



# Typology of Writing Systems

Sixth International Workshop on Writing Systems

Braunschweig Institute of Technology, Germany

German Department

18<sup>th</sup> - 19<sup>th</sup> September 2008

Program and Abstracts



# PROGRAM

## Thursday, September 18<sup>th</sup> 2008

- 09:15 - 09:30 **OPENING**
- 09:30 - 10:15 RÜDIGER WEINGARTEN: *Comparative graphematics*
- 10:15 - 10:55 NANNA FUHRHOP & FRANZISKA BUCHMANN: *The letter length hierarchy*
- 10:55 - 11:15 **COFFEE BREAK**
- 11:15 - 11:55 AMANDINE BERGÈRE & YISHAÏ NEUMANN: *Operative principles common to several writing systems: English, French, German, Chinese, Hebrew and Arabic*
- 11:55 - 12:35 TERRY JOYCE: *The significance of the morphographic principle for the classification of writing systems*
- 12:35 - 14:00 **LUNCH BREAK**
- 14:00 - 14:40 HAKIM ARIF: *The nature of opaque orthography and techniques of reading literacy of Bengali children: A psycholinguistic interpretation*
- 14:40 - 15:20 HELMA PASCH: *Scripts in competition: African writing systems*
- 15:20 - 16:00 ANNEKE NEIJT: *Syntactic and semantic encoding by -n in Dutch orthography*
- 16:00 - 16:20 **COFFEE BREAK**
- 16:20 - 17:00 SONJA HÄFFNER: *Writing systems as symbol systems*
- 17:00 - 17:40 YOUNGJUN JANG: *Parallelism between the principles of Korean Hangul and acquisition data*
- 17:50 - 18:30 Business Meeting of the ASSOCIATION FOR WRITTEN LANGUAGE AND LITERACY
- 19:30 **CONFERENCE DINNER** at the Gewandhaus

## Friday, September 19<sup>th</sup> 2008

- 09:00 - 10:00 KEYNOTE: REBECCA TREIMAN & BRETT KESSLER (Washington University in St. Louis): *Similarities among the shapes of writing and their effects on learning*
- 10:00 - 10:40 ESTHER HANSEN, ANNEKE NEIJT & ROBERT SCHREUDER: *Children's acquisition of <d> and <t> in word medial position*
- 10:40 - 11:00 **COFFEE BREAK**
- 11:00 - 11:40 NADYA DICH: *Defining a good speller: On the role of the sensitivity to spelling context as an aspect of spelling competence*
- 11:40 - 12:20 GUIDO NOTTBUSCH: *Capitalization in German: Lexical and syntactic processes in ambiguity resolution*
- 12:20 - 12:40 ANNEKE NEIJT & BEATRICE PRIMUS: *Towards a typological database of writing systems: issues related to the questionnaire*
- 12:40 - 14:20 **LUNCH BREAK**
- 14:20 - 15:00 CLÁUDIA ALEXANDRA MOREIRA DA SILVA: *Writing in chats :) - a new wrtng system?*
- 15:00 - 15:40 ESTHER STEENBEEK-PLANTING, WIM VAN BON & ROBERT SCHREUDER: *Stability of children's word identification of graphotactically complex words*
- 15:40 - 16:00 **COFFEE BREAK**
- 16:00 - 16:40 HANS BASBØLL, CLAUS LAMBERTSEN & LAILA KJÆRBÆK: *Implementing a model of sound-letter pairings in the OLAM computational system*
- 16:40 - 17:20 HYE JEONG SONG & RICHARD WIESE: *Resistance to complexity interacting with visual shape in German and Korean orthography*
- 17:20 - 18:00 MARTIN NEEF & MIRIAM BALESTRA: *Measuring graphematic transparency: German and Italian compared*
- 18:00 **FAREWELL DRINKS**
- 19:30 **FAREWELL DINNER** at Al Duomo

**Poster Session**

(12:20 - 14:20)

# Typology of Writing Systems

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# Comparative Graphematics

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Typology of writing system is still in its beginnings. The types proposed so far – alphabet, abugida, abjad, logography etc. – can give a first impression of a writing system but they fail in several respects: in the attempts to differentiate between two given writing systems, to order writing systems properly according to certain types or to make theoretical assumptions about the relationship between typological features. In other words: There is still a great difference between the linguistic disciplines typology of languages and typology of writing systems.

Several reasons might be responsible for this situation. Quite often scripts and writing systems are confused, e.g. when the latin script is classified as alphabetic. Instead, a writing system should be conceived of as an ordered pair of an individual language and a script. Accordingly, in the terms of traditional classification, the writing system amharic-latin could be classified as alphabetic, whereas amharic-ethiopic might be classified as an abugida. Another problem can be seen in the fact that these traditional classification are by far too imprecise to characterize a given writing system. For example, the so-called alphabetic english-latin writing system represents major syllabic constituents, the german-latin writing system represents among others syllables boundaries etc. In general, the representation of grammatical and suprasegmental features is underestimated. In order to get more sophisticated typologies we need more basic work in the description of writing systems. I would like to call this discipline comparative graphematics. A main task in this field will be to establish standards for comparative graphematic studies.

In my presentation I will outline the basic notions of comparative graphematics as a prerequisite for typology of writing systems. This will include four main topics: a. some basic assumptions about the representation of language in a graphic system, b. a proposal for a descriptive tool in comparative graphematics (Interlinear Graphemic Glossing System), c. some sample analyses of writing systems (e.g. german-latin, polish-latin, amharic-ethiopic, arabic-arabic) and d. theoretical consequences for a typology of writing systems.

# The Letter Length Hierarchy

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According to their shape the lower case letters of the Latin alphabet can be divided into letters with extensions (for example <b> or <p>) and without extensions (for example <o>). This observation that letters vary in terms of their spatial properties, can be related to the concept of a graphematic syllable: Plosives correspond to graphemes with extensions, and occur at the syllable edge; vowels correspond to graphemes without extensions, and occur in the syllable core.

In our paper we propose a so-called letter length hierarchy, analogous to the phonological sonority hierarchy. First, we have to devise a scalar measure of letter length. To achieve that, we divide every letter into a head and a coda (cf. Primus 2006) and rank the form of the head on a hierarchy. This length hierarchy only operates on graphematic properties and not on any phonological properties at all.

Based on the length hierarchy, we can then formulate a graphematic principle of syllable structure, analogous to the phonological principle of syllable structure, known as the sonority sequencing principle. We develop this idea for German, but we will demonstrate how the principle transfers to English and deals with letters that might on first sight pose problems such as <y> - a potential syllable core, yet a letter with an extension.

## References

Primus, Beatrice (2006): Buchstabenkomponenten und ihre Grammatik. In: Bredel, Ursula/ Günther, Hartmut (Hgg.): Orthographietheorie und Rechtschreibunterricht. Tübingen: Niemeyer, 5-43.

# Operative principles common to several writing systems: English, French, German, Chinese, Hebrew and Arabic

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Existing traditional typologies of writing systems tend to be oversimplified, classifying such systems either as morphology-oriented or as phonology-oriented (Gelb 1963 [1952], Alarcos Llorach 1968, Sampson 1985, Coulmas 2003). Yet, the reality is more complicated, since very often the units of writing correspond to both morphology *and* phonology. Such graphemic units should be characterised as equally morphograms *and* phonograms.

The purpose of this article is to put forward some descriptive parameters of writing systems that allow not only a comparative analysis of writing systems originating from one single script, but also a contrastive approach towards historically non affiliated writing system, such as Phoenician-derived on the one hand and Chinese on the other hand. That a graphemic sequence can correspond to both phonological and morphological units will be demonstrated on writing systems that are generally considered as typologically distinct: French, English and German, Chinese, Hebrew and Arabic.

	Grapho-morphological correspondences	
	Morphological divergence	Morphological similarity
French	vain – vin – vint – vingt pointer ↔ point ≠ poing ↔ poignet	vin – vinifier – vinaire; vain – vanité vingt – vingtième; vint – sentit – comprit
English	cent – sent – scent right – rite – write – Write	woman ↔ women vs. man ↔ men century ↔ cent ≠ scent ↔ effervescent
German	Meerwasser ↔ Meer ≠ mehr ↔ Mehrheit; Mahlzähne ↔ mahlen ≠ malen ↔ Maler	Hand – Hände; Haus – Häuser; Schrift(tum) fahren ↔ fährst ↔ fuhr
Chinese	麻 /ma2/ “linen” – 马 /ma3/ “horse”	嘛 /ma/ “isn't it?” – 吗 /ma/ “quest. mark” – 骂 /ma4/ “insult, abuse”
Hebrew	לא – לו; שלמה – שלומו; אם – עם מורה דרך – מורי דרך; חברו – חבריו	ראש – ראשון – ראשית; אכל – תאכל; הון – להון; מורים – מורי דרך; שלומו – לו
Arabic	عمر و موسى (Amr); كتبوا (alif al-fasl)	مدينة – مدينة بيروت; بنى – بنيت; شرم الشيخ

All of the above examples contain grapho-phonological information as well as grapho-morphological information.

What this means for the typology of writing systems is that grapho-phonology and grapho-morphology are two constant operating principles in writing systems in general, be it English, French, German, Chinese, Hebrew or Arabic. As we can see, phonology and morphology participate in many writing systems and cannot be considered mutually exclusive. Therefore, the traditional and widely accepted classification of writing systems into phonologically oriented (syllabic or phonemic) for some and morphologically oriented (“logographic”) for others cannot be sustained.

In this respect, it becomes obvious that the traditional Chinese writing system is not subject to different principles compared to common alphabets. What differs from one writing system to another, including Chinese, is the proportion at which each of these two principles is applied. To conclude, we concur with John DeFrancis’ (1989) position that the Chinese writing system is not *sui generis*, but rather an extreme example of the “The Diverse Oneness of Writing Systems”.

# The significance of the morphographic principle for the classification of writing-systems

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The significance of the morphographic principle—by which the orthographic units of a writing system primarily represent morphemes—has been seriously undervalued within the study and classification of writing systems in general and in comprehending the Japanese writing system in particular. This paper argues for a re-evaluation of the importance of the morphographic principle and suggests that the shift in focus that comes with fully acknowledging that the term morphographic is more precise than the widely (mis)used term logographic has profound consequences for how we think about writing systems and writing, as well as the kinds of questions that we ask about the nature and organization of the literate mental lexicon.

After briefly describing the formation principles of kanji as background for later discussion of classification labels, Part 2 of the paper illustrates the tendency to portray the Japanese writing system as extremely complex and speculates on whether this image is, in some measure, a reflection of typological limitations and misunderstandings. Part 3 briefly introduces a number of important linguistic classifications of writing systems (Taylor, 1883; Gelb, 1952; Diringier, 1962; Hill, 1967; Haas, 1976; Halliday, 1985; Sampson, 1985; DeFrancis, 1989; Daniels, 1990; 1996a, 2001; Faber, 1992; Coulmas, 1992; DeFrancis & Unger, 1994; Sproat, 2000; Rogers, 2005). Seeking to outline some of the assumptions about writing that shape these typologies, the short reviews also highlight the treatment of kanji within these classifications. In Part 4, the focus turns to the theoretical perspectives concerning the relationship between language and writing manifest in the long and often heated debate over classification labels, such as pictograph, ideograph and logograph, which have been applied at various times to kanji within the Chinese and Japanese writing systems (Coulmas, 1989, 1996a, 2003; DeFrancis, 1989, 2002; DeFrancis & Unger, 1994; Haas, 1983; Halliday, 1985; Hansell, 2003; Hansen, 1993; Henderson, 1982; Kaiser, 1995; Matsunaga, 1996, 2002; Miller, 1967, 1986; Sampson, 1985, 1994; Sproat, 2000; Unger, 1987, 2002, 2004; Unger & DeFrancis, 1995; Vance, 2002).

Finally, moving to consider the wider implications that emerge with the recognition that morphographic is the more appropriate term, Part 5 briefly considers psycholinguistic research into the lexical retrieval and representation of polymorphemic words in the mental lexicon. Specifically, Part 5 outlines a series of constituent-morpheme priming experiments that controlled for the word-formation principle underlying two-kanji compound word targets in the lexical decision task (Joyce, 1999, 2002a, 2002b, 2003a, 2003b, 2004; Joyce & Masuda, 2004, 2005). These experiments provide consistent evidence that morphological relationships are reflected in the organization of the literate mental lexicon. Underscoring the wider significance of the morphographic principle, it can be no matter of mere coincidence that non-cenemic writing systems must be morphographic in nature and that morphology is so fundamental to the organization of the literate mental lexicon.

# The nature of opaque orthography and techniques of reading literacy of Bengali children: A psycholinguistic interpretation

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Orthographic representation of the sounds of a language determines the nature of children's reading literacy. In terms of the relationship between sounds and written symbols (one-to-one, or one-to-many and vice-versa), the orthography of languages through out the world are classified either as opaque, or shallow. In shallow orthography as the sounds and written symbols maintain one-to-one relationship, children of the languages of such orthographic system e.g. Spanish, Italian, German acquire their reading ability comparatively easily. They learn to read the word letter-by-letter hence their reading acquisition process becomes faster. But in the opaque or deep orthography there exist a complex mechanism to identify the nature of sound and letter correspondence. In this orthographic system sometimes one sound indicates many written symbols and vice versa. So, children of the languages of such orthographic pattern like English, or Arabic usually follow the syllable break technique in the reading process of words. Hence their reading learning technique is effortful and time consuming.

The orthography of Bengali language is opaque by nature. The two reasons mentioned below tended its orthography to be recognized as opaque or deep. Many sounds in this language represent two or more letters and vice versa. On the other hand, in the writing system two or more letters together take a different shape which could be termed as *ligature*. Such ligature pattern also gives the orthography of this language an opaque identity. This paper provides a psycholinguistic description of this opaque orthography and the techniques of reading literacy of Bengali Children by searching the answers of following questions.

- What are the underlying characteristics of Bengali opaque orthography?
- How do children acquire reading literacy with this deep orthography?
- Which psycholinguistic mechanism exists in the process of Bengali opaque orthography during reading word?



## Scripts in competition: African writing systems

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Ever since the invention of writing in ancient Egypt, scripts have been transferred to other languages. Since the phonetic and phonological conditions of the donor languages differ from those in the receiver languages, imported writing systems are usually not ideally suited for the latter and their speakers modify the scripts in order to better adapt them to their respective languages.

In Africa, colonization was accompanied by considerable efforts of missionary societies to introduce writing and to alphabetize the population. The Roman alphabet was considered a medium that should allow the graphization of all African languages. It was, however, soon recognized that special characters had to be added to allow for the representation of the rich vowel and consonant systems of many African languages. In other languages, diacritics were used to fulfil that task, and diacritics serve also in many languages to mark tones.

When it became clear that special characters and diacritics made the production of texts in vernacular languages on typewriters cumbersome or impossible, linguistics -- usually from European and American universities and missionary societies -- started to develop orthographies for a number of languages which could be written on standard typewriters and later on computers.

Despite all their efforts many of the respective languages are far less well established as media for written communication than the official European languages.

Written communication and the development of print media did not develop as well as had been hoped for and oral mass communication (radio) is more important. Nevertheless writing has developed new functions and forms. In many countries cars and buses used for public transport are decorated by prayers and proverbs written in big letters. In East Africa proverbs on industrially produced dresses may be used effectively to convey personal messages.

The most striking development resulting from the introduction of Roman script is the development of local alphabets and syllabaries. Some have been created as the better graphic representation of given languages, others because certain languages were skipped in graphization programs, still others were designed as solutions for political reasons to have a writing system independent from that of the colonial powers. What is true for all new scripts, is that they constitute strong identity markers.

This social function in combination with structural features (syllabaries) is responsible for the easiness of acquisition of African scripts. With regard to the Vai-script it could be shown that it surpasses that of the Roman script by far.

## Syntactic and semantic encoding by *-n* in Dutch orthography

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In Dutch, quantifiers such as *andere* ‘other(s)’, *eerste* ‘first’, and *sommige* ‘some’ can be implicitly converted to nouns:

- (1a) De andere / eerste is klaar.  
‘The other / first one is ready.’
- (1b) Sommige(n) zijn klaar. ‘Some are ready.’

In the plural form, such converted quantifiers are written with *-n* when they refer to human beings, but not when they refer to non-humans. Hence, both *sommige* and *sommigen* is possible in (1b), but the spelling expresses reference to plural antecedents of different kinds:

- (2a) Sommigen / de eersten zijn klaar.  
‘Some / the first ones (=men, women, etc.) are ready.’
- (2b) Sommige / de eerste zijn klaar.  
‘Some / the first ones (=animals, artifacts, etc.) are ready.’

The orthographic rule for the use of *n*-endings is based not only on plurality and the semantic value of the quantifier’s referent (human or not), but also on the presence of the antecedent in the text, and the possibility to consider the sentence an ellipsis, with a gap in the position of the quantifier. When the antecedent is not mentioned, one should write *-n* in quantifiers referring to human beings. When a human antecedent is present and may fill the gap, one should *not* write *-n*:

- (3a) *antecedent mentioned and possibly gapped* (no *-n*)  
Sommige studenten zijn klaar, andere (studenten) gaan door.  
‘Some students are ready, others (other students) continue.’
- (3b) *antecedent mentioned, but not gapped* (use *-n*)  
Sommigen (\*studenten) van de studenten zijn klaar.  
‘Some of the students are ready.’  
Van de studenten zijn sommigen (\*studenten) klaar.  
‘Of the students, some are ready.’

In an exploratory study (Van der Horst, Neijt and Lamers, in preparation), we evaluated the knowledge of Dutch writers of the rule. It turns out that *-n* is used quite often when the quantifier refers to human beings, but not in cases like (3b). In this presentation, these findings are discussed from a syntactic point of view, pursuing the hypothesis that the *n*-ending in Dutch orthography not only expresses plurality, but also distinguishes nouns from quantifiers, determiners and adjectives.

# Writing systems as symbol systems

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Typologies of writing systems focus on the relation between the smallest written and the smallest spoken unit. Writing systems are classified according to the depth of this correspondence. They are regarded as “visible speech”. However, writing systems are symbol systems with specific ways of symbolizing wherein the relation to spoken language is just one aspect. Therefore, I chose a semiotic approach to describe and compare the German alphabetic script with the Japanese kanji script. It is based on the symbol theory of Nelson Goodman and of Christian Stetter, in its linguistic outline. What is special about this symbol theory is that it relates the articulation of the symbols to the type-token-relation. The type is defined by its extension and its intension that is the articulation scheme common to all tokens of the type. The connection between articulation and type-token-relation opens up the criteria digital and analog. They serve in the first place to distinguish the articulation of verbal symbol systems (digital) from pictures (analog), but there are also gradual differences between writing systems in this respect.

Next to the articulation, the semantic characteristics of the symbols are examined: which units are vacant, prime or composite. For example, one will not find in the German system an atomic unit (a letter) that has a meaning. In the kanji system, however, there are about 97 atomic radicals that do so. Furthermore, the semantic description of the symbols combined with the link between articulation and the type-token-relation reveals that the notion of the grapheme as smallest sense-discriminating unit as opposed to the smallest sense-determining unit is an implicit articulation scheme of the alphabetic system.

Finally, the writing systems differ in their ways of reference. In alphabetic scripts, the relation between form and meaning is arbitrary (at (sub)morphemic level). On the other hand, however, there has to be a clear relation to a spoken word to qualify the graph as a written word with a meaning. This submorphemic notational relation to the spoken word assures the identity and reference of the written sign. In kanji, however, is no notational relation between the written and the spoken symbol. Thus, the meaning of a compound symbol is often a result of a chain of semantic and phonological references of its components, but the compound symbol itself has not always a composite meaning. The realm of the spoken language is obviously used quite differently in the German script and the kanji script.

To describe writing systems as symbol systems adds to the common taxonomies a dimension that is focused on articulation and the ways of reference. Especially in cognitive research, the semiotic categories might be helpful. The differences in articulation, in the ways of reference and in the composition of semantics might be helpful to construct comparable stimuli and might shed a new perspective on the differences between analytical and heuristic processing of items and the question of hemispheric lateralization.

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# Parallelism between the Principles of Korean Hangul and Acquisition Data

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**A.** As well known Hangul, the writing system of the Korean language, was invented by King Sejong and his scholars in 1443. All the symbols were, according to the explanation given by King Sejong and his scholars, created in accordance with the shapes of the articulators. For example, the first consonant ㄱ, representing the velar stop [g], is the shape of the tongue at velar area. All velar sounds ㄱ [g], ㄱ' [g'] and ㅋ [k<sup>h</sup>] contain the basic symbol ㄱ. The second consonant ㄴ, representing nasal [n], is the shape of the tongue that touches the alveolar ridge and other symbols such as ㄷ [d], ㄷ' [t<sup>h</sup>], ㄸ [t'] and ㄹ [l] are derived from this basic symbol ㄴ.

**B.** There are 14 consonant symbols (originally 18) and 10 vowel symbols. However, some symbols are combinations of basic ones. For example, the symbol ㆁ, representing aspirated [k<sup>h</sup>], is the combination of ㄱ [k] and ㅏ. Likewise, the symbol ㅑ, representing the complex vowel [ja], is a combination of ㅣ [i] plus ㅏ [a].

Surprisingly, this principle of creating complex symbols for Korean Hangul is found in the child language production. The language acquisition data from 2-3 years old children DO include the following:

(1)	Adult pronunciation	Child pronunciation
	<i>kongryon ppye</i> [kongriong ppje]	[kongriong pi e]
	dinosaur bone	

As shown in (1), adult pronunciation for ppye 'bone' is a glide plus a schwa, namely [ppiye], while child pronunciation is two syllables, namely [ppi] and [e]. This is really intriguing in the sense that King Sejong took into consideration the mechanism of articulation and implemented it in the writing system. Consider the following.

(2)	Vowel symbols of Hangul			
	ㅏ ㅑ	ㅓ ㅕ	ㅗ ㅛ	ㅜ ㅠ
	[a] [ja]	[e] [je]	[o] [jo]	[u] [ju]

All the second member of each pair is invented following the principle that it is pronounced by adding the high front vowel [i] in front of the preceding vowel.

**C.** Considering the academic environment of the mid-15th century in Korea, recognizing such principles of phonetic articulation is remarkable. Without aid from computers or any other recording tools, it would not be easy to notice that complex vowels like [ja] is a combination of [i] plus [a] as a diphthong. Furthermore, this series of diphthongs are spelled according to the systematic principle of adding one more stroke to the simple symbols.

**D.** Previous research has been focused on the creativity and ingenuity of the Hangul system and of King Sejong and his scholars. However, it has not been fully evidenced how Hangul is unique and in what sense. This study, hopefully, shows that the way of creating a complex symbol is exactly attested by language acquisition data.

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## Children's acquisition of <d> and <t> in word medial position

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This study deals with the acquisition of <d> and <t> in medial position in Dutch words. It is relevant to distinguish word medial position from word onset position, because in recognizing words, language users rely on information at the beginning of words rather than on features of the middle or the end. Marslen-Wilson (1987) explains this phenomenon in terms of the 'Cohort Model'. According to this model, learning to write begins with discriminating segmental oppositions in the onsets of words. In word initial contexts, the mapping of sounds onto members of orthographic pairs like *t-d* is straightforward, as shown by the English pairs *dab – tab* and *dagger – tagger*, or Dutch *dak* 'roof' – *tak* 'branch' and *deken* 'blanket' – *teken* 'sign'. In word medial position, however, the mapping of coronal plosives onto *d* and *t* is less clear-cut, as the acquisition by English speaking children of the spelling of words like *city*, *dirty* and even *sometimes* shows. With some regularity, children will substitute *d* for *t*, most readily in *city*. They do so less often in *dirty* on account of the related form *dirt*, in which the [t] is easily distinguished. Least likely to be misspelt is *sometimes*, because in this word the [t] is not rendered as a voiced rather than voiceless so-called 'flap', but fully pronounced (cf. Treiman, Cassar & Zukowski (1994)).

Choosing between <d> and <t> in word medial position in Dutch verb forms is particularly difficult, because cases like English *city* abound: quite often, it is unclear which coronal plosive is pronounced and should be written. For instance, pronunciation yields hardly a clue as to whether the past tense of *krabben*, 'to scratch' should be spelled *krabde* or *\*krapte* (Ernestus & Baayen 2001, 2003). The distinction between *t* and *d* in this context is explicitly taught in primary schools, at length and with dubious results.

Previous research (Neijt and Schreuder 2007) revealed the existence of an interesting asymmetry in the spelling of <d> and <t> in word medial position: both experienced users and children learning to write Dutch prefer *d*'s over *t*'s. To explain this phenomenon, we investigated the development of spelling skills by first and second graders. As in the study by Neijt and Schreuder, we focussed on nouns and verbs. Within these two word classes, we distinguished <d> and <t> in stems (*hert+en*, 'deer'+plural, *houd+en* 'love'+infinitive/plural) from <d> and <t> in suffixes (*lief+de* 'dear+ness, love', *werk+te* 'work+ed'). The results of our experiments show that children start with a preference for <t>: t-words (*herten*, *werkte*) cause fewer mistakes than d-words (*houden*, *liefde*). In a couple of months time, however, they develop a d-preference, with fewer mistakes in d-words than in t-words.

The results of our longitudinal study raise three major questions: (1) *Why do first graders start with a t-preference?* (2) *Why do they then develop a d-preference?* and (3) *Why is the d-preference the final stage of this development?* Several explanations will be proposed (pronunciation, lenition, frequency and hypercorrection), the relevance of which needs to be established by future research.

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**Defining a good speller:  
On the role of the sensitivity to spelling context as an aspect of spelling competence.**

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Research on spelling traditionally distinguishes between two aspects of spelling competence: word-specific memory and knowledge of grapheme-phoneme rules. Few studies have looked at spellers' sensitivity to regularities in phonology-orthography correspondences at sublexical levels larger than phonemes (e.g., rhymes). The results of those studies have been interpreted to suggest that good spellers are more sensitive to the broader spelling context, i.e., to the regularities at a larger-than-phoneme level. However, good spellers were defined differently across studies, and to our knowledge, there has been no work that would systematically assess the relationship between context-sensitivity and other aspects of spelling competence.

The present report is based on the results of a spelling test in American English aimed at assessing both memory for exceptional lexical spellings and the sensitivity to probabilistic patterns in orthography at the level of rhyme. The test consisted of 30 rare (mean frequency ~ 2 per mln.) words with irregular spellings (e.g., *khaki*, *quiche*), and 25 nonwords. The nonwords were all monosyllables constructed in such a way that the vowel had at least two conflicting spellings: the most frequent spelling when context is not taken into account and the most frequent spelling within the context of a particular rhyme (for example, the default spelling for vowel /e/ is *a\_e* (*cake*), whereas the rhyme /en/ is most frequently spelled with *-ai* (*main*)). The test items were recorded by an American English speaker. 40 English speakers (college students) were tested. Participants were instructed to listen to the recording and type the spellings as they listen.

For each participant the following 3 scores were created: the number of misspelled words, the number of 'default rhyme' spellings, and the number of 'default vowel' spellings. Analysis of correlations between the 3 scores revealed that better spellers, defined by the number of misspelled irregular words, were more likely to use default vowel spelling, whereas worse spellers used default rhyme spellings more often. Thus, these results seem to show that sensitivity to the context of spelling does not help spellers to memorize irregular words. On the contrary, spellers who relied on rhyme-level regularities made more mistakes in irregular words.

These results are, at a first glance, conflicting with previous findings. However, the conflict can be reconciled if one takes into account the differences between spelling tasks and different spelling proficiency criteria used in different studies. One possible explanation of the results is the competition between lexical and sublexical spelling strategies, such that too much emphasis on exploring orthographic regularities on the sublexical level impacts the strength of whole-word representations of irregularly spelled words. Alternative interpretations are also discussed.

# Capitalization in German: Lexical and syntactic processes in ambiguity resolution

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German orthography has the somewhat unique property of systematically marking nouns by capitalizing their first letter. This gives the reader additional information with respect to the syntactic structure of a sentence but also burdens the writer with the task of making this structure explicit. The benefits of this information have been demonstrated for the reading process by a number of studies by Bock and colleagues (1985, 1989), but it still remains unclear though, how the writer accomplishes this task. Two different processes are conceivable: The information is either delivered by the Orthographic Output Lexicon or is syntactically generated whilst the sentence to be written is constructed. In a series of experiments, evidence is provided for an interactive exchange between lexical and syntactic processing dealing with the question of when capitalization should occur.

## Writing in chats :-)- a new wrtng systm?

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Writing in chat programs implies a deviation from standard writing. But are the “errors” in this context a total innovation or rather a recreation of early writing systems? Are chat users trying to create the ideal writing system?

Many deviations from standard writing in synchronous writing (a type of real time communication present in chats) show similarities to features from early writing systems. These include logosyllabaries (Daniels, 2001: 43) or logographic systems (Gaur, 1984: 16; Calvet, 1996: 12; Kress, 2000: 3), in which a character or picture transmits a meaning, representing a word or a morpheme; syllabaries, in which each character stands for a syllable (Daniels, 2001: 43), and the abjad (the Semitic-type script), in which each character stands for a consonant (Daniels, 2001: 43-44; Rogers, 2005: 115). How can such characteristics be seen in chats?

In our study, we concluded that logographic systems can be related to the use of smileys to express feelings and attitudes. Another important characteristic in this type of writing is the deletion of graphemes. It usually targets the subsyllabic constituents, especially the rhyme, but the number of syllables is generally respected. Thus, keeping the number of syllables can be compared to syllabaries, as the character which is preserved stands for the whole syllable. Each one is represented by the onset in most cases, but there are syllables in which the nucleus is kept, mainly when the syllable format is V (i.e., just containing a Vowel in the nucleus position). Most importantly, the preservation of the onset can bear a resemblance to the abjad and consonantal scripts, as the graphemes which are maintained are often the consonants.

Do Internet users have an explicit knowledge about the types of writing systems that they are reproducing? Why are they recreating them? Although chatters may not be conscious about it, they seem to be recreating the abjad, which is considered ideal by Daniels (2001: 69). In fact, it is the most economic script, representing syllables with the same symbols wherever in a word they occur – the consonants. Moreover, when chat users write the words as they actually hear them, they are decreasing the level of arbitrariness as they tend to produce a bi-univocal relationship between the graphemes and phonemes, which would create an optimal orthography, according to Klima (1972: 61). Can these “errors” (in the form of the suppression and change of graphemes) show the implicit linguistic knowledge of chat users and speakers in general?

In fact, these deviations from standard writing may give evidence for the importance of the syllable, as the deletion of graphemes affects its subconstituents, but frequently respects the number of syllables. Moreover, the fact that consonants are kept suggests that the speakers have an intuitive knowledge about their informational superiority in comparison to vowels. Furthermore, the economy that Internet users search for in chats expresses their knowledge of the fact that letters are used to describe sounds, showing that they are accurate listeners, who can detach themselves from their orthographic knowledge, formally learnt in schools. To sum up, chat users are creating a new way of writing, which is actually recreating old ways of writing, thus showing their implicit linguistic knowledge.

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# Stability of children's word identification of graphotactically complex words

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The purpose of reading practice for poor readers is to establish general reading skills pertaining to words of specific orthographic types. The common practice is to focus on words that were read incorrectly (Bender, 2004). However, little is known about the stability of these reading errors, possible change of stability during reading development, and whether poor and typical readers show the same patterns of reading stability.

Research of Verhoeven & Van Leeuwe (in press) shows that both poor and typical readers are very stable at the total number of errors they make (test score stability) and they remain stable as their reading abilities develop during the elementary school years. However, it is not clear whether children show a high item score stability as well. Gough, Juel & Griffith (1992) demonstrated that reading errors of English regular CVC words are not made fully consistently by beginning readers. Further research of Steenbeek-Planting e.a. (in prep) shows that children are far from fully stable when reading transparent Dutch CVC words. Moreover, during reading development stability of reading accuracy decreases.

Although Dutch has a shallow orthography, additional graphotactic rules complicate word identification from an early stage of development (Verhoeven, Schreuder & Baayen, 2006). Therefore, in the current study, word reading consistency of different types of graphotactically complex CVCVC words is examined and compared to transparent CVC words.

180 students from grade 2 and 3 participated, both normally developing readers (N = 88) and disabled readers (N = 92). Disabled readers were compared with reading age matched normal readers. Students were asked to twice read 300 Dutch CVCVC words, with an interval of a few days. CVCVC words were of specific orthographic complexities, drawn randomly with chance proportional to frequency of use. Words were presented in isolation on a computer screen. Word visibility ended at the beginning of student's vocalizing.

Data were being analysed to answer the main question whether a student consistently makes the same errors. The correspondence between the first and second administration was determined using various indices (intra-class correlation, tetrachoric correlation, percentage agreement, etc.) and related to the following factors: 1) Poor versus typical readers; 2) Grade 2 versus Grade 3; 3) Word specific factors such as frequency, bigram frequency, neighbourhood characteristics and orthographic characteristics; 4) The interaction of these three.

Preliminary results show that students are far from fully stable. Consistency of reading errors decreases with age, and reading consistency of poor readers is comparable to typical readers.

Practical implication and theoretical consequences will be discussed.

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## Implementing a model of sound-letter pairings in the OLAM computational system

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The elements of alphabetic writing systems and of the sound systems which are being mapped with them have, as the main principle, the extension of a single segment, i.e. a letter and, roughly, a phoneme. Candidates for the relevant sound system units are allophones or sound units, (concrete) phonemes, or (more abstract morpho)phonemes. An important aspect of alphabetic writing systems, both theoretically and in practice, and one with typological implications, is whether and where the mappings between letters and sound system units are ambiguous. E.g. in Finnish, the mappings are generally unambiguous; in French, mappings from letters to sound system units are much less ambiguous than the other way round; and in English, there are many ambiguities in both directions.

Basbøll (*The Phonology of Danish*, OUP 2005:88-105) applies a general model to a language with an orthography-phonology relation no less difficult than English, viz. Danish. Relations (which are not exceptional) between letters and phonemes are represented in structures encompassing correspondences in both directions, thus allowing predictions on where there will be difficulties in spelling and where in pronunciation. Basbøll makes a distinction between two binary features for sound-letter mappings (regardless of direction), viz. +/- P(inciple) and +/- S(ound). E.g. the mapping of the vowel of the word *gæst*, which is pronounced with the same vowel as in the letter name *æ*, is both +P and +S; in *hest*, which is a perfect rhyme of *gæst*, the mapping of the vowel is +P but -S; *bold*, where *d* is not mute as would be expected, but pronounced as in the letter name *d*, has a vowel which is -P +S; and the wholly exceptional *vejr*, where *ej* is pronounced as *æ*, is -P -S.

OLAM is a phonological, morphological and orthographical coding and search system (in FileMaker 9) which we have developed (Madsen, Basbøll & Lambertsen 2001, cf. Basbøll & Lambertsen 2007 ([http://www.projet-pfc.net/?u\\_s=4&u\\_a=141](http://www.projet-pfc.net/?u_s=4&u_a=141))). We shall briefly present this system from the point of view of its applicability to orthography-phonology issues, and in particular our pilot implementation of the above mentioned model in OLAM. We have strings of sound system units with all kinds of phonological analyses (distinctive features, prosodic patterns, and so on), which must be paired to orthographic strings to calculate the +/- P and +/- S values. One perspective of this effort is the possibility of classifying spelling errors as symptoms of particular learning phases or paths: e.g. a child with many +P -S errors (for correct +P +S spellings) will be hypothesized to be acquiring the spelling system together with the sound analysis, whereas a child with many -P +S errors (for +P +S) shows evidence of sound analysis but not of the acquisition of the spelling system.

# Resistance to complexity interacting with visual shape in German and Korean orthography

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A fundamental question for orthographic theories is how letters and other visual elements are combined into more complex units. To answer this question, the following topics are addressed:

- (a) interaction between lengthening-h and complex graphemes in German,
- (b) justification for the restriction on the combination of the letters \*<ii>, \*<uu>, \*<ää>, \*<öö>, \*<üü> vs. <aa>, <ee>, <oo> in the nucleus of German orthographic syllables,
- (c) historical changes of letter shape, e.g., <|•> → <†>, and the insertion of graphemes in Korean, as examples for a simplicity criterion,
- (d) classification of orthographic syllable types in Korean and German.

The aim of the present study is to develop an optimality-theoretic account of these phenomena and the underlying forces. We start by considering two properties of written language, namely visibility and simplicity. The primary property usually taken for granted is that graphic symbols make spoken language visible. It is referred to as visible speech and treated in detail by DeFrancis (1989), who also suggested that non-phonetic as well as phonetic symbols are used in conveying meaning, even though non-phonetic symbols are not essential. Adopting this suggestion by DeFrancis, we observe how the length of vowels and orthographic syllables are realized in orthographies by means of phonetic or non-phonetic devices. The term simplicity in alphabetic orthographies is understood as a one-to-one mapping between sounds and letters. However, simplicity can also affect other orthographic aspects, such as combinations of letters and representations of orthographic syllables. So our interests extend beyond the correspondence to letter shape and the dimension of arrangement of letters. We argue that simplicity constrains the possibilities of variation among letters. The tendency to avoid a complex form influences visual shape, and, conversely, the realization of a visual form is achieved at the expense of simplicity.

As an immediate consequence of this interaction, we also propose that the two different representations of orthographic syllables, those in German and those in Korean, are classified as invisible or visible, respectively. The difference between a visible and an invisible orthographic syllable is that an invisible one is the unmarked linear arrangement resulting from the resistance to complexity, whereas a visible orthographic syllable involves the two-dimensional space. The present approach is built on the interaction of universal violable constraints and allows for the description of variation between languages by means of constraints and their ranking in Korean and German.

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# Measuring graphematic transparency: German and Italian compared

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An important linguistic concept for comparing writing systems with each other is orthographic depth, sometimes also called orthographic transparency. The main idea behind this notion is the observation that phonographic writing systems can display different degrees of regularity with respect to the relation between letters and sounds, or graphemes and phonemes, respectively. Deeper orthographies may also show a stronger influence of morphology than shallow ones.

While this conception is intuitively compelling, there is a relative lack of approaches that aim at quantitatively determining the orthographic depth of a given writing system. A noteworthy exception is Sproat (2000) who captures depth within a derivational conception of grammar. Assuming an ordered set of rules that derive surface representations from underlying grammatical representations, languages are said to differ regarding the point during the derivation process at which the orthographical derivation branches off (the so-called ‘Orthographically Relevant Level’).

Based on a general dissatisfaction with derivational linguistic theories, we will suggest a different approach to theoretically reconstructing orthographic depth. The theoretical background is the Recoding Model of Graphematics as developed in Neef (2005). A central claim of this model is a distinction between a graphematic level of phonographic writing systems and an orthographic one. Graphematics as the core of a phonographic writing system is here defined as a set of rules that convert written representation units (e.g. letters or graphemes in alphabetical systems) into phonological representation units. Orthography, on the other hand, is a secondary level, at which correct spellings of words are selected on the basis of their graphematic representations. Consequently, in this conception, orthographic transparency is reconstructed as graphematic transparency, and the latter can be defined as the degree to which written representations can be converted into phonological representations in a straightforward and unambiguous manner.

A graphematic system consists of rules of different complexity. In German, for example, the letter <f> unambiguously corresponds to [f] whereas the letter <b> either corresponds to [b] or to [p], depending on phonological conditioning. In order to arrive at a strict determination of graphematic transparency, we assign different numerical values to different kinds of rules. As a result, we are able to express the graphematic transparency of a writing system as a quantitative metric, which we will demonstrate for both German and Italian.

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**Abstracts**

# **Poster Session**

# Chimaera compounds. Directional biases in object interpretation.

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Linguistic relativity, i.e. the idea that characteristics of the language influence the way speakers perceive and think about the world, has been proposed by Whorf (1956), and has received renewed interest in the last decades (for an overview, see e.g. Boroditsky, 2003).

One of a language's characteristic is its writing system, and one of a writing system's characteristic is its directional orientation, e.g., *left-to-right* as in English and German, *right-to-left* as in Arabic, or *top-down* as in Taiwanese. Adopting the notion of linguistic relativity we might expect the direction of a writing system to affect non-linguistic cognitive processes.

Our study with German participants tested for directional effects in a hybrid object naming task. Specifically, we aimed to explore whether participants' exposure to a left-to-right writing system would be reflected in a left-to-right bias when naming hybrid objects as compounds.

The participants, native speakers of German with no knowledge of languages that employ right-to-left writing systems, had to name stimuli presented on a computer screen. Stimuli consisted of digitally manipulated colour photographs of hybrid objects that were composed of two roughly equally salient components. For example, a chimeric animal, part elephant, part fish, was presented in a horizontal orientation, so that one component was on the left half of the picture and the other one on the right half of the picture. The directional orientation of the pictures was manipulated between participant groups: Half of the participants saw the original pictures, the other half a mirrored version. These hybrid object stimuli were used to elicit novel compounds (i.e., *elephant fish* or *fish elephant*). We hypothesized that the novel compound labels for hybrid objects would match the writing system direction (*left-to-right*). That is, the dependent variable in the study was the order in which the two salient objects were named as compound components.

In the above task we found a significant left-to-right bias. These results add yet another phenomenon to the list of those for which directionality effects have been obtained and suggest that object orientation can influence object interpretation: the spatial orientation of the stimulus parts affected the temporal order of constituent naming, resulting in different compound structures (i.e., *elephant fish* or *fish elephant*) and possibly ultimately different mental representations.

Within the framework of linguistic relativity this left-to-right bias can be interpreted as transfer from the directionality of a language's writing system. These results are in line with previously obtained left-to-right biases in speakers of other languages with left-to-right orthographies in other non-linguistic spatial tasks (e.g. Maas & Russo, 2003). At this moment, our findings do not, however, allow for a conclusive interpretation, as the locus of the left-to-right preference could also be an effect of a universal left-to-right scanning preference, related to hemispheric specialization, as proposed by Chatterjee et al. (1995). Follow-up research with preliterate or illiterate speakers, or speakers of languages with right-to-left orthographies might help to further determine the locus of this directional bias.

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# **An optimality-theoretic approach to capitalization with the example of English 18<sup>th</sup> century texts**

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Based on the view that orthography is a means of reader orientation, this paper examines the role of capitalization in a sample of English early modern texts. The format of optimality theory provides the instrument for an in-depth analysis of the use of capital letters, as well as an adequate method of describing the variation within the texts. The default criteria for capitals are of syntactic character, whereas semantic constraints prohibit capital letters. Several aspects of grammar and meaning play a part in the evaluation of different spellings, distinguishing between automated processes (lower ranked constraints) and claims of semantics and the lexicon (higher ranked constraints).

This paper exemplifies the analysis with a short excerpt from an 18th century novel and illustrates the three parts of my approach: first, the division of the text into its constituents; second, an evaluation of the capitalization on the basis of syntactic and semantic criteria, and eventually the representation in an optimality theory tableau. Together, these steps help to establish a profile of the text which pinpoints the specific hierarchy of the different constraints.

# *Kanji and Okurigana: A case of typologically different scripts in interaction*

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This paper aims to present a descriptive account of the interaction between Japanese *kanji* and post-*kanji hiragana* graphemes known as *okurigana*.

In its present form, the Japanese writing system is substantiated mainly by two scripts, namely *kanji* and *hiragana*. Roughly speaking, *kanji* encodes free forms, word stems and other types of morphemes, whereas *hiragana* encodes morae and is used to represent non-lexical elements such as affixes, particles, etc. Both scripts are employed in a typical text, each representing the particular linguistic elements described above. In this sense, Japanese can be characterised by the interaction of different types of scripts (Sampson 1985, Kaiser 2007).

*Okurigana* instantiate an interesting case of *kanji-hiragana* interaction. *Hiragana* graphemes constitute *okurigana* when they are postposed to *kanji* graphemes to spell out inflectional endings and/or a section at the end of stems or free forms. For instance in 食べた *tabe-ta* ‘eat-PAST’, the *kanji* 食 represents the verb stem *tabe-*, whereas the *okurigana* べ *be* and た *ta* spell out the stem-final mora and the inflectional suffix, respectively. This way, *kanji* and *okurigana* amalgamate with each other and co-construct the written word.

Significantly, one may say that *okurigana* serve to specify *kanji* readings in three respects: (i) the phonemic form (Satake 2006); (ii) the target word-form of an inflected word (Tsukishima 1970, Sampson 1985, Vance 2002, Kond\_ 2005, etc.); and (iii) the target morpheme represented by a multiple-morpheme *kanji* (Sampson 1985, Vance 2002, Kond\_ 2005, etc.). To use the same example again, for 食べた it is the two *okurigana* that guarantee the isomorphic relation between this representation and the word *tabe-ta* ‘eat-PAST’. Potentially, 食 encodes five distinct morphemes, namely *tabe-*, *kuw-*, *kuraw-*, *syoku*, and *ziki*. As the *kanji* itself does not alter its form according to the reading, it fails to graphically specify the verb stem *tabe-* and the word-form *tabe-ta*. Instead, べ *be* marks out the verb stem in question by repeating the final mora, and た *ta* indicates its word-form by representing the inflectional suffix invariably. In turn, they also suggest the phonemic form of the entire reading, which is not expressed by the structure of the *kanji* grapheme in a regular and systematic fashion.

This paper will present a uniform description of the phenomena at hand, with particular reference to the interrelation of phonological transparency between *kanji* and *hiragana*. It will be emphasised that focusing on this interrelation is essential for a better understanding of the two scripts and, in turn, the Japanese writing system as a whole.

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**Addresses:**

- Restaurant al Patra, Gewerkschaftshaus Wilhelmstraße 5, 38100 Braunschweig (Wednesday evening)
- Restaurant Gewandhaus, Altstadtmarkt 1-2, 38100 Braunschweig (Thursday, 7:30 pm)
- Restaurant Al Duomo, Ruhfäutchenplatz 1, 38100 Braunschweig (Friday, 7:30 pm)
- Hotel am Wollmarkt, Wollmarkt 9 - 12, 38100 Braunschweig
- Hotel Lessing-Hof, Okerstr. 13, 38100 Braunschweig