universität wien

BEYOND TH

Rethinking the normativity of linearity in writing systems

Sign and Symbol 2026
in Comparative Perspective
University of Warsaw

Dimitrios Meletis
APART-GSK Fellow of the
Austrian Academy of Sciences
University of Vienna

BEYOND THE LINE

Rethinking the normativity of linearity
in writing systems

Sign and Symbol 2026
in Comparative Perspective
University of Warsaw

Dimitrios Meletis
APART-GSK Fellow of the
Austrian Academy of Sciences
University of Vienna

"*All* writing systems are linear."

— Coulmas (2003: 151)

"[…] visual signs are *not* necessarily linear."

— Harris (1990: 39)

Coulmas, F. (2003). Writing systems: An introduction to their linguistic analysis. Cambridge University Press. https://doi.org/10.1017/CBO9781139164597

Harris, R. (1990). On redefining linguistics. In D. Hayley & T. J. Taylor (Eds.), Redefining linguistics (pp. 18–52). Routledge.

Why is it *non*-linearity?

¬ term is defined ex negativo — linearity is the assumed norm; "non-linearity" is whatever deviates from it

¬ implicit expectation: writing is one-dimensional and ordered — its units laid out on a line, in a sequence "delegated by language"

¬ framing is so naturalized that the deviations get the marked, negative label — not the norm

  ¬ see, for example, misaligned vowels in Thai

The doctrines of *linearity* & *phonocentrism*

Linguistics inherited linearity from speech:

- ¬ speech unfolds temporally
- ¬ sounds occur sequentially
- ¬ Saussurean/Bloomfieldian phonocentrism

Writing became conceptualized as:

- ¬ "spatial, fixed speech" (Krämer 2003: 518)
- ¬ ordered representation of language
- ¬ secondary to speech

SPEECH	WRITING
temporal	spatial
fleeting	semi-permanent
one-dimensional	two-/three-dimensional
sequential	simultaneously perceivable

Krämer, S. (2003b). Writing, notational iconicity, calculus: On writing as a cultural technique. Modern Language Notes, 118(3), 518–537. https://doi.org/10.1353/mln.2003.0059

Three biases inside the linearity principle

1

phonocentric

writing is judged only against the order of speech;
Cook's (2004) *linearity principle*: <$1> is 'non-linear' because in speech it is 'one dollar'

2

Eurocentric / alphabetocentric

linearity is treated as an alphabetic achievement(Groß 1990: 234), ignoring that non-alphabetic systems organize space the same way — and did so first

3

synchronic

linearity looks normative only for modern systems. Diachronically, systems such as Egyptian hieroglyphs and the Mayan script show richly non-linear arrangements

Cook, V. (2004). The English writing system. Routledge.

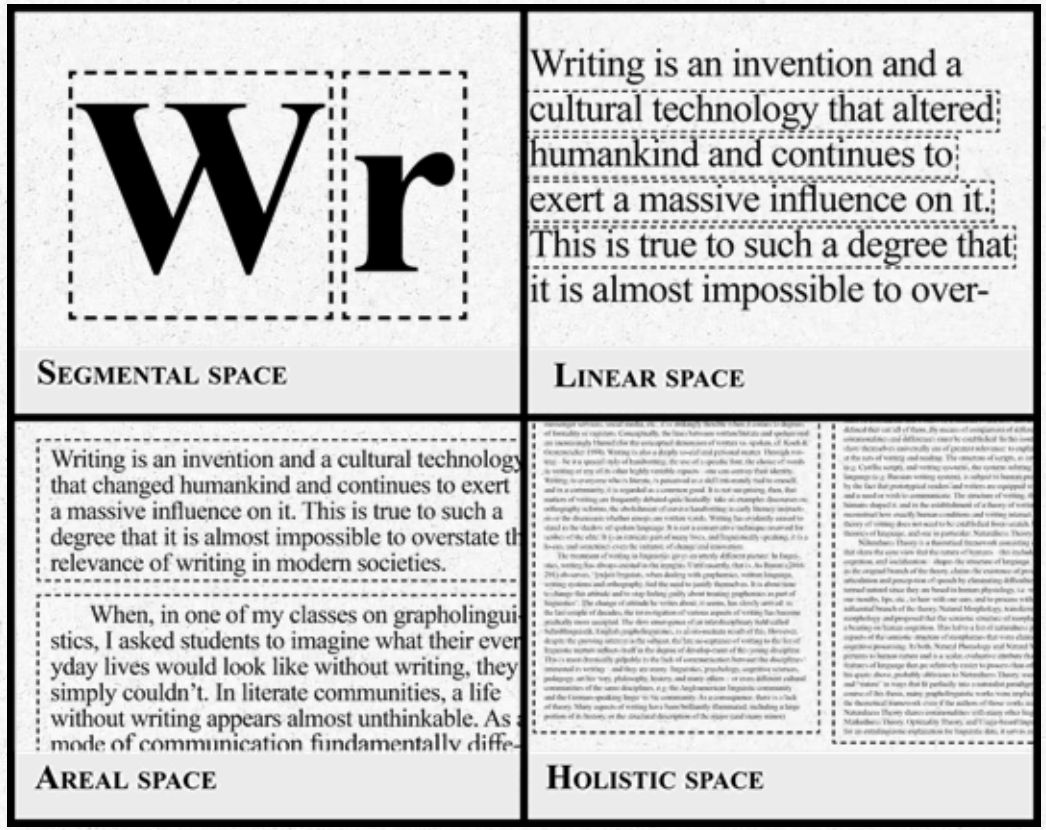
Groß, S. (1990). Schrift-Bild. Die Zeit des Augen-Blicks. In G. C. Tholen & M. O. Scholl (Eds.), Zeit-Zeichen. Aufschübe und Interferenzen zwischen Endzeit und Echtzeit (pp. 231–246). VCH.

The cartography of the writing surface

Writing is not fundamentally one-dimensional. It is:

- ¬ spatial
- ¬ multidimensional
- ¬ materially organized
- ¬ only partially reducible to speech

“Non-linearity” is not marginal deviation — it is a routine property of writing.



Types of *non-linearity* in writing (Meletis forthc.)

1. **Horizontal non-linearity**
   → unaligned linearity
2. **Vertical non-linearity**
   → multilinearity
3. **Segmental non-linearity**
   → internal spatiality
4. **Two-dimensional non-linearity**
   → multidimensionality

Note: these labels—'horizontal' and 'vertical'—are relative and here refer to writing systems with a horizontal writing direction (such as English); in writing systems with a primarily vertical writing direction, these attributes would have to be reversed (another bias!)

Meletis, Dimitrios (forthcoming). The normativity of linearity in writing and grapholinguistics. In Heather Winskel & Hye K. Pae (eds.), Handbook of Nonlinear Writing Systems: Complex Processes and Learning Challenges. Singapore: Springer Nature.

Horizontal non-linearity: *Unaligned linearity*

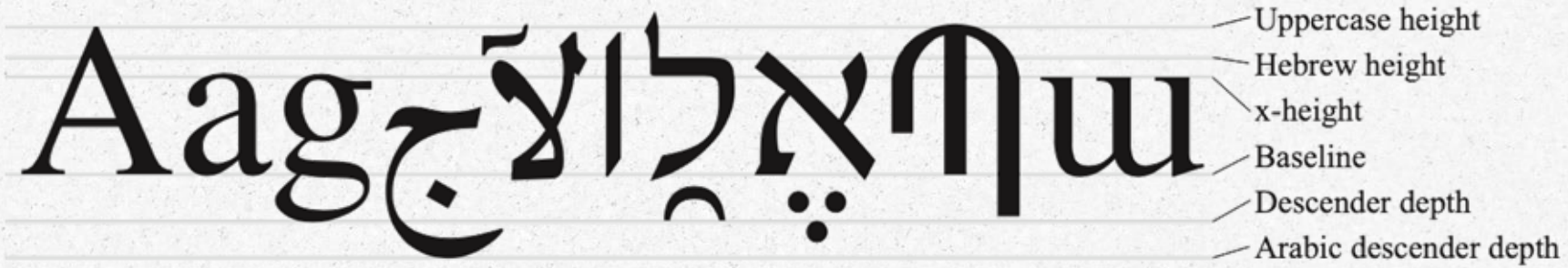
- Thai ‘misaligned’ vowels: <โต> written o–t but pronounced /to : / ‘big’. The vowel is written before the consonant it follows in speech (Winskel 2009)
  - also: discontinuous vowels that enclose a consonant — like circumfixes
- English silent <e>: in <mate>, the <e> conditions the <a> two letters earlier
  - “The final <e> … is not linear since it is out of step with the letter sequence in the word.” Cook (2004: 13)

This is **systematic**, not error. Writing systems have their own graphotactic logic.

Cook, V. (2004). The English writing system. Routledge.

Winskel, H. (2009). Reading in Thai: The case of misaligned vowels. Reading and Writing, 22(1), 1–24. https://doi.org/10.1007/s11145-007-9100-z

Vertical non-linearity: *Multilinearity*



- Roman ascenders/descenders: the three-space schema (high / central / low)
- Vietnamese diacritic stacking
- Arabic i ʿjām (dot-disambiguation) and ḥarakāt
- Devanagari shirorekha; Tibetan vertical stacking
- Georgian <ჯ> filling the whole line

<Hệ chữ viết là một phương pháp lưu trữ thông tin và chuyển...>

Vertical non-linearity: *Multilinearity*

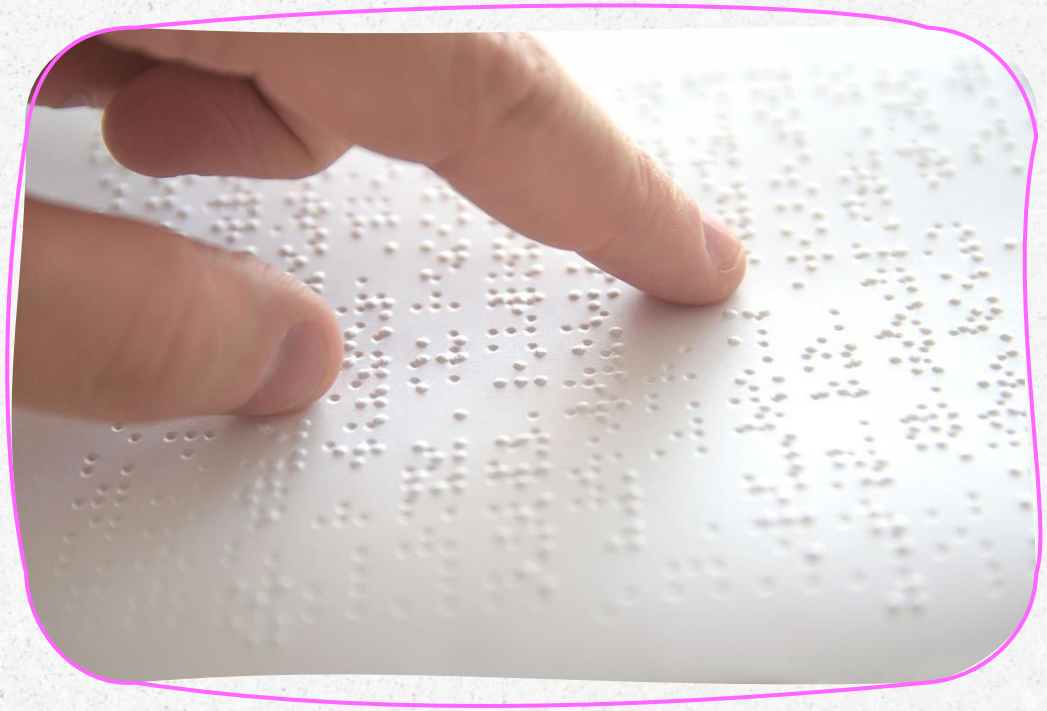
- Roman ascenders/descenders: the three-space schema (high / central / low)
- Vietnamese diacritic stacking
- Arabic i ʿjām (dot-disambiguation) and ḥarakāt
- Devanagari shirorekha; Tibetan vertical stacking
- Georgian <ჳ> filling the whole line

<Hệ chữ viết là một phương pháp lưu trữ thông tin và chuyển...>

Braille, visuocentrism, materiality, and spatiality

Braille challenges visuocentric assumptions. Writing does not have to be visual to be spatial.

- Braille is graphic — from γράφω, 'to scratch, carve' — i.e. both visual and tactile
- it prioritizes the tactile channel and operates in three dimensions: to be read, it must be felt
- its neglect in grapholinguistics exposes an implicit *visuocentrism* — and tracks the marginalization of the communities who use it



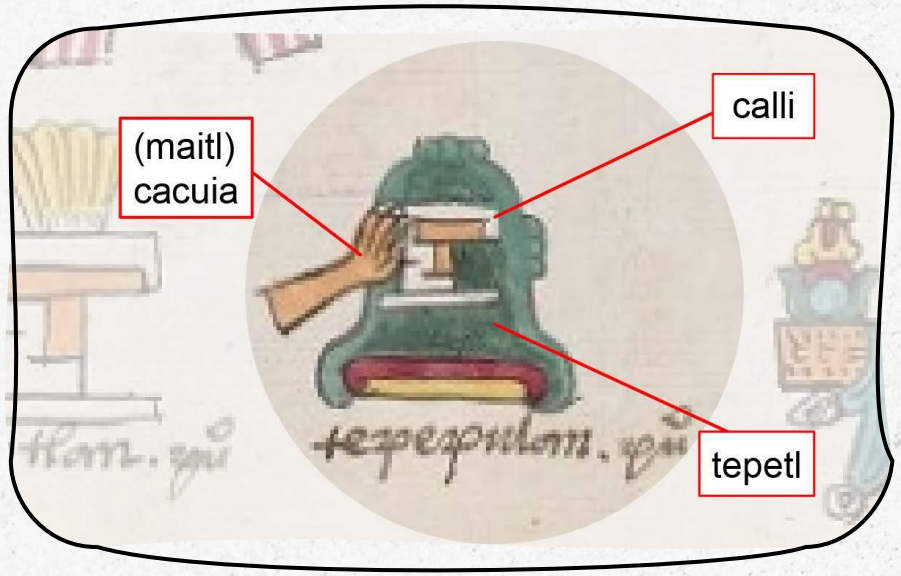
Segmental non-linearity: *Internal spatiality*

- Chinese characters: semantic + phonological components positioned within an 'idealized square' — a mini-layout, so to speak
- Korean Hangul: consonant + vowel letters composed into syllable blocks.
- Mayan would also be an example

The segmental space has its own internal spatiality — each unit echoes, in miniature, the layout logic of the whole surface.

Two-dimensional non-linearity: *Multidimensionality*

systematic:



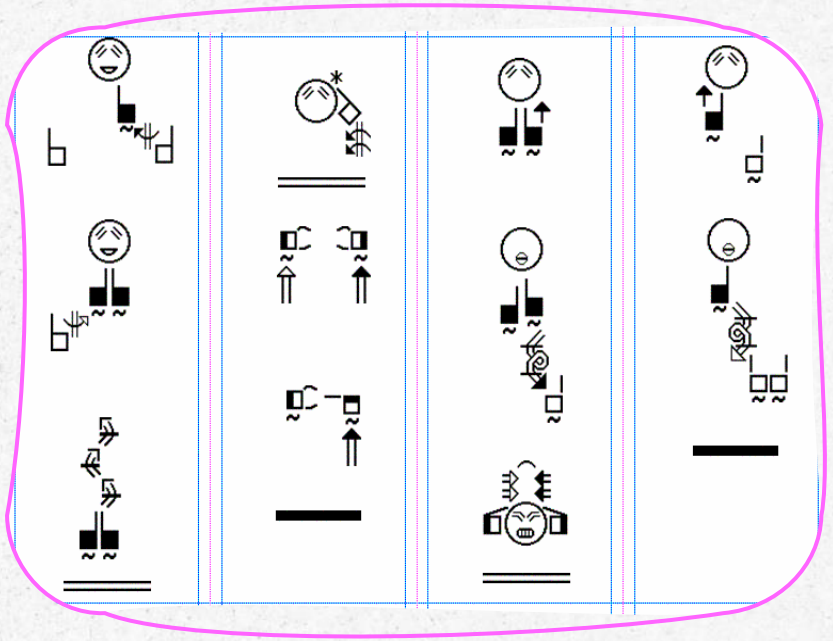
textual:

Perri, A., Perondi, L., Capo, D., Arista, R., & Dalai, G. (2024). Alternative graphemics: Aztec writing system as a case study towards an integrated, digitalised model of non-typographic graphemics. *Ocula, 24*(30), 43–64. https://doi.org/10.57576/ocula2024-5

Wehde, S. (2000). Typographische Kultur: Eine zeichentheoretische und kulturgeschichtliche Studie zur Typographie und ihrer Entwicklung (Studien und Texte zur Sozialgeschichte der Literatur 69). Niemeyer. https://doi.org/10.1515/9783110945799

Two-dimensional non-linearity: *Multidimensionality*

- layouts, columns, lists, the list mode, multimodal page design ⟶ meaning from spatial arrangement
- unlike the first three types, here elements often have no fixed reading order — reading becomes closer to scanning an infographic
- Aztec writing: spatial arrangement contributes to meaning more fundamentally than layout does in English, for example
  - this is one locus of where the "what counts as writing?" debate lives (Perri et al. 2024; Zamora Corona 2022)
- SignWriting: 3-D, simultaneous signs forced into a 2-D "vignette"



Zamora Corona, A. R. (2022). Towards a complex theory of writing: The case of Aztec and Mixtec codices. *Signata, 13*. https://doi.org/10.4000/signata.3866

Non-linear reading

- eye movements: saccades, fixations, regressions (Clifton et al. 2007)
- layout itself steers the eye
- but: scanning is not reading (Harris 1995: 45)
- transposed-letter flexibility: JUDGE/JUGDE (Massol et al. 2025)
- the “Cambridge” jumbled-text effect is writing-system-specific — in Hebrew, transposing root consonants changes the word: ל-ח-ש> <ש-ח-ל ‘to whisper’ vs. ש-ל-ח> ‘to send’ (Velan & Frost 2007)
  - “Aoccdrnig to rscheearch at Cmabrigde Uinervtisy, it deosn’t mttaer in waht oredr the ltteers in a wrod are, the olny iprmoetnt tihng is taht the frist and lsat ltteer be at the rghit pclae.”
- even processing tolerates/requires non-linearity — but only within system-specific limits

Clifton, C. Jr., Staub A., & Rayner, K. (2007). Eye movements in reading words and sentences. In R. P. G. van Gompel, Martin H. Fischer, Wayne S. Murray, & Robin L. Hill (Eds.), Eye movements. A window on mind and brain (pp. 341–371). Elsevier Science. https://doi.org/10.1016/B978-008044980-7/50017-3

Harris, R. (1995). Signs of writing. Routledge.

Massol, S., Acha, J., Rondot, L., Vergara-Martinez, M., Favre, E., & Lété, B. (2025). Transposed-character effects during learning to read: When does letter and non-letter strings processing become different? Journal of Experimental Child Psychology, 249, 106081. https://doi.org/10.1016/j.jecp.2024.106081

Velan, H., & Frost, R. (2007). Cambridge University versus Hebrew University: The impact of letter transposition on reading English and Hebrew. Psychonomic Bulletin & Review, 14(5), 913–918. https://doi.org/10.3758/BF03194121

Non-linear reading

- eye movements: saccades, fixations, regressions (Clifton et al. 2007)
- layout itself steers the eye
- but: scanning is not reading (Harris 1995: 45)
- transposed-letter flexibility: JUDGE/JUGDE (Massol et al. 2025)
- the "Cambridge" jumbled-text effect is writing-system-specific — in Hebrew, transposing root consonants changes the word: ל-ח-ש> <ש-ח-ל 'to whisper' vs. ש-ל-ח> ח-ל-ש 'to send' (Velan & Frost 2007)
  - "Aoccdrnig to rscheearch at Cmabrigde Uinervtisy, it deosn't mttaer in waht oredr the ltteers in a wrod are, the olny iprmoetnt tihng is taht the frist and lsat ltteer be at the rghit pclae."
- even processing tolerates/requires non-linearity — but only within system-specific limits

Non-linear reading

- eye movements: saccades, fixations, regressions (Clifton et al. 2007)
- layout itself steers the eye
- but: scanning is not reading (Harris 1995: 45)
- transposed-letter flexibility: JUDGE/JUGDE (Massol et al. 2025)
- the "Cambridge" jumbled-text effect is writing-system-specific — in Hebrew, transposing root consonants changes the word: ח-ל-ש> <ש-ל-ח ʃ-l-χ 'to whisper' vs. <ח-ל-ש>ʃ-l-χ 'to send' (Velan & Frost 2007)
  - "Aoccdrnig to rscheearch at Cmabrigde Uinervtisy, it deosn't mttaer in waht oredr the ltteers in a wrod are, the olny iprmoetnt tihng is taht the frist and lsat ltteer be at the rghit pclae."
- even processing tolerates/requires non-linearity — but only within system-specific limits

Clifton, C. Jr., Staub A., & Rayner, K. (2007). Eye movements in reading words and sentences. In R. P. G. van Gompel, Martin H. Fischer, Wayne S. Murray, & Robin L. Hill (Eds.), Eye movements. A window on mind and brain (pp. 341–371). Elsevier Science. https://doi.org/10.1016/B978-008044980-7/50017-3

Harris, R. (1995). Signs of writing. Routledge.

Massol, S., Acha, J., Rondot, L., Vergara-Martinez, M., Favre, E., & Lété, B. (2025). Transposed-character effects during learning to read: When does letter and non-letter strings processing become different? Journal of Experimental Child Psychology, 249, 106081. https://doi.org/10.1016/j.jecp.2024.106081

Velan, H., & Frost, R. (2007). Cambridge University versus Hebrew University: The impact of letter transposition on reading English and Hebrew. Psychonomic Bulletin & Review, 14(5), 913–918. https://doi.org/10.3758/BF03194121

Alternative views

TYPE	SUBVERTED EXPECTATION	ALTERNATIVE VIEW
segmental internal spatiality	units are atomic, one-element shapes	Written segments are often composed of smaller graphe(ma)tic elements (e.g., semantic and phonological components in Chinese).
horizontal unaligned linearity	units must mirror the order of language	Writing systems have their own graphotactic constraints and regularities that should not only be studied in relation to (possibly non-aligned) units of speech or language but also independently.
vertical multilinearity	the line is one-dimensional	The line is two-dimensional and the extension and position of units within this two-dimensional space is meaningful.
two-dimensional multidimensionality	layout is meaningless arrangement	The spatial arrangement of written (and non-written) material on writing surfaces as well as their materiality contribute to the meaning and perception of texts and should be included in their study.

Beyond the doctrine of linearity

- writing is not “fixed speech”, not purely sequential, not fundamentally one-dimensional
- writing is spatial, material, multidimensional, culturally variable
- “Non-linearity” is not the exception — it is constitutive of writing
- the negative label should make us suspicious of the norm, not the phenomenon

dimitrios.meletis@univie.ac.at

ATTENTION! ☺

Thank you

very much

for your