* and *much evidence* that all stabilisation levels assessed can be achieved by deployment of a portfolio of technologies that are either currently available or expected to be commercialised in coming decades […]. (p. 20)
(8) There is *high agreement* and *medium evidence* that Annex I countries' actions may affect the global economy and global emissions, although the scale of carbon leakage remains uncertain. (p. 18)

WG III explains that a quantitative approach was "judged to be inadequate to deal with the specific uncertainties involved in this […] report, as here human choices are involved" (WG III, Endbox 1). The InterAcademy Council in their 2010 review point to the readership of the summaries and recommend that

> [a]ll Working Groups should use the qualitative level-of-understanding scale in their Summary for Policy Makers and Technical Summary, […]. This scale may be supplemented by a quantitative probability scale, if appropriate. (p. 36)

This advice chimes well with the findings of studies of how non-experts perceive uncertainty (e. g. Budescu/Broomell/Por 2009, Leiss 2004, Patt/Schrag 2003) and may thus make it easier for the target audience of the IPCC reports to evaluate the scientific findings.

Tables 1–3 show the scalar distribution and number of occurrences of the claims which were presented by means of the three taxonomies in the *Summary*.

Table 1: Likelihood of the occurrence of a specific outcome

Scale	**Occurrences**
Virtually certain	-
Very likely	13
Likely	16
More likely than not	1
About as likely as unlikely	-
Unlikely	-
Very unlikely	2
Exceptionally unlikely	-

Table 2: Confidence in the correctness of a result

Scale	**Occurrences**
Very high confidence	2
High confidence	7
Medium confidence	3
Low confidence	-
Very low confidence	-

Table 3: Level of agreement and amount of available evidence with regard to a claim

Scale	*Much evidence*	*Medium evidence*	*Limited evidence*
High agreement	5	2	-
Medium agreement	-	-	-
Low agreement	-	-	-

As Tables 1–3 illustrate, nearly all the assessed claims in the *Summary* belong in the high end of the scales. It is either *very likely* or *likely* that the mentioned outcomes have taken place

or will take place (Table 1); the degree of confidence is typically given as *high* (Table 2); and the claims assessed qualitatively are mainly those where there is *high agreement* and *much evidence* (Table 3). Hence, the claims in the *Summary* clearly orient the discursive argumentation towards consensus. What, then, about claims where a higher degree of uncertainty might exist? It will be interesting to see in further studies to what extent such claims are found in the reports from the three Working Groups.

In another document describing the documentation processes of the IPCC, *The Preparation of IPCC Reports*, it is stated that "[d]isparate views for which there is significant scientific or technical support should be clearly identified in the IPCC reports, together with relevant arguments". Are any other disparate views included in the *Summary* than those potentially indicated in the very few examples of claims of likelihood of *more likely than not* and *with medium confidence*? Our analysis revealed very few overt linguistic traces of underlying disagreement in the research community. In section 5 we discuss how more implicit voices are heard in the text, but let us at this point take a look at an example which may imply diverging results in the research literature and contrasting points of view indicated by the connective *but*:

(9) Peer-reviewed estimates of the social cost of carbon in 2005 average US$12 per tonne of CO2, but the range from 100 estimates is large (–$3 to $95/tCO2). This is due in large part to differences in assumptions regarding climate sensitivity, response lags, the treatment of risk and equity, economic and non-economic impacts, the inclusion of potentially catastrophic losses and discount rates. (p. 22)

However, we notice that a methodological explanation for the divergence is added: *This is due in large part to …* A few other text passages explicitly refer to knowledge gaps due to the lack of studies in specified geographical areas or methodological difficulties in carrying out the studies, both of which are aspects making it difficult to posit claims with a high level of certainty. Here are two such examples.

(10) There is no clear trend in the annual numbers of tropical cyclones. It is difficult to ascertain longer-term trends in cyclone activity, particularly prior to 1970. (p. 2)
(11) Limited and early analytical results from integrated analyses of the costs and benefits of mitigation indicate that they are broadly comparable in magnitude, but do not as yet permit an unambiguous determination of an emissions pathway or stabilisation level where benefits exceed costs. (p. 22)

To sum up, then, in the *Summary* the IPCC authors point their non-scientific audiences in the direction of high-confidence and high-agreement claims; the argumentation is oriented towards the most consensual claims.

Finally in this section, we briefly consider the policy aspect of the *Summary*. The mandate of the IPCC is to be policy relevant, but not policy prescriptive. Several of the examples cited above refer to policy considerations, but the following two examples deal specifically with policy:

(12) A wide array of adaptation options is available, but more extensive adaptation than is currently occurring is required to reduce vulnerability to climate change. There are barriers, limits and costs, which are not fully understood. (p. 14)

(13) Societies have a long record of managing the impacts of weather- and climate-related events. Nevertheless, additional adaptation measures will be required to reduce the adverse impacts of projected climate change and variability, regardless of the scale of mitigation undertaken over the next two to three decades. (p. 14)

Even if the specific nature of any future action is not suggested, both examples indicate, *inter alia* through a contrastive connective (*but* and *nevertheless*, respectively) and the verb *require*, that measures so far implemented are not adequate. They may therefore be interpreted as criticism of current policies. The next three examples give indications of the consequences of acting or not:

(14) In several sectors, climate response options can be implemented to realize synergies and avoid conflicts with other dimensions of sustainable development. Decisions about macroeconomic and other non-climate policies can significantly affect emissions, adaptive capacity and vulnerability. (p. 18)
(15) […] however, they [adaptation and mitigation] can complement each other and together can significantly reduce the risks of climate change. (p. 19)
(16) Delayed emission reductions significantly constrain the opportunities to achieve lower stabilisation levels and increase the risk of more severe climate change impacts. (p. 19)

The word *significantly* gives these statements a flavour of urgency and of the severity of the issue, and example (16) refers explicitly to the time aspect (*delayed*) and the consequences of postponing action related to emissions.

An informal search of the text for words that might point to overt position taking revealed that there are only five additional instances of *require*, no other relevant examples of *significantly* and none of *must*, *should* (in its deontic meaning) or *ought to*. On the basis of this admittedly very simple lexically based analysis, the general impression created by the *Summary* is that, on the whole, the IPCC remains policy neutral. In three of the examples cited above there are, however, linguistic traces of argumentation and discussion between different points of view through the connectives *but* (12), *nevertheless* (13) and *however* (15). We discuss this kind of non-overt but underlying discussion and indirect position taking in section 5.

5 Voices

At the IPCC website it is stated that the panel "aims to reflect a range of views". This statement has been the point of departure for the research question related to whether and how different views or voices are manifested in the *Summary*. We know that the climate debate in general is particularly multi-voiced or polyphonic, and there are many important questions related to the voices participating in this debate, at different levels and in different contexts: Which voices are present, explicitly or implicitly, which ones are dominating, and which voices are absent (Fløttum 2010b)? In order to understand what is at stake, for scientists as well as for non-scientists, it is important to know who says or believes what. What is of key interest in the present study is to what extent different points of view within the scientific community are expressed in the *Summary*. It might be a dilemma for the IPCC to reflect differing viewpoints and at the same time present a consensus view.

Since the *Summary* represents the formally agreed statement of the IPCC, it seems relevant first to investigate to what extent the authors (40 in all) are present, as a collective voice. It is easy to make a first observation: there are no occurrences of the first person plural pronoun *we*, thus not a single direct reference to the collective voice of the 40 authors. This absence of personal pronouns is not surprising; it demonstrates that the text is closely related to the norms of scientific discourse (Fløttum/Dahl/Kinn 2006). However, since the *Summary* is addressed not only to policymakers but also to a broader public, one might expect a communication style characterised by more interaction through devices such as the inclusive *we*.[3] In fact, experimental research on climate change communication undertaken at the University of Exeter (Haddad/Morton/Rabinovich forthcoming) seems to indicate that the use of *we* is more engaging and more likely to increase intentions to act environmentally friendly. The involved researchers do not as yet know why, but early findings seem to suggest that the communicator is perceived as more trustworthy when using *we* (Haddad/Morton/Rabinovich forthcoming).

Even though there are no occurrences of explicit *we* in the *Summary*, the voices of the authors are present throughout the text; person manifestation may be mapped by other devices (such as adverbs and connectives; see also examples in previous sections). This will be the focus of the present section.

To justify the hypothesis of personal presence in a primarily scientific text, we may look to a number of recent studies clearly showing that the traditional conception of scientific discourse as objective or neutral is outdated (Fløttum/Dahl/Kinn 2006, Hyland 1998, 2000, Prelli 1989, Swales 1990). In most disciplines, scientific reporting is becoming increasingly more rhetorical (clearly stated by Berkenkotter and Huckin already in 1995), and thus possibly more similar to political discourse. However, there are differences between scientific and political discourse. One reason is that the key purpose of scientific discourse is (or should be) to describe and explain facts and findings, while the main purpose of political discourse is to convince or to persuade someone to take action (Charaudeau 2005, Fløttum 2010a, Gjerstad 2007, Wodak/Chilton 2005). For the text we analyse here, the context in which it is produced makes it reasonable to assume that it will display a mix of scientific and political traits.

We have seen that the authors comment on underlying voices by means of scientifically defined expressions (section 4). In addition, the text contains a high number of epistemic modifiers such as modal verbs like *may* (13 occurrences), *might* (1), *could* (11) and *would* (17). These words may convey quite different semantic content, but also the epistemic value of toning down the propositional content of the sentence in which they occur, marking some kind of hesitation. In the present context, this may be considered as an example of polyphony, where the authors add their point of view as a comment to the un-nuanced and underlying point of view, which may exist within the actual scientific community. Thus we have an internal discussion, with expressed uncertainty. Here is an example containing the modal verb *may*, where an underlying point of view – 'it is difficult …' – is modified by a model point of view 'it may be difficult …':

(17) Without substantial investment flows and effective technology transfer, it may be difficult to achieve emission reduction at a significant scale. (p. 20)

We will now turn to two specific linguistic devices which indicate mixed voices in constructions of refusal and concession, respectively. Our presentation will be limited to examples of markers of this kind of implicit polyphony, i. e. the negation marker *not* (in its polemic use) and

the contrastive connective *but* (in its concessive use). This limited selection is justified by the very frequent use of these specific markers in both political (Fløttum/Stenvoll 2009) and scientific discourse (Fløttum/Dahl/Kinn 2006) in general, and in the current text in particular.

The theoretical framework of the analysis is ScaPoLine, a theory of linguistic polyphony (Nølke/Fløttum/Norén 2004; ScaPoLine is short for La théorie scandinave de polyphonie linguistique). In a very simplistic way, we may say that this approach is based on a conception of language as fundamentally dialogic, presenting itself as an alternative to the established idea of the uniqueness of the speaking subject (inspired by sources as different as Bakhtine 1984 and Ducrot 1984). The main idea is that in one single utterance there may be several voices or points of view present, in addition to the one of the speaker/writer. The ScaPoLine theory may be used to clarify complex multi-voiced sequences with both explicit presence of different points of view (as in citations and different kinds of reported speech) and implicit presence (signalled by different markers such as adverbs, connectives and pronouns). We will now show how the theory can be applied, first by considering an example of negation (by *not*), with refutative meaning:

(18) The long time scales of thermal expansion and ice sheet response to warming imply that stabilisation of GHG concentrations at or above present levels would not stabilise sea level for many centuries. (p. 20)

pov 1: stabilisation of GHG concentrations at or above present levels would stabilise sea level for many centuries
pov 2: pov 1 is not valid

For practical reasons, we only consider the subordinated *that*-clause. In this clause, there are two points of view (pov): one stating that 'stabilisation of GHG concentrations at or above present levels would stabilise sea level […]' (pov1) and another qualifying this as not valid: 'stabilisation of GHG concentrations at or above present levels would not stabilise sea level […]' (pov2). While the speaker is responsible for pov2, the isolated utterance does not indicate who is the source of the first. The source might or might not be identified through contextualisation. The speaker instance corresponds to the authors of the *Summary*. The speaker's relation to the positive pov1 is one of refutation.

In the interpretation of an utterance, it is important to determine the various points of view which are manifested, and to try to identify their sources, be it the speaker him- or herself, another person or group of persons, more or less defined, or some general opinion or doxa. Our knowledge of the context makes it reasonable to interpret the underlying and refuted point of view here as belonging to a voice representing a point of view that is different from the consensual IPCC voice and which the IPCC voice refutes.

Thus the interpretation process consists of several steps. We need to identify not only the points of view, but also who is made responsible for each, to whom the points of view are attributed and the relation between the speaker and the different points of view presented.

Let us now turn to an example of the polyphonic marker *but* in its contrastive and concessive capacity. In simple terms, a construction with *but* can be formalised as

p but q

where p and q constitute two propositions – or arguments – in contrast: p represents the concession and q the argument that the speaker identifies him- or herself with. In the polyphonic

analysis these are treated as points of view. The following example constitutes an illustration of this construction:

(19) Such changes [in metres of sea level rise] are projected to occur over millennial time scales, but more rapid sea level rise on century time scales cannot be excluded. (p. 13)

It can be linguistically analysed as follows, in 4 povs:

pov1: 'such changes are projected to occur over millennial time scales'
pov2: pov1 is an argument in favour of the conclusion *r*
pov3: 'more rapid sea level rise on century time scales cannot be excluded'
pov4: pov3 is an argument in favour of the conclusion *non-r*.

Pov2 could also be represented as 'if pov1 then r', and pov4 as 'if pov3 then non-r'. The letter *r* symbolises a conclusion which is to be searched for in the interpretation phase of the analysis, i. e. in the context. In everyday language, the interpretation of example (19) could be translated as follows: The speaker accepts that 'such changes are projected to occur over millennial time scales'. Implicitly this pov also orients the discourse towards a conclusion (*r*) that there is 'no reason to worry now'. However, by the connective *but*, it is emphasised that what counts here and now is that 'more rapid sea level rise on century time scales cannot be excluded', with an implicit conclusion (*non-r*) saying 'Do worry!'.

This example contains in addition another signal of polyphony – the negation *not* in 'more rapid sea level rise on century time scales cannot be excluded'. We know from many public debates that sea level rise is a 'hot' topic. In (19), the IPCC official voice refutes that more rapid sea level rise can be excluded. This indicates that some researchers may have postulated that it *can* be excluded.

Let us return to the concession. A pertinent question to ask in the interpretation process is who is responsible for the conceded pov (pov1). The utterance alone does not tell us this. However, given the context of the IPCC work, this *but*-construction could be interpreted as a reflection of different viewpoints, an internal polyphonic exchange of pov. There are different voices because of different research results, because of different kinds of uncertainties, but also because there is a lack of research. The first pov has as its source some specific results and the second other results. It is nevertheless important to note that what matters here and now for the speaking voice is the proposition introduced by *but*.

Here is another example with the concessive *but*, also including the modal verbs *can* and *may*, adding a hesitating or uncertain point of view to the claim:

(20) Making development more sustainable can enhance mitigative and adaptive capacities, reduce emissions and reduce vulnerability, but there may be barriers to implementation. (p. 18)

This example shows some of the epistemic complexity (conveying uncertainty) and the underlying discussion (through the concessive *but*) which this kind of discourse represents.

Before concluding this section, let us just mention that the number of instances of the markers *not* and *but* in our text in fact is the same (13 of each in the body; in addition there are 20 occurrences of *not* and 2 of *but* in footnotes, illustration boxes, etc). However, this does not mean that there is an equal number of instances of this kind of refutation and concession.

In fact, concession wins over refutation. The reason is that many of the negations are of the descriptive kind, and thus not polemic, as in the following example:

(21) The projections do not include uncertainties in climate-carbon cycle feedbacks nor the full effects of changes in ice sheet flow […]. (p. 8)

The fact that concession wins over refutation in this document indicates only a mild form of polemic; the polyphonic argumentation is clearly oriented towards consensus.

With these few examples we have shown that the polyphonic perspective may be relevant to the analysis of this kind of discourse. In order to explore the complexity of both scientific and political discourse, it is important to examine not only explicit but also implicit manifestations of voices involved. The polyphonic perspective helps to detect subtle interactions contributing to the negotiation of different relations, represented by different voices. An additional direct relevance for the present analysis is that the identification of such markers and voices can make the analyst sensitive to relevant contextual factors and thus be a good starting point for a broader socio-political analysis of the text.

6 Moving from scientific findings to policy

The main question underpinning the analysis in the present paper has been how the play of claims and voices may orient the discursive argumentation in a climate-related text. Our investigation showed that both knowledge claims and polyphonic constructions in the *Summary* clearly orient the argumentation towards consensus. The impersonal structure typically used to introduce knowledge claims (*There is …*) indicates a quite neutral and more or less non-committed voice, modified by various calibrated adverbial expressions. These expressions take different scalar forms related to the likelihood for the predicted occurrences to happen, the confidence associated with the claims and the degree of consensus about them. Even though the impersonal and quite categorical knowledge claims give the impression of agreement with regard to the various findings presented, we know that there are many different points of view in the discussions taking place in the thousands of scientific papers on which the *Summary* is based. These points of view manifest themselves to a certain degree through different voices indicated by polyphonic markers, which may express hesitation, concession and refusal. However, the most typical feature of the voices which are different from the speaker's voice is that their sources are not explicit in the *Summary*. In order to know who the real participants in this implicit polyphonic play are and to verify to what extent the points of view expressed correspond to specific research findings, we would have to go back to the different Working Group reports and perhaps also further into the scientific papers and reports they have used for their assessment. All in all, then, we may interpret the presentation in the *Summary* as given by a negotiated collective official IPCC voice.

As regards the broader issue of climate communication, we note that what characterises the presented scientific findings is uncertainty. This reflects the very nature of climate change, an extremely complex natural phenomenon which it takes centuries to observe and measure, and which manifests itself differently across the world. These facts make it difficult for scientists to give clear recommendations about political actions related to adaptation and mitigation. IPCC texts are explicitly stated to be policy neutral, and the *Summary* represents only a

first step in the process of moving from scientific findings to concrete political measures. An interesting question then becomes how policymakers understand the IPCC message with its expressed as well as implicit uncertainty, and further, how and to what extent they turn the various findings into political action. The UN Climate Change Conference 2009 in Copenhagen (COP 15) demonstrated how difficult it can be to reach any agreement on this complex global issue. •

Notes

[1] The criticism recently levelled at the IPCC has not resulted in a weakening of the actual scientific basis for the work published by this organisation, as made clear in the InterAcademy Council's 2010 review of the processes and procedures of the IPCC.

[2] Other dichotomy-based terms like *layperson* and *non-expert* are used in other communication studies. In reality, a continuum, with degrees of relevant knowledge gained through formal education or interest, is a better picture. For reasons of simplicity, we here use the term *non-scientific* to refer to people without a climate science background.

[3] Interestingly, in the French translation, there is abundant use of the pronoun *on,* which in current French often corresponds to the first person plural (www.ipcc.ch/publications_and_data/ar4/syr/fr/spm.html).

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Martynova, Olga (2010): ***Sprachwahl in der deutsch-russischen Unternehmenskommunikation.*** Frankfurt am Main u. a.: Lang (Duisburger Arbeiten zur Sprach- und Kulturwissenschaft/Duisburg Papers on Research in Language and Culture 80). ISBN 978-3-631-60045-0, 243 Seiten.

Erfolg in der Geschäftstätigkeit einer globalen Welt ist in hohem Maße von der Wahl der Kommunikationssprache(n) eines Unternehmens abhängig, wie die wegweisende Untersuchung von Sonja Vandermeeren (1998) zu „Fremdsprachen in europäischen Unternehmen" gezeigt hat. Dies gilt neben anderen Rahmenbedingungen auch für deutsche Unternehmen, die mit Russland kooperieren. Die Forschungsarbeit von Olga Martynova zur deutsch-russischen Unternehmenskommunikation ist in diesem Kontext offenbar die erste ihrer Art, die sich insbesondere folgenden Fragen zuwendet: „Welche Sprache(n) – Deutsch, Englisch oder Russisch – werden dafür als Kommunikationssprachen gewählt? Ist diese Sprachwahl optimal für die effektive und effiziente Abwicklung der Geschäftskontakte oder behindert sie den Erfolg jeweiliger Unternehmen auf dem russischen Markt? Sind die Manager deutscher Unternehmen überhaupt für das Problem der Sprachwahl sensibilisiert und wie gehen sie damit um? Tragen sie zur Förderung der eigenen Muttersprache in Russland bei oder wird die in der Wirtschaft gängigste Sprachwahlstrategie – die Wahl des Englischen als Lingua franca – gewählt?" (Vgl. Vorwort, S. 4)

Zur Beantwortung dieser und weiterer Fragen gliedert die Autorin ihre Untersuchung in vier Teile. Sie bietet damit sowohl dem sprachlich interessierten Leserkreis als auch Managern, die sich aus Zeitmangel wenig mit Sprachfragen auseinandersetzen können, einen verständlichen und gleichzeitig überzeugenden Einblick in die Thematik: (1) Definition der Begriffe Sprachwahl und Fremdsprachenbedarf im Unternehmen; (2) Faktoren, die die Sprachwahl im Unternehmen beeinflussen (u. a. Intensität der Wirtschaftsbeziehungen und Stellung der Fremdsprachen in den Kontaktländern, rechtliche Vorgaben, Größe des Unternehmens); (3) Studien, die dem Fremdsprachenbedarf in Unternehmungen (Arbeitskommunikation, Smalltalk, Änderung der Kommunikationssprache) gewidmet sind, und (4) Lösungsvorschläge für die Verbesserung der deutsch-russischen Unternehmenskommunikation.

Nach einer Definition und Positionierung der Kernbegriffe Unternehmenskommunikation (nach Bruhn 1995), kooperationsbezogene und kooperationsunabhängige soziale Kommunikation (nach Brünner 2000, S. 8) im ersten Teil der Arbeit diskutiert Martynova Sprachwahl und Sprachenpolitik. Sie resümiert, dass die Sprachwahl als wichtiger ökonomischer Faktor die Wettbewerbsfähigkeit des Unternehmens im Markt bestimmt, wobei folgende Optionen denkbar sind: (1) Wahl der Muttersprache (MS) des Stammhauses – Nichtadaptation; (2) Wahl der MS des ausländischen Kooperationspartners/Standortes – Adaptation; (3) Wahl einer Lingua franca (hier besonders Englisch) und (4) polyglotter Dialog (vgl. S. 12). Daraus entwickelt sich ein Fremdsprachenbedarf im Unternehmen, der sich auch an den Arbeitsaufgaben der Mitarbeiter orientiert, z. B. Englisch für Mitarbeiter, die mit russischen Kunden mit Englischkenntnissen im Service kommunizieren, oder Russischbedarf für Mitarbeiter, die mit russischen Kunden ohne Fremdsprachenkenntnisse in Kontakt treten. Wie lässt sich nun das komplizierte Geflecht von verschiedenen Kommunikationsereignissen im Unternehmen (offiziell/inoffiziell, symmetrisch/hierarchisch, export-/importorientiert) und zwischen Kommunikationspartnern mit zum Teil sehr unterschiedlichen Sprachvoraussetzungen zu einem Optimum zusammenfügen? Wie

kann ein daraus resultierender Mehrbedarf an Fremdsprachenkenntnissen gedeckt werden? Zum einen bietet es sich natürlich an, vorzugsweise Mitarbeiter mit Fremdsprachenkenntnissen einzustellen, die in der Lage sind, sowohl in den fachbezogenen als auch den nicht fachlich determinierten Situationen adäquat zu kommunizieren und so die richtige Kommunikationssprache und -strategie unter Wahrung kultureller Maximen anzuwenden. Wohl ein Idealfall. Zum anderen werden (zumindest in größeren Unternehmen) zum Ausgleich von Kenntnislücken auch diverse Fremdsprachenkurse angeboten (mit ganz unterschiedlichem Erfolg!) oder Übersetzungs- und Dolmetschleistungen angefordert, die allerdings zumeist kostenintensiv sind und daher oft nur für Verhandlungen und die Abfassung von Vertrags- und Kundendokumenten genutzt werden.

Wie Martynova ausführt, wird die Sprach(en)wahl vordergründig auch durch wirtschaftliche Faktoren der Makro- und Mesoebene (z. B. Rolle als Handelspartner, Zusammenarbeit von Institutionen im Rahmen von Ausbildungs- und Austauschprogrammen) und durch rechtliche Vorgaben sowie durch die traditionelle Rolle und den Status einer Fremdsprache im Kooperationsland bestimmt. Englisch nimmt sowohl in Russland als auch in Deutschland den Status einer Lingua franca ein. Russisch hingegen lernen nur ca. 1–3 % der Schüler in Deutschland, inzwischen weit abgeschlagen hinter Französisch (ca. 25–40 %, vgl. S. 45). Deutsch in Russland genießt – traditionell – vor allem aufgrund von wirtschaftlichen Erwägungen einen noch immer relativ hohen Status, wird allerdings inzwischen durch Englisch abgelöst. So werden in den meisten Stellenanzeigen Englischkenntnisse vorausgesetzt (51 %), gefolgt von Englisch- und Deutschkenntnissen (28 %), vgl. dazu die Statistik S. 57.

Nach der Beschreibung von weiteren, für die Untersuchung durchaus wichtigen Faktoren kann der Leser endlich die mit Spannung erwartete Untersuchungsmethodologie von Olga Martynova ab Seite 118 (!) kennenlernen. Die Daten wurden schriftlich (über Fragebogen mit neun Fragen) und per Telefonumfrage (mit Interviewleitfaden) erhoben. Dass Unternehmen sich in der Tat scheuen, die Sprachenwahl zu thematisieren, wird an der doch unerwartet kleinen Rücklaufquote der Fragebogenerhebung – nur 23,3 % (108 von 463 Unternehmen) – deutlich.

Wie gestaltet sich nun die Sprach(en)wahl der befragten Unternehmen? Die Kommunikation deutscher Unternehmen mit ihren russischen Tochtergesellschaften erfolgt polyglott, dominant aber in Deutsch. Für die Kooperation mit Vertretungen und für Handelskontakte mit Russland wird überwiegend Englisch genutzt. Die Sprachwahl ändert sich allerdings mit der Abnahme des formellen Charakters der Kommunikationssituation: Mangelnde Russischkenntnisse deutscher Mitarbeiter führen häufig zur Kommunikation in Deutsch (Stammhaussprache), der Wunsch nach Anwendung und Verbesserung der Deutschkenntnisse durch russische Mitarbeiter befördert dies. Dennoch kommen in diesem Kontext auch Russisch und Englisch zur Anwendung. Setzt man die Größe des Unternehmens in Beziehung zur verwendeten Sprache, zeigt sich eine leichte Dominanz des Deutschen in Unternehmen mit mehr als 500 Beschäftigten, ein vermehrter Englischgebrauch jedoch bei Unternehmen im Mittelstand. Während große Unternehmen durchaus Dolmetsch- und Übersetzungsleistungen nutzen (40 %, vgl. S. 132), sinkt dieser Anteil bei mittelständischen Unternehmen auf 26,7 % (vgl. S. 137).

Interessante Ergebnisse zeigen sich bei der Betrachtung der einzelnen untersuchten Branchen: Im Maschinenbau wird häufig Deutsch genutzt (wobei man nicht von einem Branchensprachgebrauch sprechen kann), im Rohstoffhandel nutzt man Russisch und

Englisch, in der Chemiebranche Englisch (mit dem Charakter einer Branchensprache) und in der Elektronikbranche spielt Russisch (mit 70 %, vgl. S. 145) die wichtigste Rolle, gefolgt von Englisch. Betrachtet man die Ergebnisse zur Export-/Import-Orientierung, so ist festzustellen, dass vorwiegend Englisch genutzt wird. Teilweise bestätigen die Ergebnisse der Befragung die gängigen Thesen: „Man kauft in der Muttersprache ein und verkauft in der Sprache des Kunden." „Man verkauft in der Sprache, die dem Kunden bekannt und bequem ist, wenn man die Muttersprache des Kunden schlecht oder gar nicht beherrscht" (d. h. Nutzung des Englischen, vgl. S. 150). Verschiedene Kommunikationssituationen bestimmen darüber hinaus auch die Sprachenwahl: Für reine Kontaktaufnahmen wird häufig Englisch gewählt, für Werbe- und Produktmaterialien Russisch und Russisch/Englisch, zur Abwicklung von Aufträgen alle drei Sprachen (bei Unternehmen mit Tochtergesellschaften) und Englisch bei Unternehmen mit Vertretungen bzw. mit Handelskontakten. In allgemeinen und technischen Beratungsgesprächen dominiert Russisch, gefolgt von Englisch. Maßgebliche Gründe für die Sprachenwahl sind primär „die vorhandenen Sprachkenntnisse der Mitarbeiter", „Englisch als Lingua franca", der „Verzicht auf Übersetzungs- und Dolmetschdienste" sowie die „Anpassung aus Höflichkeitsgründen". Die Faktoren „Stammhaus-" oder „Branchensprache" sowie „Englisch zur Vermeidung von Muttersprachlervorteilen" spielen nur eine untergeordnete Rolle (vgl. S. 184). Die Gründe für die Bevorzugung der einen oder anderen Sprache lassen sich wie folgt zusammenfassen: Für die Nutzung von Russisch spricht das bessere Verständnis des russischen Marktes und der Mentalität, es ist ein Zeichen der Höflichkeit gegenüber dem Kunden, aber auch bei schlechten Fremdsprachenkenntnissen russischer Partner notwendig. Englisch hat einen hohen Verbreitungsgrad, d. h., es besteht die Erwartungshaltung, dass im wirtschaftlichen Umfeld jeder Englisch nutzen kann. Deutsch wird verwendet, da man sich in der Muttersprache besser als in der Fremdsprache ausdrücken kann. Indirekt heißt dies aber auch, dass die Fremdsprachenkenntnisse deutscher Manager offensichtlich nicht so gut entwickelt sind.

In Telefoninterviews hat Olga Martynova auch Manager russischer Firmen befragt. Ca. 45 % sind der Auffassung, dass man das Erlernen der deutschen Sprache befördern sollte, ca. 28 % teilen diese Auffassung nicht, da Englisch für Geschäftsleute ausreichend sei (vgl. S. 200 f.). Trotz dieser Erhebungen plädiert Olga Martynova in ihrem Fazit für die Beförderung der russischen und der deutschen Sprache im jeweiligen Partnerland, z. B. durch Austauschprogramme für Mitarbeiter, durch Einrichten von öffentlich-privaten Partnerschaften im Bereich des Mittelstandes und der Verbesserung der schulischen Motivation, über Englisch hinaus weitere Fremdsprachen zu lernen.

Fazit: Die Arbeit ist inhaltlich ansprechend und in einem sehr klaren akademischen Stil verfasst. Die Theoriedarstellung mag etwas zu ausgedehnt erscheinen, bietet aber gerade einem Leserkreis, der sich mit dem Thema noch nicht umfassend auseinandergesetzt hat, einen guten Überblick zu den relevanten Begriffen und deren Kontext. Die Untersuchung ist solide durchgeführt und hat zu aussagekräftigen Ergebnissen geführt. Die zahlreichen Abbildungen sind auf den ersten Blick verwirrend, ihre gute textuelle Einbindung und Kurzzusammenfassungen am Ende eines Abschnittes erleichtern jedoch ihr Verständnis. Etwas merkwürdig mutet die Nutzung des Begriffs „Heimseite" an, ohne Kontext würde man wohl nicht wissen, dass hier der Webauftritt eines Unternehmens, also *Homepage*, gemeint ist. Aber dies mindert keineswegs die Qualität dieser sehr lesenswerten Publikation. ◆

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Kvam, Sigmund/Knutsen, Karen Patrick/Langemeyer, Peter, Hrsg./eds. (2010): *Textsorten und kulturelle Kompetenz. Interdisziplinäre Beiträge zur Textwissenschaft/Genre and Cultural Competence. An Interdisciplinary Approach to the Study of Text.* Münster, New York, München, Berlin: Waxmann. ISBN 978-3-8309-2253-7, 322 Seiten.

Die vorliegende Anthologie ist aus der Arbeit der Forschungsgruppe *Text und Kontext* entstanden, die auf Initiative von Sigmund Kvam an der Hochschule Østfold (Halden/Norwegen) gegründet wurde und der auch Forscher von *Wisstrans* und *NordCrit* angehören. Eine interdisziplinär ausgerichtete internationale Tagung an der Gesamthochschule Østfold bot 2009 schließlich Anlass für die vorliegende Publikation. Im Mittelpunkt der 13 Beiträge von Autoren aus Dänemark, Griechenland, Norwegen, Österreich und Schweden steht der TEXT in seiner kulturellen und kontextuellen Eingebundenheit, die aus sprach-, literatur- und sozialwissenschaftlicher Perspektive beleuchtet wird.

Das Themenspektrum der Betrachtungen ist breit gefächert: Neben faktualen Texten, d. h. Gebrauchstexten aus verschiedenen Domänen (u. a. amtliche Dokumente und deren Gattungsbildung, Internettexte von Fluggesellschaften, Lehrbücher zum wissenschaftlichen Schreiben, popularisierende medizinische Texte und Texte aus den Sozial- und Erziehungswissenschaften) sowie Übersetzungen, werden in drei Beiträgen auch fiktionale Texte betrachtet. (Aufgrund der primär fachsprachlichen Ausrichtung dieser Zeitschrift werden diese hier nur kurz erwähnt: K. P. Knutsen zu „Michael Cunnigham in Woolf's Clothing"; T. F. Elsness zu „Trust and Relations of Trust in Two Novels for Young Adults" und P. Langemeyer zu „Metaleptische Erzählverfahren in Erich Kästners ‚Romanen für Kinder'".)

Der trotz großer Heterogenität gemeinsame Nenner aller Beiträge ist, wie im Vorwort (S. 11) klar ausgeführt wird, in den fünf „K-Wörtern" zu suchen: „kulturelle Kompetenz", „Kontext", „Konvention", „Kohärenz" und „Konstruktion". Sie werden in den einzelnen Artikeln auf unterschiedliche Weise und mit verschiedener Akzentuierung thematisiert. Folgt man einer sachgebietsorientierten Strukturierung, so ergeben sich drei Bereiche, mit denen sich die Beiträge auseinandersetzen: (1) Theorien zu Text, Kontext und Übersetzung, (2) die Übersetzungsqualität von überwiegend instruktiven/direktiven Texten, (3) die Textwirkung von Textsorten mit Blick auf Handlungsentscheidungen. Die Rezension betrachtet die Beiträge daher in dieser Kategorisierung.

Mit dem einführenden Beitrag von Sigmund Ongstad unter dem Titel *„Synchronic-Diachronic Perspectives on Genre Systemness"* wird abgesteckt, was unter TEXT, ÄUSSERUNG,

GATTUNG (im Verständnis von Bachtin) und GATTUNGSBILDUNG (*genrefication*) verstanden wird. Ongstad diskutiert das Wechselverhältnis von diachronischer und synchronischer Betrachtungsweise von Texten im Rahmen der Gattungsbildung. Er skizziert Faktoren, die der Ausbildung und Veränderung von Textsorten dienen. Zur Veranschaulichung seiner Methodologie analysiert der Autor im zweiten Teil des Beitrags die Weiterentwicklung von Textgattungen anhand der allgemeinen Zielstellungen des norwegischen Lehrplans von 2006. Der uneinheitlich verwendete Begriff KONTEXT steht im Mittelpunkt des Aufsatzes von Hilde Wågsås Afdal und Geir Afdal (*„The Hidden Context"*). An einer Fallstudie aus drei methodologisch orientierten Texten der Sozialwissenschaften veranschaulichen sie Kontext als „Behälter" (*container*), als „Gemeinschaften und Umgebungen" (*communities and surroundings*) sowie als „Netzwerk" (*network*) und explizieren dies durch Beispiele. Es wird deutlich, dass Kontext nicht nur als mehrdimensional, sondern auch als dynamisch einzustufen ist und damit fortlaufend Raum für weiterführende Diskussionen bietet. Eine klare Abgrenzung scheint also nicht möglich.

Übersetzungswissenschaftliche Aspekte stehen in vier Beiträgen im Blickfeld der Betrachtungen. *„Grenzen und Möglichkeiten von Invarianz als funktionaler Analysekategorie – unter besonderer Berücksichtigung der Übersetzungswissenschaft"* ist der Titel des Beitrags von Sigmund Kvam. Über die Abgrenzung von Äquivalenz (verstanden als Gleichwertigkeit) und Invarianz (verstanden als Gleichheit) in der Übersetzung wird ein Übersetzungsauftrag (Englisch–Deutsch) für die Gebrauchsanleitung einer Kaffeemaschine betrachtet. Es zeigt sich, dass Invarianz auf ganz verschiedene Weise interpretiert werden kann. Sie ist zum einen als Bindeglied zwischen Funktionalität und Intertextualität zu verstehen, erweist sich jedoch zum anderen auch als deskriptive Kategorie auf Sprachsystemebene. Invarianz konstituiert sich in der Interaktion, was im vorliegenden Beitrag im Übersetzungsauftrag, d. h. einer „ausgehandelten Bedeutung" zwischen Auftraggeber und Übersetzer, dargestellt wird. Mit einer „interaktional begründeten Invarianz" ist es möglich, zu einer Typologie von Übersetzungen und Paralleltexten beizutragen.

Mit Gebrauchsanweisungen für technische Haushaltsgeräte (im Vergleich Deutsch–Norwegisch) und der Frage ihrer Übersetzung aus dem Englischen bzw. aus dem Deutschen setzt sich Kåre Solfjeld auseinander. Er konstatiert, dass Handlungsschritte in diesen Sprachen auf unterschiedliche Weise ausgedrückt werden. Deutsche Satzstrukturen bieten die Möglichkeit, themen- und rahmenbildende Elemente in Frontposition des Satzes zu platzieren. Es werden vorzugsweise Infinitive und *Sie*-Formen eingesetzt. Im Gegensatz dazu tritt durch den Imperativ in norwegischen Texten eine solche Platzierung nur selten auf, man nutzt das s-Passiv und eine größere Frequenz von nichttypischen Formen als im Deutschen. Da viele Texte aus dem Englischen (als Ausgangssprache) übersetzt werden, sollten zukünftige Studien auf die syntaktische Prägung von Strukturen in den Zielsprachen durch die Ausgangssprache Englisch achten. Durch die Studie werden nicht nur syntaktische Unterschiede zwischen den Sprachen Deutsch und Norwegisch deutlich, sondern auch kulturelle, zum Beispiel in der Wahrung von Höflichkeitsmaximen. Insgesamt ist dieser Beitrag durch die Anschaulichkeit der Beispiele sehr lesenwert für Forscher, die sich mit kontrastiver Linguistik aus syntaktischer Perspektive beschäftigen.

Die Risikokommunikation in Instruktionstexten und ihren Übersetzungen ist zentraler Gegenstand des Beitrags von Anastasia Parianou. Die Autorin hat ein Korpus technischer und medizinischer Instruktionstexte mit Blick auf vertrauensbildende Handlungsschritte zwischen Verkäufer und Käufer im Rahmen des *Customer Relationship Managements* (CRM) und ihre

Versprachlichung untersucht. Sie geht darin auf die emotionalen Aspekte dieser Texte unter Nutzung der Schlüsselbegriffe „Involvement, Emotion und Kognition" (vgl. S. 254 ff.) ein. Wie kann das Kundenvertrauen im Rahmen von CRM hergestellt werden? Wie wird zum Beispiel Risikobewusstsein in der Verbindung von Emotion und Kognition versprachlicht? Wie lassen sich diese Faktoren durch eine Übersetzung wiederherstellen? Es zeigt sich, dass der Übersetzer mit kultursensitivem Einfühlungsvermögen den emotional ansprechenden Charakter der zu übersetzenden Texte zunächst erkennen und dann in der Zielsprache rekonstruierbar vermitteln muss. Über die Rekontextualisierung für die „soziale Umwelt" der Zielsprache gelingt es, angemessene Instruktionstexte für die Kommunikationsgemeinschaft der Zielsprache zu produzieren.

Mit *„Fachkultur und Textsorten im interkulturellen Kontrast und Transfer"* setzt sich Cornelia Feyrer auseinander. Es geht dabei insbesondere um die Relevanz von Textsorten(konventionen) in medizinischen Texten (sowie Übersetzungen) und wie diese in die Ausbildung von Übersetzern integriert werden können. Dazu nutzt die Autorin Analyseergebnisse eines Korpus von französischen und deutschen Texten sowie eines Korpus von spanischen und deutschen Texten und zeigt Wege zur Didaktisierung dieses Wissens auf. Sie konstatiert, dass ein zielgruppenadäquater Text neben dem relevanten Fachwissen auch die Kenntnis von kulturellen Gepflogenheiten sowie der Fachkultur voraussetzt. In der Translationsdidaktik ist es daher besonders wichtig, Textsorten kontrastiv und mit fortschreitender Progression im Fachlichkeitsgrad zu vermitteln, um so eine fachkulturelle Sensibilisierung bei den Studierenden auszubilden. In diesem Kontext ist auch ein Zusammenwirken mit Fachleuten der jeweiligen Disziplin unabdingbar.

Die Untersuchung der Textwirkung von Internettexten und Texten instruktiv-direktiven Charakters mit Blick auf Handlungsentscheidungen steht im Mittelpunkt der folgenden vier Beiträge. Die Klimakommunikation von Fluggesellschaften ist Gegenstand des Beitrags von Aase Voldgaard Larsen und Anne Grethe Julius Pedersen (*„Klimakommunikation von Fluggesellschaften – eine Untersuchung der Sender-Empfänger-Relationen in der Online-Klimakommunikation von deutschen und dänischen Fluggesellschaften"*). Ihre Untersuchung basiert auf einer Analyse der Internetpräsentationen von 63 Fluggesellschaften (53 deutsche und zehn dänische). Sehr bemerkenswert ist, dass zwei Drittel der betrachteten Airlines das Thema Klimawandel und Co_2-Emissionen überhaupt nicht thematisieren und sich auf Verkaufsargumente (flexibel, schnell, sicher und komfortabel) fokussieren. Zwölf Airlines betonen in kurzen Statements ihre Umweltfreundlichkeit und sechs große Gesellschaften zeigen sich proaktiv zu diesem Thema: Sie übertragen auch Verantwortung auf ihre Passagiere und bieten ihnen zum Beispiel an, zur Kompensation von Co_2-Emissionen für Projekte zum Umweltschutz zu spenden. Diese Untersuchung zur Selbstdarstellung der Unternehmen und zur Kommunikation mit dem Leser bietet wichtige Ansatzpunkte für weiterführende Studien im Bereich der externen Unternehmenskommunikation.

Um institutionelle Kommunikation geht es im Beitrag von Anne-Lise Arnesen und Lisbeth Lundahl (*„Standardized Individualisation: Text-mediated Relations of Governance in Two Nordic Welfare Institutions"*). Sie betrachten den Standardisierungsprozess von Kommunikation durch Formulare, Instruktionen und Vorschriften sowie Fallstudien anhand eines Korpus von Texten aus norwegischen Kindergärten und von Arbeitsämtern in Schweden. Auf diese Weise gelingt es ihnen, Entscheidungsfindungsprozesse von Mitarbeitern für die Allgemeinheit nachzuvollziehen und darzustellen. Sie konstatieren, dass normierte Texte regulierend auf das menschliche Verhalten und so auf das soziale Verhalten in der Gesellschaft wirken.

Eine ähnliche Zielstellung wird auch im Beitrag von Geir C. Tufte zu *„Prioritized Norms in Municipal Geriatric Care in Norway and Sweden"* verfolgt. Interviews mit Mitarbeitern des Gesundheitswesens und Pflegepersonal in Altenheimen und eine darauf aufbauende Problemlösungsaufgabe für zwei Fälle bieten einen guten Einblick in die Entscheidungsfindungsprozesse des verantwortlichen Personals für die Betreuung von älteren Personen in Norwegen und Schweden. Sie zeigt die Professionalität und Sorgfaltspflicht der Mitarbeiter bei der Abwägung von Entscheidungen zwischen individuellem Bedarf und Konformität mit den gesetzlichen Grundlagen des Wohlfahrtsstaates.

Jon D. Orten (*„The Form of Written Knowledge: On the Nature of Academic Writing"*) analysiert die Prozesshaftigkeit von wissenschaftlichen Schreibprozessen anhand vorliegender englischer Handbücher zu diesem Thema. Neben der Genrespezifik diskutiert er Interdisziplinarität und Interdiskursivität. Es wird deutlich, dass es fächerübergreifende Konventionen gibt, die in den Schreibratgebern auch dargestellt sind, aber dass die Disziplinenbewusstheit beim Schreiben individuell zu trainieren ist. Dazu schlägt er vor, anstelle von Interdisziplinarität besser von Interdiskursivität zu sprechen.

Fazit: Die Beiträge der Anthologie sind ausgesprochen heterogen. Jeder einzelne Beitrag thematisiert jedoch ein relevantes Forschungsgebiet und Ergebnisse mit solider Basis. Insgesamt ergibt sich dadurch ein buntes Panorama zur Textsortenforschung im skandinavischen und deutschsprachigen Raum. Dem Resümee des Vorwortes lässt sich so durchaus zustimmen: „Durch exemplarische Textanalysen mittels verschiedener fachwissenschaftlicher Ansätze hoffen wir, einige Schlaglichter auf das facettenreiche Phänomen *Text im Kontext* geworfen zu haben." (S. 19). Vorbildhaft für weitere Publikationen sind auch die Zweisprachigkeit Deutsch und Englisch im Vorwort sowie die englischen Zusammenfassungen zu Beginn jedes Beitrags. Insgesamt ein vielfältiger und sehr lesenswerter Sammelband. ◆

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Scheller, Petra (2010): *Verständlichkeit im Physikunterricht. Kriterien und Ergebnisse einer interdisziplinären Analyse.* Bad Heilbrunn: Klinkhardt. (Beiträge zur historischen und systematischen Schulbuchforschung). ISBN 978-3-7815-1743-1, 323 Seiten. (= Dissertation, Augsburg 2009).

Dass die naturwissenschaftlichen Disziplinen in der Schule gemeinhin als schwieriger (und als schwerer verständlich) wahrgenommen werden als die übrigen Unterrichtsfächer, gehört zu den Binsenweisheiten der empirischen Bildungsforschung. Dass ein Großteil der Schülerinnen und Schüler jedoch, wie die Ergebnisse der jüngeren PISA-Studien gezeigt haben, den Naturwissenschaften und hier insbesondere dem Fach Physik mit einem sehr spezifischen Desinteresse begegnet, hat in Zeiten eines vielfach beklagten Fachkräftemangels auch die Bildungspolitik auf den Plan gerufen. Petra Scheller, wissenschaftliche Mitarbeiterin am Deutschen Museum in München, leistet in ihrer Dissertationsschrift ein Stück nüchterner Ursachenforschung. Sie geht der interessanten Frage nach, ob und inwiefern die Unlust der Schüler-

schaft am Fach Physik mit der mangelnden Verständlichkeit des Unterrichts zusammenhängt. Dazu beschäftigt sie sich vorrangig mit der Verständlichkeit der im Unterricht verwendeten Schulbücher. Scheller verfolgt mit ihrer Studie das Ziel, „pädagogische und didaktische Anforderungen an die Vermittlung physikalischer Inhalte im Allgemeinen und an Physikschulbücher im Speziellen zu identifizieren" und „daraus konkrete wünschenswerte Eigenschaften abzuleiten" (S. 9). Dabei weicht sie auch der (berechtigten) Frage nach der „grundsätzliche[n] Sinnhaftigkeit des Physiklernens" (S. 12 f.) nicht aus und beantwortet sie positiv. Der Sinn des schulischen Physikunterrichts wurzele in der prinzipiellen „Notwendigkeit, Schüler/innen mit dem Einfluss der Naturwissenschaften auf die Art, wie eine Gesellschaft Wissen erzeugt und mit diesem umgeht", zu konfrontieren (S. 13). Schülerinnen und Schüler sollten durch den Physikunterricht unter anderem dazu befähigt werden, „in gesellschaftspolitischen Kontexten verantwortungsbewusst zu handeln und in der öffentlichen Diskussion physikalischer Technologien sachbezogen argumentieren zu können" (S. 13).

In einem sehr umfangreichen, aber dafür auch sehr lesenswerten theoretischen Vorspann referiert Scheller die entwicklungspsychologischen und kognitiven Voraussetzungen sowie die pädagogischen und fachdidaktischen Rahmenbedingungen des Physikunterrichts. Als eine der entscheidenden Barrieren im Lern- und Verstehensprozess identifiziert Scheller dabei (neben der Abstraktheit und Komplexität der Unterrichtsthemen) vor allem die stark formalisierte Sprache des Physikunterrichts. Das für den schulischen Unterricht charakteristische Bemühen um alltagssprachliche, allgemeinverständliche Erklärungen für die zu beschreibenden physikalischen Phänomene konkurriere hier mit dem Anspruch auf „präzise Begriffszuweisungen" (S. 65), also mit der (im Prinzip wissenschaftlichen) Forderung nach einer sachangemessenen und konsistenten Terminologie. Dieses Spannungsverhältnis zwischen Fach- und Alltagssprache, das ja im Prinzip für jede Form der Experten-Laien-Kommunikation charakteristisch ist, stellt für Schülerinnen und Schüler sowie für Fachlehrerinnen und -lehrer, nicht zuletzt aber auch für die Autorinnen und Autoren von Schulbüchern eine große Herausforderung dar. Letztere müssen sich in der Konzeption eines Physikschulbuchs auf einen Sprachgebrauch verständigen, der den divergierenden Ansprüchen und Fähigkeiten in ausreichendem Maße Rechnung trägt und der für die am Unterrichtsgeschehen beteiligten Akteure gleichermaßen verständlich und nützlich ist.

Vor dem Einstieg in die eigentliche Analyse beschreibt Scheller zunächst typische Verwendungssituationen des Physikschulbuchs und berücksichtigt dabei auch die verschiedenen Nutzungsoptionen außerhalb der schulischen Präsenzlehre. Weil allerdings kaum aktuelle empirische Untersuchungen zur tatsächlichen Nutzung von Schulbüchern vorliegen, muss Scheller hier größtenteils auf die sehr normativen und teilweise stark idealisierenden Annahmen der systematischen Schulbuchforschung sowie auf ältere Beiträge zur gesellschaftspolitisch inspirierten Schulbuchkritik der 1970er Jahre zurückgreifen. Sehr aufschlussreich ist in diesem Zusammenhang aber dennoch die von vielen Autoren geteilte Einschätzung, dass Physikschulbücher sehr viel stärker von Lehrern als von Schülern genutzt werden. Nicht weniger bemerkenswert ist auch die (auf eine Erhebung von Merzyn 1994 zurückgehende) Feststellung, dass ein nicht unerheblicher Anteil an Fachlehrerinnen und -lehrern den Einsatz von Schulbüchern im Unterricht prinzipiell ablehne, weil die Darstellungen darin zu abstrakt seien und die Sprache zu schwierig sei (S. 75).

Aus der Zusammenstellung prototypischer Nutzungssituationen leitet Scheller einen sehr umfangreichen Katalog an kommunikativen Anforderungen an Physikschulbücher ab. Das Schulbuch als solches wird dabei (in Anlehnung an Wiater 2003 und Bamberger et al. 1998)

texttypologisch zwischen dem Sachbuch und dem wissenschaftlichen Fachbuch verortet, wobei das Schulbuch sich, so konstatiert Scheller, gegenüber den benachbarten Textsorten vor allem durch die „Eingegrenztheit des […] vorgegebenen Stoffes, die klare Abgrenzung der Adressatengruppe und die Orientierung an lernpsychologischen Erkenntnissen und konkreten Zielsetzungen" (S. 88) auszeichne.

Das eigentliche Kernstück der Studie ist die Untersuchung von vier ausgewählten Physikschulbüchern für bayrische Gymnasialschülerinnen und -schüler der 7. Klasse. Exemplarisch greift Scheller dabei die textlichen Realisierungen des Themas „Kräfte in Natur und Technik" heraus. Den theoretischen Rahmen für die Analyse bilden ein eher kursorischer Überblick zur Theorie des Textverstehens, eine ausführliche Würdigung des didaktischen Ansatzes der Elementarisierung in Nachfolge Wolfgang Klafkis sowie eine Zusammenstellung verschiedener Verständlichkeitskonzeptionen und -modelle. Scheller referiert in diesem Zusammenhang die ‚Klassiker' der Verständlichkeitsforschung, angefangen von den *readability formulas* über das populäre Hamburger Verständlichkeitsmodell von Langer/Schulz von Thun/Tausch und Groebens theoretisch-deduktiven Ansatz bis hin zum Sechs-Felder-Modell Sauers. Dieser Überblick über die Geschichte der Verständlichkeitsforschung ist sehr verdienstvoll, allerdings nicht vollständig. Es ist schade, dass ausgerechnet die neueren Ansätze aus der Fachsprachenforschung (wie z. B. Göpferich 2006) in der Zusammenstellung fehlen. Auch Hans Jürgen Heringers flammendes Plädoyer für eine dezidiert sprachwissenschaftliche Verständlichkeitsforschung (Heringer 1979), in dem alle wesentlichen linguistischen Probleme der Verständlichkeitsthematik *in nuce* vorweggenommen werden, findet in Schellers Forschungsüberblick keinen Platz. Diese selektive Rezeption des Forschungsdiskurses mag einer der Gründe dafür sein, warum der von Scheller eingeschlagene methodische Weg in der Ausführung vergleichsweise konventionell anmutet: Sie beurteilt ihre Untersuchungsgegenstände anhand eines textbezogenen (gleichwohl sehr differenzierten und feingliedrigen) Analyserasters, das sich stark an den althergebrachten Kategorien des Hamburger Verständlichkeitsmodells sowie den Verständlichkeitsdimensionen von Groeben/Christmann 1989 orientiert. Das traditionelle Analyseraster wird in einigen Bereichen um textsortenspezifische Aspekte ergänzt. Innerhalb der einzelnen Kategorien formuliert Scheller jeweils Leitfragen für die Analyse. Diese beziehen sich auf größtenteils quantifizierbare Oberflächeneigenschaften (Wortlänge, Wortanzahl, Satzanzahl, Satzlänge etc.), aber auch auf Formen der grafischen Aufbereitung von Inhalten (Bilder, Diagramme, Tabellen, Charts etc.), auf die Gestaltung des Orientierungsapparats (Überschriften, Inhaltsverzeichnis, Register, Kolumnentitel) sowie auf die schulbuchtypischen Mittel der Organisation der Wissensaneignung (Aufgaben, Merksätze, Glossarien etc.). Im Bereich der eher interpretativen Kategorien (z. B. „Kürze–Prägnanz" und „Zusätzliche Stimulanz: Interessantheit") bleiben Schellers Begriffsbestimmungen naturgemäß etwas vage. Dieser Umstand wirkt sich nachteilig auf das Set der Leitfragen aus, die Scheller diesen Kategorien zuordnet (z. B. „Wie prägnant sind die Darstellungen?", S. 146). Sie erweisen sich in der Untersuchung als kaum operationalisierungsfähig und wenig präzise. Die Antworten auf diese Fragen sind dementsprechend kaum verobjektivierbar. Wesentliche Aspekte der textuellen Entfaltung, wie etwa die Anordnung und Verknüpfung einzelner Propositionen, werden nur am Rande gestreift.

Die geschilderten Unzulänglichkeiten gesteht Scheller in einer abschließenden Reflexion zur Methodik ihrer Analyse auch offen ein (S. 300). Nichtsdestotrotz gelingt es Scheller im Rahmen ihrer Analyse dennoch, wertvolle Erkenntnisse zur Verständlichkeit der untersuchten Schulbuchtexte zutage zu fördern. So kann sie etwa auf der Ebene der Lexik nachweisen, dass

die themenbezogene Fachterminologie in den Schulbüchern zwar systematisch eingeführt, von den Autoren selbst aber bisweilen uneinheitlich verwendet wird (S. 191). Ferner weist Scheller auf Mängel in der Anlage der Einstiegstexte hin (S. 235f.), die für einen erfolgreichen und motivierenden Unterricht höchst relevant sind: Zwei (der vier untersuchten) Schulbücher lassen in den Einstiegssequenzen explizite Hinweise auf die Nützlichkeit und die Alltagsrelevanz des zu vermittelnden Themas gänzlich vermissen. Ein sachbezogenes Problembewusstsein oder gar eine intrinsische Lernmotivation könne bei Schülerinnen und Schülern damit kaum geschaffen werden (S. 237). Die didaktischen Strategien, die in Schulbüchern typischerweise zur Organisation der Wissensaneignung und zur Verständnissicherung eingesetzt werden (insbesondere Aufgaben und Merksätze), beurteilt Scheller in den von ihr analysierten Texten weitestgehend positiv. Gleichwohl gibt Scheller in diesem Bereich wichtige und sehr plausible Optimierungshinweise. Sie plädiert u. a. für den vermehrten Einsatz von „Verbalisierungsaufgaben", also Aufgabenstellungen, die die Schülerinnen und Schüler gezielt dazu animieren, erworbene Kenntnisse selbstständig in schriftlicher oder mündlicher Form zu versprachlichen (S. 296).

Weil Scheller grundsätzlich daran festhält, dass sich das Schulbuch als Unterrichtsmedium für die Vermittlung physikalischer Themen eignet (S. 72), schlägt die an sich deskriptiv gedachte Bestandsaufnahme stellenweise in eine normative Apologie der Textsorte und eine Verteidigung ihrer Urheber/innen um. Dieser Eindruck kulminiert im vorletzten Kapitel, wo Scheller die Ergebnisse von Experteninterviews vorstellt, die sie mit Schulbuchautorinnen und -autoren geführt hat. Trotz des apologetischen Grundtenors ist dieser Abschnitt der Studie (nicht nur) für die Schulbuchforschung von besonderem Wert, weil Scheller darin ernüchternde Einblicke in die aktuelle Redaktionspraxis in Schulbuchverlagen liefert. Entlarvend ist etwa der Hinweis eines interviewten Schulbuchredakteurs, dass man die Schulbücher im Prinzip so konzipiere, dass sie vor allem Lehrerinnen und Lehrer ansprechen. Auf die Frage nach der Überprüfung der Verständlichkeit und der Gebrauchstauglichkeit der von ihnen erstellten Schulbücher gaben die Redakteure an, sich hier im Wesentlichen auf ihre „Intuition" und auf die „Gewohnheit" zu verlassen (S. 284), theoretische Verständlichkeitskonzepte und -modelle beeinflussen laut Scheller die konkrete Redaktionsarbeit nicht. Schülertests zur Überprüfung der Verständlichkeit der erstellten Texte bezeichneten die Befragten in diesem Zusammenhang sogar als „illusorisch" (S. 284).

Am Ende ihrer Studie gelangt Scheller zu einem Gesamtresultat, das nur auf den ersten Blick beruhigend wirkt: Entgegen ihrer Ausgangshypothese bescheinigt sie allen vier von ihr untersuchten Schulbüchern unter dem Strich eine gute Verständlichkeit, dies freilich „mit Einschränkungen hinsichtlich innerer Ordnung und äußerer Gliederung" (S. 293). Vordergründig könnte daraus geschlussfolgert werden, dass das Desinteresse der Schülerschaft gegenüber der Physik wohl nicht (oder jedenfalls nicht vorrangig) auf die mangelnde Verständlichkeit der Schulbücher zurückgeführt werden kann. Dies wäre allerdings sehr vorschnell. Möglicherweise hängen die eingangs geschilderten Schwierigkeiten auch weniger mit der sprachlichen und visuellen Gestaltung der Lehrmaterialien als vielmehr mit überaus handfesten Kommunikationsproblemen in der aktuellen Unterrichtspraxis zusammen. Zu ihren zentralen Herausforderungen zählen vermehrt die soziale und die kulturelle Heterogenität sowie die Multilingualität der Lerngruppen, auf die Fachlehrerinnen und -lehrer häufig nicht ausreichend vorbereitet sind.

Schellers unbestreitbares Verdienst ist es, mit ihrer engagierten Studie den Blick der Schulbuchforschung wieder stärker auf das Thema Verständlichkeit gelenkt zu haben. In An-

schluss an Schellers Ergebnisse wäre allerdings grundsätzlich danach zu fragen, *für wen* und *unter welchen Voraussetzungen* der Unterricht und die darin verwendeten Unterrichtsmaterialien (noch) gut verständlich sind. An dieser Diskussion könnte und müsste sich neben der Erziehungswissenschaft auch die Angewandte Linguistik beteiligen. •

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Grewendorf, Günther/Rathert, Monika, eds. (2009): *Formal Linguistics and Law.* Berlin, New York: De Gruyter. (Trends in Linguistics 212). ISBN 978-3-11-021838-1, 435 pages.

Law and language have always been closely intertwined. The present collection comprises fourteen studies that reflect various aspects of this multifaceted relationship and illustrates the variety of contributions that linguistics can make to both legal practice and the study of law. The volume is the offspring of a workshop on "Language and Law" held at Bielefeld University in February 2006 which aimed at exploring the connections between linguistics and jurisprudence. The authors – scholars and professionals working at the intersection of linguistics and law – produce a broad variety of research and real-life examples from the legal systems of Austria, Germany, Ireland, Italy, the Netherlands, Switzerland and the European Union. I will first outline the content of the individual contributions and then provide a discussion of the volume as a whole.

The book opens with an introductory chapter in which the editors provide brief excerpts of the individual papers and give an overview of past and current research projects on language and law. The remainder of the collection is structured into four parts. Each part consists of three or four papers and is dedicated to a specific area in which linguistics can contribute to the field of law, namely (1) the improvement of the comprehensibility of legal texts, (2) the identification of criminals on the basis of voice or text samples, (3) the automatic retrieval

of legal information, (4) the translation and interpretation of legislation in multilingual legal systems.

The papers comprised in Part 1 discuss the task of improving the comprehensibility of legal texts. Carl Vogel ("Law matters, syntax matters and semantics matters") argues that formal semanticists can provide valuable advice for legislative drafting and for the interpretation of laws, particularly where syntactic, aspectual or lexical ambiguity is involved. Vogel supports his claims with a rich set of examples from Irish constitutional and statutory law. Stella Neumann ("Improving the comprehensibility of German court decisions") analyses how the wordings of German court decisions can be made easier to understand. In a corpus study, she identifies three types of constructions that are difficult to understand for lay persons and yet occur frequently in German court decisions: sentences with multiple levels of embedding, complex noun phrases, and nominalisations. Neumann describes a psycholinguistic experiment in which she compared the comprehensibility of the original text of a court decision with that of two rephrased versions: an alternative version whose language was kept as simple as possible and a version that roughly exhibited the syntactic complexity of a typical newspaper report. She finds that this latter rephrased version is understood better than the original text or the overly simplistic version. Neumann attributes this result to the fact that there is a trade-off between syntactic simplicity and text cohesion. Monika Rathert ("Understanding a Riester-pension: A reply to Becker and Klein 2008") presents a critical assessment of another psycholinguistic study into the comprehensibility of a legal text: Becker and Klein (2008) investigated how jurists, insurance agents and laypeople read and understand the provisions of a pension contract. Rathert criticises that the methods employed in their experiment do not allow for a principled way to predict comprehensibility and proposes Frame Semantics as a model with the potential to overcome this shortcoming.

The second part of the collection is dedicated to forensic linguistics. It deals with questions related to the identification of a perpetrator by comparing speech or text samples produced by the perpetrator and suspects respectively. Michael Jessen ("Forensic phonetics and the influence of speaking style on global measures of fundamental frequency") investigates whether samples of spontaneous speech can be compared to speech data gathered from reading. His phonetic analysis of the recordings of 100 speakers shows that it is only under noisy conditions that the average fundamental frequency is significantly lower in reading than in spontaneous speech. Angelika Braun and Stefan Friebis ("Phonetic cues to speaker age: A longitudinal study") ask whether some parameters of a person's speech change with age. In a longitudinal phonetic study, they find that this is indeed the case for voice onset time in voiced plosives, vocal shimmer and speaking tempo. Jan Seifert ("Does speech reveal one's age? On the use of gerontolinguistic topics for forensic authorship analysis") asks whether certain lexical features in a text can serve as indicators of the author's age. In his critical discussion of existing studies, he comes to the conclusion that a comprehensive theory of such age-markers has as yet not been developed and that thus no reliable indicators are available at the present time.

The papers comprised in Part 3 discuss projects that apply methods of computational linguistics to support legal information retrieval. Stephan Walter ("Definition extraction from court decisions using computational linguistic technology") presents an approach to automatically identifying legal definitions in German court decisions. The method he applies exploits the fact that sentences containing definitions often follow certain linguistic patterns. Walter demonstrates that by searching for these patterns in a corpus of parsed court decisions, definitions can indeed be identified automatically at a high precision. The main difficulty, he points

out, arises from the fact that most state-of-the-art Natural Language Processing has not been adapted to the peculiarities of legal texts and thus still produces a certain number of errors. Emile de Maat, Radboud Winkels and Tom van Engers ("Making sense of legal texts") apply similar techniques (parsing, detection of typical patterns) to resolve references within and between legislative texts and to extract a formal representation of the texts' meaning. The system they describe has been put into practice by the Dutch Tax and Customs Administration. Doris Liebewald ("Interfacing between different legal systems using the examples of N-Lex and EUR-Lex") evaluates the usability of existing legal information systems in the multilingual and cross-national context of the European Union. She demonstrates that the shortcomings of these systems are partly due to the fact that they are used for purposes other than those they were originally built for. The paper by Erich Schweighofer ("The LOIS system and beyond") describes the development of a multilingual semantic network (WordNet) of legal terms and concepts with the aim of providing support for cross-linguistic legal information retrieval and database access.

The fourth and last part of the collection addresses issues specific to multilingual legal systems. The contributions by Karin Luttermann ("Multilingualism in the European Union. Status quo and perspectives: The reference language model") and Agnieszka Doczekalska ("Drafting and interpretation of EU law – paradoxes of legal multilingualism") both discuss the tensions arising from the European Union's legal multilingualism on the one hand and the need for legal security on the other hand. Luttermann responds to this challenge by proposing a language policy for the EU in which the two most frequently spoken languages serve as reference languages and the provision of reliable translations into the respective national languages is left to the individual member states. In contrast, Doczekalska argues that the apparent paradoxes of the EU's legal multilingualism disappear when considered in the concrete practical contexts of legislative drafting and legal interpretation. Andreas Lötscher ("Multilingual law drafting in Switzerland") describes the workings of legal multilingualism in the Swiss Confederation from the perspectives of drafting and interpreting law. He provides a rich set of real-life examples that illustrate how specific translation and interpretation issues were solved. Lötscher demonstrates that legal multilingualism can lead to clearer and more carefully drafted legislative texts and that it can support the interpretation of laws. Finally, the paper by Jacqueline Visconti ("A modular approach to legal drafting and translation") addresses the textual dimensions of multilingual legal drafting – as opposed to most other studies on the topic, which usually focus on terminological questions. Visconti analyses the cross-linguistic equivalences of conditional connectives and information structure found in English, French, German and Italian legal texts and proposes formal representations to capture these relationships.

The present volume provides a good overview of a new and growing field of research. It succeeds in portraying the breadth and variety of contributions that linguistics can make to the field of law and is probably unique in its composition. Some of the papers contained in the collection present outstanding original work – including, but not limited to, the contributions by Neumann, by Jessen, by Walter and by Lötscher (to name just one article per part). Some other papers tend to be somewhat heavy on literature reviews and sparse on genuine research, but they ensure that the book can also serve as an introduction and first point of reference to the state of the art. The editors' decision to include these latter papers alongside the actual research articles is thus to be welcomed.

Readers of this volume learn of a field with great potential, but they also become aware that there is still a long way to go. Several authors emphasise (a) the need for thorough corpus-

based studies into the formal properties of legal language – despite its title, the book offers little in the way of formal linguistics but mainly approaches its topic from various angles of applied linguistics – and (b) the need for Natural Language Processing tools specifically geared towards the analysis of legal texts to help build the very corpora required for such studies.

Unfortunately, the volume's editing is not always entirely satisfying. Although multilingualism is one of its core topics and although a majority of its contributions discuss German-language examples, all papers are kept in English. It is, however, quite apparent that not all authors are equally familiar with English academic writing. While most papers are well written, a few contain distractingly high numbers of English grammar mistakes, cumbersome (and sometimes obscure) Germanisms and instances of faulty punctuation and inappropriate style, which at times obstructs reading. The volume would have benefited from having a native speaker of English proofread the texts or allowing contributions in German into the book.

As a whole, however, the present collection can be recommended to scholars and professionals alike who work at the intersections of law and language. It can serve as a first point of reference for scholars trying to familiarise themselves with the range of issues addressed in their field, and it can give professionals an impression of the state of the art and open up new perspectives. Anyone who is interested in the language of law, or in the contributions linguistics can make to legal practice, will find at least one article in this volume (and probably more) that bears some relevance to his or her own work. ◆

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Bibliography of Recent Publications on Specialized Communication

Ines-A. Busch-Lauer

53rd Installment

Seit der 48. Fortsetzung erscheint die „Kleine Bibliographie fachsprachlicher Untersuchungen" auch online unter www.fachsprache.net (Link Bibliography) und trägt den Titel „Bibliography of Recent Publications on Specialized Communication". Die Datenbankversion der Bibliographie bietet verbesserte Suchmöglichkeiten, wie beispielsweise eine Schlagwortsuche. Derzeit finden sich in der Datenbank alle Titel, die seit der 48. Fortsetzung in der Bibliographie enthalten sind; nach und nach werden auch die früheren Ausgaben dieser Bibliographie in der Datenbank erfasst.

From the 48th installment on, the "Kleine Bibliographie fachsprachlicher Untersuchungen" has appeared under the title "Bibliography of Recent Publications on Specialized Communication". The references it contains can also be accessed online at www.fachsprache.net (Link Bibliography). The online version of the Bibliography offers additional search options, for example a keyword search. Currently, the database contains the titles included in this Bibliography since the 48th installment; the contents of the former issues will successively be added.

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Apples: Apples – Journal of Applied Language Studies, University of Jyväskyla, Centre for Applied Language Studies, <http://apples.jyu.fi>

ASp: ASp, la revue du GERAS, <www.geras.fr>

Critical Discourse Studies: Critical Discourse Studies, London, New York, Routledge

Der Sprachdienst: Der Sprachdienst, Wiesbaden, Gesellschaft für deutsche Sprache e. V.

Discourse & Communication: Discourse & Communication, Sage Publishers

Discourse Studies: Discourse Studies, Sage Publishers

ESP J: ESP Journal. English for Specific Purposes. An International Journal, New York, Amsterdam, Elsevier

ESP across Cultures: English across Cultures. Edizioni B.A. Graphis, <http://www.unifg.it/esp>

Fachsprache.IJSC: Fachsprache. International Journal of Specialized Communication, Wien, facultas.wuv, <www.fachsprache.net>

FuH: Fremdsprachen und Hochschule (FuH) – Die Fachzeitschrift des AKS, Bochum, Clearingstelle des AKS, <http://www.aks-web.de/publikationen/>

IJCL: International Journal of Corpus Linguistics, Amsterdam, Philadelphia, Benjamins, <http://www.benjamins.com/cgi-bin/t_bookview.cgi?bookid=IJCL%209%3A1>

JLS: Journal of Language and Social Psychology, Sage Publishers

JoSTrans: The Journal of Specialised Translation, <http://www.jostrans.org/index.htm>

LSP Journal: LSP Journal, Language for Special Purposes, Professional Communication, Knowledge Management, Cognition, Copenhagen Business School (CBS), <http://rauli.cbs.dk/index.php/lspcog>

MDÜ: MDÜ. Fachzeitschrift für Dolmetscher und Übersetzer, Berlin, BDÜ Weiterbildungs- und Fachverlagsgesellschaft mbH

RFLA: Revue Française de Linguistique Appliquée, <http://www.rfla-journal.org/presentation.html>

Target: Target. International Journal of Translation Studies, Amsterdam, Philadelphia, Benjamins

technische kommunikation: technische kommunikation. Fachzeitschrift für Technische Dokumentation und Informationsmanagement, Lübeck, Schmidt-Römhild

Terminology: Terminology. International Journal of Theoretical and Applied Issues in Specialized Communication, Amsterdam, Philadelphia, Benjamins, <http://www.benjamins.com/cgi-bin/t_seriesview.cgi?series=TERM>

TIS: Translation and Interpreting Studies, Amsterdam, Philadelphia, Benjamins, <http://benjamins.com/catalog/tis.6.1.03rod?sa=1>

trans-kom: trans-kom. Zeitschrift für Translationswissenschaft und Fachkommunikation, <www.trans-kom.eu>

ZfAL: Zeitschrift für Angewandte Linguistik, Frankfurt am Main u. a., Lang

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