THE DYNAMICS OF WRITTEN-LANGUAGE ACQUISITION

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Abstract: Written language skills are dynamic, they develop differently in individuals and are acquired in multiple ways and contexts. Paradoxically, mainstream research on and teaching of these skills is based on a linguistic philosophy that has always valued highly systematic – and static – descriptions. 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 the present article I claim the so-called 'alphabetical principle' to be an unfortunate product of static perspectives, and which has a very limited relevance when we want to seize the dynamics of written language acquisition. A consequence of my position is that it does not make sense to polemicize whether one should teach 'phonics' or 'whole language'. Before we search for a narrow perspective – a teaching method – we must assure that the basic assumptions we choose to lean on are the best possible. After doing so, we may end up with a narrow perspective that may involve some aspects of what we today know as both 'phonics' or 'whole language'. But the most important goal is that such perspective should make teachers and researchers capable of seizing the dynamics of written language acquisition. In the present article, an alternative approach is suggested in order to maintain dynamic perspectives on written-language acquisition. This approach degrades the role of traditional linguistic description, such as the 'phoneme', focusing instead on a psychological model of 'skill' in which linguistic structures in spoken language play a role as possible cues in the acquisition of written language. It is claimed that this model also carries greater potential for explanation than do static approaches.

French Dans le domaine de la recherche et de l'enseignement de la lecture-écriture, un problème général renvoie à l'utilisation de perspectives statiques alors que l'on se centre sur le développement. Le

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problème des perspectives statiques est qu'elles décrivent une compétence liée à des structures à un moment donné, en dehors de tout modèle flexible du comportement en lecture-écriture. Dans cette étude, une approche alternative est proposée afin de promouvoir des perspectives dynamiques sur l'acquisition du langage écrit. Cette approche rompt avec les descriptions linguistiques traditionnelles pour se centrer sur un modèle psychologique des compétences dans lequel les structures linguistiques de l'oral joueraient un rôle en tant qu'indices hypothétiques. Nous pensons que ce modèle permet d'aller plus loin en termes d'explication que les approches statiques.

Chinese 在阅读及写作的研究及教学领域上，有一普遍问题。当集中探讨儿童的发展时，多以固有的方向作分析，其缺点在于当他们描述儿童的能力时，只根据既定的儿童语言能力发展进行描述，并没有任何有关阅读及书写行为的弹性模式。本文为了在书面语习得上维持多变角度，提出另一种研究方法。这种方法降低了传统语言描述的重要性，集中强调心理模型的技巧，当中口语的语言结构，亦可反映儿童语言能力的假设性信号。这模式比固有的方法，有更大的解释能力。

Norwegian Skriftspråklege ferdigheiter er dynamiske, dei utviklar seg forskjellig mellom individ og ein tileignar seg dei på ulike vis og i ulike kontekstar. Som eit paradoks byggjer rådande forsking og undervisning på ein lingvistisk filosofi som alltid har verdsett svært systematiske – og statiske – framstillingar. Problemet med statiske perspektiv er at dei berre skildrar lese- og skrivekunne relatert til strukturar på eit gitt punkt i utviklinga, utan nokon fleksibel modell for utvikling av lesing og skriving. I denne artikkelen hevdar eg at det såkalla 'alfabetiske prinsippet' er eit uheldig produkt av statiske perspektiv, og som har svært avgrensa relevans når me vil prøva å gripa dynamikken i tileigninga av skriftspråklege ferdigheiter. Ein konsekvens av den hevda posisjonen er at det ikkje gir meining å polemisera om ein skal undervisa etter metodar som 'phonics' eller 'whole language'. Før ein søkjer etter nære perspektiv – ein undervisningsmetode – må me sikra oss at dei grunnleggjande antakingane som me vel å støtta oss til er dei best moglege. Etter at ein har gjort dette, kan det tenkjast at me endar opp med eit nært perspektiv som også involverer nokre aspekt av det me i dag kjenner frå undervisningsposisjonar som 'phonics' eller 'whole language'. Det viktigaste målet må likevel vera eit perspektiv som gjer læraren og forskaren i stand til å gripa dynamikken i skriftspråkstileigninga. I denne artikkelen blir det føreslått ei alternativ tilnærming som siktar mot å halda oppe dynamiske perspektiv på tileigning av skrive språk. Denne tilnærminga degraderer rolla åt tradisjonelle lingvistiske beskrivingar og fokuserer på ein psykologisk modell av 'ferdigheit' der lingvistiske strukturar i talt språk kan tena som hypotetiske signal i innlæringa av skrive språk. Det blir også hevda at denne modellen – i motsetnad til statiske tilnærmingar – har eit potensiale for forklaring.

Key words: Phonology, alphabetical principle, skill, connectionism, acquisition

1. INTRODUCTION

In the study of language acquisition, there is a general problem involving the use of an approach where the end state or an idealized state of language is taken as the reference point for developmental changes (Deutsch & Budwig, 1983). This approach is characterized by Deutsch & Budwig as the *descending approach*. It certainly has its methodological advantages, in terms of idealization and abstractness. Nevertheless, it also has its shortcomings:

> Child language is so-to-speak placed in a 'Procrustean bed', in which all characteristic features that cannot be unequivocally classified as 'right' or 'wrong' as defined by the target language are laid to rest. This leads to a static view of language acquisition which chiefly states what the child is and is not capable of at a given point in time. *(Deutsch & Budwig, 1983, p. 37)*

A potential source of this unfortunate approach can easily be found in the Saussurian principle of abstractness, which has endured over shifts in linguistic theory and has had a heavy impact on speech- and writing-related research up to our days. One may

argue that the Saussurian idea of *phoneme inventory* is bound to the descending approach because of its abstractness. The descending approach is unfortunate because it overlooks the characteristics of the pathway to a certain structure, presupposing instead a structure which is not yet established in the individual. This is why this approach can be called static. What is needed in developmental studies is a dynamic approach, because language and language acquisition are dynamic. This opposite approach is called the *ascending approach* and emphasizes the uniqueness of child language as a system (Deutsch & Budwig, 1983).

Descending approaches have been valued in linguistics because they make it possible to *describe* consistent systems. It is not controversial to claim that linguistics has traditionally been occupied primarily with description. However, when we use an ascending approach, language comes to be seen as undergoing constant change, and this reduces our ability to produce a consistent description of any system. Ascending approaches – and dynamic approaches as well – are more strongly connected to explanation. This is evident, due to the degree of normative aspects of end-state descriptions. Because of the different perspectives inherent in the ascending and the descending approach, the descriptions produced by traditional linguistics are not directly relevant to the explanations we seek. In this sense, taking an ascending approach to written-language acquisition amounts to focusing on explanation. In the tradition of linguistics, *contrast* has played a major role in descriptive systems, in terms of distinctive features, minimal pairs, and necessary and sufficient conditions. Description based on contrast first achieved success in phonology and was later applied to other domains of linguistics, such as morphology and syntax.

Unfortunately, descending approaches are widely used in developmental studies, for instance in the field of phonology, and in these cases the principle of description – contrast – is often transposed to explanation in a simplistic way. The interesting question, which remains open, is what role contrast plays in explanations of language development. In this article, an interplay of contrast and frequency is suggested as an explanation. This explanation should be treated as a hypothesis.

The arguments put forward fall into three major dimensions: First, it is questioned whether traditional linguistic description can be usefully applied to the development of written-language skills. Second, it is claimed that, for the empirical study of the relationship between spoken and written language, the best hypothesis is to consider spoken and written language as each having its own validity. And third, focus is placed on a nuanced model of 'skill' in order to show how the dynamics of written-language acquisition can be studied. But in order to describe an ascending and dynamic approach to written-language acquisition, we first have to confront a series of controversial issues.

2. CULTURAL AND SOCIAL FOUNDATIONS OF LANGUAGE STRUCTURES

2.1 Frequency is more fundamental than contrast

The position taken in this article is the hypothesis that relative frequency of input and output is the main force in language acquisition. According to Lacerda & Lind-

blom's modelling of the acquisition of vowels (1997), all contextual variation is considered important and relevant to learning, but the frequency of differences calibrates the categories of speech sounds. However, contrast is built into their model as a constraint:

> The general argument is that the speech input available to the young listener is, on one hand**, too variable** for the infant to uncover its underlying regularities and, at the same time, far **too poor** to allow the child to figure it (the so-called poverty of the stimulus argument). In our opinion, this reasoning is closely linked to formal work on syntax and adopts too restricted an adult view on language acquisition. *(Lacerda & Lindblom, 1997, p. 16)*

In structuralist and generative theory, contrast is seen as the fundamental mechanism of structure. Further, 'contrast' is understood as lexical contrast in minimal pairs. This view is referred to in the present article as *structure-by-contrast*. On this understanding, the problem arises when we want to explain *how* the child's system evolves. According to the structure-by-contrast view, the answer – if any – would be: by increasing contrast. At this point we encounter an interesting question: what makes contrast increase? In my view, this is where the fundamental impact of relative frequency comes into play. It is important to note here that no contradiction between frequency and contrast is implied; rather, their interplay is highlighted in making a special point out of the assumption that frequency is more fundamental than contrast. Thus, the strict lexical base for structure-by-contrast is problematic because the end product is focused upon while the pathway to contrast is skipped. This is why structuralism cannot explain change, only produce descriptions of it. With regard to these objections, an improved basis for structure can be put forth: *structure-by-frequency-and-contrast*. Lacerda & Lindblom's model allows for structure-by-frequency-and-contrast without focusing on lexical contrasts as a major source; their claim is that 'categories with prototypical properties emerge in a self-organizing way as a consequence of the distributional patterns that the exemplars cumulatively form in the perceptual representational space and in phonetic memory' (Op. cit., p. 14). The perspective taken in the present article is to look upon structure-by-frequency-and-contrast as the fruitful combination of both frequency and contrast, where frequency is considered as more fundamental. The development of language systems is probably a complex matter involving both lexical matters and acoustics/phonetics. Even if we allow for distributed representations (Elman et al., 1996) with no strict separation of form and function, we have to deal with the fact that language has a physical, phonetic shape that we may call *form* and something mental that we may call *function* or *meaning*. It is suggested that language structure evolves from an interplay or competition between these, like in the 'competition model' (Bates & MacWhinney, 1989). Thelen & Bates (2003) claims that this model does not 'know' the difference between form and function (Thelen & Bates, 2003). This point is interesting as regards the interplay between these two factors. On my interpretation, the effects of form and function are not separable. Only at some points in development does the difference become observable, for instance when the child discovers its surroundings and overgeneralizes a linguistic sign. Iterative input (and output) will, over time, clear the way for a contrast at some point, as is the case with children's overgeneralization. Specialist knowledge, be that the vocabulary of

an electrician or the Inuit's knowledge about snow, can be seen from this perspective, that is from the perspective of how focus, attention or interest (involving high frequency or relative frequency) is primary to contrast. On this view, interest and attention rule out pure frequency, favouring instead what we may call relative frequency. This point leads us into the discussion of the role of awareness versus automaticity. Tønnessen (1999a) claims that connectionism presents a theory base for a flexible combination of automaticity and awareness, enabling learning to be seen as a combination of strict frequency on the one hand and interest and attention on the other. On this connectionist basis, Tønnessen suggests a nuanced understanding of 'skill' (see Section 4). In Tønnessen's (1999a, 1999b) interpretation the potential in connectionism lies in philosophical, methodological and theoretical positions that are not well maintained within the cognitive paradigm.

If we stick to a strict structure-by-contrast view, we can study the child's language only after it has reached a point where the child produces words. A second problem is to choose what contrasts to consider at different ages. An example of an unfortunate structure-by-contrast view is Roman Jakobson's early rejection of the child's babbling as irrelevant to its phonological development (Jakobson, 1941). The structure-by-frequency-and-contrast view, on the other hand, has several commonalities with central assumptions in optimality theory, such as the two 'families' of conflicting 'forces': faithfulness and markedness (Kager, 1999). Faithfulness is a 'force' of resemblance while markedness is a 'force' working for maximal contrast. In this sense there are some commonalities between the two 'forces' in optimality theory and the notions of 'frequency' versus 'contrast' in the structure-by-frequency-and-contrast view. Although the aim for 'optimality' becomes problematic in an ascending approach, optimality theory portrays interesting aspects of explanation.

The present article differs somewhat from other approaches focusing on frequency in that it seeks to determine the status of frequency in relation to traditional phonological description. Most approaches to reading and writing do consider frequency effects, but phonological arguments always make up the foundation. In my view, this is due to (1) the general lack of reflection on linguistic theory (and its purpose) as applied in reading and writing research; and (2) the chosen assumption of the priority of spoken language over written. Among the more interesting approaches used we find Morrison et al.'s evaluation (2002) of the 'cumulative-frequency hypothesis', where they report that the age-of-acquisition effects of a lexical entry are not reducible to cumulative frequency. However, they focus on lexical-retrieval effects in adults, and they contrast the age of acquisition with a rather strict view on frequency. While their findings are highly interesting, the role of frequency *before* a lexical entry can be reported as acquired remains highly unclear in their approach. And it is exactly this unclarity which is the concern of the present article. The position taken here is, to a large extent, concurrent with the view on frequency found in Ellis's (2002) sound review of frequency effects in language processing:

> The role of frequency has largely been ignored in theoretical and applied linguistics for the last 40 years or so. As this review has shown, there is now ample justification for its reinstatement as an all-pervasive causal factor. In the final analysis of successful lan-

> guage acquisition and language processing, it is the language learner who counts. (p. 178)

However, what I claim to do differently is that I question the role of traditional phonological descriptions and the traditional assumption of the relationship between spoken and written language. As an alternative to contemporary conceptions of the role of awareness, I also apply a more flexible, connectionist model for how to conceive of automaticity and awareness in written-language skills (Tønnessen, 1999a).

2.2 Language structures are highly dependent on culture

Language is a matter of both culture and nature. Sociolinguistics shows how different systems co-evolve and co-exist in the learner, adapted to social contexts. It is interesting to study how this discipline has evolved in a structuralist context – a tradition which can only describe change, not explain it. The position taken in the present article is that language structures are not autonomous. But if language structures are not autonomous, how are they intertwined with what we may call culture? And, secondly, how should we define 'culture'? If linguistics turns away from highly abstract systems, the definition of 'culture' should follow the same path:

> Another set of interesting ideas that emerge is the deconstruction of the notion of 'culture' or 'community'. Communication relies on shared meanings and strategies of interpretation. However, this common ground is distributed in a complex way through social networks. Such networks may constitute effective 'sub-cultures', nested communities within communities; but they can also cross-cut linguistic and social boundaries of all sorts, creating regional or even global patterns of shared, similar communicative strategies in specialist networks. *(Gumperz & Levinson, 1996, p. 12)*

When 'culture' is deconstructed in the way Gumperz & Levinson portray, it becomes difficult to make any strict division between notions such as 'cultural' and 'social'.

From this position, I consider it highly complicated to tell precisely what parts of culture are relevant to the language learner, because the acquisition of spoken language is not just a matter of sound. Gestures and mimics play an important role from early on. From the study of written-language acquisition, we know that both sound and visual input are important. These facts can be considered as explicit indications of how language structures are intertwined with culture. If elements which are not present in the end state are important to the pathway, and if all contextual variation is systematic and relevant to acquisition, how can we then seize these elements? An answer is that they cannot be seized with a structure-by-contrast view, as any attempt would lead to an exaggerative increase of detailed formalism. Taking the structure-by-frequency-and-contrast view amounts to considering language structures as highly intertwined with culture in a broad sense. This may seem basic, but it is in fact the antithesis of the autonomous line of structure (the principles of arbitrariness and abstractness) which is inherent in structuralism and generative linguistics. This can be seen in pidgin and creole linguistics, which has – like written language – unfortunately been considered peripheral to so-called theoretical linguistics:

> Pidgin and Creole linguistics is thus seen as involving a wider communicative context. Verbal forms of behaviour are at least partially dependent on and interwoven with ex-

> tralinguistic and non-linguistic factors. A social vacuum would lead to no language development, rather than the development of ideal natural pidgins and creoles. (Mühlhäusler, 1986, p. 280)

Further, it is assumed that (distributed) representations may be established and changed in very different ways, according to cultural preferences. By reference to theoretical claims made in nativism, this relativistic view on change would be considered as 'strong', but with regard to the diversity of the world's languages it could be considered as 'moderate'.

The position taken here is a functional approach to language, combined with connectionism. While functional approaches to language have focused on the diversity of the world's languages, connectionism has not yet worked much on cultural and social aspects:

> Both connectionism and dynamic systems have also neglected social factors as a source of structure in mental/behavioural development. But that is a matter of neglect rather than ideology. Because of their emphasis on external information as source of structure, both theories are entirely compatible with social-interactive accounts that emphasize the role of society in the construction of mind. *(Bates & Thelen, 2003, p. 387)*

2.3 A language structure is 'structure' only within its own system

A language structure is 'structure' only within its own system. To other systems, a language structure can be a *cue*[1]. When it comes to the relationship between spoken and written language, different views have been taken. Wengelin (2002) summarizes three main views: In the first view, priority is given to written language, and spoken language is dependent on and derived from written language. The second view is that taken by many linguists of the 20th century, where spoken language is primary and written language secondary. Finally, in the third view, spoken and written language each has its own validity. These views have been thoroughly discussed in the light of oral and written culture (Ong, 1982), and also within psycholinguistics (Chafe, 1994; Slobin, 1996; Strömqvist et al., 2004). Linell (1982) has, however, shown how the study of spoken language in modern linguistics is biased by the use of methods and concepts elaborated for the study of written language. Moreover, Wengelin (2002) has claimed that the focus on spoken language obtaining over the past century has hampered true discoveries about written language. According to these two positions, the investigation of both spoken and written language suffers from the second view: that spoken language is primary to written.

In this article, I claim the third view of the relationship between spoken and written language, for purely empirical reasons. Only if we distinguish between – not separate – spoken and written language in this way, can we obtain truly empirical findings about their relationship. The history of modern linguistics shows us how

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[1] *By the notion of 'cue' is meant that the status of a feature changes when it is considered as isolated from the other elements that make up the system. The notion of 'cue' does not refer to systems and does not imply a general ability. Because of the change in status, a cue cannot represent the system from which it is retrieved. Phonemic awareness is considered as a cue and thus cannot represent a phonological system, because it is assumed to favour individual abilities whose connection to sound patterns is highly vague.*

difficult it is not to make *a priori* statements about spoken and written language (Linell, 1982; Wengelin, 2002).

The criticism voiced by Linell in his book *The written language bias in linguistics* (1982) is partly directed at the alphabetic understanding of the relationship between spoken and written language. This part of the own-validity view will be focused on in this article.

When an oral culture develops written communication, the structure of written language as well as the orality (and structure) of spoken language are made explicit. Spoken language is then no longer conceived of as only an integral part of the culture; its structure is made explicit by a conceptual framework. Written language is already explicit by its introduction and by the claim of a relationship to spoken language. Both modalities are still part of culture; however, their explicit character seduces us into thinking that they are not integral parts of culture, but rather isolated phenomena interacting with culture. They are conceptualized as *structures*. What is left unclear in such a conceptualization is the function of structures in relation to culture, and *vice versa*. In the first two views above, structure is focused upon because the two structures (written and spoken language) are perceived as related to one another by being dependent on each other. This is also seen when phonological skills are considered to be an obligatory prerequisite for the acquisition of written-language skills. The third view, however, opens up the possibility that written and spoken language may both be intertwined in similar ways with culture in a broad sense, rather than requiring explanation in relation to the other structure. According to this view, elements of the structure of spoken language form certain cues that are exploited in the acquisition of written language, along with other social, contextual cues – even though the cues from spoken language may be considered stronger because of their specific function.

When a society has developed written language, there is no reason to consider written language as secondary in any psychological or linguistic sense (Biber, 1988). Claiming that spoken and written language each has its own validity is not to say that they do not interact, but it is to emphasize *how* they interact. If we focus on the acquisition of written language according to this view, spoken language is considered as part of the rich input from the culture and environment where the written language is acquired. When it comes to the acquisition of spoken language, written language may, in the same way, be part of the rich cultural input which makes up the learning environment. In both cases, frequency of input, guided by interest, is the main path to language acquisition. The separate validity of both spoken and written language is ensured from the start in every sense. The two systems differ owing to context, pragmatics, different frequency of various inputs, different status of languages and norms, references and different structures. In spoken language, gestures and mimics are important inputs (Gullberg, 1999). In written language, we might think of lay-out, graphics, style and punctuation in similar ways (Adorno, 1990). Frequency is the force that causes a particular weight to be associated with some types of input. According to this view, cues of connections evolve. And these cues are diverse with respect to strength, type and modality. Learning spoken language in a society which has a written language involves cues from written language, in the same way as the acquisition of written language exploits cues from its connection to

spoken language. Given the order in which these languages are typically learned, for most pupils at a young age who are learning to read and write there will be a dominance of cues from spoken language. Placing frequency at the front is to transform the Saussurian phoneme inventory of a language from two-dimensional to three-dimensional. When the inventory is three-dimensional, some cues can be seen as stronger (or more easily processed) by being more frequent (or focused), while others are rather peripheral in this sense. Still, these cues are only cues from one part of culture – a part that is made explicit as 'structure'. In written-language acquisition, the cues from spoken language – and their strength – are not qualitatively different from other cues, such as visual ones. In acquisition, the diverse cues mix and their differing salience is a product of frequency (also of *low* frequency: low-frequent structures may often be more marked). The position taken does not exclude awareness as a factor in acquisition, but the reliability of awareness is linked to some salient contexts that emerge from the interplay of spoken language, written language and culture in a broader sense. This emergence will be discussed below.

So far in this article, the strict focus on structure-by-contrast and the comparison of structures have been degraded from the position as the basis for the acquisition of written language. As claimed, the focus on frequency transforms the two-dimensional structure-by-contrast view into a three-dimensional structure-by-frequency-and-contrast view, and it additionally brings forth a potential for explanation of change. Still, the importance of *relative frequency* – that is: how language development is guided by interest, attention and needs – is a further argument in favour of the cultural foundation of structure and in favour of considering writing primarily as a *skill* (Tønnessen, 1999a). This position will be explicated towards the end of the article, but first we will deal with certain aspects of the structure-by-contrast view.

3. ASPECTS OF OVERFOCUSING ON STRUCTURES IN THE ACQUISITION OF WRITTEN LANGUAGE

3.1 Spoken language: what structure is real?

A characteristic of phonology up to the last decades of the 20th century has been the neglect of prosody (Linell, 1982). The tradition from Saussure up to the last decades can be considered to have a strong focus on the segment, and the description of spoken language is claimed to be highly influenced by the alphabetic structure of (some) written language(s) (Linell, 1982; Miller, 1996; Öhman, 1979). However, in the last few decades, some major discoveries of structural properties in prosody have been made (Horne, 2000). These findings place phonetic features on different parallel tiers, all related to a timing grid, and strongly question the common-sense assumption of segmental structure in spoken language. As a consequence, the structure of spoken language cannot be considered to fit nearly as well as had previously been assumed the alphabetic structure of written language. The findings of modern phonology can be considered as steps towards the aim of describing spoken language as such. In this endeavour, the scientist should always keep in mind the overall problems of description. As Öhman points out, implicit assumptions guide attention:

> The problem with phonetic transcription is not only that the human recorder, in collecting the speech data, must rely so much on his sensory acuity, but that he must let his perception be guided by a theory, implicit in the rules and conventions of the writing systems used, concerning the phonetic nature of the speech signals recorded. (Öhman, 1979, p. xvii)

Öhman's point is clear: one must be aware that a description might not have ontological reality. According to his view, the description of observed phenomena must be regarded as a hypothetical construct, not as an ontological entity. Empirical findings may support or contradict such a hypothetical construct. According to autosegmental-metric theory (AM), the segmental view of sound structure is strongly questioned, and the notion of 'phoneme' is challenged. Findings related to AM theory do not support the hypothetical constructs of the traditional, segmental theory, such as the Saussurian phoneme or the Chomskyan bundle of features (Chomsky & Halle, 1968). Paradoxically, phonemic awareness is considered, according to the psychological study of reading, to be the most important prerequisite for learning to read and write. Different scientific disciplines have different aims and goals. In the psychological study of reading, the conception of spoken language has a clear purpose, namely to explain its relationships to written language. The phoneme is considered as an important and basic unit in this tradition. In this situation, one should ask ontological questions within the research field and exploit the full range of recent discoveries about structure in spoken language. Hypothetical constructs are intended to serve the research field in which they belong, but they should also be adjusted according to the knowledge available. Concerning the notions of 'phoneme' and 'phonemic awareness', one should carefully avoid any transference from aspects of appropriateness to questions of ontology.

The phonology of the 20th century is often described in terms of either 'linear' or 'non-linear' phonology. The term 'linear' is problematic when used about spoken language. One of the most important findings in phonology over the past century is probably the discovery of the temporal aspects of spoken language, and the discovery of how prosody is systematic when it comes to timing (Bruce, 1977; Horne, 2000). Spoken language is primarily a temporal matter, while written language is (also) highly spatial. The notion of 'linear' is very unfortunate because it confounds aspects of space with aspects of time. In fact, 'linear' phonology (structuralism and traditional generative phonology) has, in many ways, a spatial conception of sound structure, where derivations apply in a serial order from left to right. This is problematic in the light of the recent findings in phonology. The notion of 'linear' also underscores the 'traditional' view of the relationship between spoken and written language. Still, the notion of 'non-linear' makes sense, because it stands in opposition to the traditional spatial conception of structure in spoken language. When non-linear phonology (temporal) meets written language (spatial), the outcome is that the structure-by-contrast view and the segmental approach are questioned. On this view, there is no obvious and widespread correspondence of structures to be found. Even if we specify in detail the phonological structure of a word, we will still not be able to equate this structure with the orthographic structure of the same word – but we may find *cues* (cf. Weingarten et al., 2004). With linear phonology, we might be led to assume such an equation, but such an enterprise would overlook the different as-

pects of time and space related to the oral and written form. This is why structure-by-contrast is not emphasized when we use the notion of 'skill'.

In this section, I have made a point out of the problem of implicit and *a priori* assumptions about spoken language when dealing with written-language acquisition. Usually, three main reference points have been chosen in discussions about written-language acquisition: mode of teaching, structure of spoken language and orthography. All of them may count as relevant approaches to the object of study, but they all favour a focus on structures. Focusing on *representational change*[2] is to take one step in another direction – towards considering written language as a skill. Representational change is a counter-argument to the claim that the structure of written language is similar to the structure of spoken language, a claim derived from the historical fact that written language was created on the basis of spoken language. Representational change is the explanation of how written language can be learned as a language skill.

3.2 Written language: there is no scientific 'alphabetic principle'

Any notion of 'transparent written language' is problematic. The idea of transparency can be discerned in the view of literacy as the mastery of written 'spoken' language, seen as a mirror of spoken language. Even if this view has been modified, the close relationship to spoken language remains in focus. This inherent implication of transparency conceals the fact that written and spoken language are subject to very different conditions with regard to origin and development. One may well claim that written language should be primarily regarded as a cultural construction. Still, I will claim that, in some respects, it functions as a kind of human language. The difficult part in dealing with written language is to distinguish aspects of nature from aspects of nurture. In this article, I will not try to do so; my claim is that any human language must be an interaction of both (Elman, 1996). Linell (1982) claims that the current understanding of structure in spoken language is a result of culture and tradition. And if a cultural construction is falsely considered as 'transparent', we may run into problems in other areas.

However, we may suggest that systematicities of written languages may be learned in similar ways as those of spoken language, and that this is how written language becomes natural. The following hypotheses are based on two assumptions: (1) the focus on segments does not capture the most central aspects of spoken language; and (2) the most challenging common aspect of spoken and written language is their ability to build a language in the learner. This view is supported by the fact that written language can in fact be learned without spoken language as a basis (for instance by congenitally deaf people).

Having stated the difference between these major systems, it then becomes interesting to focus on their interaction. I will claim that this approach is more fruitful

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[2] *By 'representation' is here meant distributed representations of multisensory character. Distributed representations are calibrations of multisensory input and output, and are therefore dynamic. Adding 'change' may therefore seem superfluous; however, the dynamic aspects cannot be over-emphasized.*

than the other way around. Still, this starting-point does not imply any random relationship between an acoustic signal and a written word, because there are obvious connections and systematicities. However, they are ontologically different, and the establishment of any simple connections in the description of elements should be avoided. Further, there should be no predominance of the medium in the theory. This would be the most empirical approach. There are certainly important commonalities between spoken and written language, but we also know that there is no unidirectionality of these commonalities between the media – they may go both ways. For instance, the existence and acquisition of written language changes the way we speak. When we study written and spoken language *as languages*, the medium itself will most likely unveil different characteristics of the human linguistic ability[3]. The emergence of written and spoken language shows, in different ways, how the human brain builds language from different media and contexts. However, there is a point in clarifying the differences between the media as well as their commonalities. When doing so, the challenge is to identify commonalities with a similar empirical status, because there is a danger in equating elements having a different empirical status. The claimed grapheme–phoneme mapping should not be considered as a commonality, owing to the different empirical status of the grapheme and the phoneme: the grapheme is physical while the phoneme is, to a greater extent, an abstraction involving metaphysical aspects.

The notion of 'transparent orthography' is closely related to the understanding of spoken language as primarily segmental. 'Transparent' signifies that the letters in the written language fit with corresponding categories of sound in the spoken language. One can argue that this is not a matter of fact, but rather a cultural construction (Linell, 1982). With regard to culture, common sense will probably admit that orthography, from an overall perspective, is a cultural construction, but will reject the inclusion of the segmental understanding of spoken language as part of this construction. We may propose that there is no precise and inherent correspondence between letter and sound category in the world's languages, and that this is a general aspect of interaction between categories of two different systems. On this view, one cannot consider the orthography of one language to be more transparent than that of another when talking about the correspondence between letters and sounds. As regards the conceptual metaphor of 'transparent orthography', I want to emphasize the importance of the viewer. We should ask what the viewer may hear (or 'see') in terms of sound categories in the written language. In my opinion, 'transparency' is too often presented as a quality located at a descriptive level relating to a natural relationship between letter and sound category. However, transparency demands a viewer – it is not an objective matter of fact. At this point, we should investigate the factors that may cause the experience which we call transparency. One of these factors is how the correspondence between spoken and written language is established in the learner. This happens in different ways in different languages, probably owing both to orthographic differences and to differing phonological structures, but not

[3] *This position is close to the symptom approach in the discussion of how to define 'dyslexia' (Tønnessen, 1997). Tønnessen suggests that the concept of dyslexia should be built from the bottom up, based on symptoms, without a priori assumptions of causes.*

because of a variably transparent correspondence between the category of letters and the category of sounds. If the learner may hear (or 'see') correspondence in some situations, it will then be some correspondence between letter and segment in the stream of speech, not between letter and sound categories.

Alphabetic writing favours the segmental feature of spoken language, degrading the information inherent in the non-linear features of the acoustic signal. Because of this, greater explanatory power is granted to elements that contradict a strict alphabetic principle. However, the written language does not break down if this principle is broken – something that most of the alphabetic orthographies of the world may exemplify.

From a typological perspective, all languages serve the same overall purpose of communication but have different means and categories to do this. These typological differences can also be considered to be more or less segmental in nature; the different roles of tone and inflection in the languages of the world may serve as an example. If we see the word as a unit, agglutinative languages can be said to exploit the segmental option far more than many analytic and tone languages. Functions which are caused by the addition of segments – large or small – can, in line with this, be referred to as more segmental than functions which are realized by non-segmental means. And we know that languages differ in this respect. The notion of 'transparency' seems to be linked to a strict alphabetic principle, and it further applies mainly to agglutinative languages. Therefore it seems likely that it is in fact other properties of the system that make learners – 'viewers' – establish various correspondences in different languages. In my view, this is also the point of Usha Goswami (1999), who suggests that different phonologies (orthographies) make different orthographic units salient. She claims awareness of rhyme to be more salient to English students than awareness of the phoneme – and she does not claim this to be the case in other languages:

> Cross-linguistic findings such as these raise the interesting possibility that the level of phonological awareness may vary with the phonology of the language that is being learned and the orthographic units that this phonology makes salient to the learner. *(Goswami, 1999, p. 142)*

This perspective represents a further argument in favour of degrading the focus on traditional linguistic descriptions – as implied in the notion of the 'alphabetic principle' – when comparing written-language skills in different languages.

3.3 Language: nature and nurture intertwined

In the article *Biological unity and cultural diversity*, researchers report from studies of dyslexic and normal readers in Italian, English and French, claiming that reading ability differs between the languages but that the difference between a dyslexic group and a normal group is similar in the three languages (Paulesu et al., 2001). They also found that English and Italian normal readers showed particular brain activity in different parts of the brain. The Italian proficient readers showed activity in the part of the brain associated with phoneme processing (left superior temporal regions), while the English proficient readers showed greater activity in the part asso-

ciated with word retrieval (left posterior inferior temporal gyrus and anterior inferior frontal gyrus) – differences not found in the dyslexic groups. From these results, they claim a biological unity for dyslexia, more specifically a phonological deficit that appears to be independent of orthography (Paulesu et al., 2001). However, for proficient readers no claim of biological unity could be made. On the contrary, for this group *diversity* in brain activation was the most interesting finding. This is of course interesting as long as English and Italian – as is often the case – are placed at the two extremes on a scale of orthographic transparency. Paulesu et al. claim culture to be the cause of the diversity they have found; while they do not specify what they mean by 'culture', they seem to end up equating it with orthography, which is too specific in my opinion. There are several reasons to specify both the typology of the spoken language and the methods used in teaching as influential factors in the cultural construct. Even if cultural diversity is viewed in the context of varying orthographic transparency, the study may open for questions as to whether there are other plausible explanations for the differences in reading ability than differing correspondence between written and spoken language.

Another potential answer to the question of cultural impact can be derived from the differences found in a study of Vietnamese and Turkish pupils writing in Norwegian (Hvenekilde, 1985). In their texts, the two groups made very different types of errors, and these differences cannot entirely be explained by their different first-language backgrounds. Nor did their errors correspond with proficiency in pronunciation: the Turkish pupils had no major difficulties in pronouncing Norwegian, but still made significantly more spelling errors than did the Vietnamese, whose pronunciation of Norwegian was bad. In contrast to the Turkish children, the Vietnamese ones made hardly any spelling errors in words. While the Turkish children made errors related to segments in the spoken language, the Vietnamese children tended to choose the wrong word, which they, however, spelled correctly.

Below are two examples of texts written by a Turkish and a Vietnamese pupil, respectively (Hvenekilde, 1985). Misspelled words are grey. The English texts given below the Norwegian texts are (more or less) word-by-word translations:

> Turkish pupil, aged 10 years, 2 years in Norway:
> vi gå tøven badet vi leker me parken. vi kan gå erkeberk. vi se på fåtbal vi gå siverge. vi Hente vido vi se på tane filim.[4]
>
> Vietnamese pupil, aged 10 years, 2 years in Norway:
> jeg skal gå på tur og fotball også eller jeg går til bade ute og sole seg[5]

The differences between the examples in terms of misspelled (grey-marked) words clearly show the differing tendency for the two language groups. However, no evaluation of syntax was made in this study. In this respect, it should be noted that, impressionistically, the Vietnamese texts are difficult to read for a proficient Nor-

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[4] *English translation: we go [place name] swimming-pool we play with park. we can go [place name]. we watch football we go sweden. we Get video we watch cartoon movie.*

[5] *English translation: I will go for a walk and football too or I go to swimming (pool) outside and sunbathe oneself [my translation] (Hvenekilde, 1985)*

wegian reader, because they come across as a collection of correctly spelled words with unclear syntax, while the Turkish texts are easier to read, even if a large number of the words diverge from the orthographic norm. At first sight, it seems that the errors of the Turkish pupils are direct consequences of their first-language syllable structure. A large number of the errors were related to consonant clusters that do not exist in Turkish, where the pupils compensated either by inserting a vowel or by simplifying or adjusting the clusters. Examples: *blyantsipiser* instead of *blyantspisser* ('pencil sharpener'), *vansikli* instead of *vanskelig* ('difficult'), *kanse* instead of *kanskje* ('maybe') (Hvenekilde 1990). As isolated examples they cannot be used as direct support for the structure-by-frequency-and-contrast view, but if we take into account the overall pattern of errors in the two groups of pupils as well as their poor matching between pronunciation and writing in Norwegian, it could be valuable to search for further explanations. Hvenekilde argues that different reading-instruction conventions in the two countries involved constitute an adequate explanation of the phenomena (Hvenekilde, 1990). She claims that Turkish reading instruction in general focuses on a strictly segmental approach, where pupils are taught to 'trust their ears'. This works very well because of the correspondence between letter and sound segment. The pupils are trained to combine sounds and segment words. Since Turkish is an agglutinative language, long words occur often, which would make an approach based on word images less practical. Vietnamese reading-books also start off by introducing individual letters and putting them together in simple syllables. When all the letters have been introduced, the training starts to focus on units larger than the letter or simple syllable (Hvenekilde 1990). Hvenekilde refers to four Vietnamese instruction books which all have the individual letters of the target letter combination marked in different colours. While all the letter combinations in question are monosyllabic, they do have tone differences. There are six tones, which are marked by diacritics on the vowel. Thus the recognition of the letter combination *and* the small diacritic becomes the crucial point of information. This instructional approach is probably one possible explanation why the Vietnamese are so good at word images in Norwegian (Hvenekilde 1990), and probably also why they so often mix up similar-looking words (rather than misspell the correct word) when writing. One could argue that a study involving students with two typologically different first languages writing in their second language may encompass too many variables for any one plausible explanation to be given. However, this aspect of second-language writing strongly suggests a connection between a non-segmental approach to written language (as well as spoken language) and the mastery of orthography in a second language.

The bilinguals' approach to written language is interesting as an example of the lack of a general correspondence of correspondence between letter and sound category. Certainly, the typological differences in Hvenekilde's study are considerable, but I stick to the assumption that some differences along this line can be found in monolinguals as well. Having monolingual subjects would make it possible to keep out typological differences and the variables related to writing in a second language, so that one could instead focus on the effects of introduction to written language. At the same time, the different approaches to written language found in a group of

monolinguals will of course not have as remarkable effects as those seen in Hvenekilde's study.

I consider word accents, tones and quantity to challenge the segmental approach implicit in the 'alphabetic principle'. If we have a segmental theory of spoken language, and written language is considered as a representation of spoken language, then very strict constraints are imposed on teaching and research in the field of reading. Natural, spoken languages differ with regard to tones, accents and quantity, and I suggest that, for the purposes of reading and writing, spoken languages should be described as occupying different positions on a scale from more segmental to less segmental. Talking of 'orthographic transparency' in this context is to introduce a normative, heuristic tool of very limited use, whose conditions are moreover highly vague. Competence in an agglutinative language may yield an overall experience in the learner of how language in general is constructed, while languages with more tone features may cause a different experience. Still, the two extremes are not equally distant from the alphabetic principle, because they favour different features. It is probable that a tone-language speaker will be better able to handle other features than segmental ones, for instance features of sound quality. The instruction method encountered may contribute to forming a more explicit conception of how language is structured, and the pre-instruction conception of structure can probably be supported or obstructed to some extent by the instruction method. Therefore, the interplay of experience and conception (through instruction) in different languages may be represented by a scale of mismatch with regard to the segmental and non-segmental preferences of the language in question.

Instead of presupposing the normative scheme of the alphabetic principle, one could focus on the 'symptoms' of the written language emerging in the learner, based on multimodal cultural stimuli, spoken language included. For instance, we know that the doubling of consonants is among the most frequent error areas in written Norwegian (Wiggen, 1982). It is possible to investigate on-line behaviour relating to this symptom in different languages. Findings from such studies report different behaviour in different languages (Nordqvist, Leiwo & Lyytinen, 2003; Uppstad & Solheim, to appear). While we cannot draw any conclusions about causes, this enables us to study the 'symptoms' thoroughly. On-line studies of writing may fill a gap in traditional writing research (Wengelin, 2002) in that they represent a way to study the characteristics of writing as it unfolds in real time, without *a priori* assumptions about its relationship to spoken language.

3.4 The implications of considering reading and writing as skills

Tønnessen (1999a) presents a nuanced understanding of 'skill'. He claims that behaviourism has overemphasized the automatic part of reading, while cognitive psychology has overemphasized the intellectual part. Moreover, he highlights the problematic situation caused by the fact that these two important aspects of human functioning are claimed by different schools of psychology. Tønnessen claims that connectionism offers a framework for considering an interaction of both awareness and automaticity. His model is based on the nuanced understanding of 'skill' as the

flexible combination of automaticity and awareness. In this model, neither factor is sufficient (Tønnessen 1999a), and they are highly intertwined:

> In most skills it is artificial to envision them as two separate factors: awareness + automaticity. Rather they are both components of something that is greater than the sum of its parts. Reading difficulties then can occur if 1) there is a deficit in the automaticity, 2) there is a deficit in the awareness and 3) there is an inappropriate combination of the two. *(Tønnessen 1999a, p. 95)*

With its connectionist basis, the skill position includes the aspects of explanation inherent in the structure-by-frequency-and-contrast view. Connectionism focuses on connections that can be strengthened – not by strict, cumulative frequency, but rather by *relative frequency* and emergent properties. In this sense, the flexible combination of automaticity and awareness (i.e. skill) is at the core of how structure-by-frequency-and-contrast works. Skills differ between individuals, and what we need is therefore a model for conceiving of these differences, without applying static perspectives. I consider Tønnessen's model of skill to be a model for how to maintain dynamic perspectives on written-language acquisition. The notion of 'skill' according to Tønnessen is linked, in this article, to the status of written language, and more precisely to the view that spoken and written language each has its own validity. On this view – which is chosen for empirical reasons –, we may investigate the performance of the individual in terms of *monitoring* and *steering*, which are extremes on a continuum of combined awareness and automaticity. Monitoring is the most automatic part of the continuum, while steering represents the most conscious part; however, the point is that the individual's performance will cover the whole continuum (the distribution depending on the task). This is because, according to Tønnessen, even skilled readers' behaviour is not fully automatic all the time – they have to guide their attention towards certain contexts, even though most of the time they are only monitoring their own behaviour (Tønnessen, 1999a). There is no easy way to explain what is new in this conception, in terms of pointing out an antonym, because many of the existing approaches to written-language acquisition posit common theoretical insights while being distinctively different. Still, there is a major tendency to focus on interactions of autonomous structures, where complexities are identified by the correspondence between a phonological structure and an orthographic structure.

Taking the view of written language as a skill involves a different set of terms. The notion of 'skill' degrades the *a priori* assumption of a 'natural' relationship between spoken and written language. Further, it is hypothesized that relative frequency is at the centre of language acquisition – also for written language. On this view, one may talk of *cues* instead of searching for corresponding units.

With regard to the three views of the relationship between spoken and written language previously mentioned (Chafe, 1994; Wengelin, 2002), the first two are based on conceptions where *structures* are focused on and *units* are searched for. The position taken here claims written language as a *skill*, focusing on *frequency*. This division also follows the dividing line between a static and a dynamic approach to the acquisition of written language. The search for corresponding units is claimed to be a characteristic of a static approach.

First and second view: Third view:

Spoken language dependent on written (1st view) – or *vice versa* (2nd view)	Spoken and written language each has its own validity
Identify structures	Skill
Structure by contrast (static)	Structure by frequency and contrast (dynamic)
Units	Cues
Awareness	Awareness/automaticity

Importantly, the above table does not represent contradictions – only examples of different focus and theoretical span. Taking the third view of the relationship between spoken and written language is probably more of a major theoretical deviation than an adjustment of details in mainstream theory. This is seen in psycholinguistics, where a change has occurred in the view of thought and language, in Dan I. Slobin's words: 'From "thought and language" to "thinking for speaking" ' (1996). This change involves the claim that a special mode of thinking is related to the act of speaking, and an analogous position has then been taken for writing, producing the notion of 'thinking for writing' (Strömqvist & Verhoeven, 2004). The position of thinking-for-writing may in many ways serve as both an important theoretical basis and an operationalization of the view of reading and writing as a skill, by combining 'thought and language' into modes of action.

Another potential insight that can be gained by considering written language as a skill relates to how the notion of 'representational change' fits into the picture. Talking of written language as a skill is to consider the acquisition of language as an ongoing process of representational change. Spoken (distributed) representations are assumed to change when written language is introduced to a learner, in which situation the mode of approach (teaching) is also assumed to have an impact. Further, (distributed) representations are continuously changing in the acquisition of written language.

The changes for written and spoken language are not assumed to be equal, but the general processes causing these changes are considered to be similar. Normally, a person who is learning to speak has a learning environment which is different from that obtaining at the time of acquisition of written language in terms of input, age, frequency of input and context. Therefore, the characteristics of the changes differ. Still, they are considered as effects of the same general processes. Focusing on structure in this context is deemed static and does not make it possible to account for the ongoing changes related to these developing skills. The Saussurian quotation 'diachronie, ce n'est que d'une synchronie a l'autre' (Saussure, 1969, p. 126) underlines the static perspective of the structure-by-contrast view. It is a fact that symptoms can only be studied successively in developement. However, taking the structure-by-frequency-and-contrast view we get a framework for understanding how structures emerge.

Taking the skill position amounts to focusing on the structure-by-frequency-and-contrast view, where automaticity and awareness are intertwined. The skill position therefore has less focus on structural descriptions, and a stronger preference for issues of explanation. A skill consists of both automaticity and awareness, but it is

more than the sum of these parts (Tønnessen, 1999a, p. 94). Because skill is more than the sum of awareness and automaticity, we cannot assign causality backwards on this view. The skill is the window where we can observe the consequences of the complex establishment of skills, which is captured only partially (and also simplistically) by the structure-by-contrast view:

> In practice it is often difficult to measure awareness and automaticity separately. *(Tønnessen, 1999a, p. 95)*

Because of this difficulty, we should assess *symptoms*, rather than build our approach on an uncertain division between awareness and automaticity. What is normally called 'awareness' within the cognitive paradigm is probably located in the most conscious part of the continuum of combined awareness and automaticity and is therefore unfortunate as a category concerning skills. Thus, both teaching and experimental designs should be built on the skill view. Models of ideal reading and writing are tied to static approaches to the phenomenon of writing in that they identify stages related to structures. A strong focus on proficiency in groups may also seduce the observer or researcher into using the conceptual frames of ideal writing. However, the skill approach together with the structure-by-frequency-and-contrast view represents an ascending pathway to written-language acquisition, where the individual's proficiency can be studied and where light can be shed on the dynamics of learning to read and write.

4. CONCLUSION

In the present article I have claimed that the dynamics of written-language acquisition cannot be seized by a focus on structures in spoken language and their relationship to orthography. However, this does not mean that such structures are without relevance. It is claimed that these structures provide cues that are exploited in acquisition.

An alternative model for seizing the dynamics of written-language acquisition is suggested. This model focuses on the interplay of automaticity and awareness, described as a continuum of steering and monitoring (Tønnessen, 1999a). It is claimed that this model provides the best platform for maintaining dynamic perspectives in both research and education concerning written-language skills.

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