A SHARED REPOSITORY OF HIEROGLYPHIC SIGNS: THE *THOT* SIGN-LIST

ST. POLIS (F.R.S.-FNRS) & S. ROSMORDUC (CNAM)

OUTLINE

- Introduction
- The encoding of hieroglyphs
  - Principles of the *Manuel de Codage*
  - The existing sign-lists
- Hieroglyphic encoding in digital corpora
  - The Ramses corpus
  - The practices of annotation
    - Types of graphemic variations
    - Principles of normalization
- Towards the *Thot* Sign-list

INTRODUCTION

- Writing systems in Ancient Egypt

INTRODUCTION

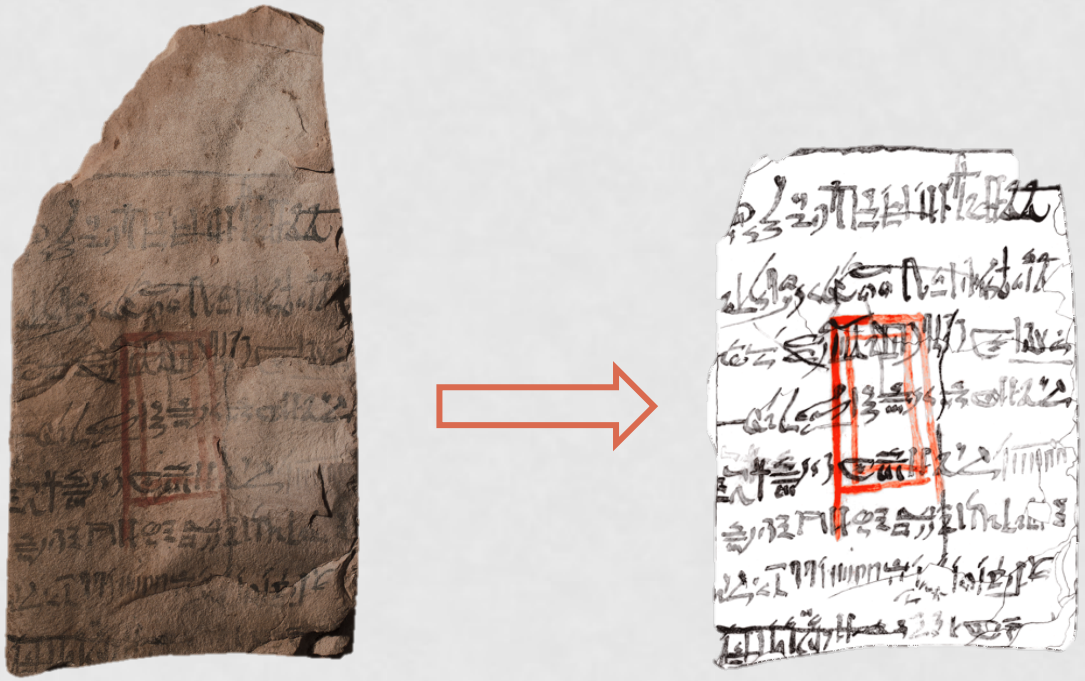
- Writing systems in Ancient Egypt

INTRODUCTION

- Writing systems in Ancient Egypt
- The *Thot* sign-list envisions solely:
  - Hieroglyphic signs
  - Hieratic signs

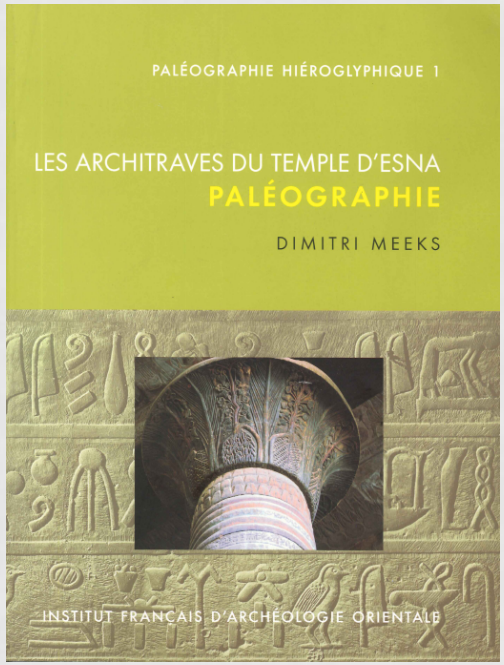
INTRODUCTION

- Writing systems in Ancient Egypt
- The *Thot* sign-list envisions solely the hieroglyphic and hieratic signs
- Various degrees of normalization of the iconic complexity:
  - Fac-simile



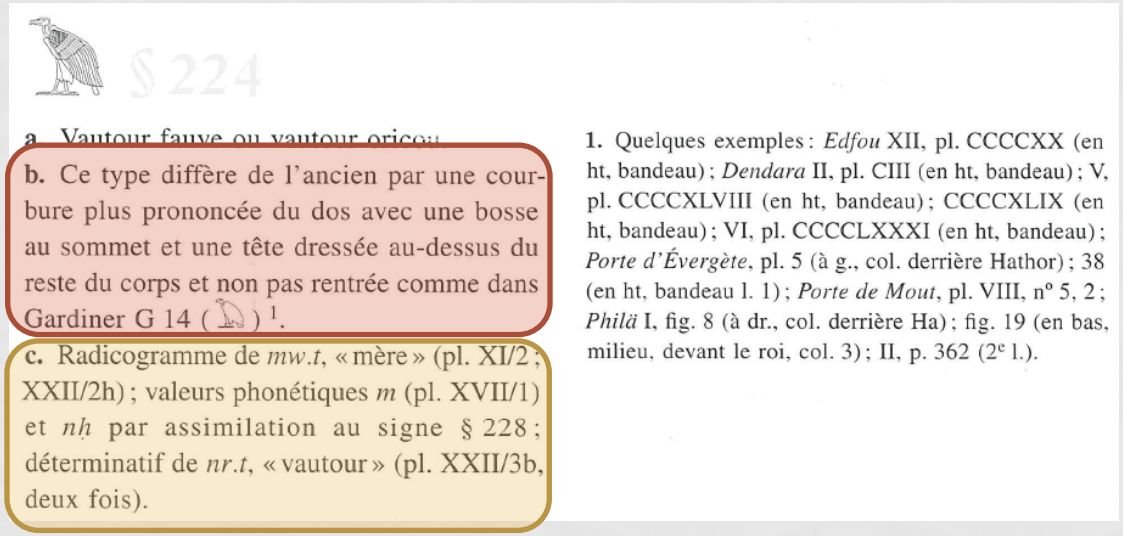
INTRODUCTION

- Writing systems in Ancient Egypt
- The *Thot* sign-list envisions solely the hieroglyphic and hieratic signs
- Various degrees of normalization of the iconic complexity:
  - Fac-simile
  - Paleography
    - Hieroglyphic



INTRODUCTION

- Writing systems in Ancient Egypt
- The *Thot* sign-list envisions solely the hieroglyphic and hieratic signs
- Various degrees of normalization of the iconic complexity:
  - Fac-simile
  - Paleography
    - Hieroglyphic



§ 224

a. Vautour fauve ou vautour oricou

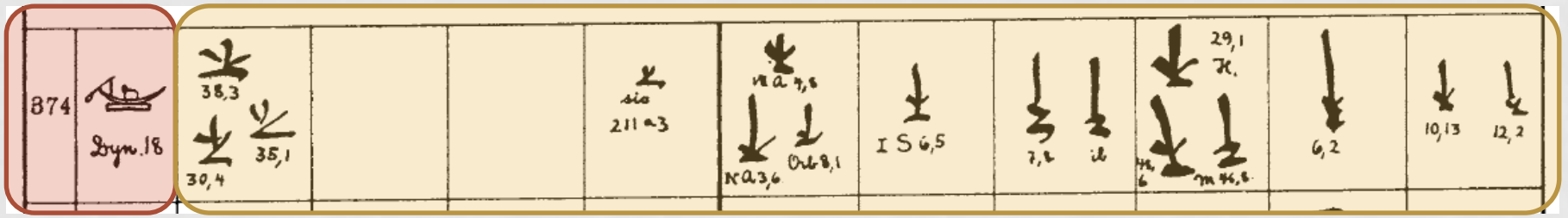
b. Ce type diffère de l'ancien par une courbure plus prononcée du dos avec une bosse au sommet et une tête dressée au-dessus du reste du corps et non pas rentrée comme dans Gardiner G 14 ( ) [1].

c. Radicogramme de *mw.t*, « mère » (pl. XI/2 ; XXII/2h) ; valeurs phonétiques *m* (pl. XVII/1) et *nḥ* par assimilation au signe § 228 ; déterminatif de *nr.t*, « vautour » (pl. XXII/3b, deux fois).

1. Quelques exemples : *Edfou* XII, pl. CCCCXX (en ht, bandeau) ; *Dendara* II, pl. CIII (en ht, bandeau) ; V, pl. CCCCXLVIII (en ht, bandeau) ; CCCCXLIX (en ht, bandeau) ; VI, pl. CCCCLXXXI (en ht, bandeau) ; *Porte d'Évergète*, pl. 5 (à g., col. derrière Hathor) ; 38 (en ht, bandeau l. 1) ; *Porte de Mout*, pl. VIII, nº 5, 2 ; *Philæ* I, fig. 8 (à dr., col. derrière Ha) ; fig. 19 (en bas, milieu, devant le roi, col. 3) ; II, p. 362 (2e l.).

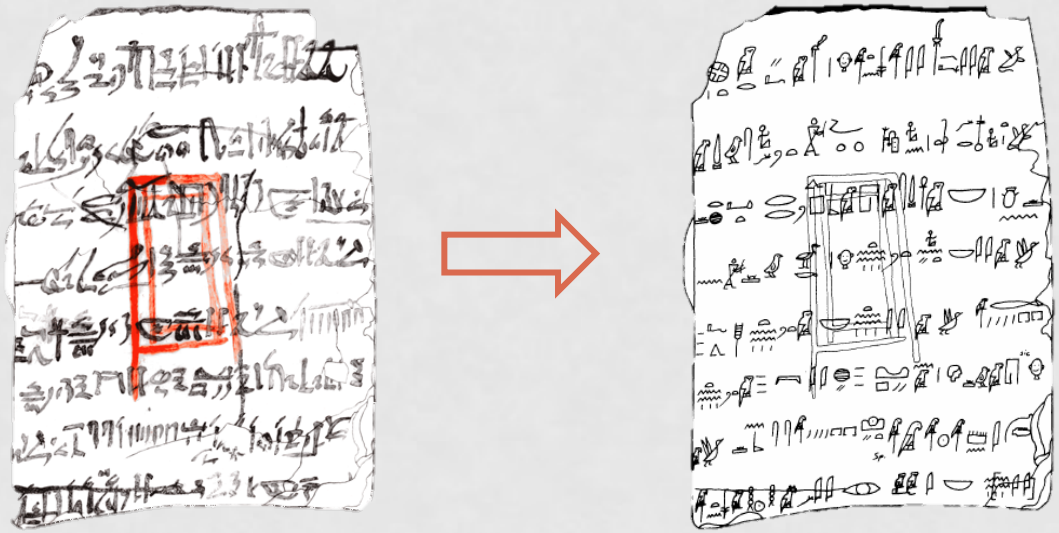
INTRODUCTION

- Writing systems in Ancient Egypt
- The *Thot* sign-list envisions solely the hieroglyphic and hieratic signs
- Various degrees of normalization of the iconic complexity:
  - Fac-simile
  - Paleography
    - Hieroglyphic
    - Hieratic



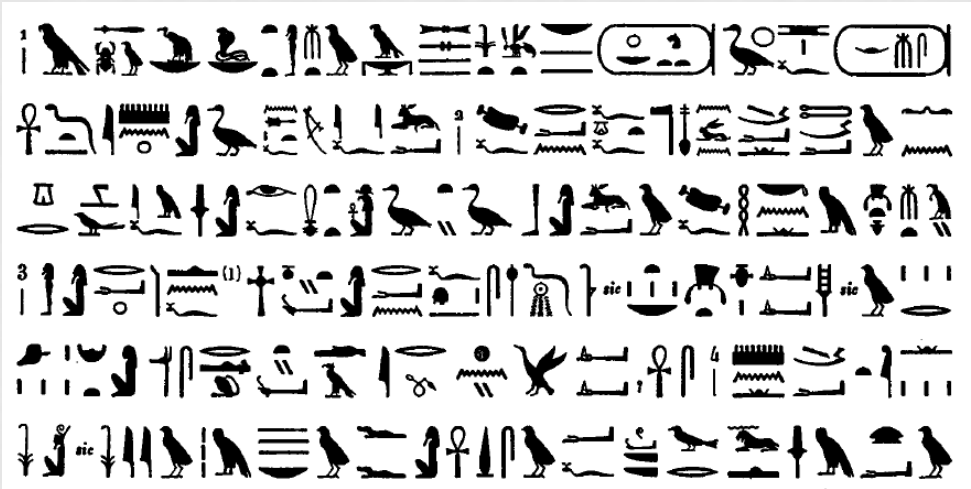
INTRODUCTION

- Writing systems in Ancient Egypt
- The *Thot* sign-list envisions solely the hieroglyphic and hieratic signs
- Various degrees of normalization of the iconic complexity:
  - Fac-simile
  - Paleography
  - Transcription
    - Hand made



INTRODUCTION

- Writing systems in Ancient Egypt
- The *Thot* sign-list envisions solely the hieroglyphic and hieratic signs
- Various degrees of normalization of the iconic complexity:
  - Fac-simile
  - Paleography
  - Transcription
    - Hand made
    - Typographic



INTRODUCTION

- Writing systems in Ancient Egypt
- The *Thot* sign-list envisions solely the hieroglyphic and hieratic signs
- Various degrees of normalization of the iconic complexity:
  - Fac-simile
  - Paleography
  - Transcription
    - Hand made
    - Typographic

INTRODUCTION

- Writing systems in Ancient Egypt
- The *Thot* sign-list envisions solely the hieroglyphic and hieratic signs
- Various degrees of normalization of the iconic complexity

THE ENCODING OF HIEROGLYPHS

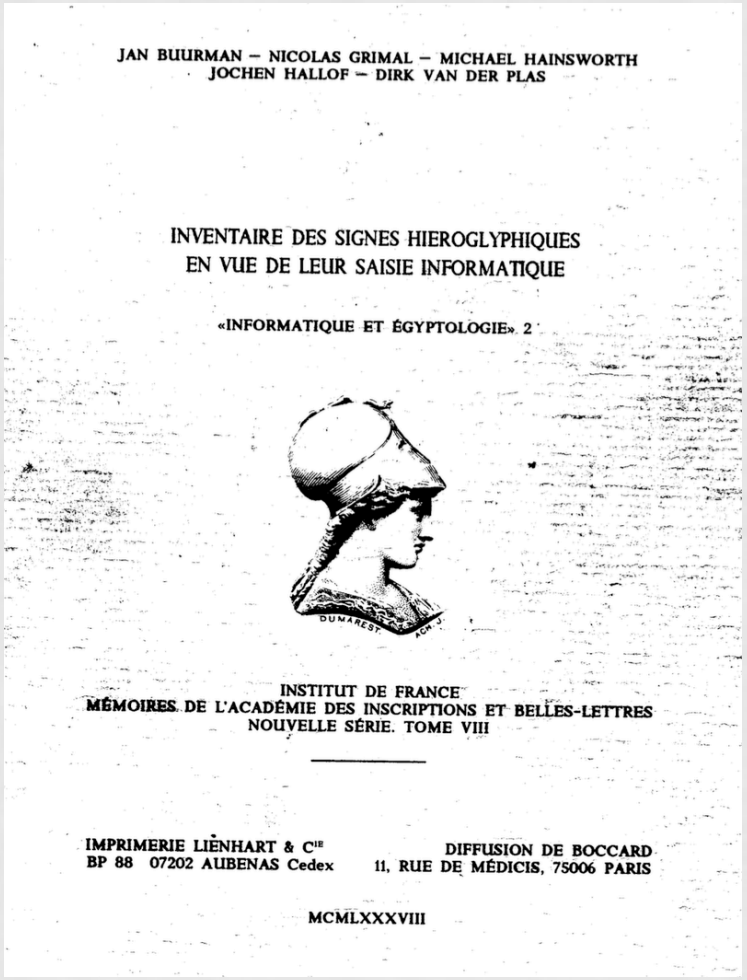
THE ENCODING OF HIEROGLYPHS

- The « Manuel de Codage »
  - 1988, working group « informatique et égyptologie » of the IAE
  - Based on *Glyph*, a software solution developed by Jan Buurman (beginning of the 1970's)
- Principles
  - Codes for hieroglyphic signs
  - Positioning operators

`r:a-ra-G7` =

THE ENCODING OF HIEROGLYPHS

- The original Sign-list (Appendix D)



JAN BUURMAN – NICOLAS GRIMAL – MICHAEL HAINSWORTH
JOCHEN HALLOF – DIRK VAN DER PLAS

INVENTAIRE DES SIGNES HIEROGLYPHIQUES
EN VUE DE LEUR SAISIE INFORMATIQUE

«INFORMATIQUE ET ÉGYPTOLOGIE» 2

INSTITUT DE FRANCE
MÉMOIRES DE L'ACADÉMIE DES INSCRIPTIONS ET BELLES-LETTRES
NOUVELLE SÉRIE. TOME VIII

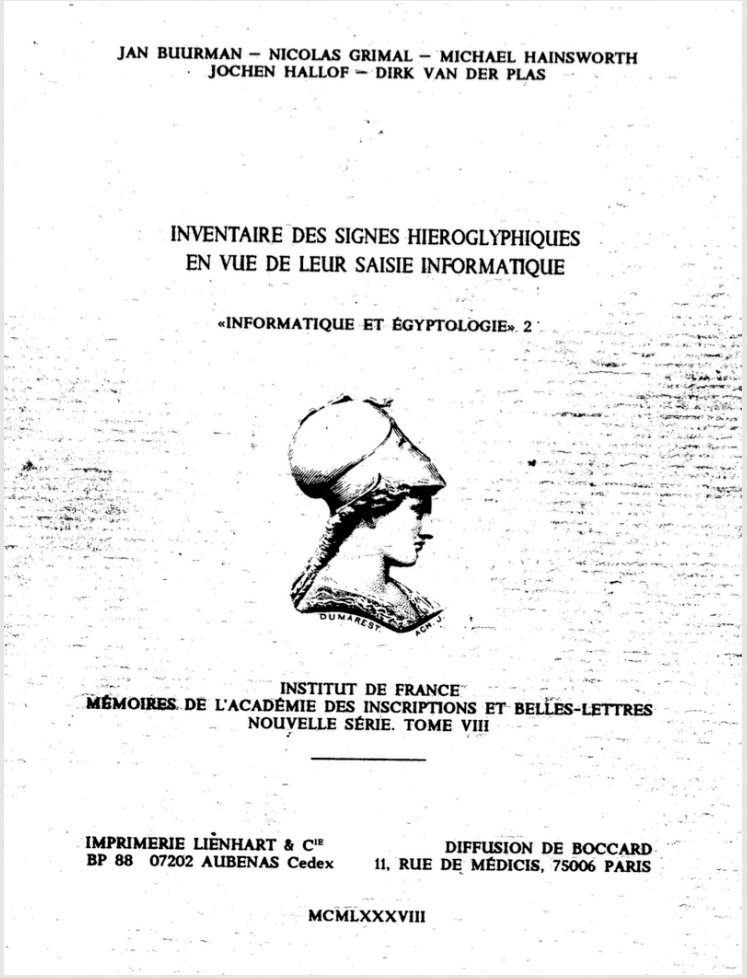
IMPRIMERIE LIENHART & Cie
BP 88 07202 AUBENAS Cedex

DIFFUSION DE BOCCARD
11, RUE DE MÉDICIS, 75006 PARIS

MCMLXXXVIII

THE ENCODING OF HIEROGLYPHS

- The original Sign-list (Appendix D)
  - Based on the slips of Berlin + lead fonts (e.g. metal typesetting font of the IFAO)



JAN BUURMAN – NICOLAS GRIMAL – MICHAEL HAINSWORTH
JOCHEN HALLOF – DIRK VAN DER PLAS

INVENTAIRE DES SIGNES HIEROGLYPHIQUES
EN VUE DE LEUR SAISIE INFORMATIQUE

«INFORMATIQUE ET ÉGYPTOLOGIE» 2

INSTITUT DE FRANCE
MÉMOIRES DE L'ACADÉMIE DES INSCRIPTIONS ET BELLES-LETTRES
NOUVELLE SÉRIE. TOME VIII

IMPRIMERIE LIENHART & Cie
BP 88 07202 AUBENAS Cedex

DIFFUSION DE BOCCARD
11, RUE DE MÉDICIS, 75006 PARIS

MCMLXXXVIII

THE ENCODING OF HIEROGLYPHS

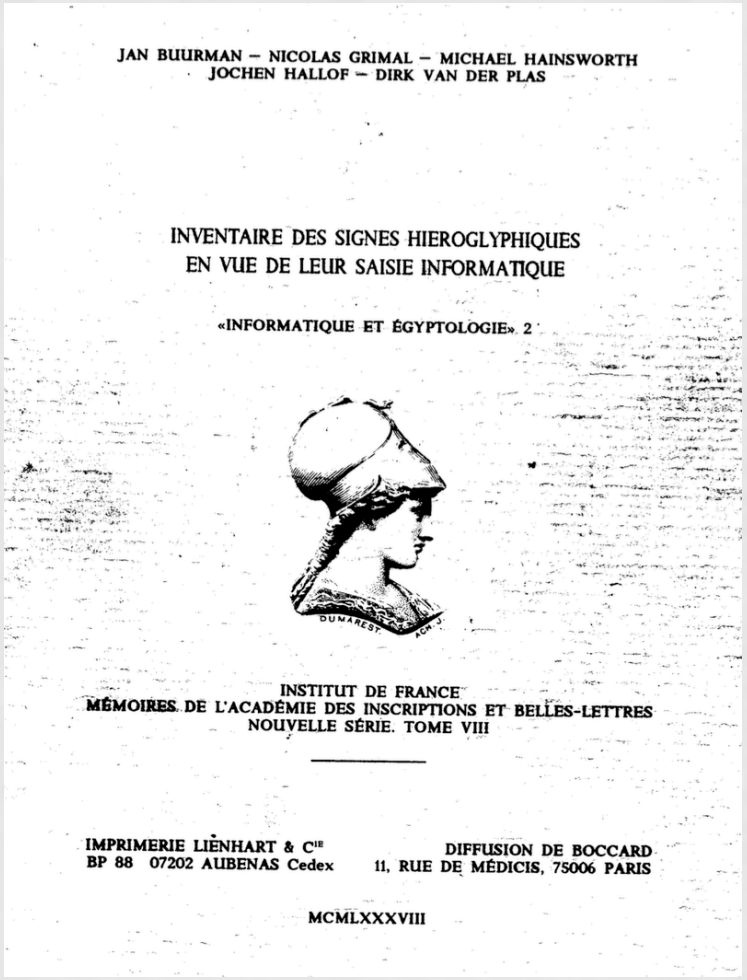
- The original Sign-list (Appendix D)
  - Based on the slips of Berlin + lead fonts (e.g. metal typesetting font of the IFAO)
  - Distinction similar to the unicode distinction between *character* and *glyph*

Hommes debout associés à un signe:

A168

A169

A170



JAN BUURMAN – NICOLAS GRIMAL – MICHAEL HAINSWORTH
JOCHEN HALLOF – DIRK VAN DER PLAS

INVENTAIRE DES SIGNES HIEROGLYPHIQUES
EN VUE DE LEUR SAISIE INFORMATIQUE

«INFORMATIQUE ET ÉGYPTOLOGIE» 2

INSTITUT DE FRANCE
MÉMOIRES DE L'ACADÉMIE DES INSCRIPTIONS ET BELLES-LETTRES
NOUVELLE SÉRIE. TOME VIII

IMPRIMERIE LIENHART & Cie
BP 88 07202 AUBENAS Cedex

DIFFUSION DE BOCCARD
11, RUE DE MÉDICIS, 75006 PARIS

MCMLXXXVIII

THE ENCODING OF HIEROGLYPHS

- The original Sign-list (Appendix D)
  - No comments and no references in the orignal Sign-list
    - Font designers: what matters in a sign?
    - Users: which sign should be used?

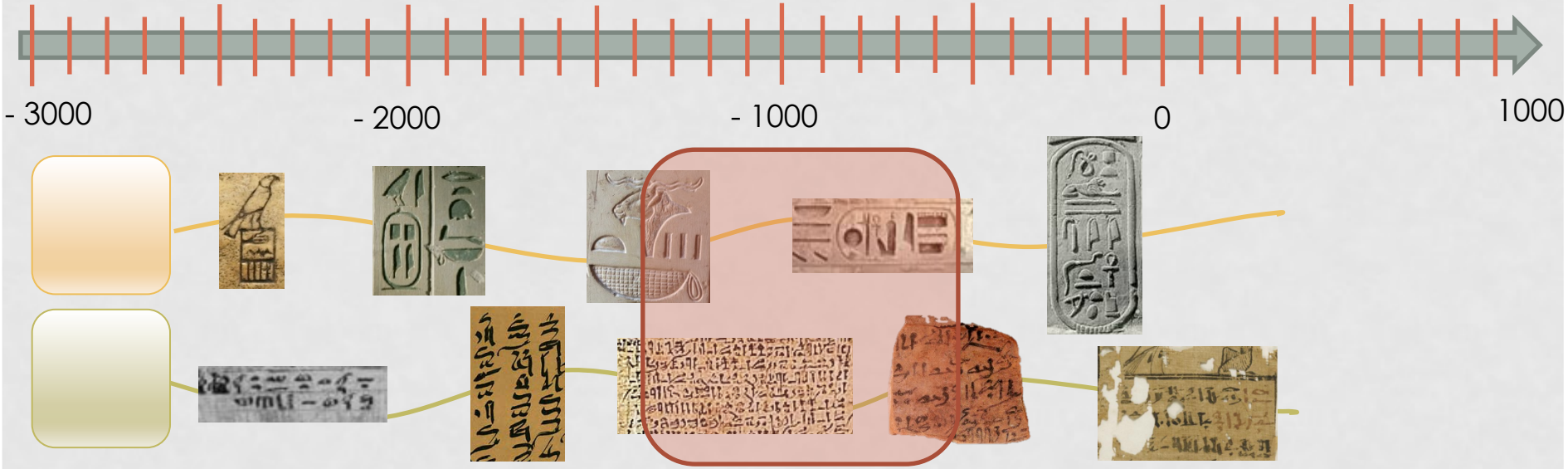
THE ENCODING OF HIEROGLYPHS

- The original Sign-list (Appendix D)
  - No comments and no references in the orignal Sign-list
    - Font designers: what matters in a sign?
    - Users: which sign should be used?
- Extensions of the MdC in the various hieroglyphic text editors (Gozzoli 2013)
- Evolution of the Sign-list depending on specific needs (e.g., the edition of the temple of Denderah)

HIEROGLYPHIC ENCODING IN DIGITAL CORPORA

HIEROGLYPHIC ENCODING IN DIGITAL CORPORA

- The Ramses Project
  - Goal: building a richly annotated corpus of Late Egyptian texts, with the hieroglyphic spellings

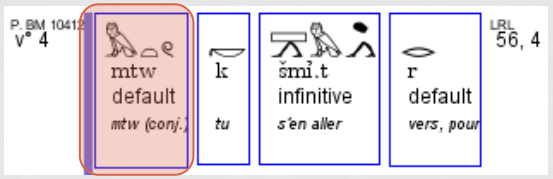


HIEROGLYPHIC ENCODING IN DIGITAL CORPORA

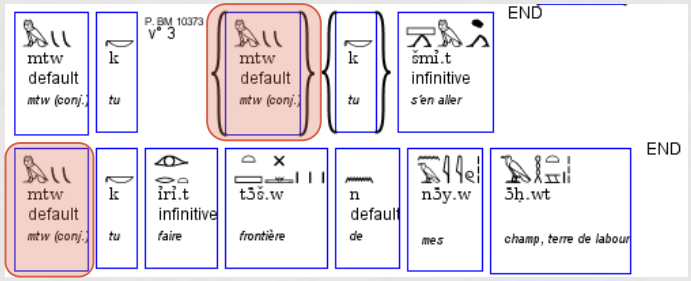
- Encoding of the hieroglyphs in Ramses
  - **1st step (2007-2015)**: "systematic" (speed and efficiency)

    ⇒Principle: "follow as closely as possible the hieroglyphic transcription of the edition encoded"

P. BM EA 10412, v° 4 (= Janssen 1991: pl. 42)



P. BM EA 10373, v° 3 (= Janssen 1991: pl. 30)

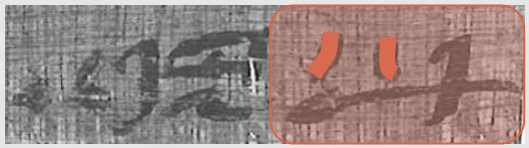


HIEROGLYPHIC ENCODING IN DIGITAL CORPORA

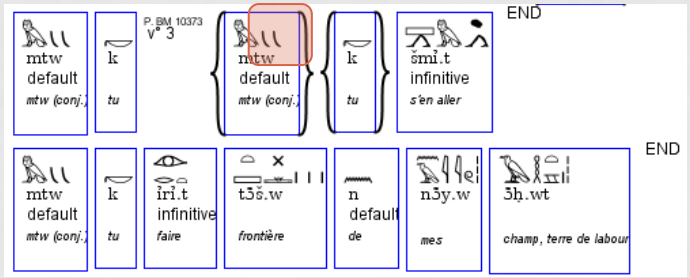
- Encoding of the hieroglyphs in Ramses
  - **1st step (2007-2015)**: "systematic" (speed and efficiency)

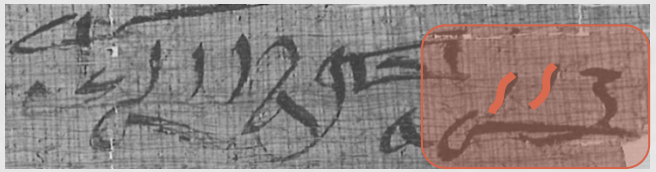
    ⇒Principle: "follow as closely as possible the hieroglyphic transcription of the edition encoded"

P. BM EA 10412, v° 4 (= Janssen 1991: pl. 42)



P. BM EA 10373, v° 3 (= Janssen 1991: pl. 30)

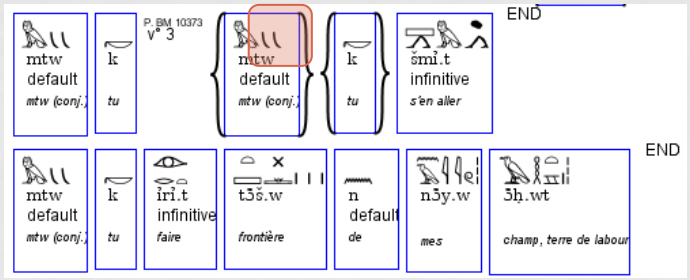


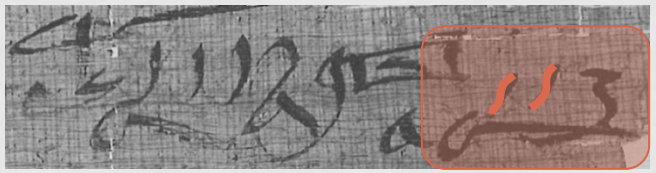


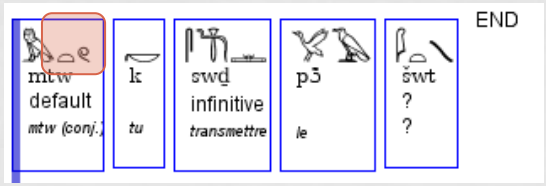
HIEROGLYPHIC ENCODING IN DIGITAL CORPORA

- Encoding of the hieroglyphs in Ramses
  - **1st step (2007-2015)**: "systematic" (speed and efficiency)
    ⇒Principle: "follow as closely as possible the hieroglyphic transcription of the edition encoded"

P. BM EA 10373, v° 3 & vo 6 (= Janssen 1991: pl. 30)

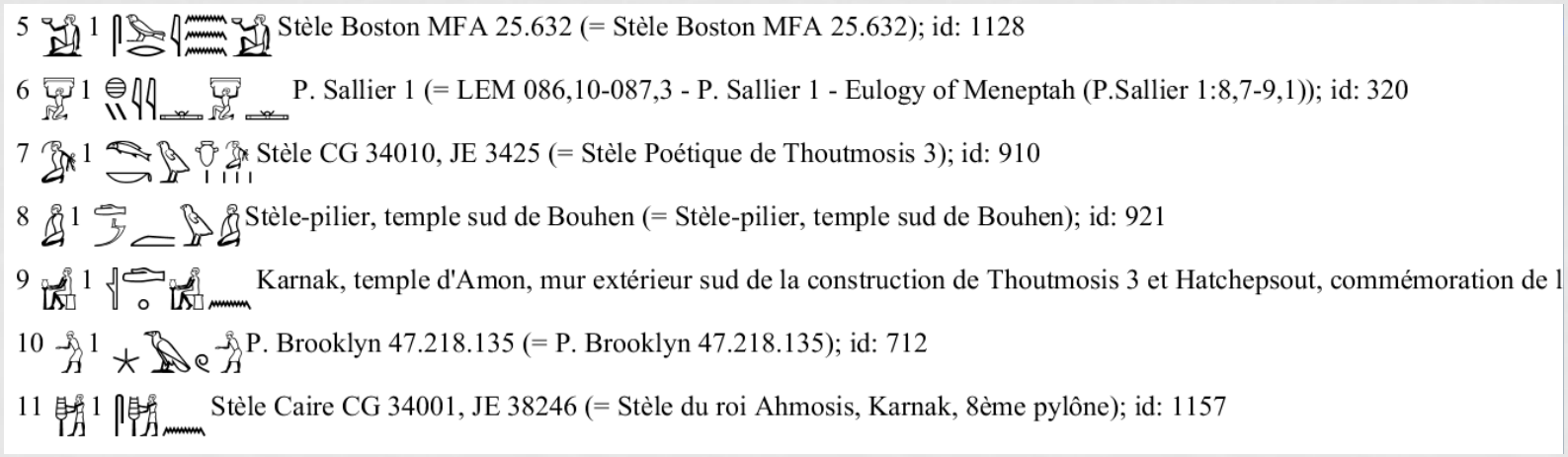






HIEROGLYPHIC ENCODING IN DIGITAL CORPORA

- Encoding of the hieroglyphs in Ramses
  - **1st step (2007-2015)**: "systematic" (speed and efficiency)
    ⇒Principle: "follow as closely as possible the hieroglyphic transcription of the edition encoded"
  - **2nd step (2013-2017)**: analysis of the data
    ⇒*Data-mining* (e.g., extracting all the hieroglyphic signs attested in Ramses, building frequency lists, as well as lists of words in which each sign occurs, etc.)



HIEROGLYPHIC ENCODING IN DIGITAL CORPORA

- Encoding of the hieroglyphs in Ramses
  - **1st step (2007-2015)**: "systematic" (speed and efficiency)
    ⇒Principle: "follow as closely as possible the hieroglyphic transcription of the edition encoded"
  - **2nd step (2013-2017)**: analysis of the data
    ⇒*Data-mining* (e.g., extracting all the hieroglyphic signs attested in Ramses, building frequency lists, as well as lists of words in which each sign occurs, etc.)
  - **3rd step (2017/2018-…)**: shared repository of hieroglyphic signs (*Thot Sign-list*) for the encoding of hieroglyphs in digital corpora

TYPES OF GRAPHEMIC VARIATIONS

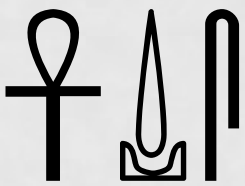
(AS ATTESTED IN RAMSES)

TYPES OF GRAPHEMIC VARIATIONS

- Sources of graphemic variation
  - **The document**
    - Variation of shape

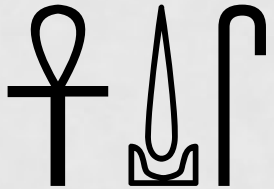
TYPES OF GRAPHEMIC VARIATIONS

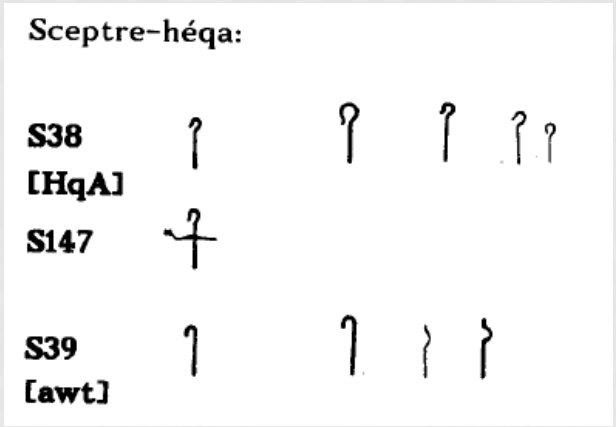
- Sign S39 (scepter) : 7 occurrences in Ramses
  - 6 in *ꜥ.w.s* "L.P.H." (1 *ꜥw.t* "small cattle")



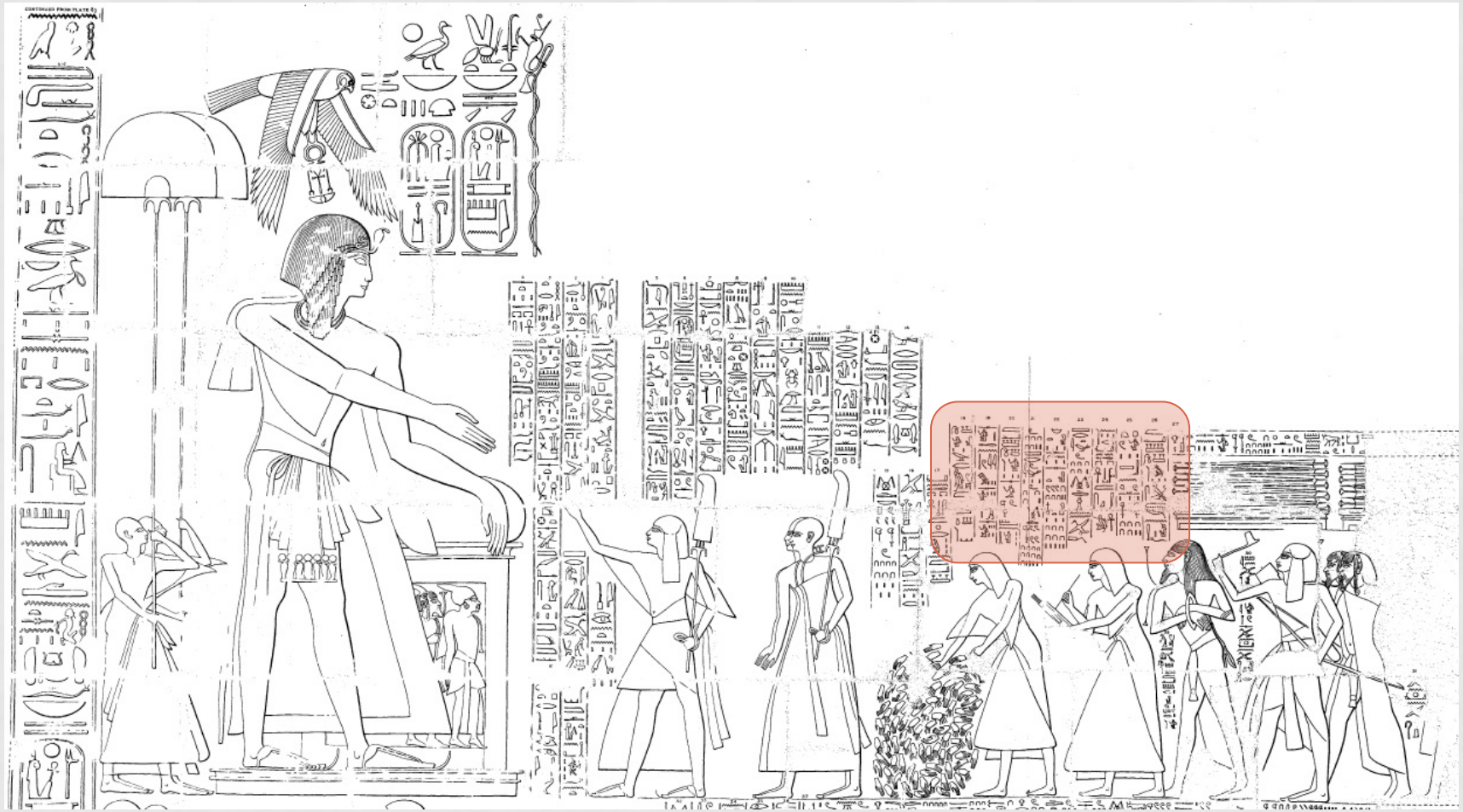
S29

vs

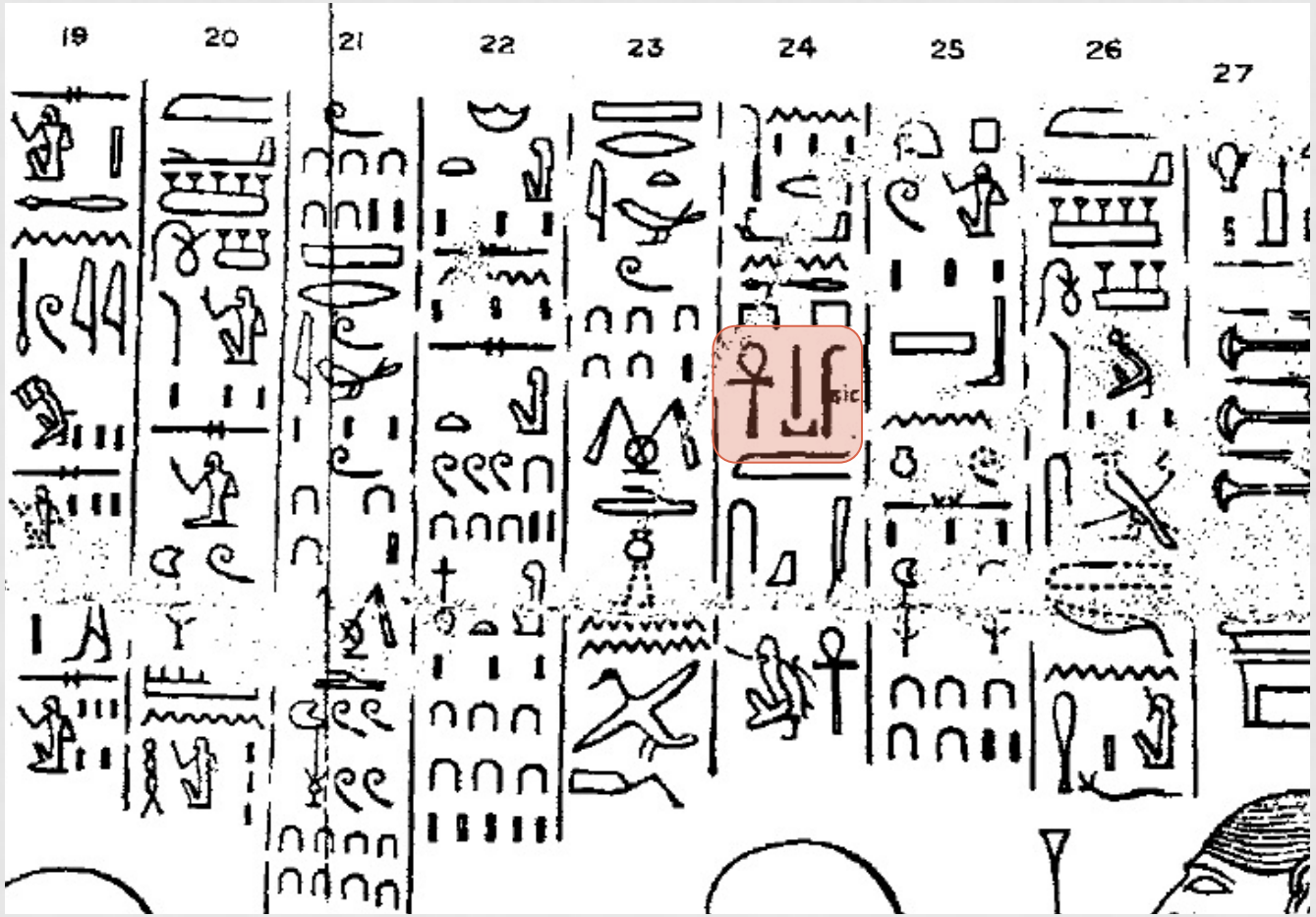


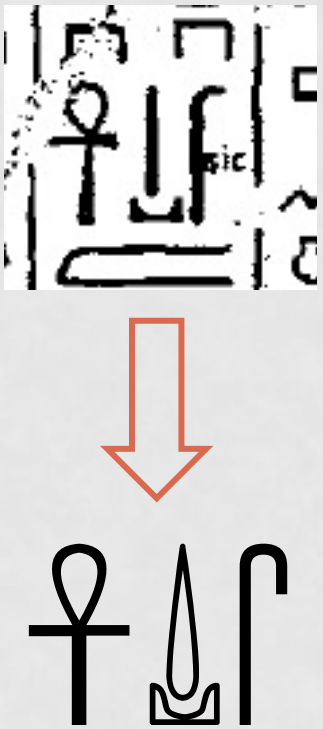


TYPES OF GRAPHEMIC VARIATIONS



TYPES OF GRAPHEMIC VARIATIONS





TYPES OF GRAPHEMIC VARIATIONS

- Sources of graphemic variation
  - **The document**
    - Variations of shape
    - Innovations (that are integral to the hieroglyphic writing system)

TYPES OF GRAPHEMIC VARIATIONS

- Sources of graphemic variation
  - **The document**
    - Variations of shape
    - Innovations (that are integral to the hieroglyphic writing system)

Verb *sʿḥʿ* "to set up, to erect"
⇒ Usual spelling:

⇒ Stele of Ahmôsis (Karnak), l. 33 :
(= St. Caire CG 34001)

⇒ Combination between

⇒ The radicogram *ʿḥʿ*

⇒ The classifier

⇒ 1st hieroglyphic transcription (= *ASAE* 4, p. 29)
& (Lacau 1909 : 4)

⇒ But Sethe's manuscript transcription
(*Urk*. IV, 23,14)

TYPES OF GRAPHEMIC VARIATIONS

- Sources of graphemic variation
  - **The document**
    - Variations of shape
    - Innovations (that are integral to the hieroglyphic writing system)

Verb *sʿḥʿ* "to set up, to erect"
⇒ Usual spelling:

⇒ Stele of Ahmôsis (Karnak), l. 33 :
(= St. Caire CG 34001)

⇒ Combination between

⇒ The radicogram *ʿḥʿ*

⇒ The classifier

⇒ 1st hieroglyphic transcription (= *ASAE* 4, p. 29)
& (Lacau 1909 : 4)

⇒ But Sethe's manuscript transcription
(*Urk*. IV, 23,14)

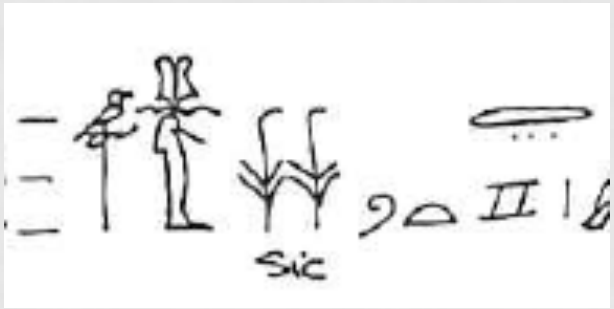
Sign A170

TYPES OF GRAPHEMIC VARIATIONS

- Sources of graphemic variation
  - **The document**
  - **The edition**
    - Technical constraints (*sʿḥʿ* in *ASAE* 4)
    - Choices made by the editors (*mtw* supra)

TYPES OF GRAPHEMIC VARIATIONS

- O. DeM 1703 & 1704, l. 2

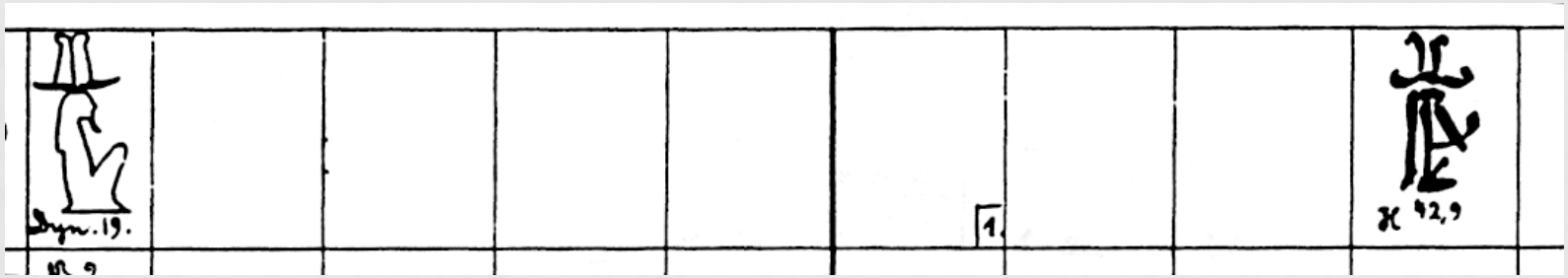


TYPES OF GRAPHEMIC VARIATIONS

- O. DeM 1703 & 1704, l. 2

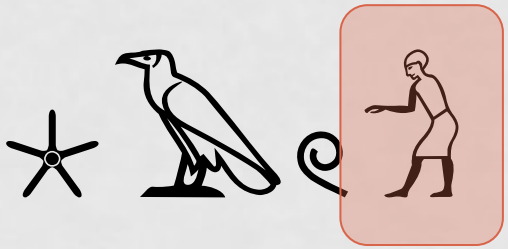
S77\73**A53{{66,713,194}}

C18

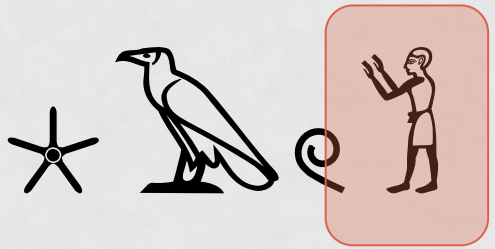


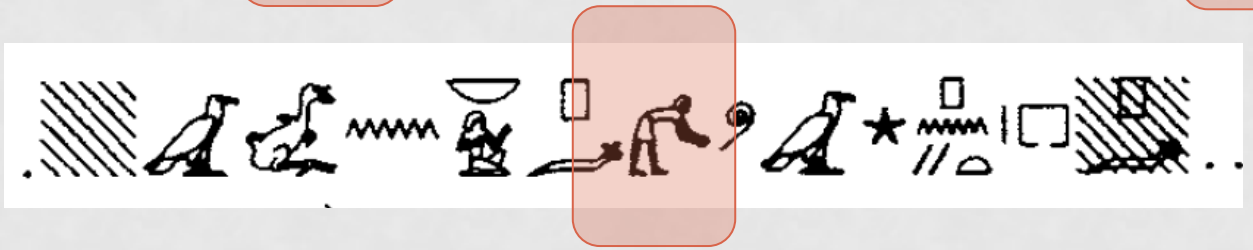
TYPES OF GRAPHEMIC VARIATIONS

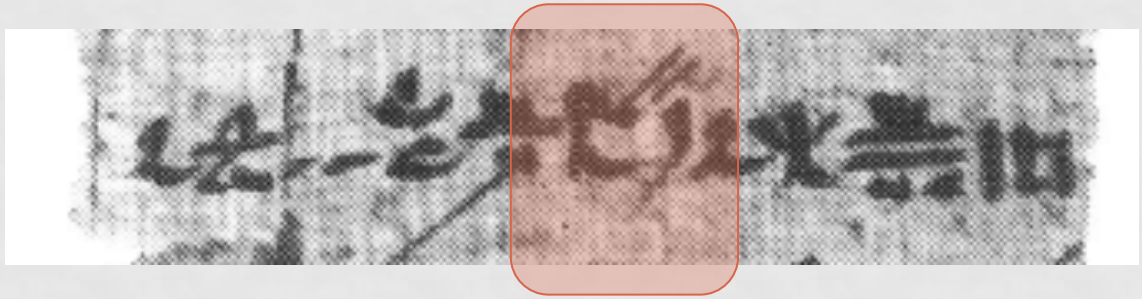
- P. Brooklyn 47.218.135, col. 2, l. 15



vs



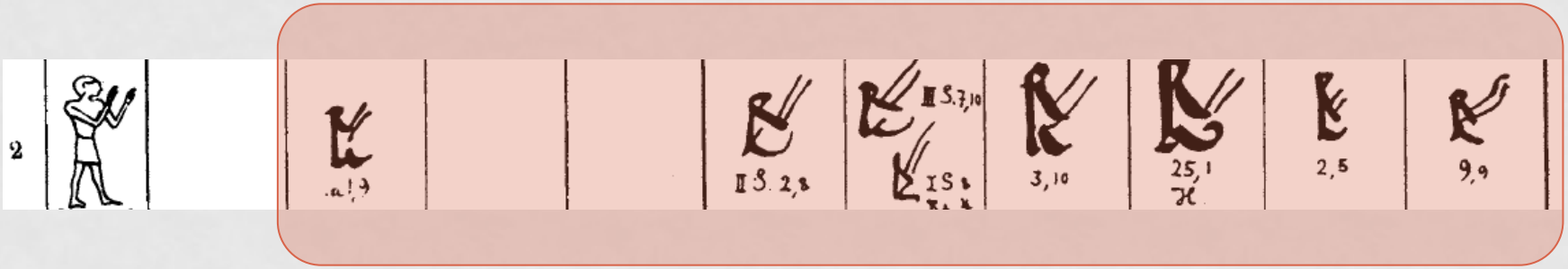




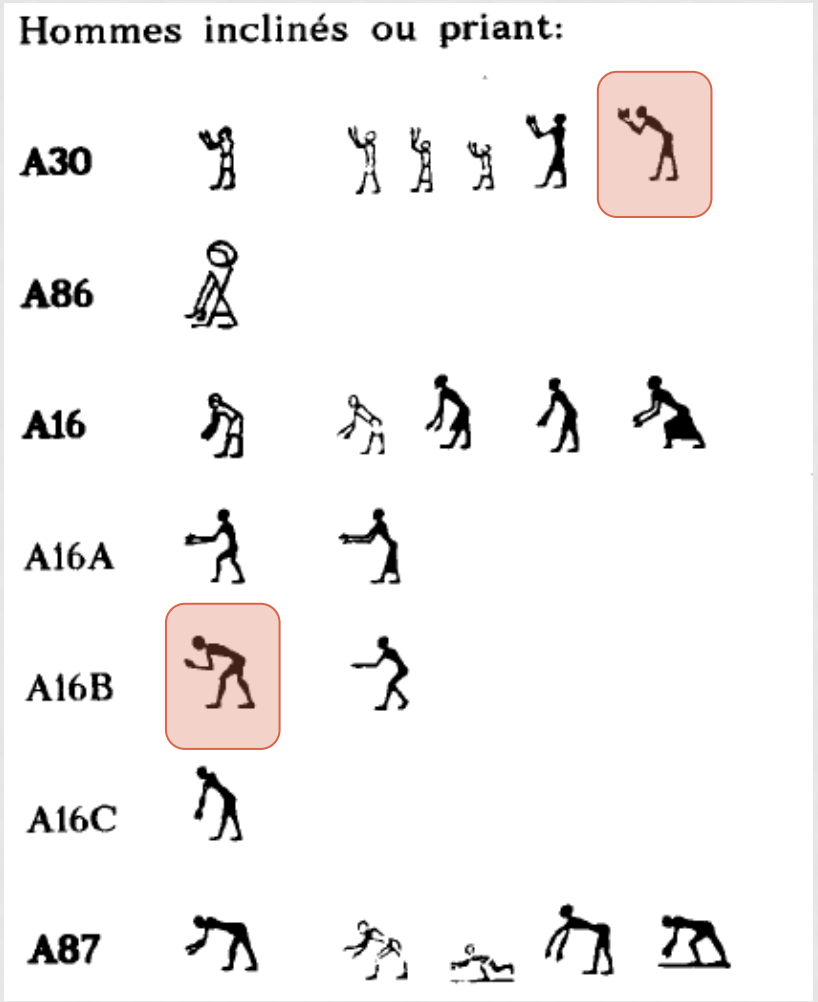
TYPES OF GRAPHEMIC VARIATIONS

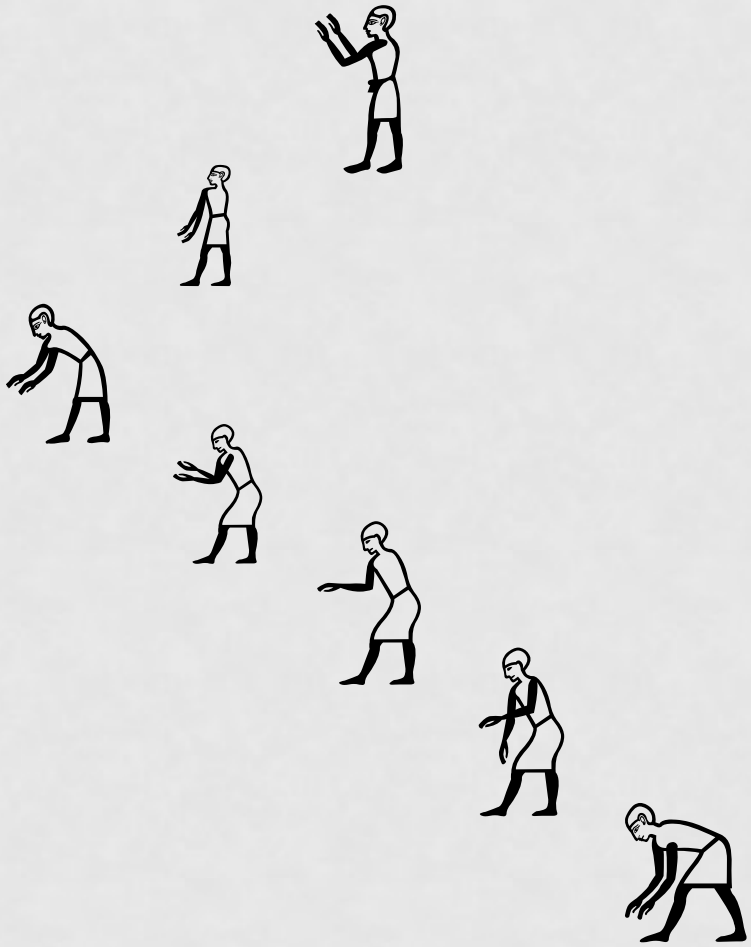
- P. Brooklyn 47.218.135, col. 2, l. 15

VS



TYPES OF GRAPHEMIC VARIATIONS





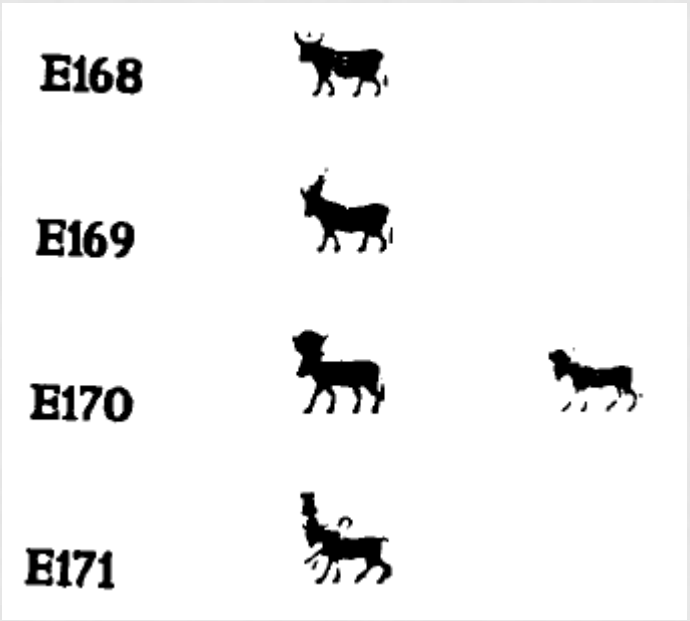
TYPES OF GRAPHEMIC VARIATIONS

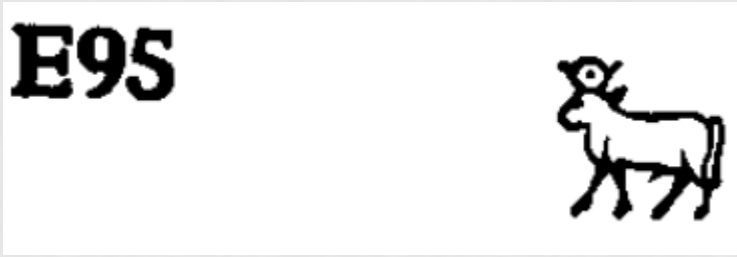
- Sources of graphemic variation
  - **The document**
  - **The edition**
  - **The encoding**
    - "the most similar sign" syndrome

TYPES OF GRAPHEMIC VARIATIONS

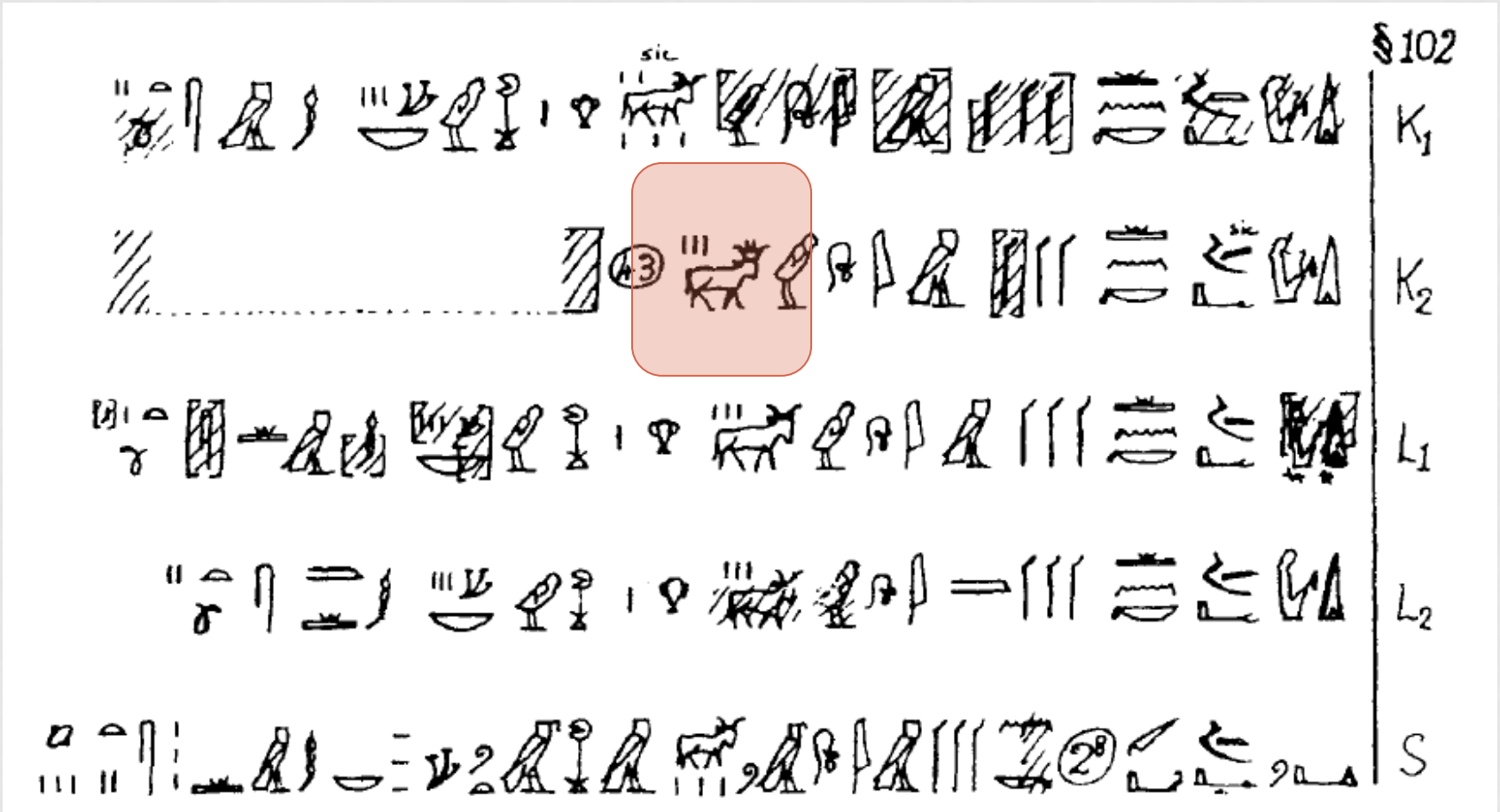
- E95 in *i3w* "oxen"

- E95 is a type of cow with the sun between its horns in the MdC

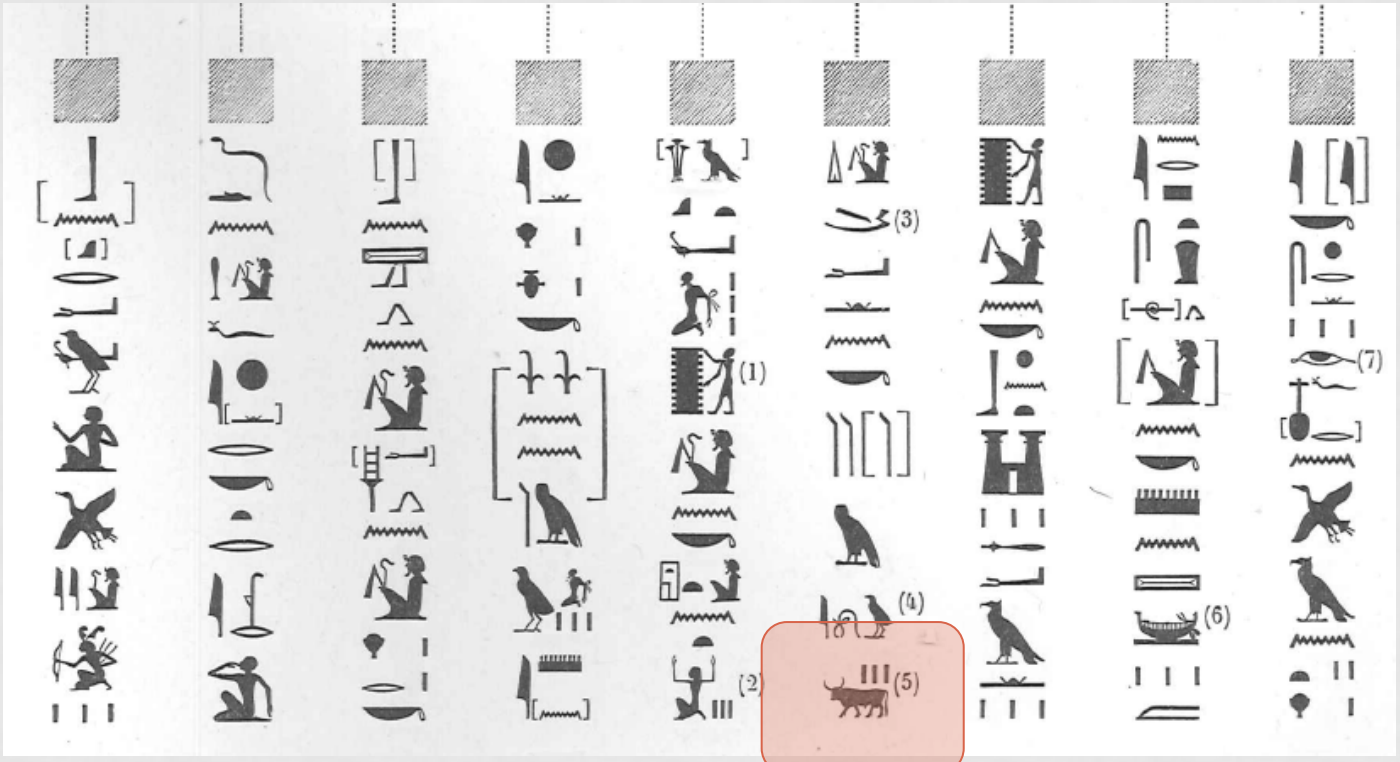




TYPES OF GRAPHEMIC VARIATIONS



TYPES OF GRAPHEMIC VARIATIONS



TYPES OF GRAPHEMIC VARIATIONS

(1) : le maçon n'escalade pas le mur, il a les deux pieds à terre.

(2) et non .

(3) Le signe est bien incliné, mais son extrémité pointue est à gauche.

(4) est petit comme à la colonne 21.

(5) On pourrait croire qu'il y a quatre paires de cornes et qu'on a affaire à un signe complexe comme , ou ; mais d'une part les pattes n'ont pas été multipliées et d'autre part il y a le signe du pluriel . Les traits entre les deux cornes sont en réalité un ornement composé, semble-t-il, de plumes d'autruche et qui est fréquent sous les XIX^{e} et XX^{e} dynasties (ex. : 1re cour du temple de Ramsès II à Abydos : MARIETTE, *Abydos*, II, pl. 10, en bas) pour les bœufs gras dans les cérémonies.

(6) Le déterminatif de *mnš* ressemble beaucoup à celui d'Abydos, col. 37 (cf. pl. VI, n° 7). Il est identique à celui de K 1, col. 25.

(7) Le cercle central (pupille et iris) est, comme partout dans ces textes, visible en entier.

TYPES OF GRAPHEMIC VARIATIONS

Fig. 1. Tombe thébaine n° 101 (Tjenro). Dessin d'après DAVIES-GARDINER, *Ancient Egyptian Paintings*, pl. 34.

Fig. 2. Tombe d'Amarna n°4. Dessin d'après DAVIES, *Amarna*, I, pl. XIV.

Fig. 3. Tombe d'Amarna n° 4. Dessin d'après DAVIES, *Amarna*, I, pl. XIV.

TYPES OF GRAPHEMIC VARIATIONS

Fig. 1. Tombe thébaine n° 101 (Tjenro). Dessin d'après DAVIES-GARDINER, *Ancient Egyptian Paintings*, pl. 34.

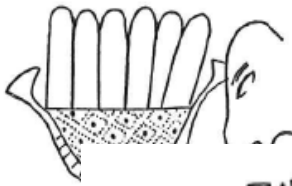


Fig. 2. n°4. De… *Am…*

Fig. 4. Tombe d'Amarna n°4. Dessin d'après DAVIES, *Amarna*, I, pl. XIV.

Fig. 5. Tombe d'Amarna, n°4. Dessin d'après DAVIES, *Amarna*, I, pl. XIV.

TYPES OF GRAPHEMIC VARIATIONS

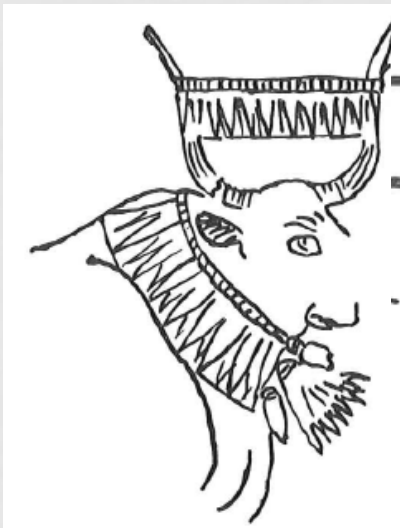
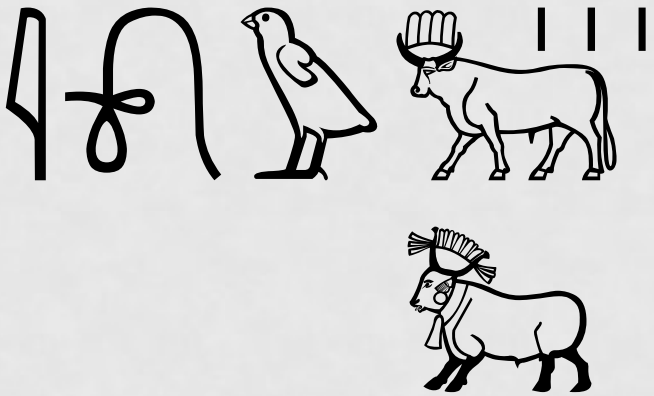


Fig. 1. Tombe thébaine n° 1
(Tjenro). Dessin d'après Davie
Gardiner, *Ancient Egypti*
Paintings, pl. 34.

Fig. 7. Tombe thébaine n° 40 (Houy). Dessin d'après Gardiner-Davies, *Tomb of Huy*, pl. XXX.

Tombe d'Amarna,
sin d'après Davies,
rna, I, pl. XIV.

TYPES OF GRAPHEMIC VARIATIONS



⇒ Not in the MdC
⇒ No reference or documentation available

TYPES OF GRAPHEMIC VARIATIONS

- Sources of graphemic variation
  - **The document**
  - **The edition**
  - **The encoding**
  - **The Manuel de Codage**

TYPES OF GRAPHEMIC VARIATIONS

- Lack of explanations in the MdC: the sign for *sn*
  - Gardiner ([3]1957 : 512) distinguishes T22 from a variant T23

22 two-barbed arrow-head[1] Ideo. in *snw*, O.K. var. ,[2] 'two' and in related words like *sn* (*ś*n) 'brother'. Hence phon. *sn* (*ś*n),[2a] exx. [3] *sn* (*ś*n), var. Pyr. [4] *śin*, 'smell', 'kiss'; *sntr* 'incense'.

[1] Not a spear-head, but an arrow-head, SCHARFF 33; among earliest exx. (PETR. *Eg. Hier.* 753–6) is one with quite short shaft; for later lengthening cf. the sign for 'foot' (D 58); the two barbs yield the notion of duality, contrast the sign for 'one' (T 21), *ÄZ.* 47, 36. [2] *Urk.* i. 147, 3. [2a] For *ś* see *śnt* 'loose', *Pyr.* 1100. [3] So already *Pyr.* 1323. [4] *Pyr.* 1027, unless a different word.

23 [1] alternative form of last (Dyn. XVIII) Use as last.

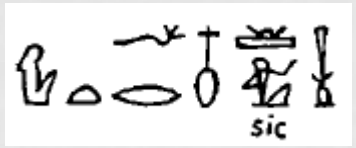
[1] Ex. *Th. T.S.* iii. 21.

TYPES OF GRAPHEMIC VARIATIONS

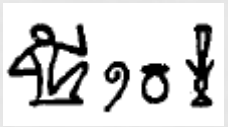
- Lack of explanations in the MdC: the sign for *sn*
  - Gardiner ([3]1957 : 512) distinguishes T22 from a variant T23

T22
O. Berlin P 12376, v° 1

T22A
P. D'Orbiney, 1,1 (*LES* 9,10)

T22B


O. DeM 209, r° 4

T22C

P. Genève D407, 8 (= *LRL* 14,9)

HOW TO STANDARDIZE THE ENCODING OF HIEROGLYPHS

IN ANNOTATED CORPORA?

PRINCIPLES OF NORMALIZATION?

Ideally, the encoding of hieroglyphs should be:

- reproducible
- economic
- no loss of (linguistic) information

The big question is:

- What is meaningfull and what is not?

Proposal:

- Take into account the function of hieroglyphic signs

PRINCIPLES OF NORMALIZATION?

The hieroglyphic sign functions

- See Polis & Rosmorduc (2015)

	+ SEMOGRAM		– SEMOGRAM
AUTONOMOUS	Pictogram	Logogram	Phonogram
NON-AUTONOMOUS	Classifier	Radicogram	Interpretant
	– PHONEMOGRAM	+ PHONEMOGRAM	

Fig. 10 A taxonomy of the hieroglyphic sign functions

PRINCIPLES OF NORMALIZATION?

The hieroglyphic sign functions

- See Polis & Rosmorduc (2015)
- The square of hieroglyphic sign functions (Schenkel 1997; Kammerzell 2004: 151; Lincke 2011: 3; Lincke & Kammerzell 2012)

	+ signified	**- signified**
+ autonome	Logogram	Phonogram
- autonome	Classifier	Interpretant (« complément phonétique »)
	Semogram	**Phonogram**

PRINCIPLES OF NORMALIZATION?

The hieroglyphic sign functions

- See Polis & Rosmorduc (2015)
- The square of hieroglyphic sign functions (Schenkel 1997; Kammerzell 2004: 151; Lincke 2011: 3; Lincke & Kammerzell 2012)

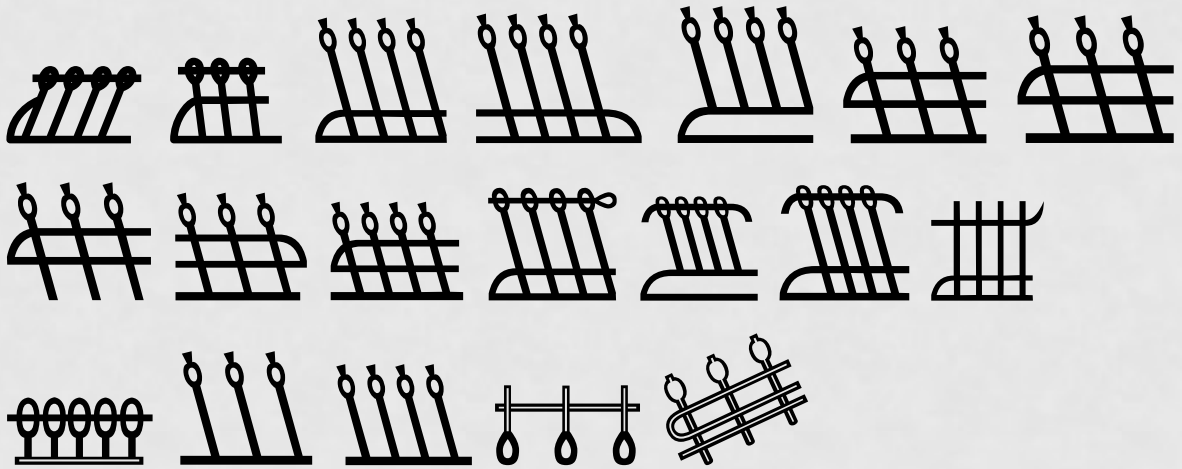
	+ signified	**- signified**
+ autonome	Logogram	Phonogram
- autonome	Classifier	Interpretant (« complément phonétique »)
	Semogram	**Phonogram**

- **Observation 1**. Whatever its shape, form, etc. a hieroglyphic sign used as a ***phonogram*** is unable to modify the meaning or reference of a word in context.

PRINCIPLES OF NORMALIZATION?

The sign *šsp* (O 42)

- Very many variants in the MdC

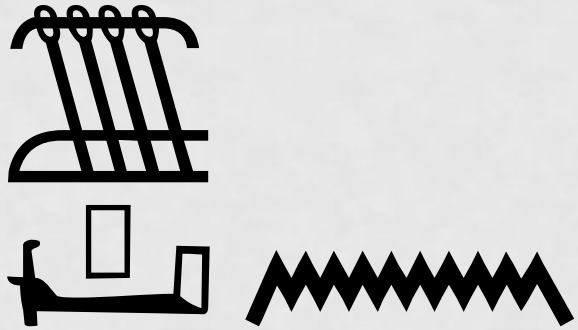


- Do they cover all the variants attested in our documents?
- Are they relevant and meaningful for annotated corpora?

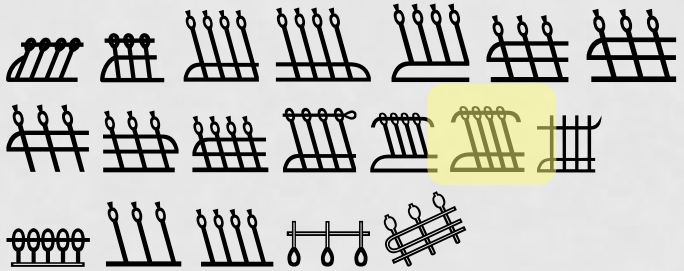
PRINCIPLES OF NORMALIZATION?

The sign *šsp* (O 42)

- *Medinet Habou, pl. 45, col 8*



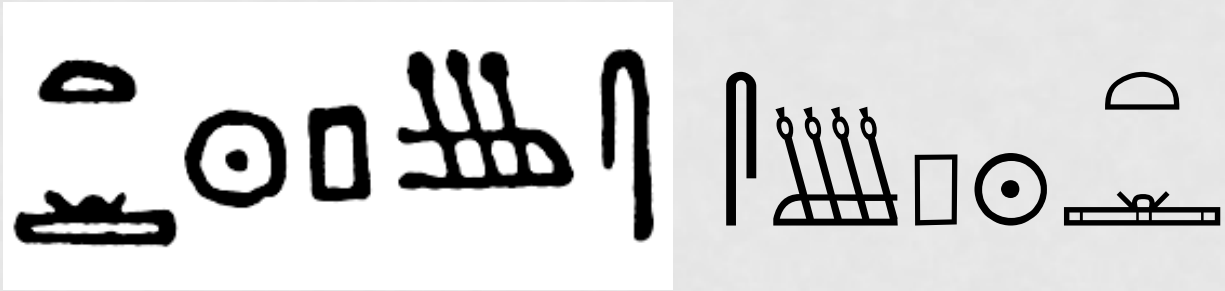
- O42K = a quite good approximation

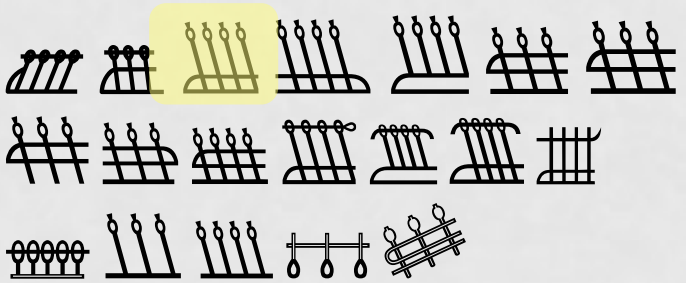


PRINCIPLES OF NORMALIZATION?

The sign *šsp* (O 42)

- *P. Chester Beatty 1, pl. XXII, l. 2*





PRINCIPLES OF NORMALIZATION?

The hieroglyphic sign functions

- See Polis & Rosmorduc (2015)
- The square of hieroglyphic sign functions (Schenkel 1997; Kammerzell 2004: 151; Lincke 2011: 3; Lincke & Kammerzell 2012)

	+ signified	**- signified**
+ autonome	Logogram	Phonogram
- autonome	Classifier	Interpretant (« complément phonétique »)
	Semogram	**Phonogram**

- **Observation 1**. Whatever its shape, form, etc. a hieroglyphic sign used as a ***phonogram*** is unable to modify the meaning or reference of a word in context.
- **Proposal 1**. A single standard code should be used for all these uses.

PRINCIPLES OF NORMALIZATION?

The hieroglyphic sign functions

- See Polis & Rosmorduc (2015)
- The square of hieroglyphic sign functions (Schenkel 1997; Kammerzell 2004: 151; Lincke 2011: 3; Lincke & Kammerzell 2012)

	+ signified	**- signified**
+ autonome	Logogram	Phonogram
- autonome	Classifier	Interpretant (« complément phonétique »)
	Semogram	**Phonogram**

PRINCIPLES OF NORMALIZATION?

The hieroglyphic sign functions

- See Polis & Rosmorduc (2015)
- The square of hieroglyphic sign functions (Schenkel 1997; Kammerzell 2004: 151; Lincke 2011: 3; Lincke & Kammerzell 2012)

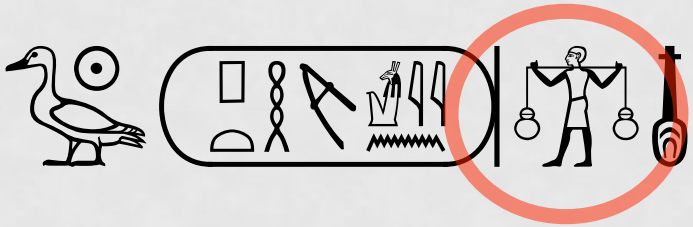
	+ signified	**- signified**
+ autonome	Logogram	Phonogram
- autonome	Classifier	Interpretant (« complément phonétique »)
	Semogram	**Phonogram**

- **Observation 2**. A hieroglyphic sign used as a semogram, because of its potential iconic link with the meaning/referent of the word, can modify the meaning or reference of a word in context.

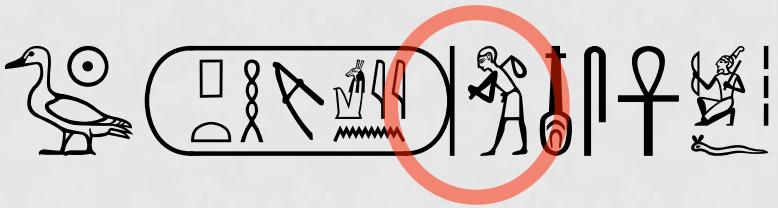
PRINCIPLES OF NORMALIZATION?

Complex semogram

- Logogram in the Kanaïs inscription

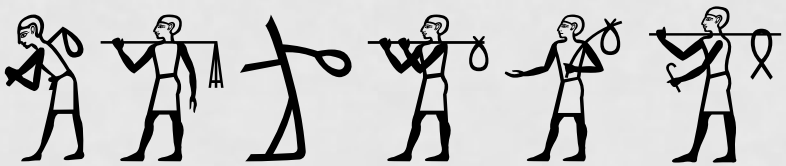


Water carrier A344



Normalized encoding

Variants of the herdsman:
A33, A33A... et A383



PRINCIPLES OF NORMALIZATION?

The hieroglyphic sign functions

- See Polis & Rosmorduc (2015)
- The square of hieroglyphic sign functions (Schenkel 1997; Kammerzell 2004: 151; Lincke 2011: 3; Lincke & Kammerzell 2012)

	+ signified	**- signified**
+ autonome	Logogram	Phonogram
- autonome	Classifier	Interpretant (« complément phonétique »)
	Semogram	**Phonogram**

- **Observation 2**. A hieroglyphic sign used as a semogram, because of its potential iconic link with the meaning/referent of the word, can modify the meaning or reference of a word in context.
- **Proposal 2**. Meaningful variants of semograms should be coded in annotated corpora

TOWARDS A SHARED REPOSITORY

THE *THOT* SIGN-LIST

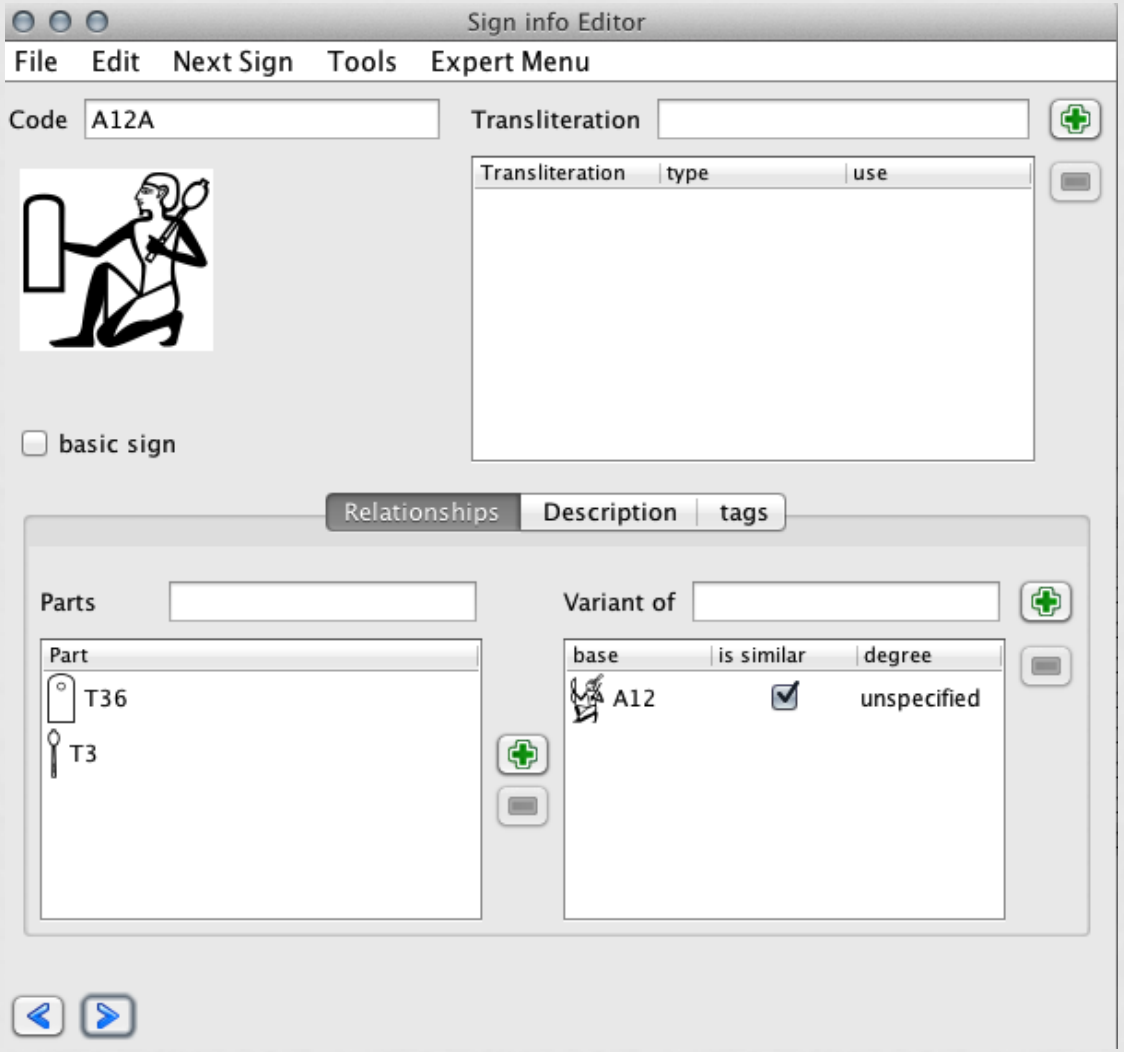
TOWARDS THE *THOT* SIGN-LIST

Requisite 1. Each sign has to be

- **Described**
  - Functions
  - Distinctive iconic features (so as to limit the number of variants) with a controlled vocabularies :
    - Units - principle of the Unicos (R. Vergnieux)

    - Predicates (« holding », « wearing », etc.)

TOWARDS THE *THOT* SIGN-LIST



TOWARDS THE *THOT* SIGN-LIST

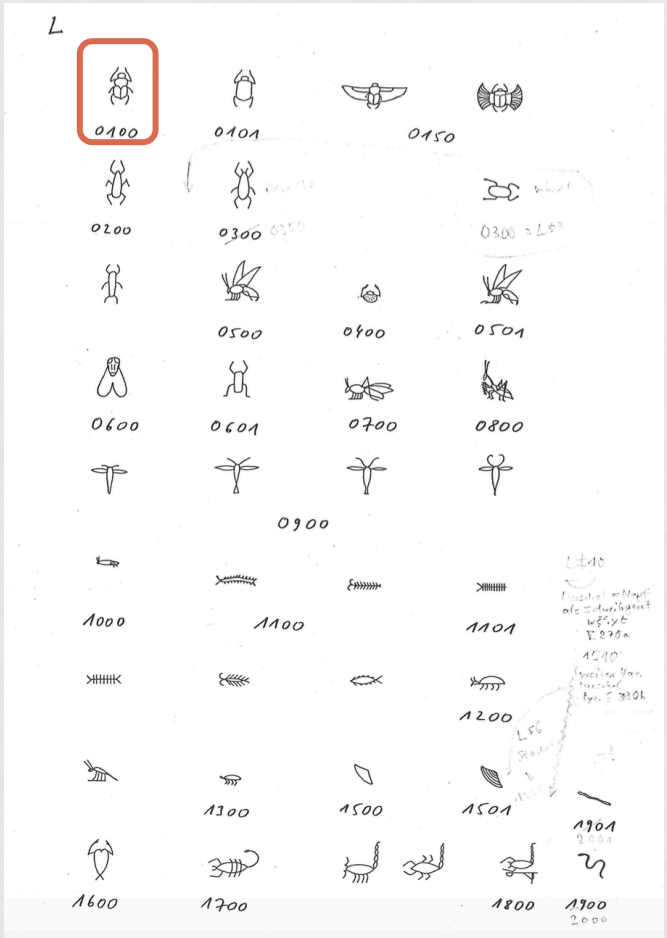
Requisite 1. Each sign has to be

- **Described**
  - Functions
  - Distinctive iconic features (so as to limit the number of variants) with a controlled vocabularies :
    - Units - principle of the Unicos (R. Vergnieux)

    - Predicates (« holding », « wearing », etc.)
- **… and referenced: link to publication (pictures and/or facsimiles)**

TOWARDS THE *THOT* SIGN-LIST

Hornung & Schenkel's sign-list

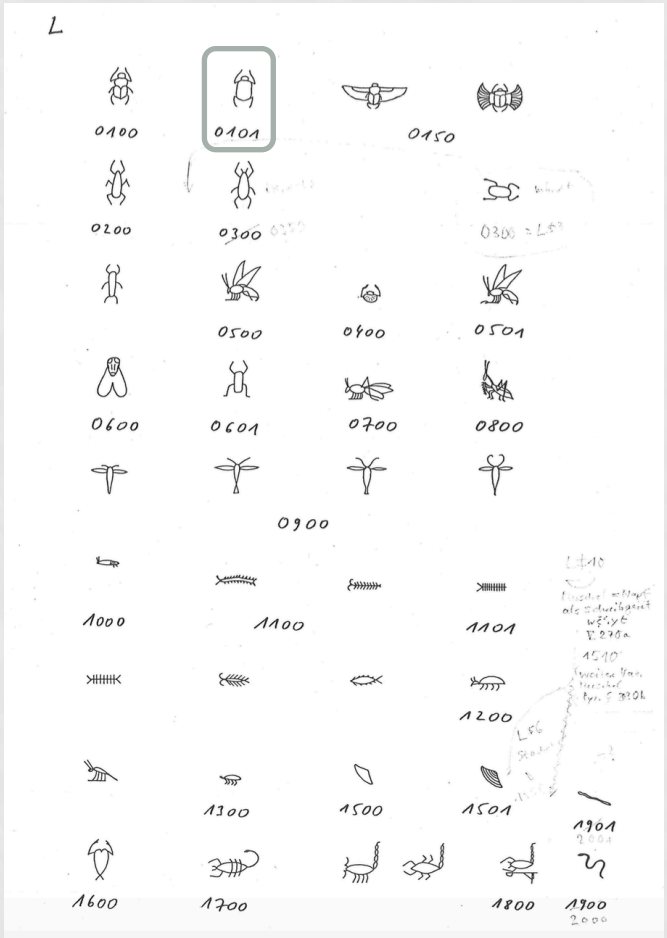


L: Insekten, etc.

0100	Skarabäus	**L 1**
0101	(ohne Mittelbeine)	Med.Habu I 24:3
0150	Geflügelter Skarabäus	Wb I 179; Drioton, ASAE 44,1944,112
0200	Agrypnus-Käfer	Wb I 204; Keimer, ASAE 31,1931,174ff.
0300	mht-Käfer	CT VI 302f
0350	jkw-t'-Käfer	CT VII 37m
0400	Käferkopf	Piankoff, Chapelles...Tout-Ankh-Amon pl.IV Mitte
0500	Biene	**L 2**
0501	("Kralle vorne")	Med.Habu I 16:17. 22:29. 26:21 Biene im Haus siehe O
0600	Fliege	**L 3**
0601	(ohne Flügel)	CT VII 53c
0700	Heuschrecke	**L 4**
0800	Gottesanbeterin	Otto, Mundöffnung I 28f.; II 56 Nr.7
0900	Schmetterling?	Wb III 422,7; Keimer, ASAE 34,204f.
1000	Δspr-Insekt	CT VI 302e
1100	Tausendfuß	**L 5**
1101	(schematisch)	Wb III 441
1200	Laus	CT II 94a; V 281c
1300	Floh	CT I 215f
1500	Muschel	**L 6**
1501	(mit Innenzeichnung)	Wb III 218,17; Junker, Giza IX 44
1600	Wasserskorpion (Nepa)	**L 7**; von Känel, La nêpe et le scorpion Wasserskorpion im Haus siehe O
1700	Skorpion	Wb I 351; CT VI 124g
1710	(mit Rollsiegel)	Saqqara Tombs I (1984) pl. 28 f.
1800	Skorpion auf Standarte	Petrie, Gizeh and Rifeh pl.XIII,G
1900	Skorpionpaar	Beni Hasan I pl.7, links
2000	Wurm	Wb I 498,5
2001	(gerade)	CT IV 1b

TOWARDS THE *THOT* SIGN-LIST

Hornung & Schenkel's sign-list

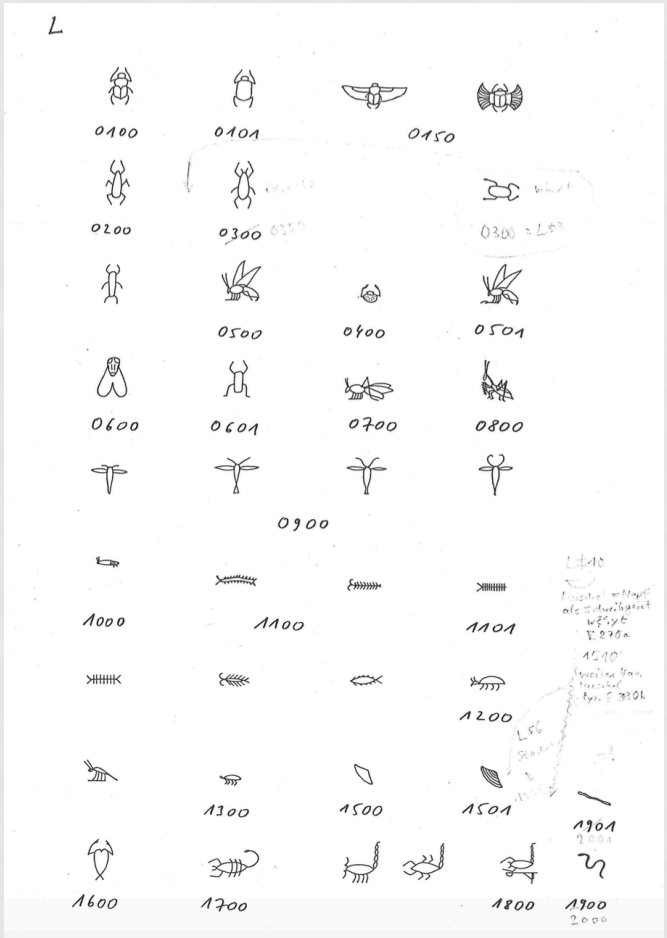


L: Insekten, etc.

0100	Skarabäus	**L 1**
0101	(ohne Mittelbeine)	Med.Habu I 24:3
0150	Geflügelter Skarabäus	Wb I 179; Drioton, ASAE 44,1944,112
0200	Agrypnus-Käfer	Wb I 204; Keimer, ASAE 31,1931,174ff.
0300	mht-Käfer	CT VI 302f
0350	jkw-t'-Käfer	CT VII 37m
0400	Käferkopf	Piankoff, Chapelles...Tout-Ankh-Amon pl.IV Mitte
0500	Biene	**L 2**
0501	("Kralle vorne")	Med.Habu I 16:17. 22:29. 26:21 Biene im Haus siehe O
0600	Fliege	**L 3**
0601	(ohne Flügel)	CT VII 53c
0700	Heuschrecke	**L 4**
0800	Gottesanbeterin	Otto, Mundöffnung I 28f.; II 56 Nr.7
0900	Schmetterling?	Wb III 422,7; Keimer, ASAE 34,204f.
1000	Δspr-Insekt	CT VI 302e
1100	Tausendfuß	**L 5**
1101	(schematisch)	Wb III 441
1200	Laus	CT II 94a; V 281c
1300	Floh	CT I 215f
1500	Muschel	**L 6**
1501	(mit Innenzeichnung)	Wb III 218,17; Junker, Giza IX 44
1600	Wasserskorpion (Nepa)	**L 7**; von Känel, La nêpe et le scorpion Wasserskorpion im Haus siehe O
1700	Skorpion	Wb I 351; CT VI 124g
1710	(mit Rollsiegel)	Saqqara Tombs I (1984) pl. 28 f.
1800	Skorpion auf Standarte	Petrie, Gizeh and Rifeh pl.XIII,G
1900	Skorpionpaar	Beni Hasan I pl.7, links
2000	Wurm	Wb I 498,5
2001	(gerade)	CT IV 1b

TOWARDS THE *THOT* SIGN-LIST

Hornung & Schenkel's sign-list



L: Insekten, etc.

0100	Skarabäus	**L 1**
0101	ohne Mittelbeine)	Med.Habu I 24:3
0150	Geflügelter Skarabäus	Wb I 179; Drioton, ASAE 44,1944,112
0200	Agrypnus-Käfer	Wb I 204; Keimer, ASAE 31,1931,174ff.
0300	mht-Käfer	CT VI 302f
0350	ikw-t°-Käfer	CT VII 37m
0400	Käferkopf	Piankoff, Chapelles...Tout-Ankh-Amon pl.IV Mitte
0500	Biene	**L 2**
0501	("Kralle vorne")	Med.Habu I 16:17. 22:29. 26:21
		Biene im Haus siehe O
0600	Fliege	**L 3**
0601	(ohne Flügel)	CT VII 53c
0700	Heuschrecke	**L 4**
0800	Gottesanbeterin	Otto, Mundöffnung I 28f.; II 56 Nr.7
0900	Schmetterling?	Wb III 422,7; Keimer, ASAE 34,204f.
1000	Δspr-Insekt	CT VI 302e
1100	Tausendfuß	**L 5**
1101	(schematisch)	Wb III 441
1200	Laus	CT II 94a; V 281c
1300	Floh	CT I 215f
1500	Muschel	**L 6**
1501	(mit Innenzeichnung)	Wb III 218,17; Junker, Giza IX 44
1600	Wasserskorpion (Nepa)	**L 7**; von Känel, La nêpe et le scorpion
		Wasserskorpion im Haus siehe O
1700	Skorpion	Wb I 351; CT VI 124g
1710	(mit Rollsiegel)	Saqqara Tombs I (1984) pl. 28 f.
1800	Skorpion auf Standarte	Petrie, Gizeh and Rifeh pl.XIII,G
1900	Skorpionpaar	Beni Hasan I pl.7, links
2000	Wurm	Wb I 498,5
2001	(gerade)	CT IV 1b

TOWARDS THE *THOT* SIGN-LIST

- **Advantages**
  - Methodologically
    - Hieroglyphic signs can receive arbitrary IDs
    - A way out of hierarchical taxonomies => reticular (i.e. network-like) organization of the sign-list
  - Practically
    - Easy to find a sign based on its functions and components.

TOWARDS THE *THOT* SIGN-LIST

Requisite 2. Attribute for the degree of abstraction between token et type

Token Type

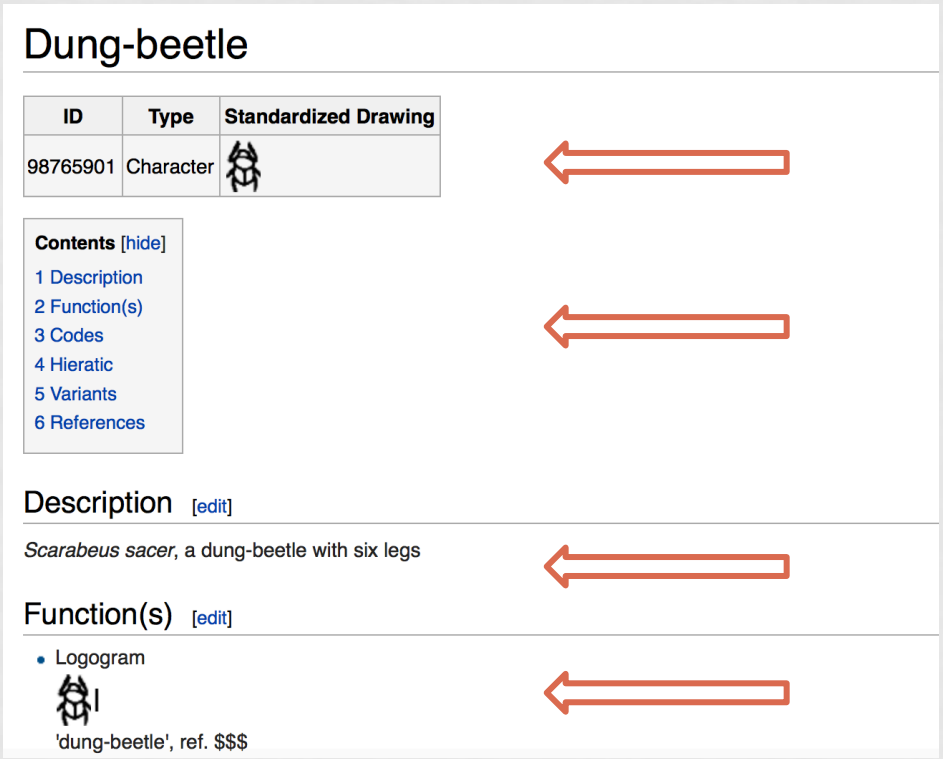
	Glyph	Class	Character
Distinctive criterion	Morphological	Iconic	Functional
Description	Stylistic (« Courbure prononcée du dos »)	Controlled vocabulary	Phonogram with the value *šsp*

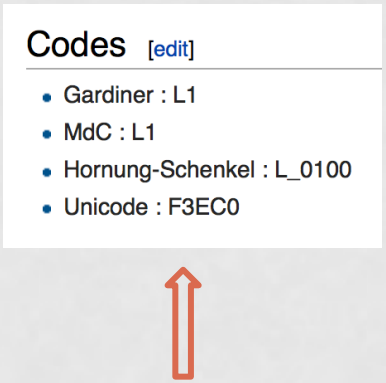
TOWARDS THE *THOT* SIGN-LIST

- **Advantages**
  - The degree of normalization is explicit (very useful for encoding and queries)
  - The hierarchical links between signs are explicit
  - The encoding is not polluted by the multiplication of variants

TOWARDS THE *THOT* SIGN-LIST

Requisite 3. The sign-list should be shared and enriched by the various projects of annotated hieroglyphic texts





THANKS !