MORTEXVAR

ISL

Similar signs and sign assimilation

The issues posed by similar looking distinct signs and their impact on digital encoding and optical character recognition

Jorke Grotenhuis

Universidad de Alcalá, Madrid

jorke.grotenhuis@uah.es

Text Mining the Coffin Texts (TM-CT)

Everlasting Variations. Case studies on the hieroglyphic repertoire in synchrony and diachrony (Liège, Belgium; 11–13 June 2025)

TM-CT: *Text mining the Coffin Texts* project (CNS2023-144010, "Consolidación Investigadora" Programme, Spanish Ministry for Science, Innovation and Universities), Universidad de Alcalá, 2024-2026

T3D: *Textos en 3D: los ataúdes del Reino Medio egipcio como documentos* (SBPLY/23/180225/000093, "Proyectos de investigación científica y transferencia de tecnología" Programme, Castilla-La Mancha Region), Universidad de Alcalá, 2024-2025

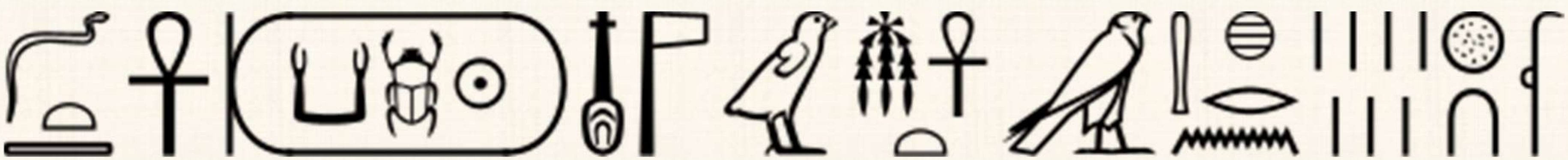
Introduction

- Similar signs
- Geometric signs
  - Circles
  - Rectangles
  - Ovals
- Rotations
- Same shape, different object
- Sign assimilation
- Optical Character Recognition (OCR)

Similar signs

- One shape, multiple signs?

Stela of Mentuwoser (MMA 12.184), line 1 © Metropolitan Museum of Art, CC0 1.0
https://www.metmuseum.org/art/collection/search/544320



Similar signs

- One shape, multiple signs?
- Lack of available signs for transcription:

PT 438a (W):

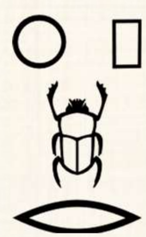
No (D158) available

Closest similar sign (K26) used instead

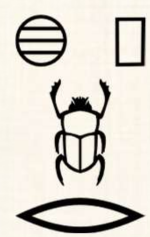
Piankoff (1968) pl. 33

Similar signs

- One shape, multiple signs?
- Lack of available signs for transcription
- Two primary methods of transcription:
    - **Visual** approach: Use the sign that most closely resemble what is seen
    - **Functional** approach: Use the *prototypical* sign that represents the function of the sign, rather that its specific appearance



visual



functional

Corpus data

- Data and sources based on the recent expansion of the Hierogyphic repetoir in Unicode:

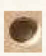
Suignard, M. (ed.), Anderson, D., Dils, P., Grotenhuis, J., Gülden, S., Nederhof, M.-J., Polis, S., Richmond, R., Rosmorduc, S., Werning, D. A. 2023. *Draft Encoding Proposal for an Extended Egyptian Hieroglyphs Repertoire (L2/23-109).* https://www.unicode.org/L2/L2023/23109-n5215-hieroglyphs.pdf

- Database:

https://www.unicode.org/L2/L2023/23109-n5215-database.pdf

Geometric signs

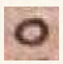
- Signs that can be represented as a circle:

		N5	The sun within a halo	http://thotsignlist.org/mytkclass?id=4293&cl=01
		N9	The moon, one half obscured	http://thotsignlist.org/mytkclass?id=4363&cl=02
		N10	The moon, partly obscured to form a crescent at the top of the circle	http://thotsignlist.org/mytkclass?id=4363&cl=02
		O48	A plan of a prehistoric building at the town of Nekhen, written as a circle	http://thotsignlist.org/mysign?id=4845
		O49	A plan of a crossroads in a village	http://thotsignlist.org/mysign?id=4848
		O50	A circular threshing floor covered with grain	http://thotsignlist.org/mytkclass?id=4853&cl=01
		S21	A ring or bracelet	http://thotsignlist.org/mysign?id=5643
		X6	A round loaf with a finger mark at the bottom	http://thotsignlist.org/mytkclass?id=6705&cl=01
		Y17	A tambourine	KIU 4113, line 7: http://sith.huma-num.fr/karnak/4113
		Y24	A ball	Dendera XII, p. 167,3, pl. 104
		Aa1	A placenta	http://thotsignlist.org/mytkclass?id=931&cl=01

Geometric signs

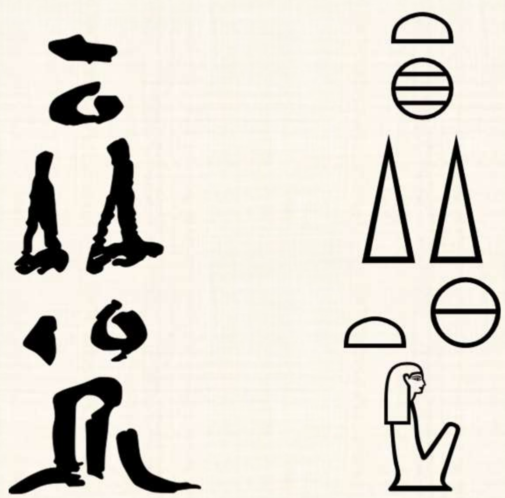
- Signs that can be represented as a circle:

Smaller circles:

	𓂂	D12	The pupil of an eye	http://thotsignlist.org/mysign?id=1896
	𓈒	N33	A grain of sand	http://thotsignlist.org/mysign?id=4251

Geometric signs

- Signs that can be represented as a circle
  - Size of the circle might not be a clear sign of which sign it is:



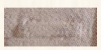
CT II: 15,b (B1C)

Geometric signs

- Signs that can be represented as a circle
  - Size of the circle might not be a clear sign of which sign it is:
    - 𓐍 (Aa1) in B1C:
      - *CT* II, 15,b 
      - *CT* II, 4,c 

Geometric signs

- Signs that can be represented as a rectangle:

		N37	A rectangular pool	http://thotsignlist.org/mytkclass?id=4265&cl=00
		O230	A broad rectangular stone slab or brick	http://thotsignlist.org/mytkclass?id=4788&cl=01
		S106	A rectangular piece of cloth	Cairo JE 37726 (57127), der Manuelian (2003): p. 14-15
		Y1	A papyrus scroll, rolled up	http://thotsignlist.org/mytkclass?id=6712&cl=04
		Aa12	A rectangular platform	http://thotsignlist.org/mytkclass?id=937&cl=01

Rotations:

		M195	A stalk of reed	http://thotsignlist.org/mysign?id=3898
			A straight stick, oriented vertically	http://thotsignlist.org/mysign?id=7161
		U107	An upright of a ladder	http://thotsignlist.org/mysign?id=6054

Geometric signs

- Signs that can be represented as an oval:

		N17	A strip of land	http://thotsignlist.org/mytkclass?id=4196&cl=01
		N18	An oval of sand	http://thotsignlist.org/mysign?id=4201
		O47	A plan of a prehistoric building at the town of Nekhen, written as an oval	KIU 6963, line 7: http://sith.huma-num.fr/karnak/6963
			A bale of cloth	http://thotsignlist.org/mysign?id=4201
		X4	A roll of bread	http://thotsignlist.org/mytkclass?id=6695&cl=01
		Z8	A flat oval shape, without any internal marking	http://thotsignlist.org/mysign?id=6819

Geometric signs

- Signs that can be represented as an oval
  - In cursive script, there is an alternative catch all sign for oval signs: (N141)

CT I, 94,a (B1P)
ỉw (island)

CT I, 10,b (MC105)
d(ꜣ)ỉ.w (loincloth)

CT I, 10,c (MC105)
ḏꜣḏꜣ.t (council)

Rotations and mirroring

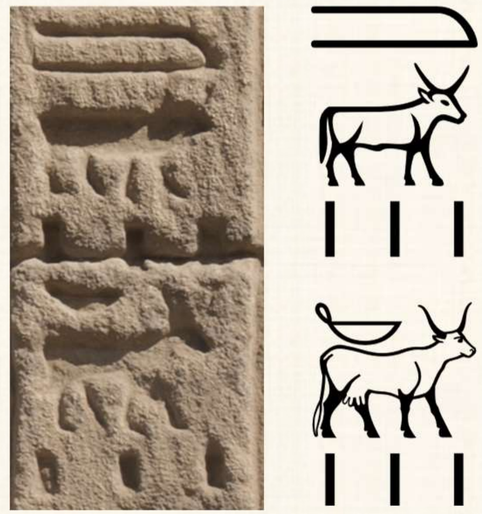
- Functional distinct signs that could, but should not be created by rotations
  - (U31) vs (Aa56) > *rḥ* vs *m*
  - (A28) vs (A29) > *qꜣỉ* vs *sḫd*
  - (A53) vs (A54) > *twt* vs *ẖꜣ.t*

Rotations and mirroring

- Functional distinct signs that could, but should not be created by rotations
  -  (D54) *movement*
  -  (D55) *backwards movement*
  -  (D287) *falling* (mutilated form of A15)
  -  (D292) *being upside down* (mutilated form of A29)

Same shape, different object

- Gender specific signs
  - Bull 𓃒 (E1) vs cow (E92)
    m kꜣ.w ỉd.wt (in bulls and cows)



KIU 3811, line 5: http://sith.huma-num.fr/karnak/3811

Same shape, different object

- Masts, ladders or scepters
  - Common sign: (P6)
    - In mꜣq.t (ladder)

Piankoff (1968) pl. 3

Same shape, different object

- Masts, ladders or sceptres
  - Common sign: 𓊛 (P6)
    - In *mꜣq.t* (ladder)
    - Class of 𓊛 (P6) looks like a sceptre (S42)

Stela of Megegi (MMA 14.2.6), line 3

https://www.metmuseum.org/art/collection/search/544007

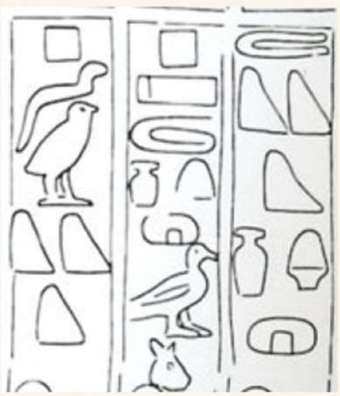
Same shape, different object

- Triangular signs
  - A thorn 𓋉 (M44) or a conical loaf of bread

KIU 3475, line 17: http://sith.huma-num.fr/karnak/3475

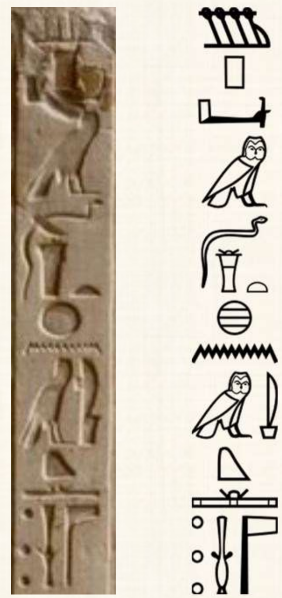
Same shape, different object

- Triangular signs
  - ◿ Sandy slope, half loaf of bread or nose?



gs.w pẖr pḏ.w
half loaf; pekher offering;
spread out offering

ACEr 21, plate 49, offering list



šsp mḏ.t ẖnm snṯr
receiving unguent, smelling incense

Leiden AP 14b, column 2, © Rijksmuseum van Oudheden, CC BY 3.0 NL
http://img.rmo.nl/imageproxy/proxy.aspx?server=10.0.10.13&port=5297&filename=\017926.jpg

Same shape, different object

- Triangular signs
  - A sandy tract of land or a tail?

KIU 1050, line 5:
https://www.cfeetk.cnrs.fr/archives/?n=78233

Same shape, different object

- Triangular signs
    - A sandy tract of land or a tail?
        - Misinterpreting Gardiner

From O.K. onward a sign of like appearance is used in  *ḥb-sd* 'jubilee', *Sed*-festival'
(Egyptian Grammar 3rd Edition, p. 532)

- Not a sandy tract, but a class of  (F33), the tail.

Same shape, different object

- 𓂭 Fingers, sticks and cloth

ỉqr mꜣꜥ
truly excellent one

Votive tela of Userhat (MMA 05.4.2) column 3 © Metropolitan Museum of Art, CC0 1.0, https://www.metmuseum.org/art/collection/search/544776

wnḫ.w
wnḫ-cloth

Mastaba of Kai-ni-nisut (G2156), offering list
Giza III, abb. 22.

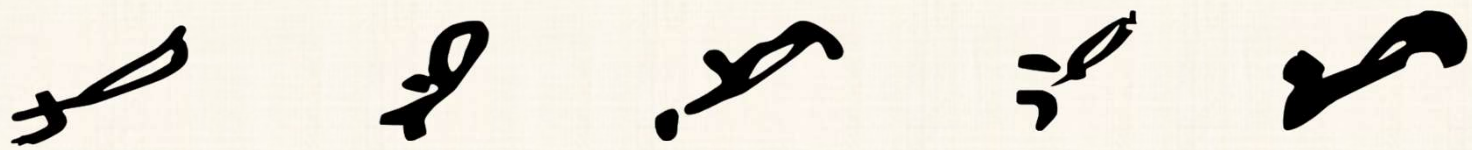
Sign assimilation

- Signs can become generic prototypes of higher-level abstractions:
    - The duck/goose (G38)
        - Generalization for birds, and later even ‘*winged ones*’

          (Goldwasser (2002), pp. 19-20; Goldwasser & Soler (2024), p. 36)
            - By Graeco-Roman period, can perform nearly any function covered by another bird

Sign assimilation

- Fishes in the *Coffin Texts*
  - *špt* (to be angry) should use the pufferfish (K7) as classifier
  - Classifier used is a form of either (K2) or (K4)

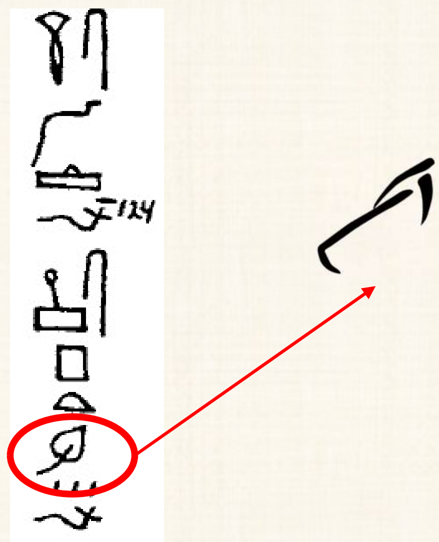


A1C | G1T | G2T | M5C | Papyrus Prisse, BN 186-194, col. 14, line 9

CT V:151,a

Sign assimilation

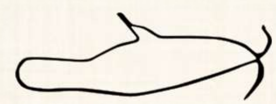
- Fishes in the *Coffin Texts*
  - (K2) or (K4) used as phono-repeater for other fishes as well?
    - sꜣp.t (Lotus leaf) in *CT* III, 286,c (B1P)



Sign assimilation

- Fishes in the *Coffin Texts*
  - (K2) or (K4) used as phono-repeater for other fishes as well?
    - sꜣp.t (lotus leaf) in *CT* III, 286,c (B1P)
    - snwr (to make tremble), phono-repeater n-V-r, replacing the catfish (K13):

CT I, 104,b (B1P)



CT I, 104,b (S10C)

Sign assimilation

- Generic fish
  - 𓆝 (K3) used as logogram for fish

ỉw bt m mw m-m rm.w ỉw⸗f mdw⸗f ḥnꜥ nꜥr snbb⸗f ḥnꜥ ẖꜣ(.t)

"The shepherd is in the water, among the fishes, while he speaks with the catfish and converses with the oxyrhynchus."

Tomb of Ti (Steindorff (1913), pl. 111)

Sign assimilation

- Generic fish
  - 𓆝 (K3) used as classifier for “water-dweller”

ḥꜣ⸗ṯn ỉmy.w mw
“Back, water creatures!”
MMA 50.85, line 40 (https://thotsignlist.org/db/mysource?id=2899)

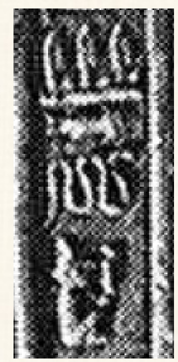
Sign assimilation

- Generic fish
  - (K14) used in transcriptions of Graeco-Roman inscriptions as 'catch-all fish'

(K14) replacing (K1)

KIU 3824, line 1: http://sith.huma-num.fr/karnak/3824

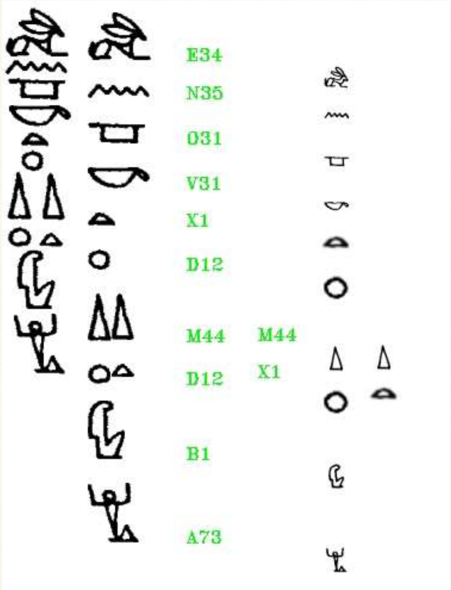
(K14) generic fish for cryptographic phonogram '*s*'



Dendera X, p. 156,11, pl. 76 (col. 44)

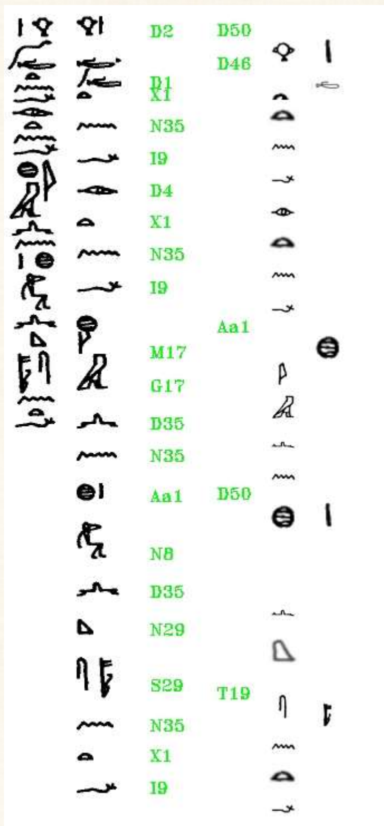
Optical Character Recognition (OCR)

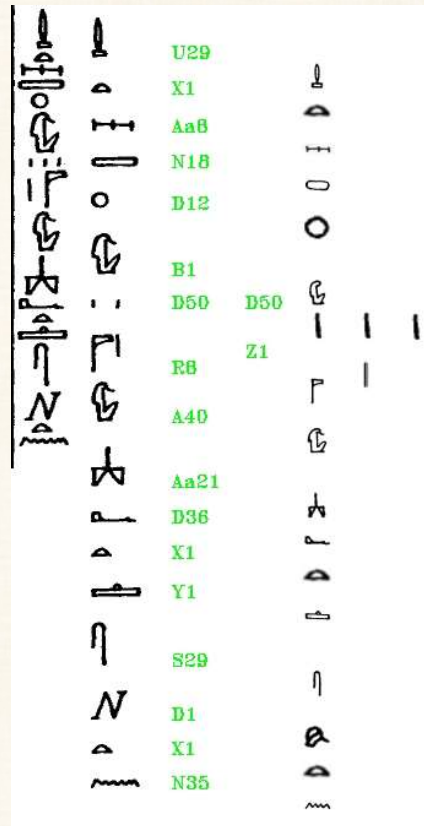
- OCR-PT-CT (Universidad de Alcalá)
  - Semi-automatic transcription of ancient Egyptian hieroglyphic documents



CT II: 15,b (B1C)

Optical Character Recognition (OCR)





Conclusions

- Similar looking signs are relatively common
- Likely many more exist
- Due to similar signs and sign assimilation, visual digital transcription will likely introduce errors, hampering proper searches
- With additional training, programs like OCR will be a beneficial tool for hieroglyphic transcriptions

Thank you for your attention