

writing/reading interface

Association for Written Language and Literacy's 14th International Workshop on Writing Systems and Literacy

10-12 November 2023

Temple University Rome, Italy

Association for Written Language and Literacy
Ассоциация письменного языка и письменности
Ενωση για τη γραπτη γλωσσα και τη βασικη εκπαιδευση
书面语言和识字协会
Association for Written Language and Literacy

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Association for Written Language and Literacy's 14th International
Workshop on Writing Systems and Literacy (AWLL14)

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Temple University Rome, Italy

Organizers

Terry Joyce (Tama University; Temple University Japan)

Lynne Cahill (University of Sussex, UK)

Dorit Ravid (Tel Aviv University, Israel)

Programme committee

Terry Joyce, Lynne Cahill, Dorit Ravid

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AWLL: <http://faculty-sgs.tama.ac.jp/terry/awll/index.html>

Day 1: Friday, 10 November 2023

09:15 – 09:45	Check-in
09:45 – 10:00	Opening remarks
10:00 – 11:30	Oral session 1
11:30 – 12:00	Break
12:00 – 13:00	Keynote 1
13:00 – 14:00	Lunch
14:00 – 15:15	Poster session 1
15:15 – 16:45	Oral session 2
16:45 – 17:15	Break
17:15 – 18:45	Oral session 3
18:45 – 19:15	Time buffer + transfer to reception venue
19:15 – 21:15	Conference reception

Day 2: Saturday, 11 November 2023

10:00 – 11:30	Oral session 4
11:30 – 12:00	Break
12:00 – 13:00	Keynote 2
13:00 – 14:00	Lunch
14:00 – 15:15	Poster session 2
15:15 – 16:45	Oral session 5
16:45 – 17:15	Break
17:15 – 18:15	Oral session 6
18:30 – 18:45	AWLL business meeting
18:00 – 18:45	Time buffer + transfer dinner venue
19:00 – 20:30	Conference dinner [followed by 20:30 - 21:30 drinks]

Day 3: Sunday, 12 November 2023

10:00 – 11:30	Oral session 7
11:30 – 12:00	Break
12:00 – 1300	Keynote 3
13:00 – 14:00	Lunch
14:00 – 15:30	Oral session 8
15:30 – 16:00	Break
16:00 – 17:30	Oral session 9
17:30 – 18:00	Break
18:00 – 18:45	Panel discussion
18:45 – 19:00	Closing remarks [plus group photograph]

Day 1: Friday, 10 November 2023

09:15 – 09:45 Check-in

09:45 – 10:00 **Opening remarks****10:00 – 11:30 Oral session 1** [chair: Keisuke Honda]10:00 – 10:30 Terry Joyce; Hisashi Masuda; Chikako Fujita
Japanese *rubi*: Finessing the writing/reading/meaning interface10:30 – 11:00 Jon W. Carr; Kathleen Rastle
Why do languages tolerate heterography? An experimental investigation of the cultural evolution of informative orthographies11:00 – 11:30 Dimitrios Meletis
Literacy fosters normativity: Exploring how material and functional features of writing relate to linguistic norms

11:30 – 12:00 Break

12:00 – 13:00 Keynote 1 [chair: Dorit Ravid]

Vito Pirrelli

Is the finger-voice span an indicator of reading proficiency?

13:00 – 14:00 Lunch

14:00 – 15:15 Poster session 1

Wieke Harmsen; Martijn Bentum; Ferdy Hubers; Roeland van Hout; Catia Cucchiarini; Helmer Strik

The reliability of teacher evaluations of reading skills of primary school pupils

Nikolina Runje; Ana Matić Škorić; Jelena Kuvač Kraljević; Mirjana Lenček; Antonia Štefanec

Phonological and writing skills at the end of the second grade in Croatian speaking children with and without dyslexia

Koji Miwa; David Allen; Kelly Pasich

Effects of handwriting and keyboarding on the processing of morphographic characters

Jordan Gallant

Morphological learning in an online language app: Evidence from Lingvist users

15:15 – 16:45 Oral session 2 [chair: David Roberts]

15:15 – 15:45 Adi Shechter, Sivan Medina, David L. Share, Amit Yashar

[online]

Language-universal and script-specific factors in the recognition of letters in visual crowding: The effects of lexicality, hemifield, and transitional probabilities in a right-to-left script

15:45 – 16:15 Constanze Weth

Same but different? Syntax encoded on the written word across languages: The example of French plural spelling and German noun capitalization

16:15 – 16:45 Elinor Saiegh-Haddad; Rachel Schiff
A longitudinal study of the long-term effect of a multi-domain diglossia-centred literacy intervention in kindergarten on the reading skills of Arabic-speaking children in the 3rd grade

16:45 – 17:15 Break

17:15 – 18:45 Oral session 3 [chair: David Share]

17:15 – 17:45 Dorit Ravid; Ronit Naydic Rosen
Written prepositional prefixes in Hebrew narratives: morpho-orthographic and semantic analyses

17:45 – 18:15 Hanadi Abu Ahmad; David Share
[online] Reading instruction, CVs-based or phonemes-based method? An experimental study among Arab pre-school children

18:15 – 18:45 Nikita Bezrukov; Ronan Soni
Emergence of featurality as a byproduct of script inheritance

18:45 – 19:15 Transfer to conference reception

19:15 – 21:15 Conference reception

Day 2: Saturday, 11 November 2023

10:00 – 11:30 Oral session 4 [chair: Vito Perrilli]

10:00 – 10:30 Erich Fox Tree
A comic guide to the writing and reading of manual gestures in Ancient Maya iconography using indigenous sign languages

10:30 – 11:00 Jordan Gallant; Laurie Feldman; Gary Libben
Understanding the time course of written compound word production: Implications for theories of meaning and morphology in lexical processing

11:00 – 11:30 Antonio Perri; Luciano Perondi; Leonardo Romei
Does non-linear arrangement of written units hinder the writing/reading interface? Some counterexamples providing a negative answer, from Aztec script conventions to specific visual patterns in European texts

11:30 – 12:00 Break

12:00 – 13:00 Keynote 2 [chair: Terry Joyce]

Kathy Rastle
Understanding reading, understanding writing

13:00 – 14:00 Lunch

14:00 – 15:15	Poster session 2
	Jon W. Carr; Davide Crepaldi Readers target words where they expect to find maximal information based on the structure of the lexicon
	Yvonne Knospe; Maria Levlin; Maria Rosenberg Morphology and variance in word reading and spelling among poor readers of Swedish in grade two and four
	Kathleen Carroll; Fiona Lyddy The contribution of handwriting over typing to text quality and understanding of the writing task: the role of transactional (but not transmissional) writing beliefs
	Benjamin K. Tsou The origins of the Chinese writing system: Explorations in linguistic archeology and sociolinguistics
15:15 – 16:45	Oral session 5 [chair: Constanze Weth]
15:15 – 15:45	Zeynep Arslan; Julia Edeleva Vocabulary knowledge and word recognition at the reading/spelling interface
15:45 – 16:15 [online]	Nancy Joubran-Awadie; Yasmin Shalhoub-Awwad The morphological distance in Arabic diglossia: Insights from a longitudinal study (K – G3)
16:15 – 16:45 [online]	Rana Yassin; David Share; Yasmin Shalhoub-Awwad Learning to spell in Arabic: The impact of script-specific visual-orthographic features
16:45 – 17:15	Break
17:15 – 18:15	Oral session 6 [chair: Koji Miwa]
17:15 – 17:45	Keisuke Honda How alphabetic is Japanese rōmaji? Implications for the description and classification of writing systems
17:45 – 18:15	Amalia E. Gnanadesikan The representation of distinctive features in writing systems: Omission and commission
18:15 – 18:30	Break
18:30 – 18:45	AWLL business meeting
18:45 – 19:00	Transfer to conference dinner venue
19:00 – 20:30	Conference dinner [followed by 20:30 - 21:30 drinks]

Day 3: Sunday, 12 November 2023

10:00 – 11:30 Oral session 7 [chair: Kathy Rastle]

10:00 – 10:30 Peter Horn; Guido Nottbusch

How far does the awareness go? Results from a written plural preference task on analogous and non-analogous novel noun plurals in German

10:30 – 11:00 Wieke Harmsen; Roeland van Hout; Helmer Strik; Catia Cucchiarini

Exploring a joint approach for analyzing reading and writing errors in Dutch

11:00 – 11:30 Joanna Kamykowska; Magdalena Łuniewska-Etenkowska; Ewa Haman

Connections between phonological awareness, poor reading and poor oral language in early school-age children: results from an (almost) transparent orthography

11:30 – 12:00 Break

12:00 – 13:00 Keynote 3 [chair: Lynne Cahill]

David Share

Extricating reading science from entrenched Anglocentrism, Eurocentrism, and Alphabetism and embracing global diversity

13:00 – 14:00 Lunch

14:00 – 15:30 Oral session 8 [chair: Dimitrios Meletis]

14:00 – 14:30 Hye K. Pae

Easy decoding yet difficult encoding: What does the asymmetry between reading and writing in Korean Hangul mean for grapholinguistics?

14:30 – 15:00 Rachel Garton

Literacy development for language revitalization: Exploring literacy processing in the endangered language context

15:00 – 15:30 Dave Roberts; Amalia Bar-On; Elinor Saiegh-Haddad

Heterophonic homography in African and Semitic: Comparing the functions of tones and vowels

15:30 – 16:00 Break

16:00 – 17:30 Oral session 9 [chair: Amalia Gnanadesikan]

16:00 – 16:30 Ariel Gabbay

[online]

The patterns of the qal conjugation in Mishnaic Hebrew: Between the first vocalized editions and the oral reading traditions

16:30 – 17:00 Andrea Santamaria

Readability determines the presence of writing: materials, light effects, and sign sequences on Cretan Hieroglyphic seals

17:00 – 17:30 Lynne Cahill

The North-South divide in Middle English spelling conventions

17:30 – 18:00 Break

18:00 – 18:45 Panel discussion [panelists: Vito Pirrelli, Kathy Rastle, David Share]

18:45 – 19:00 Closing remarks [plus group photograph]

Sundry workshop information

Extending the Association of Written Language and Literacy's (AWLL) tradition of international conferences devoted to writing systems, AWLL14 will convene to facilitate researchers from various backgrounds in exploring together their shared interests in understanding how the complex interface between writing and reading plays out across the diversity of writing systems.

AWLL14 as hybrid conference:

Although we initially envisaged convening AWLL14 with only onsite presentations (plus online audience participation), with several presenters due to attend from Israel and the obvious difficulties with travel for those people, it was felt that they should have the chance to present virtually. The venue for AWLL14 is the Temple University Rome campus; housed in the Villa Caproni, an historic building, close to the Tiber River in the heart of Rome.

Presenter requests:

Onsite oral: Please note that, to facilitate smooth transitions between onsite presentations and for zoom continuity, a venue computer will be used for all onsite presentations (i.e., it will not be permissible to use own computer). Accordingly, onsite presenters are reminded that presentation files should be sent by Nov 7 at the latest (to Terry; with apologies for this late reminder).

All oral presentations: Oral presentations are for 30 minutes, inclusive of 5-10 mins for questions and answers at the presenter's discretion. Chairpersons will, however, provide time warnings (signs onsite and warning messages online).

Posters: The panels for poster presentations are 150 cm (horizontal) and 100 cm (vertical). Presenters are free to utilize the panel space as you wish (but please do not exceed these dimensions). Poster presenters are responsible for printing own posters, but you are also reminded to send an electronic version by Nov 7 at the latest (to Terry) to be uploaded to the conference website to share with online participants.

We sincerely look forward to welcoming everyone, both onsite and online, to AWLL14 next week.

Terry, Dorit, and Lynne
AWLL14 organizers

Japanese rubi: Finessing the writing/reading/meaning interface

Terry Joyce^{1,2}; Hisashi Masuda³; Chikako Fujita⁴

¹Tama University, Japan; ²Temple University Japan, Japan;

³Hiroshima Shudo University, Japan; ⁴Nanzan University, Japan

Intrinsic to its unique composition of multiple scripts, one particularly distinctive characteristic of the Japanese writing system (JWS) is its convention of marginal annotation known as rubi (Joyce & Masuda, 2019; Wakabayashi, 2006); a term inclusively denoting the small-font materialization of annotations, the basic practice, and its multifarious applications. Prototypically, when rubi in hiragana script are attached above a base-word in kanji script, as is (1), it is to indicate the base-word's **pronunciation**; a simple device for bridging the writing/reading interface.

(1) にほんご
日本語 /nihongo/ *Japanese language*

However, rubi also function as an innovative device for creatively finessing the writing/reading/meaning interface. As Wakabayashi (2006: 3) astutely observes, rubi can serve to “enhance a word’s expressiveness, emphasize, exaggerate, elucidate or delimit its meaning, convey a different register or speech mode, or act as a paraphrase or inside joke”. This creative potential stems primarily from the juxtaposition of two closely related aspects. The first is that the base-rubi interface is malleable; indeed, it is often inverted and typically reciprocal in nature. Mirroring the JWS’s propensity for graphematic variation (Joyce & Masuda, 2019), the second aspect is that base words and rubi can be graphematically represented by any component script. For instance, in the commonly attested (2a-c), the kanji accentuate specific nuances of the katakana-script rubi /maji/; a casual, yet polysemous, spoken word.

(2) a マジョ
本当, b マジョ
本気, c マジョ
真剣 a /hontō/ *true*; b /honki/ *serious*; c /shinken/ *earnest*

Sampling contemporary examples from advertisements, manga, magazines and literature, this paper outlines a framework for interpreting Japanese rubi. One dimension maps the rich interplay across the writing/reading/meaning interface that rubi embodies. Initially espoused to account for graphematic variation within the JWS, the second dimension extends Joyce and Masuda’s (2019) notion of intentionality; a factor of singular significance for Japanese rubi.

Joyce, Terry, & Masuda, Hisashi. (2019). On the notions of graphematic representation and orthography from the perspective of the Japanese writing system. *Written Language and Literacy*, 22(2), 248–280.

<https://doi.org/10.1075/wll.00028.joy>

Wakabayashi, Judy. (2006). Translating in a forked tongue: Interlinear glosses as a creative device in Japanese translations. *Translation and Interpreting Studies*, 1(2), 3–41. <https://doi.org/10.1075/tis.1.2.01wak>

Why do languages tolerate heterography? An experimental investigation of the cultural evolution of informative orthographies

Jon W. Carr; Kathleen Rastle

Royal Holloway, University of London, UK

It is widely acknowledged that opaque orthographies place additional demands on learning, often requiring many years to acquire fully. It is less widely recognized, however, that such orthographies may offer certain benefits in the context of reading. For example, the heterographic homophones (e.g., <knight> vs. <night>) impose additional costs in learning but may be beneficial in reading because they reduce ambiguity. Could it be the case, then, that heterography – and therefore orthographic opacity – may sometimes be selected for in the evolution of writing systems, despite the cost in learning? Berg and Aronoff (2021) have posited two models of heterography: *differentiation*, in which new spellings are created to differentiate words that are homophonous in speech (e.g., <lite> from <light> to signal low-fat), and *conservation*, in which heterography arises as an epiphenomenon of sound change (e.g., <meat> vs. <meet> resulting from the /ɛ:/-/e:/ merger in the Great Vowel Shift). In large-scale experiments with 540 participants, we test these models by simulating the cultural evolution of orthography using the iterated learning paradigm (Kirby et al., 2015). Specifically, an artificial “alien language” is allowed to evolve as it is inherited along a chain of participants, allowing us to explore the processes of differentiation and conservation, as well as two distinct pressures: a learning pressure (participants are incentivized to faithfully reproduce what they learned) and a communicative pressure (participants are incentivized to be communicatively successful). Under the learning pressure, we expect to observe the emergence of spelling transparency, while under the communicative pressure, we expect to observe the emergence of informative heterographic spellings that diverge from the spoken language to express meaning directly. We will further discuss how these scaled-down simulacra can inform our understanding of the real-world processes underlying spelling change, including the roles of variation, redundancy, and top-down reform.

Berg, K., & Aronoff, M. (2021). Is the English writing system phonographic or lexical/morphological? A new look at the spelling of stems. *Morphology*, 31(3), 315–328. <https://doi.org/10.1007/s11525-021-09379-5>

Kirby, S., Tamariz, M., Cornish, H., & Smith, K. (2015). Compression and communication in the cultural evolution of linguistic structure. *Cognition*, 141, 87–102. <https://doi.org/10.1016/j.cognition.2015.03.016>

Literacy fosters normativity: Exploring how material and functional features of writing relate to linguistic norms

Dimitrios Meletis

University of Vienna, Austria

Although spoken language remains the main subject of mainstream linguistic research, it is undeniable that the concept of *orthography* ‘correct writing’ greatly overshadows that of *orthoepy* ‘correct speech’, reflecting that normativity and prescriptivism are closely tied to writing and written language. This is the starting point of this paper, in which it is argued that literacy facilitates and promotes normative reflection about (not only written) language, rendering it a cornerstone of linguistic norms. The main question is: How does literacy shape both static conventions or ‘rules’ concerning the language system and dynamic prescriptive practices and ideologies affecting the manifold processes of reading and writing?

First, the advent of the normative concept of *orthography* is traced within the diachrony of writing (cf. Desbordes 1997) to then characterize structurally, psycholinguistically, and sociolinguistically how “the availability of the written form has a profound influence on language structure and representation at both the individual level (mental grammar) and the social level (language as a conventional system shared by a community of speakers)” (Dąbrowska 2020: 75). A key piece of evidence presented is the lack of metalinguistic awareness in illiterates (cf. Kurvers, Vallen & van Hout 2006).

Next, prototypical material and functional features of literacy facilitating normativity are presented; they include the segmentality, spatiality, permanence, and ontogenesis (through educational instruction instead of through natural acquisition) of writing as well as the vital role it assumes in, e.g., ritual and authoritative contexts as well as political standardization and unification.

Finally, a discussion of the implications of assuming a causal relation between literacy and linguistic normativity is complemented by an outlook of how investigating normativity across different writing systems and the literate cultures in which they are embedded uncovers an orthographic relativity affecting, for example, differences in what is considered a spelling ‘mistake’ vs. acceptable variation.

Dąbrowska, Ewa (2020): How writing changes language. In Anna Mauranen & Svetlana Vetchinnikova (eds.), *Language change: The impact of English as a lingua franca*, 75–94. Cambridge: CUP.
<https://doi.org/10.1017/9781108675000.006>

Desbordes, Françoise (1997): The notion of orthography: A Latin inheritance. In Clotilde Pontecorvo (ed.), *Writing development: An interdisciplinary view*, 117–128. Amsterdam: John Benjamins.
<https://doi.org/10.1075/swll.6.10des>

Kurvers, Jeanne, Ton Vallen, and Roeland van Hout (2006): Discovering features of language: Metalinguistic awareness of adult illiterates. In Jeanne Kurvers, Ineke van de Craats & Martha Young-Scholten (eds.), *Low-educated second language and literacy acquisition: Proceedings of the inaugural symposium*, 69–88. Utrecht: LOT.

Keynote 1**Is the finger-voice span an indicator of reading proficiency?**

Vito Pirrelli

CNR Pisa, Italy

A simple and reliable strategy for supporting attention focus, directional movement and voice-print match in oral reading involves the use of the index finger to track each word as it is read aloud. In Pisa, we used an ordinary tablet as a reading book to measure the exquisite coordination of voice articulation and the movement of a reader's index finger across a text displayed on the tablet touch screen. These data were then compared with eye-tracking data of the same subjects reading the same texts aloud on a computer screen.

Analyses of the three time lines of voice articulation, eye fixations and finger-tracking revealed, unsurprisingly, that voice, finger and eye have different speeds, which are nonetheless tightly coordinated during oral reading. In particular, while the voice typically lags behind both the finger and the eye, eye and finger movements tend to slow down at the same text joints for their time distance to the voice to be kept relatively constant over multi-word text units.

Such an "elastic" dynamic of the finger-voice and the eye-voice spans in oral reading is shown to be the outcome of an optimally adaptive viewing strategy, interactively modulated by three factors: a subject's reading skills, the tracking mode, and lexical and structural features of the written text. In particular, we observed that:

- i) the voice span may vary across subjects depending on their rate of articulation;
- ii) spans vary even more prominently within the same reader, as they tend to get larger when the text contains larger intonational and structural units;
- iii) spans are modulated differently depending on tracking mode, with the eye being mainly sensitive to larger text units, and the finger to smaller ones.

While all this evidence agrees with recent studies emphasizing interactive effects between eye/voice distance to the voice and eye/finger movements, it also suggests that the fine coordination between voice, finger and eye is functional to fluent oral reading, as it allows the reader to optimally plan articulation, using her phonological working memory to buffer lexical units into larger meaningful intonation units before reading them out. Ultimately, a more proficient reader is able to better adapt her working memory buffer and articulation rate to the structure complexity of a text.

The reliability of teacher evaluations of reading skills of primary school pupils

Wieke Harmsen; Martijn Bentum; Ferdy Hubers; Roeland van Hout; Catia Cucchiarini; Helmer Strik

Radboud University Nijmegen, Netherlands

Primary school teachers need to monitor the reading proficiency of their pupils. This can be assessed with a word reading task: A pupil reads a list of words aloud, while a teacher scores the read words as correct or incorrect (van Til et al., 2018). This is a laborious task, and the teacher could be aided by an automatic system that evaluates a pupil's reading proficiency (decoding skills) and can quickly assess which child needs remedial training. To develop such an automatic system, we need teacher evaluations (correct/incorrect) of pupils learning to read. Because the system can only be as good as the data it was trained on, these teacher evaluations should ideally have a high inter- and intra-rater reliability at both the pupil and the individual word level. It is therefore crucial to gain insight in the current practice of teachers with respect to the assessment of pupils' reading proficiency.

As part of the Dutch Automatic Reading Tutor (DART) project, pupils (aged 6 – 7) were recorded in their first year of learning to read. These recordings contain read aloud word lists of 24 words. For six recordings each read aloud word was rated as correct or incorrect by 51 teachers. Another set of 377 recordings of read aloud word lists was evaluated by two or three teachers. Based on these data we examined the inter-rater reliability of teachers on the pupil level, aggregating the binary evaluations of each teacher for a single recoding (correct/incorrect) into a percentage correct. Furthermore, we investigated the reliability at the word level by comparing the ratings from different teachers for a specific word. We present the findings, discuss how they can contribute to developing systems for automatically assessing reading proficiency and indicate possibilities for future research.

van Til, F. Kamphuis, J. Keuning, M. Gijssels, and A. de Wijs, "Wetenschappelijke Verantwoording LVS-toetsen AVI," Arnhem, 2018.

Phonological and writing skills at the end of the second grade in Croatian speaking children with and without dyslexia

Nikolina Runje^{1,2}; Ana Matic Škorić²; Jelena Kuvač Kraljević²; Mirjana Lenček²; Antonia Štefanec¹

¹Naklada Slap, d.o.o., Croatia; ²University of Zagreb, Croatia

Croatian is an orthographically transparent language with alphabetic writing system which has some specific features such as letters containing diacritics (č, ć, đ, š, ž) (Barić et al., 2005), making learning to write in Croatian a unique process. Phonological skills seem to contribute more to reading in languages that have more deviations from simple one-to-one grapheme-phoneme correspondence (Míguez-Álvarez, Cuevas-Alonso, and Saavedra, 2022), but the contribution of phonological skills has been less studied with respect to writing. Writing is a complex skill, and it seems unavoidable to consider written composition as multidimensional, which contributes to the understanding of the different roles of known writing factors such as accuracy, complexity, and quality that are important for early written expression (García, Crespo, and Bermúdez, 2017).

The purpose of this study was to examine the relationship between phonological and writing skills. Phonological skills were measured with the phonological awareness (PA), rapid automatized naming (RAN), and phonological working memory (PWM) task, while writing skills were measured with the sentence construction task which had two components: adherence to writing conventions (AWC) and productivity (P). For productivity three measures were calculated: a) total number of words (TNW), b) total number of correct words (TNCW) and c) total number of errors (TNE).

Preliminary analysis showed that there are significant correlations between the total scores on PA and AWC ($r=0.25$, $p<0.05$), TNW ($r=0.341$, $p<0.01$), TNCW ($r=0.441$, $p<0.01$), TNE ($r=-0.296$, $p<0.01$), as well as PWM and AWC ($r=0.25$, $p<0.05$), TNCW ($r=0.356$, $p<0.01$), TNE ($r=-0.309$, $p<0.05$). The result of the simple linear regression was statistically significant for TNW ($R^2 = 0.131$, $F(3, 64) = 3.209$, $p=0.029$) and TNCW ($R^2 = 0.233$, $F(3, 64) = 6.489$, $p<0.001$). The obtained findings will be discussed from the theoretical and developmental perspective, considering the features and specificities of Croatian orthography.

Barić, E., Lončarić, M., Malić, D., Pavešić, S., Peti, M., Zečević, V., Znika, M. (2005). *Hrvatska gramatika* [The Croatian grammar]. Školska knjiga, 4th edition. Zagreb.

García, E., Crespo, P., Bermúdez, I. (2017). Writing an Independently Composed Sentence by Spanish-Speaking Children With and Without Poor Transcription Skills: A Writing-Level Match Design. *Journal of Learning Disabilities*, 50(5), 511–521.

Míguez Álvarez, C., Cuevas-Alonso, M., Saavedra, Á. (2022). Relationships Between Phonological Awareness and Reading in Spanish: A Meta-Analysis. *Language Learning*, 72(1), 113-157.

Effects of handwriting and keyboarding on the processing of morphographic characters

Koji Miwa¹; David Allen²; Kelly Pasich¹

¹Nagoya University, Japan; ²Ochanomizu University, Japan

Once Japanese students enter university, the computer keyboard becomes a frequently used mode of writing. However, it is not clear whether the choice between handwriting and keyboarding has cognitive consequences (but see Mueller & Oppenheimer, 2014, for a handwriting advantage in learning). In this study, we investigated how readers' handwriting/keyboarding habits and 20-minute writing activity affect lexical processes during visual word recognition.

It is widely believed that morphographic characters are decomposed into sub-character constituents. For example, Miwa et al. (2014) reported that when Japanese two-character words are read, the lexical properties of the whole word, the constituent characters, and the sub-character constituents all co-determine response times and eye fixation durations. However, it is not clear whether such lexical processes are modulated by individual differences.

We predicted that Japanese readers' experience in handwriting and keyboarding affects how they read morphographic characters. To handwrite morphographic characters, writers have to start with sub-character constituents, writing one stroke at a time. In contrast, to properly type morphographic characters, writers must actively pay attention to phonological information. Therefore, we predicted that handwriting motivates the activation of sub-character constituents and that keyboarding motivates phonological processes.

A pretest-posttest design was used. We asked native speakers of Japanese to read 250 left-right kanji characters and 250 non-characters in a lexical decision task. We then asked half of the participants to handwrite kanji words for approximately 20 minutes and the other half to type the same kanji words using a keyboard. We then asked all the participants to complete the lexical decision task again. Participants' handwriting/keyboarding experience data were collected through a questionnaire. Using generalized linear mixed-effects modeling, we will assess the effects of writing activity and writing habit on lexical processes, considering potential nonlinearity (Miwa & Baayen, 2021).

Miwa, K., & Baayen, R. H. (2021). Nonlinearities in bilingual visual word recognition: An introduction to generalized additive modeling. *Bilingualism: Language and Cognition*, 24(5), 825-832.

Miwa, K., Libben, G., Dijkstra, T., & Baayen, R. H. (2014). The time-course of lexical activation in Japanese morphographic word recognition: Evidence for a character-driven processing model. *Quarterly Journal of Experimental Psychology*, 67(1), 79-113.

Mueller, P. A., & Oppenheimer, D. M. (2014). The pen is mightier than the keyboard: Advantages of longhand over laptop note taking. *Psychological Science*, 25(6), 1159-1168.

Morphological learning in an online language app: Evidence from Lingvist users

Jordan Gallant

McMaster University, Canada

This research explores the acquisition of morphological knowledge in the context of asynchronous online language learning, using extensive real-world data from the app Lingvist (www.lingvist.com). The learning task in this app involves reading a context sentence in the target language and completing the missing target vocabulary item using a complete gloss sentence in the source language, including both morphologically complex and simplex items.

We investigate the effects of the type frequency of encountered suffixes on the future production of targets containing those suffixes, distinguishing it from token frequency effects. To determine the role of morphosemantic knowledge in these learning processes, we additionally investigated the type and token frequency effect of three-letter sequences in the final rime of morphological simplex words that, by definition, had no morphological or semantic structure.

The analysis of user data from 3902 Spanish-speaking and 7115 German-speaking learners of English revealed a significant facilitatory effect of type frequency, but not token frequency, for English suffixes. This suggests that exposure to suffixes in various morphological contexts improved production accuracy, while repeated exposures to suffixes in the same contexts did not provide the same benefit. Interestingly, we observed similar effects when investigating repeating orthographic patterns in the rime of morphological simplex words, as the type frequency of orthographic patterns was greater when they were phonologically consistent.

These findings imply that the morphological learning effect may be primarily driven by surface-level orthographic and phonological forms rather than deeper semantic or morphological structures. We discuss these results in relation to the acquisition of additional language literacy and writing skills, as well as their contribution to our understanding of morphological knowledge from a psycholinguistic perspective.

Language-universal and script-specific factors in the recognition of letters in visual crowding: The effects of lexicality, hemifield, and transitional probabilities in a right-to-left script

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Visual crowding, which refers to the failure to identify an object in clutter, imposes a significant constraint on reading and has been linked to reading difficulties (Joo et al., 2018) and developmental dyslexia (e.g., Bertoni et al., 2019). Previous studies in alphabetic scripts have demonstrated that letter recognition within a trigram string is more accurate when the string forms a word compared to a pseudoword (the well-known “lexicality” effect). This effect occurs both in the fovea and the parafovea (Martelli et al., 2005). However, words and pseudowords not only differ in their lexical properties such as print frequency, but also sublexically in terms of the transitional probabilities of their letters (n-grams). These transitional probabilities, which capture the likelihood of a letter given its neighboring letters, play a crucial role in reading. However, the precise mechanism through which transitional probabilities facilitate reading remains unclear. Using a letter recognition task in varying display conditions, we investigated the effects of lexicality (words vs. pseudowords), visual hemifield, and transitional probability (bigram/trigram frequency) among skilled readers (Experiment 1, N = 14; Experiment 2, N = 13) in Hebrew - a script read from right to left. We predicted and confirmed two language-universal effects: a lexicality effect and a right hemifield (left hemisphere) advantage, as well as a strong language-specific effect - a left bigram advantage stemming from the right-to-left reading direction of Hebrew. The latter finding suggests that transitional probabilities are a significant factor in parafoveal letter recognition. The results shed light on the visual system's processing of crowded stimuli in general and in printed words in particular, revealing that script-specific contextual information such as letter combination probabilities influences letter recognition in crowded displays.

Bertoni, S., Franceschini, S., Ronconi, L., Gori, S., & Facoetti, A. (2019). Is excessive visual crowding causally linked to developmental dyslexia?. *Neuropsychologia*, 130, 107-117.

Joo, S. J., White, A. L., Strodman, D. J., & Yeatman, J. D. (2018). Optimizing text for an individual's visual system: The contribution of visual crowding to reading difficulties. *Cortex*, 103, 291-301.

Martelli, M., Majaj, N. J., & Pelli, D. G. (2005). Are faces processed like words? A diagnostic test for recognition by parts. *Journal of Vision*, 5(1), 6-6.

Same but different? Syntax encoded on the written word across languages: The example of French plural spelling and German noun capitalization

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Written words do not only encode phonological, morphological and lexical but also syntactic information at word level. One famous example is written French that represents a consistent inflection morphology in writing, unrelated to phonology. The most regular written inflection is French plural (FPS) with <-s> for nouns and adjectives and <-nt> for verbs. One example in German is noun capitalization (GNC). GNC has been modelled as syntactic, visually emphasizing the nucleus of the noun phrase, and surpassing the word class noun (Maas, 1992). Despite the difference of FPS and GNC, both seem to be similar in (a) the salience of encoding syntactic information, and (b) the unrelatedness to phonology.

FPS and GNC are difficult in spelling acquisition. Teaching that raises syntactic awareness related to the syntactic markers has been shown to be effective for syntactic spelling in German (Brucher et al., 2020) and French (Totereau et al., 1997).

The current paper presents and discusses the results of an intervention study training syntactic awareness to foster FPS and GNC based on teacher videos in Grade 4 (N = 176) with learners who become literate in German and French. The study examined whether the learners benefit similarly from a parallel designed training for FPS and GNC. All students participated in the French and the German training and were tested in both languages at four test points. To test the training effects, we applied a GLMM including all test points, both languages and training groups as fixed factors. The results showed positive effects of the French training on spelling, short-term and long-term, confirming previous results. However, unlike in previous studies, no training effects were found in GNC when compared to the control group.

The paper discusses the results from a linguistic perspective and from the educational context of the study.

Brucher, L., Ugen, S., & Weth, C. (2020). The impact of syntactic and lexical trainings on capitalization of nouns in German in grade five. *L1 Educational Studies in Language and Literature*, 1–23. <https://doi.org/10.17239/l1esll-2020.20.01.01>

Maas, U. (1992). *Grundzüge der deutschen Orthographie*. Niemeyer.

Thévenin, M.-G., Totereau, C., Fayol, M., & Jarousse, J.-P. (1999). L'apprentissage / enseignement de la morphologie écrite du nombre en français. *Revue Française de Pédagogie*, 126, 39–52.

A longitudinal study of the long-term effect of a multi-domain diglossia-centred literacy intervention in kindergarten on the reading skills of Arabic-speaking children in the 3rd grade

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Purpose: In Arabic diglossia, the linguistic distance between the spoken dialect (SpA) and Modern Standard Arabic (MSA) was found to interfere with metalinguistic awareness and word reading in MSA (Saiegh-Haddad, 2022a). At the same time, metalinguistic skills in SpA were found to predict metalinguistic and word reading skills in MSA (Saiegh-Haddad, 2022b; Schiff & Saiegh-Haddad, 2018). Children participating in this study received a multi-domain diglossia centered literacy intervention in kindergarten. The intervention was diglossia-centered and took linguistic distance in the content and the procedures implemented in the intervention. The intervention was multi-domain and targeted language, literacy, metalinguistic and metacognitive skills. The current study investigated the long-term effect of the intervention on children's reading skills in the 3rd grade. It also investigated synchronic and diachronic predictors of reading in the 3rd grade.

Method: The sample consisted of 306 third grade children out of a total of 1054 children participating in the intervention study in kindergarten: 194 (64.1%) were in the intervention and 112 (36.6%) were in the control group. In kindergarten, children were tested on language, metalinguistic, cognitive and literacy skills. In third grade, children were tested again on language, metalinguistic, word reading and reading comprehension.

Results: Children participating in the intervention in kindergarten outperformed children in the control group on all language, metalinguistic and reading tasks in the third grade. Moreover, regression analysis showed that affiliation with the intervention in kindergarten predicted reading skills in the third grade. Finally, beyond affiliation with the intervention, word reading was predicted by kindergarten metalinguistic and memory skills and by third grade metalinguistic skills; reading comprehension was predicted by the same skills in kindergarten and by listening comprehension in the third grade.

Conclusion: Results highlight the long-term effect of a multi-domain diglossia-centred intervention in kindergarten in enhancing the literacy skills of Arabic speaking children.

Saiegh-Haddad, E. (2022a). A psycholinguistic-developmental perspective on the role of diglossia in reading: Issues, methods, and findings in Arabic as a Testcase. In E. Saiegh-Haddad, Laks, L. & McBride, C. (Eds.), *Handbook of literacy in diglossia and dialectal contexts: Psycholinguistic, neurolinguistic and educational perspectives*. Springer Nature (pp. 135-165).

Saiegh-Haddad, E. (2022b). Embracing diglossia in Early literacy education in Arabic: A pilot intervention study with kindergarten children. *Oxford Review of Education*. <https://doi.org/10.1080/03054985.2022.2090324>

Schiff, R. & Saiegh-Haddad, E. (2018). Development and relationships between phonological awareness, morphological awareness and word reading in spoken and standard Arabic. *Frontiers in Psychology*, 9 (356).

Written prepositional prefixes in Hebrew narratives: morpho-orthographic and semantic analyses

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Written Hebrew words are constructed of a multi-layered stem-and-envelope structure, at the heart of which lies the root core, surrounded by derivational and inflectional affixes respectively, with syntactic prefixal units attached to the very beginning of the word (Ravid, 2012). This is illustrated in the string ***uxsheb******mahalaxan*** spelled **וּכְשֶׁבְמַהֲלַכְךָ** ‘**and-when-in**-course-3rd Masc Pl = and when in their course’ starting with three bound syntactic prefixes (in bold) preceding the inflected noun stem (underlined). Four syntactic prefixes obligatorily bound to the written stem are of particular interest in the current context – כ, מ, ל, ב, respectively signifying the prepositions ‘in, to, from, as’. These participate in the construction of a plethora of Modern Hebrew adverbials, complex conjunctions and discourse markers such as *be’emet* באמת ‘really’, *le’umat* לעומת ‘as against’, or *kamuvan* כמובן ‘of course’ (Brandes & Ravid, 2019; Ravid & Shlesinger, 1999).

The current study examines these four prepositional prefixes in the context of developing written text production abilities in Hebrew. The study population consisted of 293 typically developing, native Hebrew speaking participants in five age groups – 4th, 7th and 11th graders, young adults during military or civil service, and older adults, each of whom wrote two narratives in the general theme of ‘a journey story’. The study corpus thus consisted of 586 narrative texts, containing 33,876 words tokens. All preposition tokens in the texts were identified and analyzed by morpho-phonological structure and semantic / discourse functions across the five age groups. The most prevalent class of prepositions, consisting of over 2/3 of the total number of preposition tokens, was composed of the four prepositions written as bound to the stem, with a sharp increase in the two oldest groups. The talk will present a functional analysis of the syntactic and discourse roles of these prepositional prefixes in developing written text production abilities.

Ravid, D. (2012). *Spelling morphology: the psycholinguistics of Hebrew spelling*. New York: Springer.

Ravid, D. & Shlesinger, Y. (1999). Modern Hebrew adverbials: Between syntactic class and lexical category. In E. Contini-Morava & Y. Tobin (Eds.), *Grammatical categories* (333-351). Amsterdam: Benjamins.

Brandes, G., & Ravid, D. (2019). The development of adverbial clause functions in Hebrew narrative and expository writing across adolescence. *Written Language and Literacy*, 22(1), 130-158.

Reading instruction, CVs-based or phonemes-based method? An experimental study among Arab pre-school children

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This study addresses aspects of reading acquisition with different grain size units among Arabic-speaking pre-school children living in Israel. The Authors' study (2021) which was framed by the phonological-unit-availability notion of the Psychological Grain Size Theory (Ziegler & Goswami, 2005) revealed three accessible phonological units among pre-literate Arab children living in Israel by analyzing children's responses in phonological awareness tasks; phonemes, demi-phonemes tri-phonemic units /ʔεC/ that begin with the prefix /ʔε-/ and end with the target (consonantal) phoneme (e.g., /ʔεs/ for the consonant /s/) and CVs, i.e., core syllables. Based on Authors' previous study (2021), the present study aims to determine whether reading among Arabic-speaking pre-school children is more easily acquired when the teaching method varied according to phonological unit size; phonemes, demi-phonemes or CVs. In addition, the study aimed to investigate the predictors of reading acquisition via the different phonological units in the three training conditions using measures assumed to be related to early reading.

One hundred four children were allocated to three training conditions matching those three phonological units using an unfamiliar script (Malayalam). Children participated in 14 training sessions and were evaluated via retention and generalization of reading and spelling measures.

The CV-based method was found to be more effective than phonemes or demi-phonemes. Further, working-memory, short-term memory and RAN predicted learning via phonemes and demi-phonemes but not via CVs.

Psycholinguistic and pedagogical implications of this experimental study are discussed, in particular, the generalizability of many of the English-based and alphabet-based theories of reading acquisition.

Ziegler, J. C., & Goswami, U. (2005). Reading acquisition, developmental dyslexia, and skilled reading across languages: A psycholinguistic grain size theory. *Psychological Bulletin*, 131, 3–29.

Emergence of featurality as a byproduct of script inheritance

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This presentation explores various writing systems used in languages with vowel harmony across Eurasia, with a primary focus on Turkic languages. The main objective of the project is to investigate how different scripts (Arabic, Cyrillic, Latin) adopted by Turkic speakers encode or fail to encode specific phonological features relevant to vowel harmony processes. Theoretically, this study centers on “featurality,” which refers to a writing system's ability to visually represent individual phonological features. During the talk, we provide a formal definition of featurality and offer explicit derivations for the vowel systems discussed in our paper.

The examination of Turkic data raises intriguing theoretical questions regarding how featurality is represented, which leads to an investigation of asymmetries between writing and reading. Latin-based scripts utilize diacritics to transparently represent frontness/backness. On the other hand, Cyrillic-based scripts for Turkic languages often involve adding extra strokes to potentially encode similar contrasts, but the usage of these additional strokes tends to be less systematic. For instance, in Tatar, the resulting system is sufficiently transparent, but in Kazakh, the use of additional strokes to represent conflicting features raises questions about how grapheme pairs like $o-\theta/o-\emptyset/$ and $\gamma-\varphi /y-u/$ are visually deconstructed. We hypothesize that on the orthographic level, during writing, the character can be broken down into the main glyph and the additional stroke. However, during reading, the character is perceived as a whole segment since the additional stroke involves conflicting feature specifications. Consequently, such a writing system cannot be considered truly featural.

Arabic-based writing systems for Turkic languages are typically limited in their ability to encode individual vowel contrasts. Nevertheless, in certain cases, such as Ottoman Turkish, an unexpected dimension of featurality emerges as the Arabic symbols ﻮ and ﻮ essentially encoding roundedness.

A comic guide to the writing and reading of manual gestures in Ancient Maya iconography using indigenous sign languages

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Epigraphers and historians have long used ancient iconography to guide or verify translations of oral languages in accompanying texts, or to decipher ancient information transmitted in the iconography itself, including both stories transmitted mnemonically and data in written through phonetic and ideographic hieroglyphs representing oral languages. Yet recent research suggests that ancient Mesoamerican iconography may also have transmitted another mode of linguistic that has not been the focus of much research into ancient or even modern literacy: signed languages “spoken” mostly through gestures and manual signs people *articulate spatially* and *see*, rather than the oral-auditory languages that most people *articulate orally* and *hear*.

Comparative analysis of modern visuo-spatial languages spoken by Indigenous Mesoamericans today and reconstructing potential proto-signs can assist in the decipherment of gestures in ancient Maya art. This presentation argues that as occurs with all writing systems, reduction and simplification of what aspects of language got recorded was crucial to Mayas’ iconographic transcription of ancient gestural/signed language. In particular, ancient Maya artisan-scribes developed conventions for representing only certain parameters of signed languages. They also preferred to record short polysemic expressions and discourses in signs. Yet they simultaneously developed conventions for depicting movement that enabled widespread gestural literacy: the writing and reading of gestural signs in iconography. This presentation reviews some of these conventions, showing how they were reminiscent of those employed in modern comic strips, and they are crucial for the modern decipherment of gestural language in pre-Hispanic Maya iconography.

This presentation concludes with a summary of approaches that could help speakers of modern sign languages to translate gestures “written” graphically by ancient peoples elsewhere around the world.

Understanding the time course of written compound word production: Implications for theories of meaning and morphology in lexical processing

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The metaphor of the mental lexicon as a dictionary of stored knowledge about words has constrained the manner in which we think about morphology. One limitation of treating a word's lexical representation as static and relatively independent from that of other words is that compound words are treated as either transparent (e.g., 'blueberry') or not transparent with respect to their constituents e.g., ('hogwash'). An alternative account of how constituent meaning relates to compound meaning supposes that it emerges from a composite of role-dependent morphological contexts, i.e., morphological transcendence (Libben, 2021).

In this study, we investigate the effects of semantic and lexical properties of modifiers in the typed production of English compounds to better understand what lexical and semantic properties of the constituents of a compound influence the motor program for typing it. Participants typed visually presented strings. To maximally control for effects of word and constituent length, all were 8-letter compounds containing two 4-letter constituents. The core stimuli consisted of 30 real compound pairs (e.g., 'raindrop' and 'teardrop'). Each pair shared the same head constituent (C2) and included modifier constituents (C1) with different positional compound family sizes (e.g., '#rain-', n=26; '#tear-', n=6). Non-word modifiers changed the first two letters of the C1s (e.g., 'geindrop' and 'thardrop'). Mean keystrokes were faster in compounds containing C1s with large families and C1s with lower modifier consistency ('#worm-' in 'wormhole' vs '#rain-' in 'raindrop'). Family size effects were limited to the typing of the first constituent and did not influence the typing time for K1 alone. Modifier consistency effects, on the other hand, were observed for keystrokes within C1, within C2 as well as initial keystrokes. We interpret these results as pointing to the interdependence of constituents. In essence, the compound context in which a C1 appears impacts patterning throughout production.

Libben, G. (2021). From lexicon to flexicon: The principles of morphological transcendence and lexical superstates in the characterization of words in the mind. *Frontiers in Artificial Intelligence*, 4.

Does non-linear arrangement of written units hinder the writing/reading interface? Some counterexamples providing a negative answer, from Aztec script conventions to specific visual patterns in European texts

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³Independent researcher

Linearity of speech is a structural constraint according to which the interface between oral discourse, or reading practice, and written text presupposes a one-dimensional order of signs. However, in some ancient script conventions (mainly pictorial, such as Nahuatl writing) but also in particular written or printed texts from Western tradition we see emblematic or non-linear compositions as alternative strategies for encoding of information and linguistic content.

In this paper we assume that non-linear, or emblematic representation in written language is, indeed, a main feature of textualization practices occurring in any scriptorial tradition. While it does not hinder or seriously damage the interface between writing and reading with a cumbersome lack of mapping, on the contrary what we have called *synsemic layouts* – as the emergence of Western multi-linear textual structures testifies, first, during Medieval times, then in scientific writing of European Renaissance and the hermetic tradition of the sixteenth century, but also in contemporary “infographic” or in what is called multimodal writing – do play a major role in the very process of linguistic understanding, at the crossroads between universal visual strategies and language-specific devices.

Fernández-Fontecha, A., O’Halloran, K. L., Tan, S., & Wignell, P. (2019). “A multimodal approach to visual thinking: the scientific sketchnote”. *Visual Communication*, 18(1), pp. 5-29.

Bonora G., Dalai G., De Rosa D., et al. (2020) “Sinsemia as a tool for designing interactive artifacts for teaching. The case study of The topography of Dante’s *Inferno* and the detailed definition of reference frame”. In: Università degli Studi di Sassari, UNISS (Italy), Ceccarelli N., Jiménez-Martínez C., et al. (eds.) *2CO Communicating Complexity. Contributions from the 2017 Tenerife Conference*. Vicerrectorado de Docencia. Universidad de La Laguna. Servicio de Publicaciones de la Universidad de La Laguna, pp. 94-104. DOI: 10.25145/b.2COcommunicating.2020.

Lussu, G. (2020). “Writing Is Image”. In: Cicalò, E. (ed.) *Proceedings of the 2nd International and Interdisciplinary Conference on Image and Imagination. IMG 2019*. Advances in Intelligent Systems and Computing, vol 1140. Springer, Cham, pp. 15-20. https://doi.org/10.1007/978-3-030-41018-6_3

Keynote 2**Understanding reading, understanding writing**

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Reading is one of the most well-studied phenomena in the psychological sciences. The literature on reading stretches back over 100 years and hundreds of new articles are published each year. However, this research has focused on a very narrow range of writing systems and a narrow range of words within those writing systems. I present several examples of instances in which reading systems reflect salient information present within writing systems. I argue that a full understanding of reading and reading acquisition requires us to think deeply about what writing is and the type of information that it conveys. I conclude by considering whether there is any evidence that writing systems are ‘optimal’ (or may have become more optimal) for skilled, silent reading.

Readers target words where they expect to find maximal information based on the structure of the lexicon

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Skilled readers can decipher written language with remarkable ease and efficiency, relying on multiple heuristics to guide how they explore a text. One such heuristic is the way in which orthographic information about word identity is typically spread across words. In many – but not all – languages, the left-hand side of words tends to be more information rich. For example, the first three letters of the word *guarded* is more informative than the last three, since there are few words that begin with *gua-* and many that end with *-ded*. This would predict that readers should favour landing on the left side of words. Any such effect will, however, be modulated by innate constraints on perception (e.g., Brysbaert & D’Ydewalle, 1988) and may potentially be masked by various linguistic confounds. These issues have previously made it difficult to establish a causal connection between language structure and reading behaviour.

We address this by constructing an artificial lexicon in which we can manipulate information spread. In a first experiment ($n = 60$), we show that participants who learned a “left-heavy” lexicon found it easier to identify words when fixating them left-of-centre, while participants who learned a “right-heavy” lexicon found it easier to identify words when fixating them centrally, replicating the classic *optimal viewing position effect* (O’Regan et al., 1984) in an artificial language learning context. In a second eye-tracking experiment ($n = 80$), we show that participants actively target different parts of words depending on whether they had been exposed to the left- or right-heavy lexicon.

Our findings provide a causal demonstration that the way in which the lexicon distributes information affects how readers visually explore words. Furthermore, we support our analyses with a formal model of visual word recognition and a cross-linguistic study of information distribution in nine natural languages.

Brysbaert, M., & D’Ydewalle, G. (1988). Callosal transmission in reading. In G. Lüer, U. Lass, & J. Shallo-Hoffman (Eds.), *Eye movement research: Physiological and psychological aspects* (pp. 246–266). Hogrefe.

O’Regan, J. K., Lévy-Schoen, A., Pynte, J., & Brugailière, B. (1984). Convenient fixation location within isolated words of different length and structure. *Journal of Experimental Psychology: Human Perception and Performance*, *10*(2), 250–257.

Morphology and variance in word reading and spelling among poor readers of Swedish in grade two and four

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For successful planning of early reading instruction, it is important to identify if and when morphology contributes to reading and spelling among children with decoding difficulties. The present study is part of a research project that investigates whether intensive training in phonology and/or morphology can be beneficial for poor readers in grade two and four in a Swedish context (cf. Hasenäcker et al. 2023; Kirby et al. 2018; Levesque et al. 2021). Swedish has a semi-transparent orthography with a quite complex morphology, and it is still unclear to what extent morphology plays a role in the early literacy development of Swedish — if so, at what stage, when cracking the code or at a later stage? The study explores to what extent morphology, in addition to already known predictors such as phonemic awareness and rapid automatic naming (RAN), may explain individual variations in word reading and spelling in children identified with word reading difficulties. Two hundred children from several schools in a Swedish region, 75 in grade two and 125 in grade 4, are included. They were selected based on low performance on a decoding test (words and non-words) in May 2023. In autumn 2023, they will be further tested (as part of the pretest procedure of the larger intervention project). Hence, the focus of this study is on the results from this testing. By conducting correlation and regression analyses, we study to what extent morphology may explain the individual variations in word reading and spelling in these children when controlling for phonemic awareness and RAN in grade 2 and 4 respectively. In conclusion, we hope to contribute with knowledge regarding the role of morphology in early literacy development for struggling readers that may inform when and how elements of phonics and morphology should be implemented in reading instruction.

Hasenäcker, J., Mousikou, P. & Schroeder, S. (2023). The role of morphology in reading development. In Crepaldi, D. (Ed.), *Linguistic morphology in the mind and brain* (199–213). Routledge.

Kirby, J. R. & Bowers, P. N. (2018). The effects of morphological instruction on vocabulary learning, reading, and spelling. In Berthiaume, R., Daigle, D. & Desrochers, A. (Eds.), *Morphological processing and literacy development: Current issues and research* (217–243). Routledge.

Levesque, K.C., Breadmore, H.L. & Deacon, S.H. (2021). How morphology impacts reading and spelling: Advancing the role of morphology in models of literacy development. *Journal of Research in Reading*, 44(1), 10–26.

The contribution of handwriting over typing to text quality and understanding of the writing task: the role of transactional (but not transmissional) writing beliefs

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Research demonstrates an advantage of handwriting over typing for processes at the interface of writing and reading. Writing mode is also an important variable in comprehension, with some studies showing an advantage in participants' understanding for handwritten over typed writing samples (e.g., Crumb et al., 2022). Research supports a dual process account of writing engagement, with implicit transactional and transmissional writing beliefs playing a role in writing strategy, text quality and understanding (e.g., Baaijen et al., 2014). Transactional beliefs are process-focused, while transmissional beliefs focus on content. The present study investigated the relationship between participants' writing beliefs and quality of handwritten and typed samples, comparing students of STEM and non-STEM disciplines. Participants (N=34) wrote essays and rated their understanding of the topic before and after writing. A number of standard scales were used to measure attitude to, and prior use of technology, including social media, self-efficacy beliefs and writing apprehension. Conditions were counterbalanced and handwritten samples were typed up for analysis to avoid any biasing effect. Two independent raters assessed the writing samples for originality, coherence, and relevance (following Baaijen et al., 2014) and agreed a holistic score of text quality. Results showed that transactional but not transmissional beliefs were related to text quality, for both STEM and non-STEM groups. However, this applied only for the handwritten writing samples, a difference that was not accounted for by word count. Transactional beliefs were also associated with a difference in writers' self-rated understanding for handwritten but not typed samples. There was no association between self-efficacy beliefs or apprehension and quality, but for the typed samples, social media use was positively associated with text quality. Implications for writing instruction are discussed.

Baaijen, V. M., Galbraith, D., & de Gloppe, K. (2014). Effects of writing beliefs and planning on writing performance. *Learning and Instruction, 33*, 81-91.

Canz, T., Hoffmann, L., & Kania, R. (2020). Presentation-mode effects in large-scale writing assessments. *Assessing Writing, 45*, 100470.

Crumb, R. M., Hildebrandt, R., & Sutton, T. M. (2022). The value of handwritten notes: A failure to find state-dependent effects when using a laptop to take notes and complete a quiz. *Teaching of Psychology, 49*(1), 7-13.

The origins of the Chinese writing system: Explorations in linguistic archeology and sociolinguistics

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Based on the discovery of oracle bone inscriptions, there is strong evidence for a mature Chinese writing system and an associated literacy tradition by 12C BC. [Keightley 1989]. These inscriptions were used for mostly divinational and ceremonial purposes and they followed the earlier discovery of pottery marks and even earlier rock carvings. However, 12C BC is often recognized as a watershed mark in the development of the Chinese written language and the long-lasting Chinese Writing System because the earlier archaeological finds could not confirm the Chinese character's active use as a literacy medium. Furthermore, the possible dating of the origin of the Chinese writing system has attracted only scant attention until recently (Demattè 2010), as is the case with the sociolinguistic analysis of the unique Radical system underlying the Chinese characters [Tsou 1981].

We propose to re-examine the internal structure of the Chinese writing system and what light could be shed on its origins. We base our analysis on the 540 radical system, first codified by Xu Sheng about 2 millennia ago, and the subsequently revised 214 radical system 1800 years later during Qing Dynasty. We consider the significance of the strong evidence of social structure such as matriarchy as well as the additional changing saliency in the underlying taxonomy of fauna and flora, including animals such as elephant/mammoth. Furthermore, drawing on more recent archeological finds we propose that the Chinese writing system was well developed long before the appearance of the oral bone inscriptions in 12C BC and very likely prior to the end of matriarchy in China, and examine how the Rebus Principle in written communication has contributed to the maintenance of the morpho-syllabic Chinese Writing for an unprecedented duration.

Paola Demattè., 2010. The Origins of Chinese Writing: the Neolithic Evidence. *Cambridge Archaeological Journal*, Cambridge University Press: 10 June 2010, pp. 211-228.

Keightley, D.N., 1989. "The Origins of Writing in China: Scripts and cultural contexts", in Wayne, M.S. (ed.), *The Origins of Writing*, University of Nebraska Press, pp.171-202.

Benjamin K. Tsou., 1981. "A Sociolinguistic Analysis of the Logographic Writing System of Chinese", in *Journal of Chinese Linguistics*, Vol. 9, 1981, No. 1, pp.1-19.

Vocabulary knowledge and word recognition at the reading/spelling interface

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Theoretical models of literacy skills such as the cognitive model of writing (Hayes, 2012), the interactive dynamic literacy model (Kim, 2020) recognize the interaction between reading and writing development. In the current contribution, we present reading fluency and spelling data of low-literate adult L2 learners of German (N=20 with L1 Turkish, N=12 with L1 Arabic, N=34 with L1 Farsi-Dari) attending contrastive literacy classes in Germany. Contrastive approach conceptually agrees with recent research findings that stress the importance of L1 literacy skills as a high-impact explanatory variable determining the reading patterns in experienced L2 readers (Kuperman, 2022). The learners were requested to read three texts of increasing complexity in L2 German (Feldmeier, 2012). Reading fluency was calculated as the number of words that were read correctly in one minute (cwpm, Kornev & Ishimova, 2010). To assess their spelling skills, a spelling inventory of 30 items (Do Manh et al., 2021) was administered as a traditional word dictation. Additionally, the participants were screened for L2 vocabulary knowledge and word recognition accuracy. The participant sample was median-split based on their vocabulary scores and their word recognition accuracy. Two linear discriminant function models were fitted to classify the participants into those with low and with high vocabulary based on their reading and spelling scores. The participants' spelling scores were generally more informative for the model (model accuracy between 0.71 and 0.75) than their respective reading scores (model accuracy of 0.62). The results suggest that stronger lexical activation is involved in the ability to spell a word compared to the ability to read it. We discuss our results in light of current theoretical models of the relation between reading and writing skills in terms of shared sources of knowledge that they draw on.

Do Manh, Gina; Edeleva, Julia & Neef, Martin (2021) „Assessment literaler Kompetenzen in Alphabetisierungskursen“. *Informationen Deutsch als Fremdsprache*, vol. 48, 06/ 2021, Berlin: de Gruyter GmbH Verlag, online available: <https://www.degruyter.com/document/doi/10.1515/infodaf-2021-0076/html>

Tarone, Elaine & Martha Bigelow (2012): A research agenda for second language acquisition of pre-literate and low-literate adult and adolescent learners. In: *Proceedings of the 2011 LESLLA Symposium*. Ed. by Martha Bigelow & Patsy Vinogradov. Minneapolis: University of Minnesota, 5-26.

Young-Scholten, Martha & Rola Naeb (2020): Acquisition and Assessment of Morphosyntax Language and Literacy in Social Context. In: *Teaching Adult Immigrants with Limited Formal Education*. Ed. by K. J. Peyton & M. Young-Scholten. Bristol, Blue Ridge Summit: Multilingual Matters: 79-103.

The morphological distance in Arabic diglossia: Insights from a longitudinal study (K – G3)

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When the written language that children learn to read and write is distinct from the oral language they acquired as their mother tongue, they may encounter substantial challenges. The linguistic distance between two varieties of the same language could have an impact on the literacy acquisition journey. The present study focuses on Arabic, a prototypical case of diglossia, where the distance between spoken and standard varieties exists in semantics, phonology, morphology, and syntax. However, a paucity of studies has addressed their morphological distance. This study takes two steps in this direction: First, it maps the distance from spoken Palestinian dialect (SPD) to Modern Standard Arabic (MSA) by form and function in the three predominant systems: derivation, inflection, and clitics in nouns and verbs. Second, it examined the longitudinal effect of the morphological distance on morphological awareness development in the inflectional system. The mapping showed that most morphemes between SPD and MSA are non-identical, comprising 81.4% of the total. Most of these non-identical morphemes were assembled to the high-diglossic level, appearing mainly in the verb inflection category. Following the latter finding, 62 children were followed longitudinally at three-time points: K, G1, and G3. Each child completed SPD and MSA pseudo-verb inflectional tasks, categorized into two main morphological distance levels: low-diglossic and high-diglossic. The main findings indicated a higher level of performance in the low-diglossic morphological structures compared to the high-diglossic structures, throughout the three grade levels. Furthermore, different morphological awareness developmental trajectories have been obtained between the morphological distance levels in SPD relative to MSA: In SPD, the distance had disappeared towards G3, whereas in MSA the distance significantly increased from kindergarten to G1 and G3 with no significant change between G1 and G3. Implications for the possible impact of morphological distance on reading acquisition are discussed.

Learning to spell in Arabic: The impact of script-specific visual-orthographic features

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Learning to spell is a challenging process, especially for young learners, in part because it relies on multiple aspects of linguistic knowledge, primarily phonological and morphological. However, alongside these universals, there are significant writing system specifics, namely, language-specific and script-specific factors that may also challenge young readers and writers (Daniels and Share, 2018). The current study focuses on the impact of four distinctive visual-orthographic features of the Arabic abjad on spelling, namely, (i) the similarity of many basic letter-forms, (ii) allography (the positional variants of the letter forms), (iii) ligaturing (the joining of letters), and (iv) non-linearity (extra-linear diacritic-like signs used to mark consonantal, short vowel and morpho-syntactic distinctions). We examined the distribution of visual-orthographic spelling errors across three grade levels as well as the developmental changes in these errors. We predicted that these errors would account for a significant proportion of children's spelling errors. Ninety-six Arabic-speaking pupils from three elementary grades (1st, 2nd, 4th grades) were presented with a sequence of six pictures and asked to write a story or several sentences about the events depicted. All spelling errors were analyzed and categorized according to two types of categories: six visual-orthographic categories and six additional categories that relate to the more traditional error types (e.g., phonological). The results showed that the visual-orthographic category was the second most common error category across the three grade levels, accounting for over one quarter of all spelling errors. Ligaturing and letter shape formation errors emerged as the two most prevalent types of errors in this category. These findings clearly demonstrate that visual-orthographic features of the Arabic abjad pose significant challenges in learning to spell.

Daniels, P. T., & Share, D. L. (2018). Writing system variation and its consequences for reading and dyslexia. *Scientific Studies of Reading*, 22(1), 101-116.

How alphabetic is Japanese rōmaji? Implications for the description and classification of writing systems

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The current Japanese writing system is characterised by its mixed and complementary use of four main scripts called *kanji*, *hiragana*, *katakana* and *rōmaji*. Regarding *rōmaji*, or ‘Roman script’, it is commonly described as ‘alphabetic’, ‘phonemic’ or ‘segmental’. All these descriptors imply that the script operates primarily on a systematic mapping between graphs and individual phonemic segments. However, while *rōmaji* actually implements monosegmental mappings in romanisation (e.g. <sushi>: <s> → /s/, <u> → /u/, <sh> → /ʃ/, <i> → /i/), it has many other uses that are often overlooked. This study distinguishes six categories (Coulmas 1996; López Rúa 2004; Irwin 2011):

1. Acronym: <Suica> *suika* ‘Super Urban Intelligent Card’ (prepaid travel card)
2. Alphabetism: <NHK> *enueichikē* ‘Nippon Hōsō Kyōkai’ (Japan Broadcasting Corporation)
3. Letter-name word: <L> in <L 字型> *erujigata* ‘L-shape’
4. Abbreviation: <GW> *gōrudenwīku* ‘Golden Week holidays’
5. Xenography: <WC> *toire* ‘toilet’ (< Eng. *water closet*)
6. Loan orthography: <TikTok> *tikkutokku* ‘TikTok’

Of these, only Type 1 is monosegmental in the strict sense (e.g. <s> → /s/). Types 2 and 3 are polysegmental because all *rōmaji* letter names comprise multiple phonemes in Japanese (e.g. <N> → /enu/). Types 4 and 5 are morphographic because the graphs map to individual morphemes (e.g. <G> → {*gōruden*}). Type 6 is in a grey zone, where some mappings are monosegmental (e.g. <T> → /t/) but others are polysegmental due to phonotactic restrictions in Japanese (e.g. <k> → /ku/).

Unlike in writing systems based principally on the Roman script (e.g. English), polysegmental and morphographic mappings are not exceptional for *rōmaji* usage within the multi-script Japanese writing system. The present paper demonstrates this point based on a survey of the Balanced Corpus of Contemporary Written Japanese. It further discusses the significance of non-segmental adaptations of segmental scripts for the description and classification of writing systems.

Coulmas, Florian. 1996. *The Blackwell Encyclopedia of Writing Systems*. Oxford & Malden: Blackwell Publishers.

Irwin, Mark. 2011. *Loanwords in Japanese*. Amsterdam & Philadelphia: John Benjamins Publishing Company.

López Rúa, Paula. 2004. Acronyms & Co.: A typology of typologies. *Estudios Ingleses de la Universidad Complutense* 12. 109-129.

The representation of distinctive features in writing systems: Omission and commission

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Many phonographic writing systems carry hints in their design of relationships between phonemes, e.g. Old English *eth* <ð>, created from <d> to represent /ð,θ/, a phoneme similar to /d/. Other writing systems use such relationships systematically, as when Carrier Syllabics represents aspiration with a straight line and glottalization with a bent line. In phonological theory, distinctive features are properties that serve both to differentiate phonemes (when their values differ) or to group them into natural classes (when their values match). Systematic relationships between signs representing related phonemes serve as written representations of features. Features are encoded in writing systems both explicitly (“by commission,” as when kana *dakuten* encodes voicing) or implicitly (“by omission,” as when the Younger Futhark writes voiced and voiceless stops with the same letter). I will survey implicit and explicit encodings of features in phonographic scripts and examine why certain features (particularly major place of articulation) are only encoded explicitly while others (voicing, aspiration, and glottalization) are encoded either explicitly or implicitly. I draw on Dresher’s contrastive feature hierarchies, whereby some features are more central to the contrasts of phonemic inventories than others. In Dresher (2016), the phonemic ambiguities of the Younger Futhark reflect a point in the contrastive hierarchy just above the terminal feature divisions. However, ambiguities in Linear B and Cherokee are less systematic. In both cases, more explicit representation of laryngeal features is made at the coronal place of articulation than at other places. This reflects both of a feature hierarchy and the comparatively preferred status of coronal place.

Written representations of distinctive features demonstrate their accessibility to script designers. Thus the discovery of distinctive features by twentieth-century linguists was foreshadowed by their use in various writing systems, and their behavior in writing systems may help fine-tune feature theory in the twenty-first century.

Dresher, B. Elan. 2016. Contrastive feature hierarchies and Germanic phonology: Jørgen Rischel’s Analysis of the Scandinavian runic reform. Presented at the 43rd annual LACUS Forum, Saint Mary’s University, Halifax, August 2016.

How far does the awareness go? Results from a written plural preference task on analogous and non-analogous novel noun plurals in German

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According to Apel's (2014) comprehensive definition, morphological awareness encompasses rules that describe how affixes attach to base words "including changes to those base words" (p. 200). The German plural system has a rich allomorphy containing six plural suffixes, three of which show supplementary Umlaut, i.e., a vowel alternation, which leads to a phonological and orthographic shift of the base as in *Frosch* [fʁɔʃ] – *Frösche* ['fʁœʃə] (frog – frogs). The presence or absence of Umlaut within overt plural markers is an interesting research case as it comprises both, rules for obligatory occurrence and complete arbitrariness. We make use of this distinct distribution to investigate, whether regularities of the Umlaut distribution have been identified implicitly and whether speakers are aware of it and can use this knowledge to treat pseudowords adequately. Alternatively, where no rules can be applied, do they make use of word-specific knowledge (analogy strategy)? A total of 106 German-speaking adults participated in this online task on plural preference. Items were presented in written form and either prone to a single-form analogy by significant orthographic overlap to an existing word (analogous pseudowords), and items that exhibit virtually no lexical neighbors (non-analogous pseudowords). The results indicate that speakers make analogies between pseudowords and real words and base their judgments on the plural behavior of the analogous words. However, we could observe an umlaut bias that weighed even more than single-form analogies. In case of pseudowords that mimic real words that undergo Umlaut in plural by rule, participants preferred plural forms with Umlaut over forms without Umlaut. This result remained (albeit slightly weaker) even with non-analogous pseudowords. We interpret these results as evidence for both, awareness of word-specific knowledge and of morphological rules including a change to the base. Results are useful as baseline before testing children with a developing morphological system.

Apel, K. (2014). A Comprehensive Definition of Morphological Awareness: Implications for Assessment. *Topics in Language Disorders*, 34(3), 197-209. <https://doi-org/10.1097/TLD.000000000000019>

Exploring a joint approach for analyzing reading and writing errors in Dutch

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In contrast to spoken language processing, written language processing requires skills that are not learned automatically such as reading (written language comprehension) and writing (written language production). Direct instruction and active practice are necessary to master the orthographic, phonetic and morphologic principles underlying these skills and automate the processing of written language.

Recent international research shows alarming decreases in reading skills in various countries and in particular in the Netherlands (Swart et al., 2023) where a decrease in children's spelling was also observed. These findings call for additional research into the development of children's reading and writing skills and for creative solutions that can halt these negative trends.

So far, research has focused on either reading or writing difficulties, while a large-scale combined approach has eluded researchers. This was probably due to the limited availability of large child reading and writing corpora and the fact that manual transcriptions and annotations are very time-consuming and costly. However, thanks to recent developments in language and speech technology, like grapheme-phoneme alignment, child word frequency lists, and high-quality automatic speech recognition (ASR) for Dutch, this kind of more comprehensive literacy research is now within reach. Together with the availability of the BasiScript corpus (Dutch texts and dictations written by children) (Tellings et al., 2018) and JASMIN corpus (Dutch texts read by children) (Cucchiarini et al., 2008), exploratory research into the relationship between spelling and reading errors in Dutch is now made possible.

In the current study we investigated which criteria a joint annotation scheme for Dutch reading and writing errors should comply with. In addition, we explored to what extent it is possible to automatically annotate reading and writing data with this annotation scheme. We discuss our findings and present avenues for future research.

Cucchiarini, C., van Hamme, H., van Herwijnen, O., & Smits, F.. 2006. JASMIN-CGN: Extension of the Spoken Dutch Corpus with Speech of Elderly People, Children and Non-natives in the Human-Machine Interaction Modality. In Proceedings of the Fifth International Conference on Language Resources and Evaluation (LREC'06), Genoa, Italy.

Swart, N. M., Gubbels, J., in 't Zandt, M., Wolbers, M. H. J., & Segers, E. (2023). PIRLS-2021: Trends in leesprestaties, leesattitude en leesgedrag van tienjarigen uit Nederland. Expertisecentrum Nederlands

Tellings, A., Oostdijk, N., Monster, I., Grootjen, F., & van den Bosch, A. (2018). BasiScript: : A corpus of contemporary Dutch texts written by primary school children. *International Journal of Corpus Linguistics*, 23 (4), 494–508. doi: <https://doi.org/10.1075/ijcl.17086.tel>

Connections between phonological awareness, poor reading and poor oral language in early school-age children: results from an (almost) transparent orthography

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Poor reading and poor oral language skills are often co-occurring but probably distinct phenomena (Catts et al., 2005). To disentangle the relationship between phonological awareness (PA), oral language and reading acquisition, we investigated the differences in PA skills between 4 groups of monolingual Polish-speaking 2nd graders (mean age: 7 years 11 months): 1) typically developing (TD), 2) poor readers (PR), 3) children with poor language skills (PL), and 4) comorbid PL+PR skills. All groups (n = 38 each) were matched for controlled variables (age, gender, nonverbal IQ, parent's education level), and tested with a battery of phonological tasks including discrimination, rhyming, blending, segmenting, and elision, both at the syllable and phoneme level, with words and pseudowords (Bogdanowicz et al., 2015). The results indicate that PRs had significantly lower results than the TD group only in the most difficult elision tasks, whereas children with comorbid PL+PR skills had lower results also in phoneme discrimination, rhyming fluency, and phoneme blending. Moreover, even as much as 53% of PRs had no deficit in PA, compared to only 21% in the PL+PR group. These results suggest that in relatively transparent Polish orthography, reading proficiency depends less on PA skills compared to English (Pennington et al., 2012), and PA deficits are characteristic rather for children with comorbid PL+PR skills than for PRs with intact oral language.

Bogdanowicz, K. M., Krasowicz-Kupis, G., & Wiejak, K. (2015). *Bateria Testów Fonologicznych IBE Podręcznik*. [Battery of Phonological Tests IBE. Handbook]. Instytut Badań Edukacyjnych.

Catts, H. W., Adlof, S. M., Hogan, T. P., & Weismer, S. E. (2005). Are Specific Language Impairment and Dyslexia Distinct Disorders? *Journal of Speech, Language, and Hearing Research*, 48, 1378–1396.

Pennington, B. F., Santerre-Lemmon, L., Rosenberg, J., MacDonald, B., Boada, R., Friend, A., Leopold, D. R., Samuelsson, S., Byrne, B., Willcutt, F. G., & Olson, R. K. (2012). Individual Prediction of Dyslexia by Single Versus Multiple Deficit Models. *Journal of Abnormal Psychology*, 121(1), 212–224.

Keynote 3**Extricating reading science from entrenched Anglocentrism, Eurocentrism, and Alphetism and embracing global diversity**

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The science of reading has made genuine progress in understanding reading, spelling the teaching of reading, but is the science of reading just the science of reading English – an outlier orthography? Worldwide, a majority of students learn to read and write in non-European, nonalphabetic orthographies such as abjads (e.g., Arabic), abugidas/alphasyllabaries (e.g., Hindi), or morphosyllabaries (Chinese). Over a decade ago, I argued that the extreme inconsistency of English spelling–sound correspondence had confined the science of reading to an insular, Anglocentric research agenda addressing theoretical and applied issues with limited relevance for a universal science of reading. Here, I ask if the science of reading has moved forward. Acknowledging some limited progress over the past decade, it is evident that even today, mainstream reading research remains entrenched in Anglocentrism, Eurocentrism, and another form of ethnocentrism that I call alphetism. Even the two dominant theoretical frameworks for describing cross-script diversity, orthographic depth and psycholinguistic grain size theory, give little or no consideration to non-European alphabets or nonalphabetic scripts, promoting a one-dimensional view of script variation (i.e., spelling–sound consistency). Consideration of the full spectrum of the world’s languages and writing systems reveals multiple dimensions of writing system complexity, each liable to create obstacles for the developing reader. I briefly review ten dimensions of writing system complexity that Peter Daniels and I recently enumerated (historical orthographic inertia, omission of phonological elements, spelling constancy despite morphophonemic alternation, dual-purpose letters, linguistic distance, graphic considerations, ligaturing, visual complexity, multi-linearity and non-sequentiality, and symbol inventory size). If the science of reading is to contribute meaningfully to assessment, diagnosis, instruction, and intervention for all readers around the world, then we must extricate our field from entrenched ethnocentrism and embrace global diversity.

Easy decoding yet difficult encoding: What does the asymmetry between reading and writing in Korean Hangul mean for grapholinguistics?

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The Korean writing system, Hangul, is known to be a script that is (exceptionally) easy to learn to read (Pae, 2020), which is borne out by anecdotal and pragmatic evidence. At the segmental level, each segment has only one sound, which makes Hangul qualify for a shallow orthography. At the syllabic level, a consistent blending scheme of a consonant and a vowel produces systemized syllable types (i.e., CV, CVC, and CVCC). These scriptal characteristics of Hangul promote emergent readers' *learnability* and skilled readers' *efficiency*. However, spelling in Hangul is extremely complicated. In this light, this paper discusses the asymmetry between decoding (word recognition) and encoding (spelling) in the Korean writing system.

When it was invented in the 15th century by King Sejong, the Korean writing system was a purely phonetic script such that written words could be directly sounded out and that speech could be directly written down. Resulting from language drift, particularly phonological changes, during the 16th century through the 19th century without a top-down regulation, however, the disparity between phonology and orthography in both spoken language and written language was insurmountable. To address the gap between phonology and orthography, Korean linguists reformed the orthography by changing from a phonetic script to a compromised morphology-infused script. A few more orthographic reforms have taken place in modern days.

The asymmetry in Hangul has pragmatic implications in general and grapholinguistic implications in particular. The pragmatic implications involve the fact that, although decoding in Hangul is easy, the majority of the Korean public is unable to spell Korean words correctly (i.e., high incidents of typographical errors). The grapholinguistic implications point toward a pressing desideratum for a functional theory of writing that is suitable for Hangul to address the gap. This is consistent with Meletis' (2020) call for a reevaluation of theoretical grapholinguistics.

Meletis, D. (2020). *The nature of writing: A theory of grapholinguistics*. Brest: Fluxus Editions.

Pae, H. K. (2020). *Script effects as the hidden drive of the mind, cognition, and culture*. New York, NY: Springer International Publishing.

Literacy development for language revitalization: Exploring literacy processing in the endangered language context

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The languages of the world are rapidly dying, but they are not going silently. Hundreds of language communities are fighting to preserve and revitalize their languages, many with inspiring success. One of the key factors of revitalization success is having a means to read and write the language (i.e., a writing system). Development of a writing system and subsequent orthographic rules is no small feat, and many communities struggle with difficult choices about representation (Cahill & Rice, 2014).

Research on literacy processing could help give guidance in this area.

Unfortunately, the majority of literacy research has been focused on native English speakers or ESL learners (Share, 2008). This lack of cross-linguistic research inhibits our understanding of literacy processing for endangered language speakers. Furthermore, literacy in the endangered language context can be more complex than L1 literacy due to the influences of majority languages and potential prior exposure to literacy in other languages, resulting in transference from the majority language. Due to these factors, it is also unclear how existing models of literacy and contemporary grapholinguistic models of writing systems (e.g., Meletis, 2020) might apply in this context.

To better shed a light on this issue and discuss how this topic is unique from other types of literacy development, the proposed paper will review how literacy processing is different in the endangered language context and explore ways this issue can be researched more thoroughly. More specifically, this paper will synthesize research on literacy and linguistics and relate concepts to the endangered language context, drawing on examples from specific languages.

Cahill, M. & Rice, K. (2014). *Developing Orthographies for Unwritten Languages*. SIL International.

Meletis, Dimitrios. (2020). *The Nature of Writing: A Theory of Grapholinguistics*. *Grapholinguistics and Its Applications*. Flexus Editions: Brest, France.

Share, D. L. (2008). On the Anglocentricities of current reading research and practice: The perils of overreliance on an “outlier” orthography. *Psychological Bulletin*, 134(4), 584–615. DOI: 10.1037/0033-2909.134.4.584.

Heterophonic homography in African and Semitic: Comparing the functions of tones and vowels

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Bird (1999a, 1999b) was one of the first to draw attention to the similarities between the newly emerging Roman script orthographies of African languages in which tone is often under-represented, and Semitic orthographies in which most vowels are usually under-represented. This paper demonstrates that not only the orthographies, but the very linguistic *functions* of tone in African languages and vowels in Modern Hebrew and Modern Standard Arabic are similar, and not just generally so, but in the detail. It catalogues heterophonic homographs that are lexical (whether same- or cross-category), and grammatical (person, number, gender, determiners, adpositions, voice, transitivity, TAM categories, and six kinds of derivation), as well as cases of interaction between these. African languages then go further, often encoding many more lexical distinctions by means of tone patterns than Hebrew and Arabic do with vowel structures, and also using tone to articulate case, demonstratives, negation, focus, relative clauses, copula and genitive verb phrases, predicate nominals, singulative derivations and augmentative derivations. Given the striking similarities between the linguistic functions of African tone and Semitic vowels, Africanists would do well to heed the extensive literature on Hebrew and Arabic literacy acquisition and to identify what lessons can be extracted when developing tone orthographies.

Bird, Steven. 1999a. Strategies for representing tone in African writing systems. *Written Language and Literacy*, 2(1), 1-44.

Bird, Steven. 1999b. When marking tone reduces fluency: An orthography experiment in Cameroon. *Language and Speech*, 42, 83-115.

The patterns of the qal conjugation in Mishnaic Hebrew: Between the first vocalized editions and the oral reading traditions

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At an early stage in the history of Hebrew, there was a systematic distinction between the Pa^{al} pattern, which indicated active verbs, and the Pa^{el} and Pa^{ol} patterns, which indicated a state or quality. In Mishnaic Hebrew, the use of Pa^{al} supplanted the use of the other patterns. In addition, the role of the active conjugations to express a state or process was diminishing, and many of the stative verbs moved to the passive conjugations. Nevertheless, many stative verbs remained in the active conjugations, some of them are used in both passive and active conjugations with no difference in meaning, creating morphological duplications in similar contexts.

Towards the middle of the 17th century, the first vocalized Mishnah editions were published in Constantinople and Amsterdam. The above issue has not yet been thoroughly researched with attention to these editions. It turns out that the disappearance of Pa^{el} and the transition of stative verbs to the passive conjugations were greatly deepened compared to the medieval vocalized manuscripts, and yet, the written version held by the learners of MH reduced the effect of these changes on the Hebrew realized by the readers. The picture that emerges from the 17th century European editions is surprisingly similar to the reading traditions from North Africa and the Levant recorded by scholars in the second half of the 20th century.

My presentation deals with the main differences between the medieval manuscripts and the first editions of the Mishna in comparison with the reading traditions, and the fascinating interface between reading and writing, since in many cases the written forms did not match the reading methods of the vocalizers. In some cases, they aligned themselves according to the written form and vocalized contrary to their habit. However, in other cases their awareness of the reading tradition stood firmly against the written form.

Readability determines the presence of writing: materials, light effects, and sign sequences on Cretan Hieroglyphic seals

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Cretan Hieroglyphic, an undeciphered script of the Middle Bronze Age (roughly 1900-1700 BCE), represents the earliest known form of writing in Europe. Approximately half of its occurrences, including the earliest appearances, are found on seals. Serving as both luxury items (hard-stone ones denoting high status) and administrative tools (inscribed ones denoting hierarchical prominence), seals have sparked suspicion about how their physical features (material, color etc.) influenced the emergence of writing on them. However, research combining physical attributes and writing on seals has been lacking.

To address this, I conducted a Social Network Analysis of prismatic seals. Nodes of the network corresponds to seals. The connection between two nodes indicates the number of features the corresponding seals share. I included physical alongside 'epigraphical' (number and type of sequences) features.

The study reveals a correlation between readability (i.e., the ease of visually discerning an inscription) and number of inscribed faces (Figs. 1-2), the latter being proportional to the owner's hierarchical position. Through autopsy, I found that readability depends upon the stone's diaphaneity (the opaquer the seals, the more readable they are), the intaglio depth, and the paleography. Therefore, deeply engraved opaque stones typically have a high number of inscribed faces, while transparent and translucent often have only one. Seals that underwent artificial enhancement of opacity through heating display writing on all their faces.

Readability also impacts the content of the inscriptions. Sign sequences popular on soft-stone seals are normally limited, on hard stones, to lowly readable seals. Moreover, techniques employed for highly readable inscriptions require an outstandingly skilled engraver. The conclusion is that readability likely determined the value of seals, and thus, the status of their owners, as well as the significance of Hieroglyphic on seals.

Civitillo, M. (2021). 'R.E.A.D.I.N.G. Cretan Hieroglyphic Inscriptions on Seals'. *Pasiphae* 15: 83-108.

Flouda, G. (2013). 'Materiality of Minoan Writing: Modes of display and perception'. In: Piquette, K. E. / Whitehouse, R. D. (eds.), *Writing as Material Practice: Substance, surface and medium*. London, 1-31.

Holland-Lulewicz, J. / Roberts Thompson, A.D. (2021). 'Incomplete Histories and Hidden Lives: The Case for Social Network Analysis in Historical Archaeology'. *International Journal of Historical Archaeology* 26: 1025-1053.

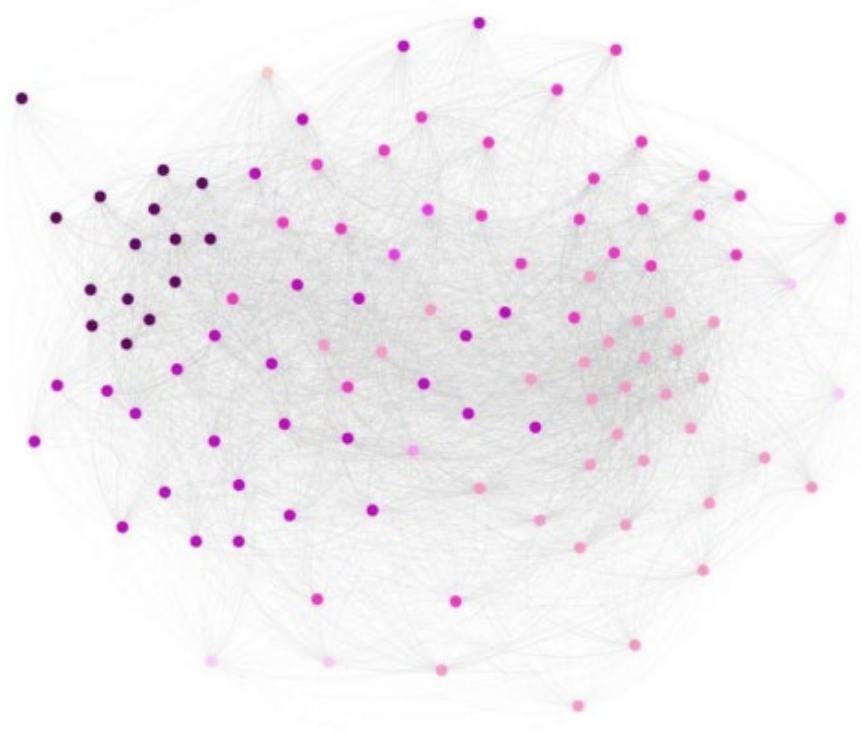


Figure 1 - SNA model with nodes colored according to their readability, i.e., the darker they are, the higher is the readability of the related seal

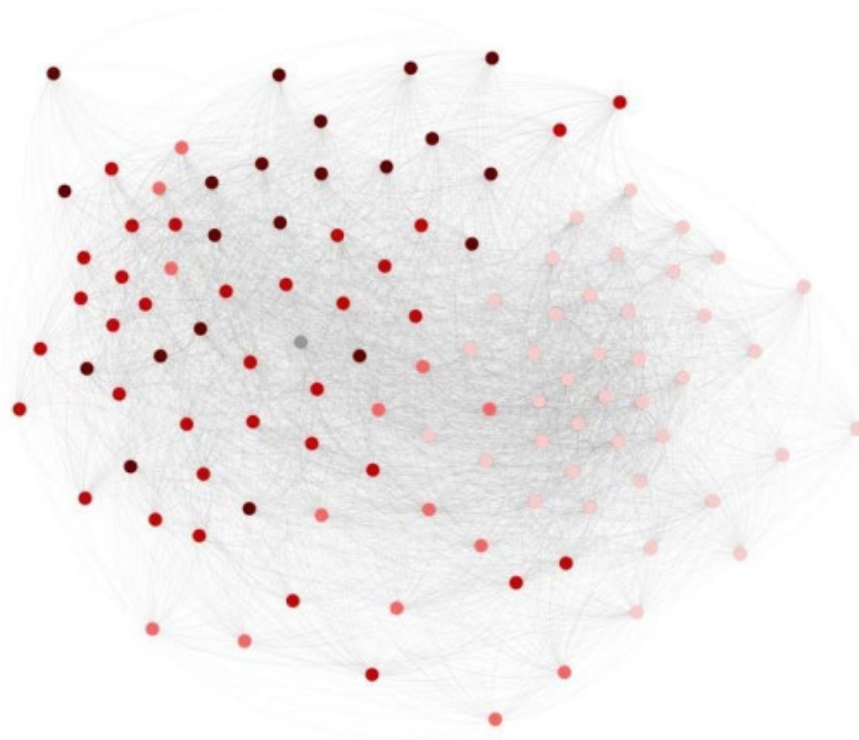


Figure 2 - SNA model with nodes colored according to the number of inscribed faces, i.e., the darker they are, the higher is the number of inscribed faces of the related seal

The North-South divide in Middle English spelling conventions

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The Middle English period is generally acknowledged as the period during which much of the structure of the English language became (to a large degree) standardised. The period covers approximately 1150 to 1450, starting around a century after the Norman invasion and ending at a point when most official writing was being done in English, as opposed to Latin or Norman French. The period is characterised by enormous variation as the linguistic system settles on accepted norms in grammar, lexis and pronunciation/spelling.

The influence of Norman French spelling conventions, has long been assumed and is illustrated with examples such as the adoption of <qu> replacing the Old English <cw> in words like *queen* and the loss of characters such as thorn. The question of the geographic factors in this influence have been raised, specifically suggesting that the South of England was more susceptible to influence from Norman French than the North or West (Stenroos 2004, 2006) or that there was a North-East/South-West split (Benskin 1982). Gordon (2021) shows that Bristol appears to buck this trend for the loss of <þ>, suggesting that neither of these characterisations is fully supported.

This paper examines claims about the geographical distribution of the influence of Norman French by comparing the spread of features across the country in the documents in the MELD corpus (Stenroos et al. 2017). The features studied include <qu> replacing <cw>, <ch> as representing [ʃ] and <i> replacing <y>. Provisional findings show that the shift to <qu> was already complete by the start of the MELD corpus in 1399, but the other features show interesting patterns of use across the country. None of the features show a clear geographical division along North/South or East/West lines, indicating the need for further investigation.

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