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LANGUAGE AND LITERACY

SOME FUNDAMENTAL ISSUES IN RESEARCH ON

READING AND WRITING

PER HENNING UPPSTAD



*Department of Linguistics and Phonetics*  
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THESIS

2005

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*[T]wentieth-century psychology has placed an extraordinarily high value on data that are publicly observable and replicable, while it has not distinguished itself for the quality of its theories. Much of contemporary linguistics has focused on the construction of elaborate theories invented for the understanding of minuscule and questionable observations. The human sciences thus suffer from various pathologies that block more complete understandings of language and the mind. (Chafe, 1994, p. 11)*

*It is the objective task of the scientist – an objective World 3 task which regulates his ‘verbal behaviour’ **qua** ‘scientist’ – to discover the relevant logical consequences of the new theory, and to discuss them in the light of existing theories. (Popper & Eccles, 1977, p. 40)*



**To Line,**

**Åsmund, Olav and Ingvild**

## LIST OF PAPERS

This thesis is based on the following seven papers:

- I. Uppstad, P.H., & Tønnessen, F.E. The Notion of 'Phonology' in Dyslexia Research: Cognitivism - and Beyond. Manuscript resubmitted for publication.
- II. Uppstad, P.H., & Tønnessen, F.E. (2005). The Status of the Concept of 'Phoneme' in Psycholinguistics. Manuscript submitted for publication.
- III. Uppstad, P.H. (2005). The Dynamics of Written Language Acquisition. Manuscript resubmitted for publication.
- IV. Uppstad, P.H., & Solheim, O.J. (2005). What is Reading? A Critical Account. Manuscript submitted for publication.
- V. Uppstad, P.H. (in press). Written Language Skills and the Notion of 'Lexicon'. *LI Educational Studies in Language and Literature*. 6(1).
- VI. Uppstad, P.H., & Solheim, O.J. (2005). Aspects of fluency in writing. Manuscript submitted for publication.
- VII. Uppstad, P.H., & Wagner, Å.K.H. (in press). Approaching the skill of writing. In L. v. Waes, M. Leijten & C. Neuwirth (Eds.), *Writing and Digital Media*. Elsevier.

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## PREFACE

This work started as a sense of frustration over the notion of ‘phonology’ in reading research. I had not been able to identify any precise definitions of ‘phonology’ in this research tradition, and moreover, the maintenance of phonology differed from how I knew it from linguistics. I realized that I could not carry out scientific studies on reading before I had investigated the ambiguous and vague concept of ‘phonology’ in reading and dyslexia research. Therefore I chose to pursue the object of my frustration. Surely, I have been warned. Professor Carsten Elbro told me ‘det er meget farligt!’ [‘it is very dangerous!’], referring to the risk of becoming a (linguistic) proselytizer with no other contributions to science than the search for errors concerning linguistic theory in the domain of psychology. I appreciate this warning, which I have taken seriously.

As my work progressed, its focus shifted from phonology to a stronger focus on written language. This shift is not at all accidental – I believe that it is a prerequisite for the empirical investigation of written-language skills and their relationship to spoken-language skills. However, this shift does not mean that I have lost interest in the issue of phonology; on the contrary, by this focus the issue of phonology is related to a wider context of psychology, linguistics and philosophy of science. In this thesis I investigate the assumptions prevailing in phonology, with the aim of explicating the differences between the study of written- and spoken-language skills. To put it short, this thesis is about how to keep the study of written-language skills empirical.

I am fascinated by the perspectives provided in Per Linell’s claim of a ‘written-language bias’ in linguistics (1982) and Åsa Wengelin’s claim of a ‘spoken-language bias’ (2002), because they highlight empirical problems in the study of spoken- and written-language skills. Still, I believe that these insights represent (only) a first step towards a stronger empirical base for the study of these two sets of skills. This is because the problem of metaperspectives in the study of spoken- and written-language skills has deep roots. These unfortunate metaperspectives cannot easily be eradicated, because they are entangled in our understanding of what science is, in how we conceive of notions such as ‘human’, ‘mind’, ‘process’, ‘language’, ‘skill’ and ‘phonology’. It is my claim that the insight about the existence of a spoken-language bias and a written-language bias will have little value in and of itself, in the absence of a methodology enabling researchers in this field to search in a more

dynamic way for truly empirical findings. What is attempted in the present thesis is the application of a theory of science with strict empirical standards to the interdisciplinary research field of spoken- and written-language skills. Because of the privileged position which theoretical linguistics has held over its sub-disciplines (and practical applications) in the past century, this endeavour, in the last resort, amounts to the investigation of fundamental positions in the philosophy of linguistics. Still, we do know more about language today than we did fifty years ago, and this is in fact an attempt to confront the foundations of the theoretical construction with the state of the art.

In my approach, I have placed great value on Quine's perspective on scientific work: 'Neurath has likened science to a boat which, if we are to rebuild it, we must rebuild plank by plank while staying afloat in it.' (Quine, 1960, p. 3). The thesis identifies some metaperspectives which are claimed to impair the empirical science of written-language skills, and it presents alternatives which are considered to meet commonly accepted standards of empirical science. Or, using Quine's metaphor: the seven articles included in the thesis portray how a specific part of science can and should be rebuilt plank by plank.

Traditional linguistics and psycholinguistics have been occupied primarily with *description*. In this tradition, one of the main objectives has been to describe the typology of the world's languages and to identify the limits of variation. The present approach is more oriented towards a tradition of *explanation*, which is primarily associated with disciplines such as empirical psychology and medicine. Focusing on explanation involves considering descriptions as symptoms with a hypothetical relationship to the phenomenon which is to be explained. This differs from how descriptions are conceived of in traditional linguistics, where they are valued according to the consistency of the system with which they are associated. However, this tradition of description is in fact related to the domain of explanation. The relationship between traditional linguistics (and psycholinguistics) and the psycholinguistics claimed here can be said to be analogous to the relationship between medical disciplines such as anatomy and physiology on the one hand and aetiology (i.e., the study of the causes of disease) on the other, even though these medical disciplines are more closely connected owing to a more dynamic development of descriptions and explanations than has so far been the case in the linguistic field.

## 1. INTRODUCTION

### *1.1 Between language and literacy<sup>1</sup>*

There is a mantra in modern linguistics, namely the primacy of spoken language as the object of study:

*[T]he traditional grammarian tended to assume that the spoken language is inferior to and in some sense dependent upon the standard written language. In conscious opposition to this view, the contemporary linguist maintains [...] that the spoken language is primary and that writing is essentially a means of representing speech in another medium. The principle of the priority of the spoken language over the written implies, first of all, that speech is older and more widespread than writing. (Lyons, 1968, p. 38)*

Modern linguistics, from Saussure onwards, represents a shift in the object of study from written to spoken language. While linguistics maintained the overall notion of ‘language’, it switched the relative order of importance between spoken and written language. As a consequence, methods and assumptions were adjusted or rejected, but the discipline remained linguistic in its scope:

*Linguistics is a term which covers certain types of scientific approaches to language; it does not denote all sciences or scientific activities that are concerned with language and the use of language. On the contrary, both insiders and outsiders would identify linguistics as a humanistic discipline which analyzes language only in some specific ways and respects. (Linell, 1982, p. 35)*

In modern linguistics, the study of phonology has had a particular position in linguistic description. One reason for this is that the principle of distinctive features first gained success in phonology and was only later applied to other aspects of language, such as morphology and syntax (Taylor, 1991). Throughout the past century, linguists have made their inferences

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<sup>1</sup> ‘Literacy’ is here used as a collective term for reading and writing skills.

based on the claim in modern linguistics about the relationship between spoken and written language:

*Langage et écriture sont deux systèmes de signes distinct ; l'unique raison d'être du second est de représenter le premier.* (Saussure, Bally, Sechehaye & Riedlinger, 1969, p. 45)

*Writing is not language, but merely a way of recording language by means of visible marks.* (Bloomfield, 1933, p. 21)

The psychological study of reading and writing disorders has adopted the position of modern linguistics, with certain modifications inspired by the combination of ideas from generative grammar and cognitive psychology:

*What follows, then, is that phonology governs all words, whether dead, living or waiting to be born. So whatever else a word is, and regardless of whether it is spoken or printed, it is always a phonological structure.* (I.Y. Liberman, Shankweiler & A.M. Liberman, 1989, p. 8)

*Written words are encoded (symbolized) representations of spoken words, and spoken words are encoded representations of environmental experiences and entities.* (Vellutino, Fletcher, Snowling & Scanlon, 2004, p. 3)

The often-cited work of Goswami & Bryant (1990) questions the phoneme as a unit in phonological awareness, but remains true to the phonological basis of written-language skills:

*We cannot assume, therefore, that children's awareness of sounds – or 'phonological awareness', as it is often called – plays an important part when they learn to read and write. We have to establish by empirical means whether this connection exists or not and what form it takes. We need to discover if children are helped, and perhaps hindered sometimes, by their sensitivity to the constituent sounds in words.* (Goswami & Bryant, 1990, p. 2)

The arguments for the claim of spoken language as a necessary condition for written-language skills are diverse, but they are based primarily on evolutionary, instructional or developmental issues (A.M. Liberman & Mattingly, 1985; I.Y. Liberman et al., 1989). However, *this claim has never been treated as a true hypothesis about human skills*. Popper's (1972) illustration of falsification in terms of the black swan falsifying the hypothesis that all swans are white is both well-known and widely applied – as an illustration. It is a powerful illustration because it clearly shows the nature of hypothesis, but it is somewhat more difficult to apply in practice because then there is a need to verify the falsification, i.e. to verify that the black swan is a swan and that it is black. Still, it may be claimed that some such verifications are easier to perform than others. I will claim that there is a true black swan in mainstream research on reading and writing.

If one agrees with Per Linell's (1982) characterization of the unsteady focus on spoken language in modern linguistics, the scientific enterprise of investigating the relationship between spoken and written language seems rather haphazard. According to Linell, modern linguistics shifted its focus from written sources to spoken language. However, the insights and methods derived from the study of written language were transposed to the study of spoken language. Therefore, the exploration of spoken language was hampered by the limitations inherited from the study of written language (or caused by methodological mismatch owing to differences between written and spoken language). This is what he calls the *written-language bias in linguistics*. And in fact, the picture is even further complicated by Åsa Wengelin's (2002) claim of a *spoken-language bias* in the exploration of writing. Her point is that the intended focus on spoken language over the past century has hampered the development of theory about written language. The contributions of Linell and Wengelin highlight the problems concerning the status of written and spoken language.

Both reading and writing are about human skills – not about descriptive systems with logical preferences (at least from the very important perspective of finding appropriate teaching methods and intervening to help those who have difficulty learning to read and write). Therefore, the object of study which is primary in linguistics is not the most important issue when we deal with questions of language and literacy. More important are the inferences made on the basis of what currently goes on in linguistics. When written-language skills are being focused upon, the basic inferences about the status of spoken and written language should be made primarily from observation of the individuals who share this skill, not based on speculations concerning historical, evolutionary and developmental issues. This is where the above-mentioned Popperian black swan shows up: when we focus on the

heterogeneous group of people who can actually read and write, we find deaf people who had not mastered a spoken language when they learned these skills. The written-language skills of these people – and the fact that their reading and writing are not based on mastery of a spoken language – raise the question of what reading and writing actually are. The fact that there are people whose written language is built entirely from other sources than spoken language should not be suppressed; instead it should prompt us to draw up new and daring hypotheses about written-language skills. Wallace Chafe signals such an attitude:

*Since we hardly have evolved to write, it is intriguing to speculate on how we are able to do it so well as we do. Writing takes clever advantage of certain abilities that evolved for other reasons, among them an excellent sense of vision as well as great skill at making fine movements with the hands. (Chafe, 1994, p. 44)*

It is also my claim that the scholars of psychology and traditional psycholinguistics have been aware of this black swan. Their solution to this problem, however, seems to be to assert that ‘black is white’, applying a logic which clearly resembles that of Humpty Dumpty in *Through the Looking-Glass*: ‘ “When I use a word”, Humpty Dumpty said, in rather a scornful tone, “it means just what I choose it to mean – neither more nor less!” ’ (Carroll, 1872, Ch. VI).

*Deaf readers, despite their hearing impairment, might have access to phonology that could be used to support skilled reading. To assume that deaf readers lack access to phonology because of their deafness confuses a sensory deficit with a cognitive one. While the term phonological is often used to mean acoustic/auditory, or sound, this usage reflects a common misunderstanding of the term. Phonological units of a language are not sounds, but rather a set of meaningless primitives out of which meaningful units are formed. These primitives are related to gestures articulated by the vocal tract of the speaker (see Liberman and Mattingly 1995 for a more detailed discussion). (Hanson, 1989, p. 73)*

As the above quotation shows, the principle of falsification is not valued, at the same time as a highly abstract and vague conception of phonology is defended. The quotation also illustrates the fallacy involved in going from a claim of spoken language as an important factor in written-language acquisition to a claim of spoken language as a *necessary condition*. It is my claim that this fallacy is characteristic of the concepts used and inferences made in

mainstream research on reading and writing. In this sense, what we have here is an assumption with dogmatic characteristics prevalent in reading and writing research. If we choose instead to work with true hypotheses, suggesting that spoken and written language each has its own validity (Chafe, 1994), we obtain a real empirical basis for the study of written-language skills. There are several good reasons for using such hypotheses. First, to do so amounts to taking seriously the claim that written language represents a different communication modality than spoken language. Second, and closely related to the first reason, such hypotheses provide the only real empirical starting-point for the exploration of the characteristics of spoken and written language. Only when the characteristics of written-language skills have been studied extensively can we challenge a hypothesis with our findings in order to try to falsify it. Importantly, this is not to say that spoken and written language are totally different. They certainly do interact and have important commonalities, but from a scientific point of view it is high time to start an investigation of their individual distinguishing features before attempting to describe causal relationships between them.

My claim, however, is that the verification of blackness and ‘swanness’ in this particular case has far-reaching consequences for fundamental issues in research on reading and writing. Once we have realized that there really is a black swan, we have to re-examine those of our conceptions which are based on the whiteness of all swans.

### *1.2 The relationship between linguistic descriptions and human skills*

According to Popper, a central feature of hypotheses is that they are open to falsification. If they are not, they resemble dogmas. Therefore, one aspect of the quality of a hypothesis can be evaluated with regard to the principle of openness to falsification. A hypothesis may resist falsification for different reasons: either because it carries what we may call ‘truth’, or because it is too general and therefore a hypothesis of poor quality (Popper, 1965). According to Popper’s position of critical realism, the principle of falsification is fundamental to the empirical enterprise. Given this position, ‘autonomous linguistics’ is problematic from an empirical point of view:

*Just as autonomous linguistics distinguishes between a speaker’s purely linguistic knowledge, determined by the language faculty, and his non-linguistic knowledge, derived from pragmatic competence and the conceptual system, so autonomous*



*phonology splits off the act of speech as an articulatory, acoustic, and perceptual event from the abstract linguistic system which is claimed to underlie the physical data.* (Taylor, 1991, p. 28)

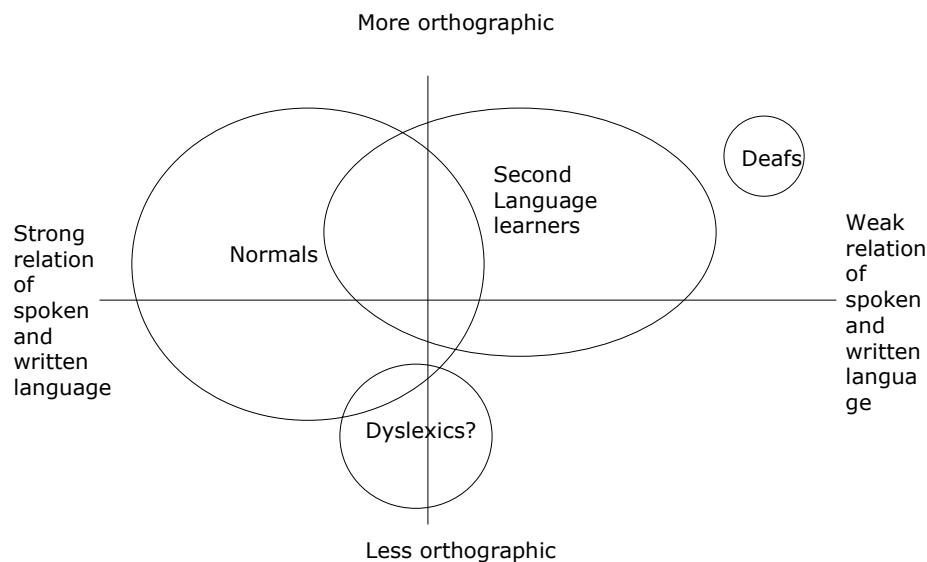
Abstract and autonomous systems in linguistics (and psychology) favour normativity and portray conceptions of ideal language behaviour. By focusing on the underlying system, autonomous linguistics goes far in equating linguistic descriptions with human language ability, but this is a leap of inference characteristic of a position which can only be considered as naïve realism (Realism, 2005). This is why our inferences about reading and writing must be based on the written-language skills of all those humans who actually read and write.

### *1.2.1 A thought experiment: phonology*

Let us make a thought experiment. We draw two axes and let the horizontal one represent the *ability to perceive a relationship between speech and written language* (this obviously presupposes the claim that among all those who can read and write, different individuals have different constraints when it comes to experiencing such a relationship). We may suggest that normal readers and writers are to be found at the end of the axis representing few constraints on experiencing a relationship between spoken and written language. At the other end, we may place deaf people. They do experience sound in different ways, but differently from hearing people, and therefore they are considered to have strong constraints on experiencing a relationship between spoken and written language. In between these two groups, we may propose to locate second-language learners of different kinds (or *other* kinds – deaf people learning to read and write should also be considered as a kind of second-language learners) depending on language, age and previously acquired reading and writing skills in their first language. The difficult question here is where to place dyslexics. They are focused on spoken language when they read and write, but nevertheless they show difficulties in segmenting spoken words. What is more, their orthographic skills are poor. I therefore suggest that they should be placed between the second-language learners and the normal readers, but this is highly uncertain.

We then let the vertical axis represent *a developmental span for written-language skills in terms of the exploitation of sensitivity to and knowledge of speech* (based on the claim that among all those who read and write, people develop differently in terms of written-language skills with regard to how they exploit their sensitivity to and knowledge of speech).

It is hypothesized that different individuals and groups have a different developmental span on an axis ranging from 'less orthographic' to 'more orthographic'. It is assumed that, at the beginning of their development, normal readers and writers extensively exploit their spoken language, progressing as time goes by to a proficiency characterized by a large degree of orthographic writing. Deaf people are hypothesized to exhibit a much shorter developmental span, starting somewhere in the 'more orthographic' part of the vertical axis. Dyslexics are also supposed to have a rather short developmental span on the vertical axis, but their span is located farther towards the 'less orthographic' part of the axis. Finally, second-language learners are hypothesized to start off as somewhat more orthographic than normal readers and writers.



*Figure 1*

*In the figure, the varying role of sound in written-language skills is hypothesized for different groups of humans who share the skills of reading and writing. The horizontal axis represents the ability to perceive a relationship between spoken and written language. The vertical axis represents a developmental span ranging from less orthographic to more orthographic.*

Although most features of Figure 1 can be questioned with regard to precision and empirical support, we do know that the groups in question perform differently with regard to the parameters used. Still, linguistic descriptions – and especially those of autonomous linguistics – presuppose an ideal phonology which is mapped with an ideal orthography. As a

consequence, two fundamental questions need to be asked of phonology: Is there a phonological theory capable of encompassing the hypothesized variation claimed in Figure 1? And what is the relationship between linguistic descriptions and human skills? These two questions are related. With regard to the first one, it is probably possible to describe all this as variation between individuals. However, this would require very detailed descriptions of different groups of people as well as of individuals at different stages of development. This raises another question, that of how to conceive of the detailed descriptions we would then obtain. In fact, we end up with similar problems both when phonological structure is abstracted away to an ideal phonology and when development is described in detail as a series of synchronic slices. However, the latter solution is preferable for empirical reasons. The problem is highlighted in the second question: What is the relationship between linguistic descriptions and human skills? This question calls for a definition of what a skill actually is – and what it is not. Even if we have a detailed description of the phonological system, we cannot infer from this description alone which parts of the system are relevant to the written-language learner. What we can do, however, is to observe what the written-language learner does when reading and writing. To do so is to focus on *skill* as the basis for the inferences that we make about reading and writing. If there is some truth to the variation hypothesized in our thought experiment (Figure 1), it is evident that skill is a better platform for our inferences than a focus on linguistic descriptions. Importantly, I do not claim that linguistic descriptions of spoken language are irrelevant to written-language skills – rather the contrary. However, the role of these descriptions must be reconsidered.

### *1.2.2 The importance of a nuanced understanding of the notion of ‘skill’*

When, for empirical reasons, we claim that spoken and written language each has its own validity (Chafe, 1994), we must focus primarily on the characteristics of the skill in question. As an example, we should be careful with *a priori* inferences about how phonological descriptions match written-language skills, because this approach has been closely linked, during the past century, to a view of spoken language having primacy over written. When I say ‘careful’, I mean that if we do this, we should do it by means of falsifiable hypotheses. In all cases where we deal with skills, we need to reflect thoroughly on the psychology involved in skills. Finn Egil Tønnessen has presented a model of skill which has the potential to underpin a new conception of psycholinguistics. In his article *Automaticity and awareness in reading* (1999), this model is applied to reading.

Tønnessen claims that behaviourism overfocuses on drill and automatic processes, while cognitive psychology overfocuses on intellectual abilities. Against this background, he asks how it is possible that two important aspects of human functioning are treated separately by two different schools of psychology:

*Too much automaticity can be a hinder when we want to perform a new and complicated task. Too much cognitive participation can also be a hinder when we want to perform a simple and well practised task. I will call an exaggerated emphasis on automaticity **the mechanistic fallacy**, and an exaggerated emphasis on the cognitive side **the intellectual fallacy**. (Tønnessen, 1999, p. 93)*

Tønnessen's aim is to unify the notions of 'automaticity' and 'awareness' in a nuanced understanding of 'skill':

*In both the learning and the performance of a skill our cognitive faculties are engaged (cf. for example: Colley & Beech, 1989; Ericsson & Smith, 1991). It is difficult to say precisely what the cognitive participation consists of, but we know it is there when a task is done better consciously than unconsciously. At the same time tasks that are done just as well without cognitive participation are not normally termed 'skills'. Therefore, breathing and blinking are not really skills. (Tønnessen, 1999, p. 93)*

He claims that connectionist theory provides the best theoretical basis for the flexible combination he sees a need for. In this model, automaticity and awareness are not considered as separate phenomena, because we rarely deal with situations that are either exclusively conscious or exclusively automatic: 'A skill consists of both performance and awareness, but is more than the sum of these parts.' (op. cit., p. 93). Therefore, the model encompasses a continuum as regards the combination of awareness and automaticity, in terms of *monitoring* and *steering*. Monitoring refers to the part of the continuum which is highly automatic, for instance when a reader monitors his or her reading. The opposite part of the continuum is conceived of in terms of *steering*; this is what happens when the reader encounters difficulties or challenges and has to stop and guide his or her own attention. A person who is reading moves back and forth repeatedly on this continuum between monitoring and steering. Tønnessen claims that such movement along the continuum is characteristic of what we call skills:

*[...] breathing and blinking are not really skills. Walking on a flat surface is somewhat less automatic, but is nonetheless automatic to the degree that a person can walk in his sleep. Thinking too much about how to walk can in fact be a hinder. It is a question of definition whether walking should be termed a 'skill'. But climbing a set of stairs demands a higher degree of awareness, and tightrope walking demands even more, so here the term 'skill' is clearly warranted. (Tønnessen, 1999, p. 93)*

In the present thesis, the nuanced understanding of 'skill' is used as a platform for making inferences about the relationship between linguistic descriptions and skills.

## 2. EXPLORATIONS OF THE RELATIONSHIP BETWEEN SPOKEN AND WRITTEN LANGUAGE

The problem of the status of written language as a human skill has occupied relatively few researchers, but there are a number of scholars who have contributed in a special way to a more specific analysis of the status of written language. In this chapter, I will present and discuss three contributions to this field: first Per Linell and his book *The written language bias in linguistics* (1982); second Wallace Chafe with his book *Discourse, Consciousness and Time* (1994); and third Åsa Wengelin's doctoral dissertation *Text Production in Adults with Reading and Writing Difficulties* (2002). In the following three sections, I will illustrate how they contribute, in different ways, towards the creation of a stronger empirical basis for the study of written-language skills.

### 2.1 Per Linell

Per Linell's book *The written language bias in linguistics* (1982) clearly points to descriptive problems in the study of spoken language. Linell's primary argument is that linguistics has traditionally studied language by means of written sources and that this tradition has given us a conceptual apparatus which is difficult to escape from:

*Our conception of linguistic behaviour is biased by a tendency to treat processes, activities, and conditions on them in terms of object-like, static, autonomous and*

*permanent structures, i.e., as if they shared such properties with written characters, words, texts, pictures and images.* (p. 1)

According to Linell, this ‘written-language bias’ is deep-rooted, because it is at the core of the earlier linguistic tradition of studying historical texts. He claims that modern linguistics did not manage to distance its scientific enterprise from this tradition. In that frame of reference, Linell cites Volosinov’s claim:

*European linguistic thought formed and matured over concern with the cadavers of written languages; almost all its basic categories, its basic approaches and techniques were worked out in the process of reviving these cadavers.* (Volosinov, 1973, p. 11)

It is clear that Linell’s motivation for taking this rather challenging position is his wish for spoken language to be properly investigated, and he considers his notion of a written-language bias to be a correction to modern linguistics. This is supported by Linell’s admission that the bias had been diminishing in recent linguistic development (Linell, 1982, p. 24). His main concern is summarized in the question ‘In what ways must linguistics be modified in order for it to tackle the problems of spoken language in the best possible way?’ (p. 24).

Linell’s position thus unveils a paradox: while the linguistics of the 20th century has claimed to focus on spoken language, much of this can be characterized as nothing but ‘lip service’. Therefore, exploration of spoken language is biased even though ‘[...] it is part of today’s standard textbook ideology to assume that spoken language is the primary and most important medium of natural language.’ (p. 24).

In discussing the conceptual apparatus, Linell touches upon the methodological foundation of linguistics. The claim of a written-language bias, in many ways, amounts to focusing on reality in linguistic descriptions. Linell’s concern is that the present framework hampers the exploration of spoken language. Another important question which follows from the claim of a written-language bias is how it is possible, within a research discipline, for a bias of this kind to sustain a century of linguistic description. On the one hand, this is a manifestation of a general problem of science involving the maintenance and protection of assumptions in what Thomas Kuhn calls ‘normal science’ (Kuhn, 1970). On the other hand, it remains an open question whether the conceptual apparatus can be adjusted in a more dynamic way. The excessive focus on description in the linguistic tradition can potentially lead to the preservation of unfortunate assumptions:

*On the other hand, some of the concepts derived from written language are indeed thoroughly misconceived as applied to spoken language. The moral is therefore that we have to discern the consequences of the theoretical proposals, whether to abandon them or not, in the specific cases one at a time. (Linell 1982, p. 32)*

Although Linell's main focus is on the quality of descriptions in the exploration of spoken language, his perspective is much wider:

*Finally, the invention of writing has naturally had important consequences for the linguistic code itself. In most literate societies we will, sooner or later, be faced with two codes or variants – one is tempted to say two languages – rather than just one. (p. 20)*

Linell actually goes far in the direction of considering written language as a human language which is different from spoken language. Although this issue is not central in his book, it can also be seen in Linell's eagerness to break out of the traditional 'narrow perspective' and the autonomous view of linguistics:

*This means that relevant parts of psychology, sociology, anthropology, ethology, neuropsychology, etc., must be taken into consideration; therefore, many scholars in the field (including myself) would now hold that the **Bindestreichlinguistiken** should be recognized as linguistics **tout court**. Such a linguistics would be characterized by methodological pluralism; it should study all significant aspects of language and its use, including its relations to other types of symbol systems and other types of behaviour. (p. 39)*

Even if Linell's concern is not primarily with written language and literacy, his criticism is highly relevant to disciplines which have exploited linguistic theory in their exploration of written-language skills. One such discipline is the psychological study of reading and reading disorders, which, over the past decades, has been built on assumptions taken from phonology. According to Linell, phonological theories do not necessarily portray the characteristics of speech, but may be seen as strongly linked to the conception of orthography: 'It may well be that even contemporary phonological theory is more suitable for investigating optimal

orthographies than for discovering the structure of spoken language.’ (p. 133). Linell’s criticism addresses not only the linguistic description of the speech flow, but also the tendency to conceive of mental states as objects. From this perspective, he relates the written-language bias to a claim from the theory of metaphors (Lakoff & Johnson, 1980) about how metaphors guide our understanding of everyday phenomena, even in science:

*If linguists analyze the observable patterns of linguistic data in terms of hierarchical constituent structures, this holds as much for the underlying structures. Deep structures, semantic representations and morphophonemic forms are portrayed as hierarchical structures of thing-like (static, discrete) segments of various sizes. Furthermore, in Chomskyan mentalism these things are assumed to be ‘psychologically real’, and some of Chomsky’s adherents, most clearly perhaps Katz (1964), have accordingly postulated a machinery of mental things that causally impinge on each other in the course of the ‘speech communication chain’. (Linell, 1982, p. 49)*

Linell also hints at a possible explanation for the dominance of written language as metalanguage: ‘furthermore, it may be that the visual mode is generally stronger in imagery than any other sense modality, including the auditive one.’ (p. 33).

## 2.2 Wallace Chafe

Interestingly, Wallace Chafe has a clear epistemological and methodological agenda in his book *Discourse, Consciousness and Time* (1994). First, he claims the importance of introspection in science; and second, he places very great importance on conscious experience:

*I believe the twentieth century will eventually be seen as a time in which the human sciences decided it was a good idea to ignore human experience. It can hardly be questioned that the century’s greatest progress has been in technology, and it would be worth studying the extent to which attempts to understand humanity have been shaped by technologies from the adding machine to the computer – from behaviorism to cognitive science. If this book has a higher purpose, it is to provide a bit of evidence*



*that sooner or later we will have to restore conscious experience to the central role it enjoyed in the human sciences a hundred years ago. Much, I believe, depends on such a reorientation. (Chafe, 1994, p. 7)*

His criticism is not directed only at specific traditions within linguistics and psychology, but has a more general character, although he values perspectives from psycholinguistics as well as child-language studies and sociolinguistics (p. 47). This broadness of target serves to underline his epistemological and methodological claims:

*Ideally, scientific understandings ought to pay equal attention to the quality of the data and the quality of the theory. In practice, it often happens that some aspect of one of these components is emphasized, while the other is treated in a manner that constitutes no improvement over folk understanding. For example, twentieth-century psychology has placed an extraordinarily high value on data that are publicly observable and replicable, while it has not distinguished itself for the quality of its theories. Much of contemporary linguistics has focused on the construction of elaborate theories invented for the understanding of minuscule and questionable observations. The human sciences thus suffer from various pathologies that block more complete understandings of language and the mind. (p. 11)*

His point is that linguistics and psychology make different kinds of errors, and that we need to rethink both the epistemological basis and the methodological one in order to advance in the study of language and the mind:

*There is an interesting irony in the fact that a great deal of modern linguistics is built on introspective data. In fact, only in the sub-field of phonetics and those areas of psycholinguistics dominated by the psychological tradition has [sic!] an exclusive commitment to public data been maintained. Most of linguistics differs radically from psychology in this respect. (p. 14)*

Chafe's main thesis is that consciousness shapes language in many important ways (p. 37). At the same time, conscious experience is the window where important aspects of language can be investigated. The notion of 'consciousness' therefore gives understanding a prominent position:

*Understanding, then, of whatever kind, is the ability, through imagination, to relate limited, particular, concrete observations to larger more encompassing, more stable schemas within which the particular experiences fit. The observations are often called **data**, the schemas **theories**. (p. 10)*

In Chafe's view, consciousness is a highly dynamic phenomenon:

*At any given moment the mind can focus on no more than a small segment of everything it 'knows'. I will be using the word consciousness here to refer to this limited activation process. Consciousness is an active focusing on a small part of the conscious being's self-centered model of the surrounding world. (p. 28)*

This notion of consciousness has a different status than the consciousness focused upon in the notion of introspection: 'In addition to perceptions, actions and evaluations, which evidently form the three basic ingredients of consciousness, there are sometimes also introspections – meta-awareness of what consciousness is doing.' (p. 31).

As mentioned above, Chafe rejects the narrow and isolated perspectives inherent in both the linguistic and the psychological tradition; for instance, he is strongly critical of the attempts made in psychology to approach the relationship between language and the mind – his alternative in this case is claimed to be qualitatively different:

*It is interesting to note that the recently emergent cognitive psychology, billed as an alternative to behaviorism, has retained its predecessor's commitment to public verifiability at the same time that it has returned to an acknowledged interest in the mind. The result has consisted in part of efforts to understand the mind by observing how long it takes students to press buttons. A rewarding but obviously limited tie to the complexities of the mental universe. (p. 13)*

According to Chafe, the real investigation of spoken language is a relatively recent enterprise and was first made possible by electronic technology (p. 46). However, even more than by a lack of appropriate technology, this investigation was hampered by the 'Chomskyan revolution', which led to a discarding of the focus on the characteristics of spoken language.

As regards the impact of writing on the study of spoken language, Chafe is close to Linell's position in several respects:

*During the heyday of linguistic text collection in the style of the late nineteenth and early twentieth centuries, an investigator sat with an oral performer and painstakingly transcribed words dictated by someone who must often have wished he could break into his normal way of talking. Some linguists of that period were remarkably skilled at capturing fine phonetic detail on paper. But, as we realize now with better technology it was by no means the whole story so far as speaking was concerned.* (Chafe, 1994, p. 46)

Here, Chafe actually seems to argue against introspection as a method, in favour of publicly available data provided by an instrument. It remains somewhat unclear how this should be understood in the light of his methodological agenda. It can be interpreted as evidence of Chafe's openness to different scientific approaches, including both observable data and introspection. It should also be noted that the insights referred collectively to by Linell as 'the written-language bias' clearly illustrate the problems involved in the use of conscious experience and introspection as a method.

When it comes to the relationship between spoken and written language, Chafe admits that spoken language has a central position in evolutionary terms: 'Speaking is natural to the human organism in a way that writing can never be.' (p. 43). However, he also clearly shows how scholars of the linguistic tradition have made hasty inferences about the relationship between spoken and written language. From this starting-point, Chafe focuses on the different uses of both speaking and writing, thereby opening up for new important research questions and perspectives:

*Since we hardly have evolved to write, it is intriguing to speculate on how we are able to do it so well as we do. Writing takes clever advantage of certain abilities that evolved for other reasons, among them an excellent sense of vision as well as great skill at making fine movements with the hands.* (p. 44)

Chafe's position is interesting for several reasons: first because it values the diversity of language use; second (but related to the first reason) because it values differences in modality

(speaking and writing); and third because it can be seen as characteristic of a new way of considering the relationship between language and the mind.

From a more critical point of view, however, there are some unclear points to be discussed. One of these points originates from the discrepancy between Chafe's strong claim about introspection on the one hand and his rather more moderate illustration of how different methodologies should interact and co-exist on the other: 'The point is that there are both good things and bad things about each of the four cells in this diagram. Each makes a contribution, but none has exclusive claim on scientific validity.' (p. 17). The categorical claims made in the introduction and the epilogue actually seem more like an antithesis to a tradition focusing on observable data than a methodological synthesis. The challenges of making such a synthesis can be summarized by Chafe's own questions:

*If observing overt behavior too severely limits our understanding of language and the mind, is there any chance that scientific understanding can be broadened to take systematic account of private observations? Is there any way to deal with the threat of solipsism, the conclusion that nothing beyond the individual self is knowable? (p. 14)*

These are good questions, but in my view they still await good answers. The problem is how to ensure that our introspections have higher quality than folk understandings.

As an example, Chafe is concerned with the characteristics of spoken language and claims that the exploration of spoken language was hampered by insights from the study of written language, by a lack of technology and by linguistic theories. However, it could be claimed that the written-language bias is in fact nourished by introspection and conscious experience. Second, if speaking and writing are adaptations to the situations in which they are used, Chafe's strong claim of a distinction between introspection and a focus on overt language behaviour can be considered as artificial in that the suggested unity of form and function actually unifies, in many important ways, what Chafe separates as 'introspection' and 'overt language behaviour', respectively. To study overt language behaviour in Chafe's wider theoretical frame therefore also means having access to rich information about what is claimed to be reached by 'introspection'. If Chafe's concepts of 'adaptation' and 'discourse' are not to be understood in this way, there seems to be a logical problem here.

However, if it is considered as an antithesis to mainstream linguistics and psychology, the focus on introspection has an important function in creating awareness of the psychological aspects present in every inference made in the scientific enterprise.

### 2.3 Åsa Wengelin

In her doctoral dissertation *Text Production in Adults with Reading and Writing Difficulties* (2002), Åsa Wengelin shows similar intentions for the study of written language as Linell does for spoken language:

*The claim of this thesis is that although linguistics may, in this way, have a written-language bias, we have not really gained enough knowledge about writing (except perhaps for normative insights; se below) and therefore not about writing difficulties.* (Wengelin, 2002, p. 7)

An underlying position common to Linell's and Wengelin's work seems to be that spoken and written language should be investigated without *a priori* inferences about their relationship, and based on their individual characteristics:

*However, it is probably the case that this **aim** to study spoken language, the view of spoken language as primary, and the struggle to get rid of the written-language influence together constitute one of several factors that have hindered the development of a written-language theory. Paraphrasing Linell, we could call this the 'spoken language bias in linguistics'. A possible underlying reason both for this and for Linell's 'written language bias in linguistics' is the view of one being just a representation of the other.* (Wengelin, 2002, p. 8)

In this way, Wengelin implies the importance of basic definitions. This is present in Linell's work as well, even though it does not become evident until Wengelin claims a 'spoken-language bias' as linked to a 'written-language bias'. The simultaneous existence of these biases can be seen as indicating that when written language is defined as only a representation of spoken language, unfortunate metaperspectives breed and scientific progress is hampered.

### 2.4 Summary

The three scholars certainly have different aims for their contributions. However, they also have common features. Linell's concern with the claim of a written-language bias is the

reality of description of spoken language. To focus on this problem is therefore to focus on a dominant metaperspective which has hampered the investigation of spoken language. Linell's argument addresses the linguistic tradition, which means that he unveils the consequences of the written-language bias for traditional linguistic description. However, his position contains few methodological contributions concerning the study of written language. His most important contribution is in fact that he makes explicit a clear example of the psychological aspects of the scientific enterprise in terms of *the written-language bias in linguistics*.

In Chafe's contribution, though, the methodological aspect is a main point. His work has clear methodological and epistemological claims concerning the study of speech and writing. The emphasis on introspection and conscious experience represents, in many ways, a contrast to mainstream research on spoken and written language. However, it is difficult to see how this claimed contrast can be considered valid for the reading and writing research of the past few decades. Introspection has been extensively valued in research on reading and writing within cognitive psychology, in terms of phonological awareness, metacognition and 'think-aloud protocols'. Chafe's concern is primarily with the relationship between language and the mind, and introspection is Chafe's solution for how to gain access to important aspects of the mind. His most interesting contribution is perhaps the understanding of consciousness as something dynamic.

Wengelin's contribution can be summarized in terms of *the spoken-language bias*. Her doctoral thesis takes into account the insights from both Linell and Chafe, but she sounds a warning of a kind similar to Linell's. While Linell's and Chafe's concerns were primarily about the exploration of spoken language. Wengelin's point is that when we focus on the exploration of written language, we deal with challenges related to how we conceive of spoken language in our encounter with written language. In my view, Linell's and Wengelin's remarks highlight the problem of metaperspectives in linguistics. Importantly, these remarks concern good examples of unfortunate metaperspectives in linguistics, but they do not solve the problems involved. With both the written- and the spoken-language bias present, we are faced with a very complex situation. A good way of illustrating this situation is to consider the use of the notion of 'phoneme'. According to Linell, the conception of the phoneme was motivated by alphabetic writing, but it went on to become widely used in theories about spoken language – and later yet it was discarded. Now the phoneme leads an autonomous and protected life in research on reading and writing. Neither Linell nor Wengelin provides any deeper points of methodology or epistemology in order to solve this complex situation.

Chafe's methodological solution is problematic in that it is difficult to see how more introspection can provide a way out of this problem.

### 3. FEATURES OF THE PHILOSOPHY OF SCIENCE USED IN THE THESIS

The present thesis has a special focus on the methodology of research on reading and writing. By 'methodology' is here meant the validity of inferences in the span from philosophy of science to pedagogical application.

#### 3.1 *About understanding*

Human behaviour is complex. When we attempt to understand our own behaviour, the object to be understood is the same as the subject who tries to understand. Understanding is not primarily a logical matter, but involves emotional and individual aspects. The process of understanding has been described in terms of hermeneutic circles (Gadamer, 1960), which portray understanding as dynamic.

Popper & Eccles's book *The self and its brain* (Popper & Eccles, 1977) is a contribution to this complex issue: 'The problem of the relation between our bodies and our minds, and especially of the link between brain structures and processes on the one hand and mental dispositions and events on the other is an exceedingly difficult one.' (p. VII). Their idea of three worlds – a physical, a psychological and a cultural one – has been widely applied:

*[...] I have talked of physical states and of mental states. I think however, that the problems with which we are dealing can be made considerably clearer if we introduce a **tripartite** division. First, there is the physical world – the universe of physical entities – to which I referred at the beginning of this section; this I will call 'World 1'. Second, there is the world of mental states of consciousness and psychological dispositions and unconscious states; this I will call 'World 2'. But there is also a **third** such world, the world of the contents of thought, and, indeed, of the products of the human mind; this I will call 'World 3' [...] (Popper & Eccles, 1977, p. 38)*

Because of Popper's emphasis on language as a World 3 object, this tripartition has also been used as a framework for discussion of the empirical foundation of linguistics. Helge Dyvik (1980) argues that orthodox generative grammar cannot be considered an empirical science, owing to its focus on intuition. At the same time, he describes a procedure for ensuring the empiricalness of linguistics. An empirical discipline must study World 1 objects. Understanding is a World 2 phenomenon which interacts with the phenomena of Worlds 1 and 3; but, importantly, it is also at the core of all scientific enterprise. In the hermeneutic tradition, we conceive of the process of understanding according to the idea of hermeneutic circles. This idea does not favour rational or logical aspects, as it involves empathy and unconscious aspects of understanding as well. This means that the hermeneutic approach is not restricted to the humanities, but counts as a basic insight for all scientific enterprise:

*It is perfectly true that the physicist is primarily interested in World 1. But in order to learn more about World 1 he must theorize; and this means that he must use World 3 objects as his tools. This forces him to take an interest – a secondary interest, maybe – in his tool, in the World 3 objects. And only by investigating them, and working out their logical consequences, can he do 'applied science'; that is, make use of his World 3 products as tools, in order to change World 1. (Popper & Eccles, 1977, p. 47)*

It is important for the limits to understanding in science to be sought, and the findings made should be applied to our linguistic research in order for us to make progress in identifying what it means to *understand* as distinguished from what it means to *describe* and to *explain*.

### 3.2 What is theoretical linguistics?

In his *Introduction to Theoretical Linguistics*, John Lyons underlines the empirical character of linguistics, but nevertheless he seems to use 'linguistics' and 'theoretical linguistics' synonymously throughout the book:

*Linguistics may be defined as the scientific study of language [...] for the moment it will be enough to say that by scientific study of language is meant its investigation by means of controlled and empirically verifiable observations and with reference to some general theory of languages-structure. (Lyons, 1969, p. 1)*



In Victoria A. Fromkin's book *Linguistics: An Introduction to Linguistic Theory* (Fromkin, 2000), the various linguistic issues discussed are sorted into the following categories: (1) theoretical linguistics, (2) descriptive linguistics, (3) historical linguistics, (4) anthropological linguistics, (5) sociolinguistics, (6) computational linguistics, (7) mathematical linguistics, (8) neurolinguistics and (9) psycholinguistics. One may object to the absence of consistent principles used for this categorization of linguistic disciplines. The book gives the impression that all disciplines are relevant to linguistic theory, and the relationship between linguistic theory and empirical data remains unclear throughout the book. In fact, the distinction between 'linguistics', 'theoretical linguistics' and 'linguistic theory' is no clearer in this book than in Lyons's *Introduction to Theoretical Linguistics* (1969). Psycholinguistics is about psychological aspects of language. Traditionally, it is considered a sub-discipline of theoretical linguistics whose task is to investigate the processing of those structures which are described in theoretical linguistics:

*Når jeg hevder at lingvistikken har et naturlig domene, distinkt fra psykolingvistikken domene, innebærer det følgende påstand: en forutsetning for å kunne besvare de psykolingvistiske spørsmålene – for eksempel om de medfødte anlegg for språkinnlæring – er at lingvistene har utarbeidet en empirisk fortolket modell som gjør det mulig å beskrive grensene for variasjon mellom språk uten allerede å forutsette visse svar på de psykologiske spørsmålene. (Dyvik, 1980, p. 17)*

[‘When I claim that linguistics has a natural domain, distinct from the domain of psycholinguistics, this involves the following assertion: a prerequisite for the ability to answer psycholinguistic questions – for instance about innate abilities for language learning – is that linguists have elaborated an empirically interpreted model which makes it possible to describe the limits of variation between languages without assuming beforehand certain answers to the psychological questions.’ – my translation]

The position claimed by Helge Dyvik is convincing, given the metaphysics of orthodox generative grammar. However, his position is not immune to objections, because it goes far in the direction of a constructivist position. Constructivism holds that descriptions are constructions which can never be empirically verified. The ‘reality’ of constructivism is the

reality we build in exploring consequences of our theories. An unfortunate consequence of constructivism is a rather naïve maintenance of the phenomenon of ‘understanding’. In order to highlight this problem, we may use Popper’s three worlds as a pedagogical gate. The idea of three worlds – a physical, a psychological and a cultural one – has inspired many scholars to discuss the empirical foundations of their scientific tradition. When focusing on World 1 objects in linguistics, i.e. sounds and signs, one captures characteristics of the objects of study by using theories (World 3) of different kinds. This is, in itself, a specific psychological phenomenon (World 2). Scientific observation therefore requires certain answers to psychological questions before description can take place. Thus, the notions of both ‘description’ and ‘limits of variation’ in linguistics are psychologically constrained, and the difference between Chomskyan psycholinguistics and ‘theoretical linguistics’ is, in my opinion, the obvious empirical problem of orthodox generative grammar rather than a matter of psychological questions. As a consequence, the above-mentioned claim by Helge Dyvik works to distance theoretical linguistics from orthodox generative grammar, but it overlooks the important empirical challenges which can be made to his own position. One may ask what it is that the descriptions of theoretical linguistics intend to describe. Do they show us the ‘limits of variation’, or do they show us psychologically restricted metaperspectives with an uncertain ontological status? According to this reasoning, both (generative) psycholinguistics and theoretical linguistics are psychologically constrained. In psycholinguistics, this is an obvious fact because the psychological assumptions are part of theory (World 3). In theoretical linguistics, it is more concealed in the notion of ‘description’. In this article it is claimed that there is no natural domain for theoretical linguistics as opposed to psychological aspects of language. In all cases, it becomes a matter of empirical foundation. *A priori* aspects are not only World 3 phenomena, they are also part of our understanding of what it means to ‘understand’. Provided that studies of psychological aspects of language meet high empirical standards, we may ask: *Can there be found a linguistics different from psycholinguistics?* In the present thesis, it is suggested that such a psycholinguistic position can in fact be maintained by treating definitions as hypotheses (Tønnessen, 1997).

Linguistic description presupposes answers to the psychological constraints on description. Traditional psycholinguistics presupposes answers to what Popper would categorize as World 3 phenomena, while theoretical linguistics presupposes answers to Word 2 phenomena. Instead of judging that orthodox generative grammar is non-empirical and theoretical linguistics is empirical, we should abstain from considering them as extremes on a

scale of empiricalness. Rather, we should ask whether it is possible to go further in the empirical direction when studying spoken- and written-language skills. What is clear is that theoretical linguistics – with its focus on description – faces fundamental challenges concerning empirical enterprise: What reality does it intend to describe?

### 3.3 *What is a definition?*

Traditionally, definitions and hypotheses are held apart when it comes to falsification: hypotheses are falsifiable, while definitions are not:

*A word has meaning if there is a convention establishing its meaning. Definitions express these conventions in the metalanguage. The conception may have been laid down formally by means of a definition, or it may have grown up informally by way of customary usage. In either case, the definition, as a formulation of a convention, is neither true nor false. (Salmon, 1973, p. 122)*

This position implies a pragmatism concerning truth, where truth becomes a matter of usefulness (cf. James, 1975). On the other hand, it may also lead to constructivism where one only comes to talk of ‘das Ding für mich’ without being confronted with hard facts (cf. Hacking, 1999). If definitions are evaluated according to their usefulness, the definition of ‘definition’ should also be evaluated according to its usefulness. This is where ‘truth’ enters the scene as regards definitions, challenging pragmatism at its core. This position is elaborated and described by Finn Egil Tønnessen concerning the definition of ‘dyslexia’ (Tønnessen, 1997). According to his position, definitions should be treated as hypotheses, and the sharp distinction between definitions and hypotheses is considered unfortunate. Consequently, both definitions and hypotheses are confronted with ‘reality’. Still, it is not fruitful to say that definitions are equal to hypotheses. The point is that any definition should be treated as a hypothesis, in being confronted with reality; for instance, the definition of ‘cancer’ has changed during the history of medical science as a consequence of such confrontation. Tønnessen’s position stresses the empirical enterprise of behavioural science in challenging pragmatism.

This position is interesting for the discipline of psycholinguistics as regards its relationship with theoretical linguistics. In work on language processing, the definitions

provided by theoretical linguistics should be treated as hypotheses, and they should be investigated as such through confrontation with empirical data. The empirical enterprise in behavioural science is to realize that the usefulness of the definition of ‘definition’ is about truth. Such a position, however, is controversial. Helge Dyvik argues that judging definitions as true or false, similarly to hypotheses, represents the position of conceptualism (1980). However, his own position is probably close to constructivism.

### 3.4 On defining ‘language’

Popper uses language as an example of a phenomenon belonging to World 3. However, aspects of language are present in both World 1 and World 2. It should be remarked that Popper’s choice agrees well with the contemporary conception of linguistic knowledge as autonomous, be that either structuralist ‘langue’ or generativist ‘competence’. In this respect, Popper’s example of language as a World 3 phenomenon does not challenge the traditional notion of theoretical linguistics. We may ask what are Popper’s basic reflections underpinning his choice of treating language as a World 3 phenomenon – whether they should be seen as a common-sense perspective or as a well-reflected position that he would be willing to defend strictly. Popper’s intentions, most probably, do not concern linguistic theory *per se*. There are also other aspects of the three worlds that seem problematic. According to Popper, World 3 is also the place for mathematical and logical truths. It should not be too controversial to claim that these issues have a more clarified status as regards universality than do national ‘languages’ as constructs. This diversity of World 3 is a weak point of Popper’s model and produces the opposite of the desired effect. However, if we stress Popper’s criterion for World 3 classification – cultural constructions –, this inconsistency may be acceptable after all. Instead of going too deep into Popper’s exemplification of language as a World 3 object, linguistics should thoroughly investigate how language should be studied from the perspective of the self and its brain. While there is massive criticism of non-empirical linguistic enterprise, few attempts have been made to define ‘language’ accordingly. In the present thesis, an attempt is made to define ‘language’ according to the reference points inherent in Popper’s three worlds. ‘Language’ is defined as ‘*a set of codes with potential for meaning*’, and ‘code’ is further defined as ‘*an articulated, gesticulated, graphic or tactile lapse*’. This suggested definition opens for the empirical study of language by focusing on code as a World 1 phenomenon. This does not mean that code belongs only to World 1 – it is

also part of and formed by World 3 as a cultural construct. The potential for meaning of this code is realized both in the individual World 2 and in the social, constructed World 3. The suggested definition of ‘language’ does not give priority to World 1 when it comes to language as a whole, but it suggests a solution to the problem of ensuring an empirical science of language, without any distinction being made between ‘theoretical linguistics’ and claimed sub-disciplines. The scientific study of language may have a common window in World 1 where the psychological restrictions on understanding are equal for all disciplines. In this respect, all linguistic disciplines – including ‘theoretical linguistics’ – deal with psychological aspects of language. However, the disciplines studying language may differ with regard to the paths followed by their investigation, focusing either on World 2 phenomena or on World 3 phenomena. The important point is that they share the empirical basis located in World 1 as well as the psychological conditions affecting the process of understanding. This World 1 approach to language focuses on observable features of the code. Such features may be of very different kind: for instance, brain imaging of language processing, variation in a specific language and temporal matters of processing. The major question in this approach to language is: *What feature should be favoured?* In an articulated lapse, the sound lapse is of particular interest; but the potential objects of study are not restricted to structural, segmental matters but to all observable features of the code. Linguistics has traditionally focused on description of structural, segmental matters. But how can we defend giving priority to this feature of the code without thorough investigation? Constructivism and pragmatism avoid this question by turning to theory (World 3 objects), where definitions are selected according to their usefulness to a given theory. While this question cannot be answered in detail in this thesis, the suggested definition of ‘language’ is intended to challenge linguistic description at its core. The reason why it cannot be answered here is that it requires empirical efforts within several disciplines which are relevant to the study of human language. Asking what constitutes language has been seen as a non-empirical matter, owing to the generativist metaphysical programme. It is probably possible, however, to perform empirical science without committing empiricism, if we reject constructivist positions in description and if we reject further metaphysics in the scientific enterprise.

Linguistic description is dependent on how we manage to distinguish between – but not separate – World 1 and World 2. This important point cannot be rejected with reference to traditional discipline boundaries, but counts as a challenge to all empirical science. Therefore, linguistic description is encompassed by what we call psycholinguistics, a psycholinguistics characterized by the psychological constraints on understanding. The object of study in such a

psycholinguistics is not different from the object of study of linguistics. The empirical bases are the same, even though the further interpretations differ. Traditional linguistics tends to interpret World 3 aspects of language, such as grammar. Traditional psycholinguistics tends to focus on World 2 aspects of language, such as awareness. In our sense of ‘psycholinguistics’, there is no strong justification for a distinction to be made between psycholinguistics and linguistics. However, besides that distinction we also have the fact that linguistics has occupied itself mainly with description. Given constructivism as a philosophical basis for linguistic description, we may ask whether there is any such reality as traditional linguistics intends to describe. The constructivist basis may lead one to ask whether linguistics is in the habit of first inventing something and next trying to find out what this ‘something’ is.

Contrary to the suggested definition of ‘language’, linguists often tend to study language as a World 3 object ‘directly’, that is through intuition (Chomsky, 1965), empathy (Itkonen, 2003) or awareness, and this is also what has happened to a great extent in reading research. According to Popper, intuition cannot be the reference point in empirical science. The focus on intuition, empathy or awareness as empirical data can be seen as an attempt to define phenomena which are highly vague by means of phenomena which are even more vague than those to be explained.

The philosophical position of constructivism is here claimed to be more exposed to bias than the position taken through the proposed definition of ‘definition’. Constructivism implies an approach to science in which operationalizations of a theory are all fully legitimated and restricted by the theory. Definitions and hypotheses are strongly linked to the preferences inherent in the overall theory; they are only to a limited extent results of inductive observations. This represents a problem in science, given that such theories are highly resistant to both falsification and verification. With respect to this point, there is no huge difference between constructivism and positivism. Constructivism provides definitions that are solely derived from theory, while positivism claims that what is not empirical is either analytically true or false – or meaningless (Ayer, 1936). In positivism, this is intentional; for constructivism, it is an unintended effect. The outcome is, however, similar for the two positions, namely: assumptions which are protected from being challenged by ‘reality’. This is a static enterprise, and it may in fact also be a prerequisite for Kuhn’s ideas of the structures of scientific revolutions (Kuhn, 1970). When reading Kuhn, one may legitimately ask: *Why* do we have these structures of scientific revolutions? To what extent are the phases of a paradigm created by perseverant positions in the philosophy of science, and to what extent are

they best conceived of as a natural whirl? The position claimed here that definitions should be treated as hypotheses is, in many ways, an ambitious claim of a more dynamic approach to scientific enterprise. This position does not exaggerate the emphasis on data, nor does it exaggerate the focus on theory. It is a position which is open at both ends, and it may therefore – if thoroughly maintained – make the phase of ‘normal science’ (cf. Kuhn, 1970) more vulnerable, thereby catalyzing real scientific progress. In linguistics, indications of a more dynamic enterprise can be seen in the relationship between phonology and phonetics. This relationship has, over the past decades, become blurred, and the constructivist character of phonology has been challenged by the discoveries of tone made by for instance Gösta Bruce (Bruce, 1977; Horne, 2000). However, constructivism endures in linguistics through definitions which are strongly restricted by their accordance with the current theory.

The consequences of constructivism and pragmatism in descriptions of spoken and written language are not easily detectable, owing to well-established common-sense opinions on the structures and interplay of spoken and written language. The ontological questions become more detectable if one focuses on what happens if the code and the mode of processing are changed. In the study of the reading of Braille – tactile reading –, the assumptions about processing were transposed from visual-reading literacy. Recent research, however, takes a different position:

*Punktskrift är en skrift anpassad till vår haptiska förmåga, vilken är en kombination av känsel, muskelkraft och rörelse. Punktskrift är i många avseenden, men inte i alla, en motsvarighet till eller likvärdig med s.k. svartskrift, det vill säga skrift avsedd att läsas med synen. (Punktskriftsnämnden, 2004)*

[‘Braille is a form of print adapted to our haptic ability, which is a combination of tactile ability, muscle power and movement. Braille is in many respects, but not in all, analogous or equivalent to “black print”, that is, print intended to be read by sight.’ – my translation]

It is claimed that the early research on reading Braille considered the Braille letter as a *form*, assuming that only one letter could be identified at a time. Further, these letters’ lack of distinctive features was expected to be the cause of the low reading speed. Current research, however, has shown that the Braille letters are conceived of as *structures* rather than forms, where the characteristics of letter recognition are dependent on dot density

(Punktskriftsnämnden, 2004). What is more, the role of hand movements during reading is emphasized in today's research. This opens up for aspects of reading fluency by the fact that the reader recognizes whole words without recognizing each single Braille letter. These findings about Braille reading have much in common with those made about reading of 'black print'. However, the major difference in mode of perception obviously remains. Braille reading has restrictions concerning overview which are due to (one-size) large letters and spacing. The reading process is generally slower than for reading by sight. One interesting question about the characteristics of Braille reading is whether tactile reading is more linear, less retrospective, than reading by sight. Such differences would in fact imply very different conditions for cognition when reading Braille than when reading by sight.

Having a definition of 'definition' which is primarily linked to usefulness will seriously undermine descriptions of linguistic aspects such as 'speaking', 'listening', 'reading', 'writing', 'signing', 'viewing', and 'reading of Braille'. If we keep the description of reading Braille hypothetical, we may be better placed to discover the true characteristics of this activity. Such changes in terms of description and definition may also create epistemological changes and yield genuinely new knowledge.

### *3.5 The relationship between definitions and circularity*

The proposition of treating definitions as hypotheses is linked to the problem which Tønnessen calls *truth by definition*:

*Looking back at the contributions made by many researchers in the history of our field, we often have to ask: which findings are merely true by definition and which are truly empirical findings? Assume, for a moment, that we define 'reading' as mainly decoding, and then define decoding as phonological processing. Should we then be surprised when we find a high correlation between 'reading difficulties' and 'phonological difficulties'? (Tønnessen, 1997, p. 85)*

Tønnessen's notion of 'truth by definition' contains moderate claims of circularity, and his proposal is intended to contribute towards a solution to this problem. Circularity in the strict sense is rarely demonstrated in the soft sciences; rather, it tends to occur to a greater or lesser

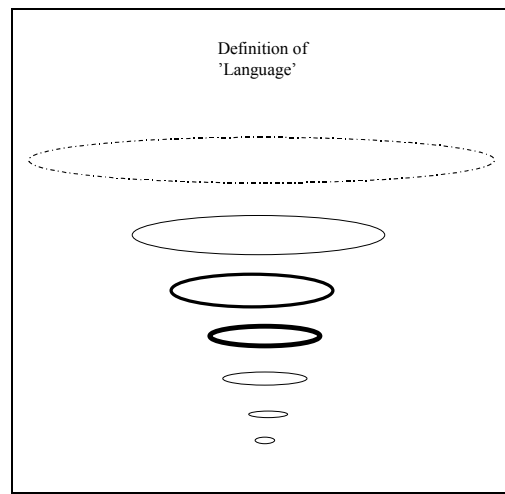


degree. An interesting question is whether there are certain characteristics of definitions that favour circularity.

Definitions always involve some kind of generalization. The question is how far such generalization should be taken, and what the motivation for the generalization is. My intention here is to say something about generalizations in definitions of 'language', but let us take a different example first: If we want to generalize the concept of 'circle', we have to set some features of specific circles aside. If we investigate circles of different diameters, we will discover that, independently of the length of the diameter, the circumference will be 3.14 times longer. The more general concept 'circle' does not have a fixed circumference or diameter, and we therefore disregard these features. This notion of 'circle' is therefore more abstract than the notion of 'a circle whose circumference is 10 cm'. However, if we generalize further to the notion of 'figure', we obtain a notion which is less useful in science. This is because, in the notion of 'figure', we have set aside so many features that it becomes difficult to define. As a consequence, the notion of 'figure' lacks precision as compared with that of 'circle'. Definitions of 'language' may be evaluated in a similar way. What seems clear is that we need some level of generalization when we define 'language'. (The discussion about *langue*/*parole* and *competence*/*performance* is a discussion about levels of abstraction.) We can say that there is general agreement that the definition of 'language' should be more general than the features of single utterances. However, modern linguistics chose, at the very beginning, to define 'language' in a highly abstract way, where the features of the definition rely on theoretical constructions which are imposed on the phenomenon to be defined. At its most abstract, 'language' is defined as 'a set (finite or infinite) of sentences each finite in length and constructed out of a finite set of elements. All natural languages in their spoken or written form are languages in this sense, since each natural language has a finite number of phonemes (or letters in its alphabet) and each sentence is representable as a finite sequence of these phonemes (or letters), though there are infinitely many sentences.' (Chomsky 1957, p. 13).

In the present thesis, a different definition is proposed and applied. 'Language' is best defined as 'a set of codes with potential for meaning', where 'code' is defined as 'an articulated, gesticulated, graphic or tactile lapse'. (Some will probably object that the notion of 'potential' is less empirical; however, it is much used in chemistry, e.g. 'salt is soluble in water' and 'petrol is flammable'. It is only through behaviour that we can determine whether a code *has* meaning, and possibly *what* meaning it has.) It is claimed that it is too big a leap to go from a definition at this level to the most abstract level. The proposed definition is claimed

to be at a level of generalization which counteracts the disadvantages associated with the highest levels of generalization.



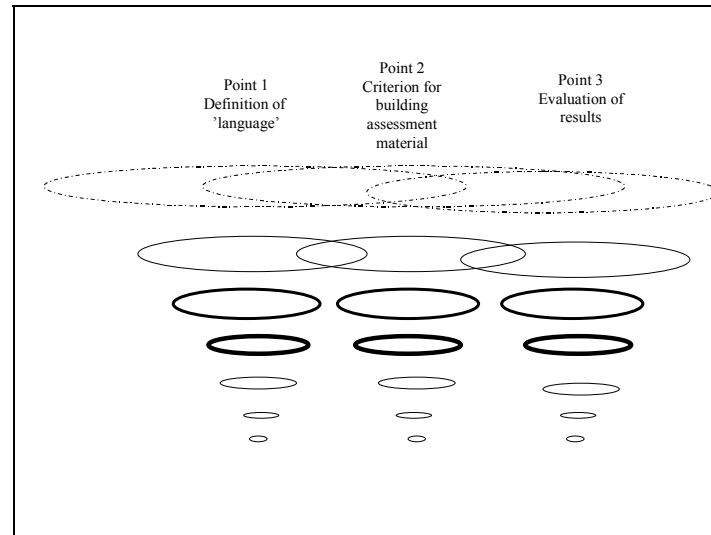
*Figure 2*

*Figure showing generalizations in different definitions of 'language'. The bottom of the figure represents a low degree of generalization, while the top represents a high degree of generalization.*

The quality of basic definitions is of great importance to experimental science, because this will in many cases be decisive for whether the findings we obtain are truly empirical findings or simply truth by definition. When it comes to the definition of 'language', it will be decisive how general the definition is as well as what features from theory (World 3) are added in order to obtain this level of generalization. An unfortunate consequence of choosing definitions that lack precision (e.g. 'figure' instead of 'circle') is that a vague platform with close ties to theory will be laid for further inferences. In the case of experiments on reading and writing skills, I would suggest that the main points of inference (Figure 3) relate to (1) the definition of 'language', (2) the design of assessment material, and (3) the evaluation of results.

If we define 'language' according to Chomsky – with a focus on rules – at point (1), and if we build our assessment according to phonological rules at point (2), and if we evaluate the results based on the same conception of phonology at point (3), then it is clear that the definition of 'language' has imposed its most characteristic features at all inference points in the experiment. In this case, the result is likely to be closer to a truth by definition than a truly empirical finding. If we choose instead a definition of 'language' which is general to a certain

level, but which has still maintained its precision, we are more likely to generate truly empirical findings in this area. A definition of this kind is favourable for several reasons. First, it makes it possible to capture the hypothetical character of the definition. Second, it hampers circularity – truth by definition – in the chain of inferences in experiments.



*Figure 3*

*Figure showing generalizations at three suggested points of inference in an experiment. The bottom of the figure represents a low degree of generalization, while the top represents a high degree of generalization. The figure indicates that there is a limit to fruitful generalization, namely where the definition comes to lack precision and becomes vague. At this point, as a consequence, the empirical character is weakened and the probability of circularity in the chain of inferences increases.*

The ideal level of generalization should be somewhere at medium level in Figure 3. The bottom line is not suitable, because it does not contain generalizations beyond single observations. An important point is that the features at different points of inference should not overlap or be iterated (as they do at the two highest levels in Figure 3). In the present thesis, an attempt is made to apply such an appropriate level of generalization and to avoid iteration of features in the chain of inferences. Therefore, ‘language’ is defined as ‘a set of codes with potential for meaning’ (point 1), the assessment material is based strictly on frequency (point 2), and the evaluation of results is made using a model of skill (point 3) (Tønnessen, 1999). This means that emphasis is placed on a coherent theory encompassing the models and definitions that we use at these suggested points of inference. Another important aspect of striving for this level of generalization is that the notion of ‘validity’ becomes more strongly

linked to the *inferences we make* on the grounds of available data, methods and results – rather than to the data, methods and results themselves. And this is what methodology is all about.

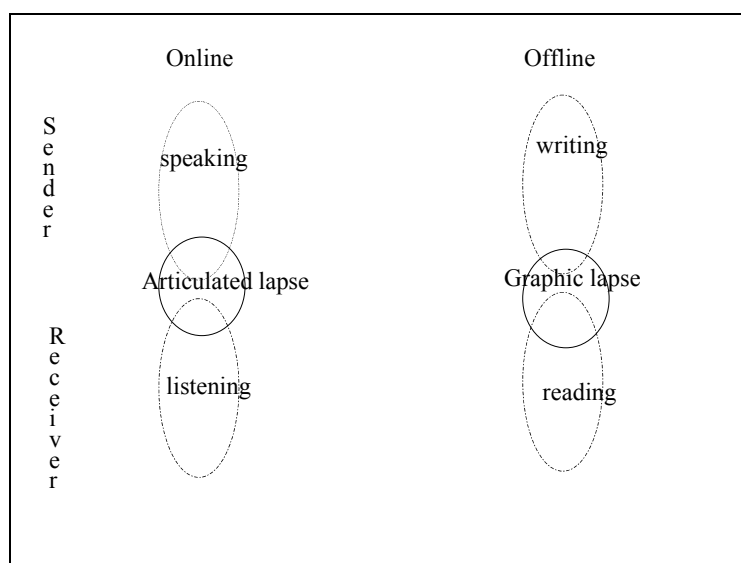
### *3.6 Application of the proposed definition: a model*

When we define ‘language’ as ‘a set of codes with potential for meaning’, we generalize beyond the traditional linguistic definitions of ‘language’ and include reading Braille, signing and written language. We do so because we realize that these are ways in which different people and groups of people communicate by means of what deserves to be classified as language. Forming hypotheses is often an inductive enterprise. Interestingly, it also involves introspection in a methodical way. For example, creativity is dependent to a large extent on introspection. I have claimed that the view of the priority of spoken language over written has never been treated as a hypothesis; a further question is whether it is in fact possible to do so. Good hypotheses are daring and open to falsification – they are vulnerable. If we take a look at the recent history of linguistics and psychology, we must realize that its conceptual framework has been elaborated on the basis of this view of the priority of spoken language over written, which does not have any characteristics of being a good scientific hypothesis.

The model suggested here is based on the neo-Whorfian position inherent in Dan I. Slobin’s article ‘From “thought and language” to “thinking for speaking” ’ (Slobin, 1996). This position claims that thought is not an isolated phenomenon – there is a specific thinking which is linked to the act of speaking. This is shown in cross-linguistic studies of how elements of a picture series are represented in narratives written in different languages. This position has been extended to the relationship between spoken and written language by Strömqvist et al. (Strömqvist, Nordqvist & Wengelin, 2004), who focus on the different constraints for communication in spoken (on-line) and written (off-line) language, developing Slobin’s insight of thinking-for-speaking in order to capture the characteristics of the processing of written language in the notion of *thinking-for-writing*.

The processual view of language stands in clear contrast to classical reading and writing research, which has a product view of language. In a product view of language, the phenomena of listening and reading are linked by both being matters of perception and therefore associated with a ‘receiver’. Likewise, writing and speaking are linked as they represent aspects of production and are associated with a ‘sender’. In the theoretical positions

of thinking-for-speaking and thinking-for-writing, cognition in speaking is split from cognition in writing owing to the absence of on-line constraints on communication in writing. According to these positions, the traditional separation of reading and writing into the coarse categories of production and perception is questioned. These categories focus only on aspects of a simple view of communication, by identifying a sender and a receiver, and do not take into account the characteristics of written language. In the proposed model, reading and writing are considered together, because they are subject to similar off-line constraints of communication. Instead of splitting reading and writing with regard to production (sender) and perception (receiver), it is suggested that both reading and writing should be distinguished from speaking and listening on the grounds of temporal constraints of processing. In fact, both reading and writing (like listening and speaking) involve production as well as perception, or in psychological terms: steering and monitoring (Tønnessen, 1999). In searching for the relationship between reading and writing, one may start by studying the interplay of steering and monitoring in individuals who are reading, writing, speaking or listening.



*Figure 4*

*Presentation of a hypothesized relationship between different linguistic skills. The figure is based on a definition of 'language' as 'a set of codes with potential for meaning'. 'Code' is defined as 'a gesticulated, articulated, tactile or graphic lapse'. Dotted lines in the figure indicate the realization of potential for meaning. Realizations of the two relevant types of code (articulated and graphic) differ with respect to the constraints for communication (on-line and off-line) and therefore also with respect to the constraints on cognition. The notions of 'sender' and 'receiver' are given in the figure in order to indicate the traditional (horizontal) equation of skills.*

In the proposed model, both spoken and written language are considered to be about realizing a potential of a code. From a theoretical point of view, writing is a realization of (some of) the potential for meaning in a graphic lapse. Speaking is a realization of (some of) the potential for meaning in an articulated lapse. When we define ‘language’ in this way, new perspectives emerge: in a study of reading, should we focus more on the connection between *reading and writing* than on the connection between *reading and listening*?

#### 4 MAIN FEATURES OF THE ARTICLES

##### ***Main features of Article I: The Notion of ‘Phonology’ in Dyslexia Research: Cognitivism – and Beyond***

Phonology has been a central concept in the scientific study of dyslexia over the past decades. Dyslexia research is therefore a field where the notion of ‘phonology’ is widely used in explanations of reading and writing disorders. However, despite the central position of this notion, it lacks both a precise definition and a clear status within this research tradition. The mainstream conception of ‘phonology’ within dyslexia research can be characterized in terms of ‘phonological awareness’.

This article investigates the notion of ‘phonology’ in the tradition of phonological awareness. An attempt is made to characterize the basic assumptions of this theory and to evaluate these assumptions on the basis of commonly accepted standards of empirical science. First, the core assumptions of phonological awareness are outlined and discussed. It is claimed that this notion of ‘phonology’ is based on assumptions from generative grammar, which is made explicit in the *phonological-deficit hypothesis*. Second, an alternative conception of ‘phonology’ is presented and discussed. The work of Paula Tallal, with its focus on auditive deficits, represents a contemporary alternative to the phonological-deficit hypothesis. Tallal’s claim therefore amounts to an *auditive-deficit hypothesis*. In this article, however, it is argued that both positions are problematic from an empirical point of view.

It is claimed that the investigation of the notion of ‘phonology’ in dyslexia research unveils a need for a more dynamic theory of phonology. This is the kind of theory which is referred to in the present thesis as a ‘vulnerable theory’. In this respect, the work of Tallal shows certain characteristics of a vulnerable theory, but it fails when it comes to the maintenance of the vulnerability of the theory. This article suggests that different disciplines make different contributions as regards the scientific explanation, description and

understanding of reading and reading disorders. This position challenges mainstream thinking about phonology in dyslexia research, where explanation, description and understanding are assumed to be concurrent.

***Main features of Article II: The Status of the Concept of ‘Phoneme’ in Psycholinguistics***

The phoneme counts as a break-through of modern theoretical linguistics in the early 20<sup>th</sup> century. It paved the way for descriptions of distinctive features at different levels in linguistics. Although it has since had a turbulent existence across altering theoretical positions, it remains a powerful concept of a fundamental unit in spoken language. At the same time, its conceptual status remains highly unclear. This article aims to clarify the status of the concept of ‘phoneme’ in psycholinguistics, based on the scientific concepts of description, understanding and explanation. Theoretical linguistics has focused mainly on descriptions, and psycholinguistics has been considered a sub-discipline of theoretical linguistics. The ideas underlying this article relate to this one-sidedness of description; it is claimed that because of this one-sidedness, important reference points concerning reality of description and purpose of description are not taken into consideration.

As a consequence, the relevance of these descriptions to psycholinguistics is questioned. It therefore also remains an open question whether psycholinguistics should be considered a sub-discipline of theoretical linguistics.

This article takes as its reference point the interaction between description and explanation in the scientific study of language acquisition. This position requires an ongoing adjustment of the two domains. It is claimed that this position is adequate for evaluating the status of the concept of ‘phoneme’. The article shows how the phoneme is part of a construction which relies on specific definitions of ‘language’, ‘mental lexicon’ and ‘the linguistic sign’. The phoneme involves a construction which is questionable when it comes to its relevance for the empirical study of human skills. It is argued that the phoneme, in addition to primarily serving the purpose of description, also involves a level of abstraction which is too high for it to be used in scientific explanations.

In parallel, an alternative is described, based on the interaction between description and explanation. This article questions the commonly acknowledged notion of the *arbitrary linguistic sign*, in claiming that Saussure’s motivation for this concept was his focus on the relationship between the symbol and the linguistic sign as *contradictory* instead of *contrary* –

and thus that the creation of this concept was a result of choice. The proposed *non-arbitrary linguistic sign* values the choice that Saussure did not make, in focusing on different kinds of representations such as symbols, words (linguistic signs) and metaphors as contrary. According to this position, the different representations are considered to be located on a continuum of association which shows arbitrariness to be relative. In this article, the phoneme, conceived of as a prototype, is used as an illustration of how we can conceive of association as the core mechanism of language acquisition. On this view, the phoneme is not *the* unit in language acquisition, but rather an example of associations which are related to the segmental tier in speech. The issue of the arbitrary linguistic sign and the phoneme shows how basic assumptions are highly intertwined. Furthermore, it is claimed that too large a part of descriptions of the linguistic sign and sound structure are based on features which can be understood. In order to be able to explain, we need a stronger interplay between description and explanation. This also involves a more fuzzy logic. A parallel example can be given from medicine: the phenomenon of depression is (often) *explained* by reference to the neurotransmitter serotonin; however, we are not able to *understand* depression by reference to this neurotransmitter.

In the framework of the present thesis, this article has two main functions. First, it questions basic insights of theoretical linguistics concerning speech and language acquisition. Second, it provides general reference points from which the description in question (e.g. that of the phoneme) can be evaluated.

### ***Main features of Article III: The Dynamics of Written-Language Acquisition***

In research and teaching within the field of reading and writing, there is a general problem associated with the use of static perspectives when the focus is on development. The problem of static perspectives is that they describe only a proficiency related to structures at a given point in time, without any flexible model of reading and writing behaviour. In this article, an alternative approach is suggested in order for dynamic perspectives on written-language acquisition to be maintained. This approach redefines the role which the linguistic structure of spoken language plays for written-language acquisition in focusing on a psychological model of 'skill' where linguistic structures may play a role as hypothetical cues. It is claimed that this model carries greater potential for explanation than is the case for static approaches.



It is claimed that static perspectives are related to the focus on description prevalent in theoretical linguistics. These descriptions have strong preferences for the synchronic system. Theoretical linguistics therefore has problems in showing how one goes from one synchronic description to another. Although sociolinguistics has focused on the impact of social constellations on language, insights from theoretical linguistics are considered as superior to findings from the sub-disciplines. This article therefore claims a different approach, involving a series of issues which will be considered controversial from the position of theoretical linguistics.

The first issue is the role of contrast in linguistic description. It is claimed that theoretical linguistics cannot explain how contrasts come about, and how contrast may increase. Modern linguistics since Saussure is concerned with *structure by contrast*. The alternative approach suggests that relative frequency is more fundamental than contrast, and their interaction is therefore focused upon in the notion of *structure by frequency and contrast*. This principle is claimed for both spoken- and written-language acquisition.

The second issue is the role of culture in the acquisition of language. It is suggested that spoken language is an important but not necessary part of the cultural input which serves as the basis for the acquisition of written language. A consequence of this position is the questioning of the status of the 'alphabetic principle'. Phoneme-grapheme conversions are considered to be simplistic, because they presuppose the co-existence of an ideal phonology and an ideal orthography.

The third issue relates to the notion of 'skill'. A major question concerning skill is how linguistic structures relate to human skills. Mainstream reading and writing research tends to take a naïve position here in presupposing that human language skills operate on the basis of the descriptions provided by theoretical linguistics. Tønnessen's (1999) nuanced understanding of 'skill' as the flexible combination of automaticity and awareness is here exploited as a psychological model for how linguistic structure is related to human language skills.

This article thus suggests an approach which is claimed to be able to maintain dynamic perspectives in studies and teaching concerning written-language acquisition. The approach is based on two main insights. First, it is based on the nuanced understanding of 'skill' as a window for studying written-language acquisition and behaviour. This position is based on connectionist theory, and it is claimed to be a synthesis of behaviourism and cognitivism. Second, the approach highlights the explanatory aspects of the structure-by-frequency-and-contrast view. This latter point is based on the assumption that a dynamic perspective

involves explanations of change, while the first point is based on the demand for an adequate model of psychological aspects concerning skills.

***Main features of Article IV: What is Reading? A Critical Account***

In psychological and linguistic research on reading, the view of the primacy of spoken language over written has been maintained in definitions of ‘reading’. This view is recognized in what is called ‘the simple view of reading’ or ‘the reading formula’, which defines reading as the product of decoding and comprehension. It is argued that this definition of ‘reading’ does not meet empirical standards when it comes to conceptual clarity and *a priori* assumptions.

In the search for explanations to reading and writing disorders and development, it remains a major challenge to keep out *a priori* assumptions about the relationship between spoken and written language. This article investigates the assumptions underlying the reading formula in discussing the notions of ‘decoding’ and ‘comprehension’. The notion of ‘decoding’ relies on the *a priori* view of the primacy of spoken language over written, focusing on decoding as a technical ability. The notion of ‘comprehension’ relies on the *a priori* assumption that comprehension in reading is equal to comprehension in listening. In addition, the different characteristics of these two notions when it comes to operationalization are highlighted. Decoding is easily manageable in experimental studies, while comprehension beyond word level is a far vaguer enterprise. It is asked whether this difference in manageability has guided the focus towards decoding. As an alternative, a different approach and model are presented. This approach involves a new definition of ‘language’ which includes different modalities of language, a focus on the relationship between reading and writing as well as an alternative relationship between thought and language. What characterizes the alternative approach is that assumptions and definitions are based on – but not restricted to – the behavioural level, which makes them open to falsification.

***Main features of Article V: Written-Language Skills and the Notion of ‘Lexicon’***

Research on written-language skills constantly deals with *a priori* assumptions about the relationship between spoken and written language. Mainstream linguistics and psychology assume that spoken language is primary to written language in every important way. The starting-point taken in this article is to consider the relationship between spoken and written language as a hypothesis, in order for progress to be possible in answering the research question about this relationship. It is claimed that when we do this, we must also rethink the conceptual apparatus which has been built on *a priori* assumptions about the relationship between spoken and written language. A central notion in this regard is ‘lexicon’. This notion becomes central because inferences about the relationship between phonology and lexicon are inevitable in research on written-language skills. It is claimed that mainstream linguistics and psychology maintain a notion of ‘lexicon’ which is built on the assumption of the primacy of spoken language over written. It is further claimed that dyslexia research is a very good window for testing assumptions about the relationship between written and spoken language, because in this field of research, assumptions about this relationship are made explicit to a greater extent than in other disciplines dealing with written-language skills. Despite the differences that do exist, it is claimed that dyslexia research illustrates positions built on general, basic assumptions of mainstream linguistics and psychology.

First, it is claimed that there are tendencies towards an ongoing shift in theory within both linguistics and psychology, and that there are clear commonalities between the disciplines. This is presented as a shift from a pairing of linguistic formalism and cognitivism to a pairing of linguistic functionalism and connectionism. Second, central preferences and characteristics of the proposed pairings are presented. The claimed theory shift is then illustrated with an issue from dyslexia research, the use of ‘non-words’. In this section, an effort is first made to show the inferences concerning the reading of ‘non-words’ in the pairing of cognitivism and linguistic formalism. Second, inferences about the reading of ‘non-words’ are elaborated from the suggested alternative position. The latter set of inferences is the result of logical reasoning, which is not documented in research. However, this position is claimed to show a set of inferences concerning the notion of ‘lexicon’, valid if the relationship between spoken and written language is treated as a hypothesis and if the quality of the conceptual apparatus is valued. These alternative assumptions may be seen as contributions to

a revitalized understanding of the connection between phonology and lexicon in the study of written-language skills.

***Main features of Article VI: Aspects of Fluency in Writing***

The notion of ‘fluency’ is most often associated with spoken-language phenomena such as stuttering. This article investigates the relevance of considering fluency in writing. The basic argument for raising this question is empirical – it derives from a focus on written and spoken language as different manifestations which should be investigated separately on the basis of their symptoms. Key-logging instruments represent new possibilities for the study of writing. The obvious use for this new technology is to study writing as it unfolds in real time, instead of focusing only on aspects of the end product. A more sophisticated application is to exploit the key-logging instrument in order to test basic assumptions underpinning contemporary theories of spelling.

In research on spelling, the notion of ‘strategy’ has been used to explain pupils’ spelling behaviour. According to this notion, a pupil uses one and only one strategy when spelling a given word, and the strategy used is identified through experiments measuring the time elapsed in writing the whole word. In this article, the conception of ‘strategy’ is questioned by means of an alternative hypothesis based on a nuanced understanding of ‘skill’. It is hypothesized that the process of spelling is better characterized by a flexible combination of automaticity and awareness. The study reported in this article contains a dictation task involving words and ‘non-words’, and it investigates the spelling of nine-year-old pupils with regard to their mastery of the doubling of consonants in Norwegian. The findings include differences with regard to temporal measures between a group of strong writers and a group of poor ones. On the basis of these pupils’ writing behaviour, the relevance of the conception of ‘fluency’ in writing is highlighted. The interpretation of the findings questions basic assumptions of the cognitive hypothesis of spelling, and a different hypothesis of spelling is proposed. It is claimed that this hypothesis is in better accordance with existing data and that it is open to falsification.

***Main features of Article VII: Approaching the Skill of Writing***

This article takes as its starting-point the fact that there is a strong conception, with strong historical roots, of what a 'text' is, whose basic assumptions do not easily fit with studies of the process of writing. This conception of text is referred to as *the common sense of text*.

The article investigates theoretical perspectives on how to combine new information about on-line measures with end-product features. The central problem is what emphasis should be given to end-product features on the one hand and temporal measures on the other. It is claimed in the article that the theory of the process of writing should be built on the characteristics of writing behaviour, without the assumptions inherent in the common sense of text. Further, it is claimed that such a theory must encompass two important aspects: (1) an operationalization of the relationship between writing and cognition; and (2) a model showing the characteristics of automaticity and awareness. Such an approach is presented in the article, and it is illustrated by a pilot study of three eleven-year-old bilingual pupils writing in their two languages; this study is used as an example of the theoretical and methodological questions raised. It shows how the pupils exploit their pausing time differently, and it may serve as an example of how on-line measures can enrich the profile drawn from end-product measures and studies of reading comprehension. It is claimed that on-line measures, within the theoretical framework suggested, have a stronger potential for explanation of behaviour than approaches based on assumptions derived from a common sense of text.

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## SAMANDRAG PÅ NORSK

Hovudlina i forkinga på lesing og skrivning byggjer på tanken om at talt språk på alle vesentlege punkt er primært i høve til skrive språk. Omgrepsapparatet for studiet av språk og lese- og skrivedugleik er også bygd kring denne tanken. Dette er problematisk frå eit vitskapsteoretisk standpunkt sidan tanken om det talte språket sin dominans ikkje er tilstrekkeleg empirisk underbygd. I denne avhandlinga er det hevda at eit syn på talt og skrive språk som distinkte – men ikkje isolerte – *sett av kodar med potensiale for meining* er den beste arbeidshypotesen i arbeidet med å komma fram til funn om lese- og skrivedugleik som kan kallast empiriske. Det følgjer av dette standpunktet ei kritisk gransking av det omgrepsapparatet som vert nytta i forking på lesing og skrivning. Dette er emnet for dei sju artiklane i avhandlinga.

Artikkel I undersøker termen 'fonologi' i forkinga på dysleksi, spesielt innan paradigmet for kognitiv psykologi.

Artikkel II diskuterer statusen til fonem-omgrepet i psykolingvistikken med utgangspunkt i perspektiva beskriving, forklaring og forståing i vitskap. I denne artikkelen blir det hevda at fonemet primært er knytt til beskriving, og at det er lite brukande i forklaringar som gjeld lese- og skrivedugleik.

Artikkel III diskuterer kva rolle frekvens spelar i høve til tradisjonelle beskrivingar av fonologi når det gjeld læring av skrive språk. Her blir det òg presentert ein modell for å halda oppe dynamiske perspektiv i studiet av språklæring.

Artikkel IV undersøker ein utbreidd definisjon av lesing i kognitiv psykologi, samstundes som det teoretiske grunnlaget for ein ny definisjon blir presentert.

Artikkel V undersøker termen 'leksikon' i forkinga på lese- og skrivedugleik. Her blir også ei alternativ forståing av leksikon presentert innafor ramma av konneksjonisme og funksjonell lingvistikk.

Artikkel VI fokuserer på samanhengar mellom sensitivitet til prosodi og dobling av konsonantar i skrivning. Her blir det brukt ein nyansert modell av 'dugleik' for å gripa denne sensitiviteten på ein måte som tilfredstiller krav til empirisk forking.

Artikkel VII føreslår ein alternativ modell for skrivning med eit spesielt fokus på korleis ein skal kunne tolka tilhøvet mellom sluttprodukt og skrivning i verkeleg tid.