On signs, lists and standardisation

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Abstract
To make hieratic texts more accessible and readable, Egyptologists usually transcribe them into hieroglyphs. But to what extent are our hieroglyphic signs-lists and fonts actually appropriate to represent hieratic script? In the scientific analysis of hieratic texts, the experience is that hieroglyphic fonts often do not offer adequate font-types for the signs encountered. The question then arises whether we develop new font-types to add to the hieroglyphic repertoire for signs, which as hieroglyphs in fact do not exist, or whether, especially considering we live in a digital age, the time has come to analyze hieratic script in its own right and come up with a repertoire and font specifically fit it? How could or should such a repertoire and font be organized? Proposals for a reorganization of the hieroglyphic repertoire seem to have much in common with a structure for the hieratic repertoire AKU is currently developing. The paper presents work in progress, one year after the start of the AKU-Project.

This paper is written within the framework of the AKU project[1] and with reference to setting-up and organizing a database for the hieratic script. It specifically concerns hieratic signs as part of sign-lists, which classify and codify them to give them a fixed and meaningful place in a structured sign-system that Egyptologists use for reference in their work. We focus especially on the questions of "Which signs do we include in a basic sign-repertoire of the hieratic script" and "How do we organize this basic repertoire?". The paper is structured in three parts. In the first part, I discuss the current state of the art: we have a collection of sign-lists, palaeographies, repertoires and fonts in print as well as in digital form. What is their value in developing a standardised, well-structured and documented digital palaeography of hieratic? In the second part, I address some specific problems that the organization of such a palaeography brings along. In the third part, I specify how we can proceed to meet our needs, for in order to arrive at a digital palaeography, we cannot simply digitize the palaeographies we have. We need a different set-up. Several proposals for reorganizing the hieroglyphic repertoire have been made, which to a large extent correspond to the proposal AKU is developing for the hieratic repertoire.

1 „Altägyptische Kursivschriften. Digitale Paläographie und systematische Analyse des Hieratischen und der Kursivhieroglyphen"; Akademie der Wissenschaften und der Literatur Mainz; Ltg. U. Verhoeven-van Elsbergen; http://aku.uni-mainz.de [5.8.2017]. Literature: Gülden, Krause & Verhoeven, in: Busch, Fischer & Sahle (edd.), *Kodikologie und Paläographie* 4, 2017, 253-273; Gülden, *Ein „nouveau Möller"?*; Gülden & Van der Moezel, in: Naether & Berti (edd.), *Altertumswissenschaften*.

The state of the art in a nutshell

Almost every grammar of Middle Egyptian has a sign-list (not per definition a list identical to others) and almost every publication of a hieratic papyrus has a palaeography. The numerous lists and palaeographies we have may be extensive, such as *Hieroglyphica*[2], the font to *Manuel de Codage*, or Möller's *Hieratische Paläographie*[3], but others are relatively concise and cover one source, a small group of sources, or one handwriting only. As to the organization of the signs and the overall structure of the lists, palaeographies tend to make use of one of roughly three models. The choice for each of them certainly is understandable, although each model has its disadvantages when it comes to a scientific analysis of the data:

1. Most palaeographies follow Gardiner's classification: his taxonomic classes ("Man", "Woman", "Mammals", "Trees and Plants", etc.) as well as his codes. For signs that Gardiner does not cover codes from the Extended Library in *Hieroglyphica* or from the text processing software *JSesh*[4] are used. Gardiner's classification and coding system is well-known, widespread, and for those reasons user-friendly, but its use for palaeographic work, whether of hieroglyphic or hieratic nature, has been rightly criticized: 1) the corpus is hardly documented, 2) it was developed as a pedagogical tool, and can only be used as such, not as a scientific tool for palaeographic analysis in grammatological context, and 3) with almost 800 signs Gardiner's original corpus is small, which leads to discrepancies in the encoding of signs as not enough or no adequate font-types are available.[5] The extensions in *Hieroglyphica* and *JSesh* include, of course, more signs, but again they are mainly undocumented and moreover biased towards the Late and Graeco-Roman periods.[6] For hieratic palaeographies there is the additional problem that the fonts in Gardiner, *Hieroglyphica* and *JSesh* were all developed for a different script (i. e. hieroglyphic) with a different repertoire of signs.
2. Few palaeographies follow Möller's codes and classification (e. g. Munro[7]). More frequently, palaeographies are structured on Gardiner's classification system, but use Möller codes to complement the codes from Gardiner and the

2 Grimal, Hallof & Van der Plas, *Hieroglyphica*.
3 Möller, *Paläographie*.
4 https://jsesh.qenherkhopeshef.org/ [5.8.2017].
5 Meeks, in: *Document numérique* 16, n° 3, 2013, 33. Also Polis & Rosmorduc, in: *ibid*., 49.
6 The IFAO needed a hieroglyphic font especially for the publication of the Edfu and Dendara temples. Meeks, in: *Document numérique* 16, n° 3, 2013, 33; Polis & Rosmorduc, in: *ibid*., 49.
7 Munro, *Totenbuch Jah-mes*, 4–10 (fig. 1–7).

Extended Library. A direct link to Möller's standard work may be helpful to the student of hieratic, yet the use of two different classification and coding systems can lead to complexities. The danger is to consider Möller's codes as a way out in the case of hieratic forms, the interpretation of which is not entirely clear or does not coincide with the graphic representation of a type-set character in Gardiner or the Extended Library. A somewhat confusing mix of Möller's codes and hieroglyphic transcriptions with Gardiner's coding and classification system is seen in Goedicke's palaeography[8]: signs are coded according to Gardiner, according to Gardiner and Möller, only according to Möller, or not at all when no satisfying match could be found (fig. 1). The signs with only a Möller code or without a code are included within the taxonomic classes taken from Gardiner, either at the end of each class or at those places within the class, where Goedicke's *hieroglyphic* transcriptions visually resemble the other *hieroglyphic* transcriptions based on Gardiner and Möller best. This practice has little to do with the hieratic nature of the data and it shows the struggles when attempting to mold the hieratic data into the structure of hieroglyphic sign-lists.

3. Finally, there are palaeographies that are structured on the basis of a classification and coding system that is developed by the palaeographer him- or herself. They mainly concern small repertoires of signs from one source or a small group of sources. An example is the palaeography of a group of papyri connected to the domain of Amon by Gasse[9], who organized the signs in form-groups ("Signes à axe vertical", "Signes pourvus d'une barre oblique", "Signes composites à deux verticales", etc.). However, these classes are in many cases ambiguous and they are formed on the basis of the hieroglyphic transcriptions instead of the hieratic forms themselves. Another example is the palaeography of *Tongefäßscherben* by Sethe[10] in which first the monoconsonantal signs (including their combinations) are organized according to value and structured according to the order in the *Wörterbuch*, after which the remaining signs are listed in the order of the known taxonomic classes without, however, using any codes: only hand drawn hieroglyphs identify the hieratic forms.[11]

8 Goedicke, *Paleography*.

9 Gasse, *Données nouvelles* I, 237–244, pl. 1–26.

10 Sethe, *Ächtung feindlicher Fürsten*, pl. 2–9.

11 Linking hieratic forms directly to their value by structuring them according to this value is not such a crazy idea as it stays true to the nature of the hieratic data: rather than saying "this hieratic form is that hieroglyphic sign", we can avoid the discrepancies and say "this hieratic form has that value". Yet, doing this only for part of the list degrades its systematicity and coherence. Then again, structuring the entire list on the basis of value would be illogical due to the large degree of similarity among hieratic forms that can have a multitude of values.

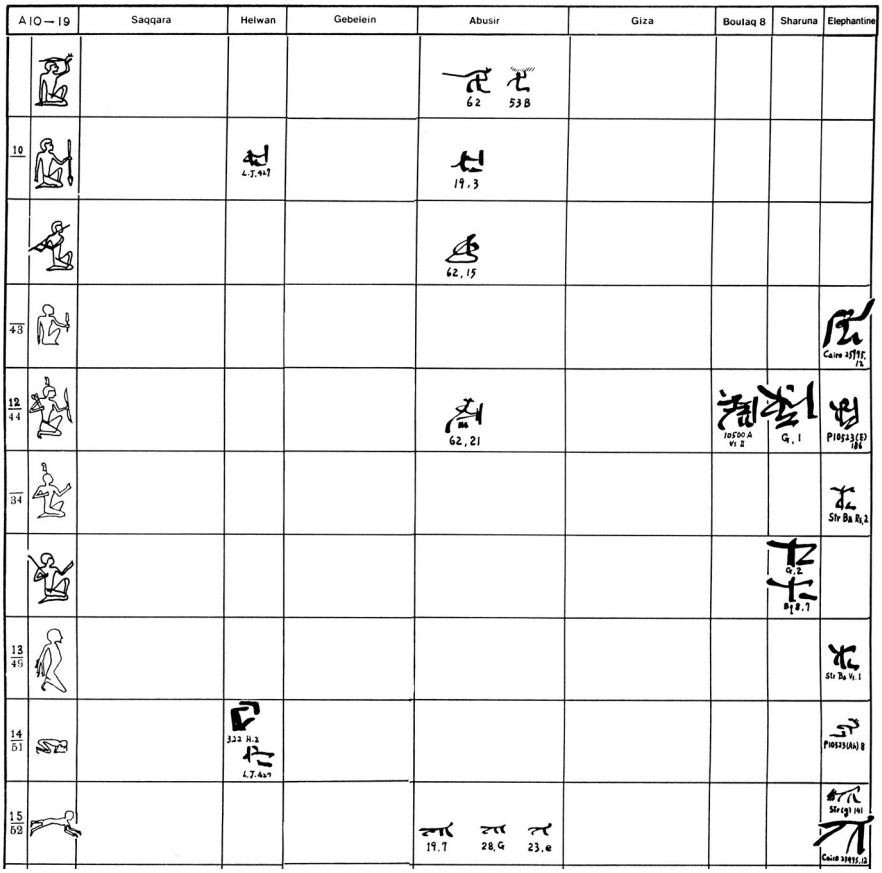

Fig. 1: Section from Goedicke, *Paleography*, p. 2a, showing signs numbered with Gardiner codes (above the line), Möller codes (below the line), both Gardiner and Möller codes, or no codes at all.

Clearly, palaeographers struggle with the organization and transcription of hieratic signs, but all, including Möller, have one thing in common: they classify and codify hieratic forms on the basis of the hieroglyphs that have been selected for their transcription.

Naturally, when publishing a palaeography on paper, one lacks certain possibilities that the digital age offers: one can collect and publish only a limited number of signs and sign-forms and the structure of the list cannot be adapted afterwards. In a database we can process and systematically study large amounts of data and accommodate them in a comprehensive overview that can be adapted to the needs and nature

of the data as well as to the needs of the researcher or user. We can accommodate as many signs and sign-forms as time allows us to study.[12] This means that we have the possibility to make an inventory of the hieratic script and subsequently develop a repertoire and font that can be used in palaeographies and text encoding databases and that overcome the discrepancies in transcription; that is, a repertoire and font that are developed on the basis of analysis of the hieratic script itself. Currently, databases that attempt to encode hieratic texts (in addition to hieroglyphic texts), such as the *TLA*[13] and *Projet Ramsès*[14], still have to rely on the available hieroglyphic fonts. That this is problematic is described by *Projet Ramsès* as follows: when encoding hieroglyphic texts, the lack of adequate hieroglyphic variations leads to discrepancies, because arbitrary choices have to be made on the basis of visual resemblance. On the other hand, when encoding hieratic texts, it is precisely the abundance of unnecessary hieroglyphic variations that causes different encoders to make different choices in the transcription, that is, again leads to discrepancies in the encoding.[15] The available hieroglyphic fonts are first of all *Manuel de Codage/Hieroglyphica* and *Unicode*. From the 1980's onwards, these fonts were collected, published and elaborated, and both now include a considerable number of hieroglyphic signs. However, their font-types were largely adopted directly from older fonts without any modification (the Theinhardt font[16], Gardiner,[17] IFAO[18]). They are therefore normalizations of fonts already normalized: the composers had in fact no idea about the "traits distinctifs" and the origins of the signs.[19] At the core of the problem lies the lack of documentation in the older fonts as a result of which signs and variations could not be verified, and this lack was not at all redressed: nothing explains where the font-types in *Manuel de Codage*/*Hieroglyphica* and *Unicode* come from or why specifically these types were included.[20] A further problem is that the structure of both lists is based

12 Gülden & van der Moezel, in: Naether & Berti (edd.), *Altertumswissenschaften*; Gülden, Krause & Verhoeven, in: Busch, Fischer & Sahle (edd.), *Kodikologie und Paläographie* 4, 2017, 253-273; Gülden, *Ein „nouveau Möller"?*. For details on this topic, see the contribution by Svenja A. Gülden in this volume.

13 http://aaew2.bbaw.de/tla/servlet/S05?d=d001&h=h001 [8.8.2017].

14 http://ramses.ulg.ac.be/site/aboutRamses [8.8.2017].

15 Polis & Rosmorduc, in: *Document numérique* 16 n° 3, 2013, 52-53, the examples presented under §§ 3.2.3, 4.1.1, 4.1.2.

16 *Liste Theinhardt*: https://archive.org/details/listederhierogl00theigoog [7.8.2017].

17 Gardiner, *Egyptian Grammar*, 442–548.

18 Cauville, Devauchelle & Grenier, *Catalogue*.

19 Meeks, in: *Document numérique* 16 n° 3, 2013, 35; the quote comes from Polis & Rosmorduc, in: *ibid.*, 50. Meeks speaks of the inclusion of many "*signes fantômes*" in the fonts. More technical limitations of *Manuel de Codage* and *Unicode* are discussed by Gozzoli, in: Polis & Winand (edd.), *Texts, Languages & Information Technology*, 96-97.

20 Polis & Rosmorduc, in: *Document numérique* 16 n° 3, 2013, 50: "*Rien n'indique d'où provi-*

on a dichotomy between "characters" on the one hand and "glyphes" on the other. Nederhof explains the "disparity" that exists

> "between the formal notion of 'character' and standard practices in Egyptology when transcribing hieratic or normalizing hieroglyphic inscriptions. Following the terminology of Unicode, a *character* is the smallest component of written language and a *glyph* is a shape that a character can have when it is rendered or displayed. In Egyptology however, there seem to be tendencies to remain true to the original manuscript while encoding a text, often to the extent of encoding glyphs rather than characters".[21]

This tendency is understandable as iconic differences between signs could be meaningful, but with regard to the font it means that we hardly need the characters, yet we do need a well-studied corpus of glyphs. The character-glyph dichotomy has furthermore not been consequently carried through. Examples are numerous. Nederhof mentions  G43 and  Z7, which are coded as two different characters, although they are in fact different shapes (i. e. glyphs) of the same character. We also find  W17 and W18 as subsequent characters, although they are glyphs of the same character.[22] Other examples are  L7 and L19, which are both glyphs, yet coded as two different characters; or  A119, which is a glyph of A9. Further examples are given by Polis & Rosmorduc.[23] The lists as such hardly reflect hieroglyphic signs as part of a grammatical writing system.[24] They are merely typological collections, the inconsistency of which also appears from several duplications (e. g.  A43B coded as a glyph and the identical A44; A45A coded as a glyph and the identical A46;  E174F coded as a glyph and the identical E176; A429 and the identical A449).

Because of the tendency of Egyptologists to stay as true as possible to the original and thus to code glyphs, *Manuel de Codage/Hieroglyphica* and *Unicode* often do not offer satisfying font-types for the signs we encounter. As a result, we are forced to make more or less arbitrary choices for font-types that visually approach the original sign best.[25] Depending on our goal, that is not a problem. For instance, for the study of grammar or the contents of a text an approximate representation is certainly sufficient. However, for an epigraphic and palaeographic analysis combined with

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ennent les signes, ni la raison pour laquelle ils sont inclus dans la liste".

21 Nederhof, in: Polis & Winand (edd.), *Texts, Languages & Information Technology*, 104. Polis & Rosmorduc, in: *Document numérique* 16 n° 3, 2013, 47–48.

22 Nederhof, in:, *ibid.*, 104.

23 Polis & Rosmorduc, in: *ibid.*, 50, 60–61.

24 Meeks, in: *Document numérique* 16 n° 3, 2013, 35–36; Polis & Rosmorduc, in: *ibid.*, 49–52.

25 Several text processors with fonts that are discussed below offer the possibility to change and create new signs and variations. These possibilities are, however, limited, as anyone working with, for instance, *JSesh* can acknowledge.

a grammatological study we need a better structured and better documented list.[26] That *Manuel de Codage/Hieroglyphica* and *Unicode* have not been able to provide for such scientific needs appears from several text processors with fonts, which Egyptologists themselves developed from the second half of the 20th century onwards. Examples are *JSesh* by Rosmorduc (which includes *Manuel de Codage/Hieroglyphica* as well as extensions), *VectorOffice* by Kurth, *Inscribe* by Richmond and *VisualGlyph* by Lapp, but specialized fonts were also developed and used by, among others, Der Manuelian and James Allen.[27] All looked for a more elaborate repertoire, seeking to include better font-types for signs encountered. Yet, they all have a downside as well: each may offer specific elaborations and provide a range of new glyphs, but the core of the repertoires as well as the inconsistent dichotomous structure were still taken over from the undocumented older fonts. They therefore remain without scientific foundation and merely fulfill, in a rather arbitrary and unstructured way, a need of the moment.[28]

The situation regarding Egyptological fonts has thus become somewhat chaotic and the possibility offered by the digital age to encode a great number of texts causes the problems to be more relevant than ever. All that we have is certainly valuable, for whether in print or in digital form many texts, signs and sign-forms are published. They serve as a basic repertoire that we can analyze and build upon. However, it is time to resolve the issues, which can now be listed as follows:

1. As to the font used to encode texts, hieroglyphic and hieratic script have different requirements. First of all, both scripts have different sign-repertoires (hieratic using less signs that hieroglyphic). Second, in contrast to hieroglyphic script, hieratic has a diversity of forms, but the visual aspect, which in hieroglyphic texts can be used to nuance meaning, plays much less a role (a semiotic difference between the two scripts). As such, a hieroglyphic font includes characters and glyphs that are irrelevant for the encoding of hieratic texts, but lacks especially glyphs that we need if we want to represent the characteristics of the hieratic writing culture.

26 Meeks, in: *Document numérique* 16 n° 3, 2013, 34–36; Polis & Rosmorduc, in: *ibid.*, 46. On *Unicode* Bunz says that it serves mainly an educated public that feels no longer bound by the analysis of the original documents. The characters in *Unicode* have not been designed as a result of palaeographic investigations. They simply represent current shapes, which are required to print a useful reader, grammar or dictionary. But they are nothing more than a printer's inventory, not a research tool. Bunz, *Encoding Scripts*, 21.

27 Gozzoli, in: Polis & Winand (edd.), *Texts, Languages & Information Technology*, 89–96; Meeks, in: *Document numérique* 16 n° 3, 2013, 34–35.

28 Meeks, in: *ibid.*, 35.

2. The signs that are currently included in the old undocumented hieroglyphic fonts form an arbitrary selection of available font-types or only include specific font-types for momentarily needs, with a bias towards the Late and Graeco-Roman periods. To resolve this as well as the previous issue, both the hieroglyphic and hieratic repertoires must be inventoried in large databases and analyzed on a palaeographic and grammatological level in a process of standardisation.[29]
3. While analyzing the repertoires of hieroglyphic and hieratic scripts and organizing new standards, a new structure for the classification of the repertoires must be developed. As mentioned, the dichotomy between characters and glyphs is not working, at least not in its present state, as it does not reflect hieroglyphic signs as part of the writing system. Its application to hieratic would be hardly possible, since we would have no characters but an enormous amount of glyphs to accommodate (see part three for further explanation). Founding the structure in grammatological analysis, that is an analysis of forms in relation to their values and functions, would make a new standard not only a pedagogical, but a scientific tool for Egyptological needs as well.

Discrepancies between Hieroglyphic and Hieratic: a specification of the problems

What are precisely the problems we encounter when we attempt to encode and analyze hieratic texts through the available hieroglyphic fonts? Principally, we cannot distinguish meaningful differences in Hieratic that do not exist in hieroglyphic script. The only case for which we can do this is the difference between *šw* and *mꜣ.t*: in hieroglyphic script both values are represented through  H6, but in hieratic the form for the value *šw* has often been given a diacritic to set it apart from *mꜣ.t*.[30] Gardiner's font developed the hieroglyph  H6A to represent this diacritic form, although as a hieroglyph it has in fact no existence.[31] There are more cases in which hieratic script differentiates, but they cannot be transcribed as the hieroglyphic fonts do not include appropriate font-types. Consider fig. 2a-d: in each case Möller's signs show a diacritic and/or even a structurally different form that is meaningful in that

29 Meeks, in: *Document numérique* 16 n° 3, 2013, 36–37. See also Bunz, *Encoding Scripts*, 6–7.

30 It should be marked that this does not always happen. Yet, it happens so often that cases in which the diacritic stroke is missing can be called the exception rather than the rule.

31 Gardiner's note with H6* in *Egyptian Grammar*, 474: "Artificial sign to be used in transcribing from hieratic, see Möller, *Paläographie* i. no. 237".

Gardiner	Möller	Value	Möller I	Möller II
A47	47	*sꜣw*		
and/or				
A48?	48	*ỉry, mnỉw*		

Fig. 2a: Möller's differentiation of signs 47 and 48 (Gardiner A47 and A48).
Commentary: In Möller we see a differentiation between the *sꜣw*-guard and the herder. In hieratic script up to the New Kingdom, the *sꜣw*-guard is represented with the stick on his knees upwards or diagonally, whereas the herder is represented with a downwards stroke on the right, although there are specimens that still resemble the *sꜣw*-guard. In the hieratic script of the New Kingdom the herder, in contrast to the *sꜣw*-guard, has been given an arm, which makes him resemble hieratic forms for A24, except for the fact that in contrast to , the herder has been given a head. The hieratic forms for the *sꜣw*-guard in this time may or may not show a stroke crossing the stick to represent the cloth; should those specimens of the guard without indication of the cloth be transcribed as such? If so, should we come up with a new prototype, or can we use A48?

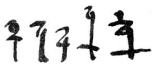
Gardiner	Möller	Value	Möller I	Möller II
U23	485	*ꜣb*		
U23	484	*m(ḥ)r*		

Fig. 2b: The signs for *ꜣb* and *m(ḥ)r*.
Commentary: In Möller we see a differentiation between the readings *ꜣb* and *m(ḥ)r* of the hieroglyphic sign . In hieratic script up to the New Kingdom, *ꜣb* has two strokes on top, whereas *m(ḥ)r* does not show this, but tends to have a diacritic protruding from the vertical line. In hieratic script of the New Kingdom up to the 21st dynasty *ꜣb* shows a crossing line at the top with a single stroke or hooked element, whereas the top-element in *m(ḥ)r* tends to be more elaborate.

it relates to a different reading.[32] This is hieratic script offering a reading help. If the goal of a transcription is to make a text better accessible and readable, would such graphic distinctions between different readings not be precisely what we would want to represent?

32 In their presentation during the conference, Peter Dils and Lutz Popko presented similar problems in the encoding of signs. Their hand-out included several problematic cases and interesting questions. The first two examples given here also occurred among their examples, which unfortunately remain unpublished so far.

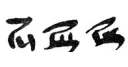
Gardiner	Möller	Value	Möller I	Möller II	Möller III
W12?	395	*g*			
W11?	396	*ns.t*			

Fig. 2c: The signs for *g* and *ns.t*.

Commentary: In Möller we see a differentiation between the readings *g* and *ns.t*. Especially the specimens from the New Kingdom to the Graeco-Roman period reading *ns.t* seem to be visual representations integrated in writing rather than true hieratic signs. In some cases, the visual representations resemble W11 instead of W12, but Gardiner never meant to differentiate W11 and W12 as such; W12 he rather included as an "Old Kingdom form" of W11 [Gardiner, *EgyptianGrammar*, 529].

Gardiner	Möller	Value	Möller II	Möller III
S42	449	*sḫm*		
S42	450	*ḫrp*		

Fig. 2d: The signs for *sḫm* and *ḫrp*.

Commentary: In Möller we see a differentiation between the readings *sḫm* and *ḫrp* of the hieroglyphic sign S42. In hieratic script from the New Kingdom up to the Late Period the hieratic forms for *ḫrp* in contrast to *sḫm* tend to be closed on top and show one or two diacritic strokes protruding from the vertical line. In hieratic script from the Late period up to the Graeco-Roman period the hieratic forms for *sḫm* in contrast to *ḫrp* tend to show a triangular form just below the scepter-head (cf. the contribution of Sandrine Vuilleumier in this volume).

The differentiations above make us wonder about the graphic diversity we see in other hieratic signs and forms as well. Could such graphic variations as represented in fig. 3a–b also be meaningful, when not with regard to value, then perhaps with regard to grammatical function or the function or type of the text, scribal hand, form-development, chronology or region?

Even though we are not in all cases certain whether a specific graphic variation is meaningful, it is not very scientific to just assume all variations are insignificant and we can get no further information from them. Especially with regard to the possibility to digitally handle large amounts of data, we should be simply able to figure out which, and to what extent hieratic variations are meaningful by collecting and analyzing the forms in their context of use. The real question is how to document

Gardiner	Möller	Value	Möller I	Möller II	Möller III
D51	118	*ꜥn.t, dḳr*			

Fig. 3a: Various hieratic forms for Gardiner D51.
Commentary: The hieratic forms for D51 show either no diacritic stroke, or one diacritic stroke to the upper right, or two diacritic strokes to the right. To what extent are the diacritic strokes meaningful? Do they set the forms for D51 with diacritic strokes apart from the forms for D51 without diacritic stroke, or was the diacritic addition meant to set D51 as a whole apart from other hieratic forms that consist of one single line? A simple inventory of forms, not only from Möller, but from other palaeographies as well, and an analysis of the word-contexts, values and functions in which they are used should be helpful. If the forms with diacritic additions appear to be meaningful, should we come up with font-types like *D51 and *D51?

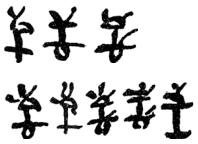
Gardiner	Möller	Value	Möller I	Möller II	Möller III
F10	150	*ꜣm, ḥtyt, ḫḫ*			

Fig. 3b: Various hieratic forms for Gardiner F10.
Commentary: The hieratic forms for F10 show either two strokes on top for the two horns of the animal, or only one hooked or curled stroke, or, in the later periods, even three strokes, the left-most in the first two examples from Möller, *Paläographie* III clearly for the representation of the ear of the animal. The bottom parts also differ, especially in the later periods when we see examples with a diagonal diacritic as well as examples of the vertical line ending in a circle. As regards the representation of the ear and the circular bottom part, it even seems that the later specimens grow nearer toward a visual representation than seen earlier, a similar development we may see in the hieratic forms for *ns.t* in fig. 2c above.

variations: should this be by adding non-existent hieroglyphs like F10 or *D51 and *D51 to the hieroglyphic repertoire?

There is a second road we could take, although it is bumpy as well. Instead of transcribing Hieratic to Hieroglyphic, we could depart completely from the hieratic forms themselves. Consider fig. 4, which is an overview of several hieratic forms for

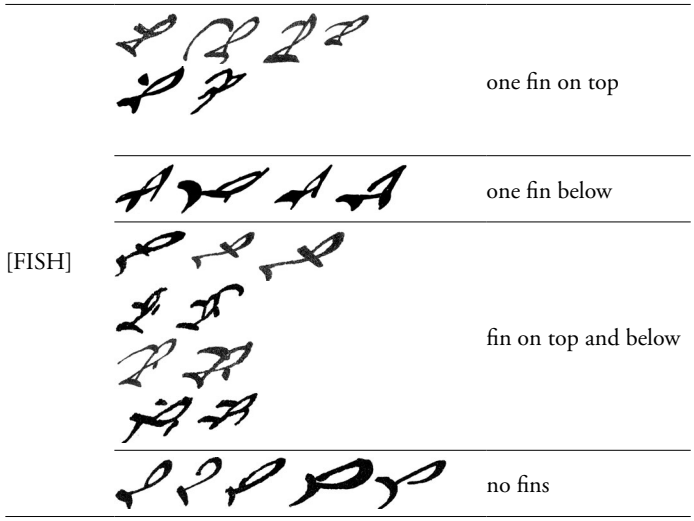


Fig. 4: Small selection of the hieratic patterns found for the fish Gardiner K5. *Commentary*: The question arises how relevant the hieroglyphic prototypes in Egyptological transliterations are. Instead of resorting to these prototypes, we could analyze the hieratic forms and patterns in the value and function of their context and as such attempt to approach the mentality of the hieratic scribe.

the sign Gardiner 𓆛 K5.[33] In addition to inner details, which Hieratic normally does not render, the hieroglyphic font-type 𓆛 shows one large rounded fin on top and two smaller fins below. The multitude of hieratic forms shows either one of the following patterns: one stroke to represent one fin on top; one stroke to represent one fin below; one stroke for one fin on top and one stroke for one fin below; no fins at all. Moreover, some forms even show a long snout, and the tails vary from triangular, to >-formed, to a single stroke. Not one form presents a visual resemblance to our hieroglyphic font-type, yet in any transcription all will henceforth be known as 𓆛, *in contrast, that is*, to Gardiner 𓆜 K1, 𓆛 K2, 𓆝 K3 and 𓆞 K4. However, comparison of the hieratic forms that are recorded for Gardiner K1–4 shows that they are very similar to the patterns mentioned for K5. As is to be expected, most fish are simplified in similar manner. It is to be questioned whether the hieratic scribe, while writing, actually had one specific fish in mind. A hieratic scribe, who was also well-trained in hieroglyphic script, may have made the difference: admittedly, some hieratic forms in the function and value of especially 𓆞 K4 do

33 The forms are taken from existing palaeographies, which are all collected in the concordance of sign-lists and palaeographies in the AKU database. For a list of the palaeographies in particular, see Appendix.

indeed show its particularities. Yet otherwise we rather see a general concept [FISH] applied in several values and functions, which can be deduced from context. Rather than to divide the hieratic forms of fish into hieroglyphic classes that may not at all have been relevant to the hieratic scribe,[34] we could collect them in a general class [FISH] and make an inventory of their patterns and their values and functions. Mapping hieratic forms and analyzing their values and functions means to advance the study of hieratic script through its own characteristics rather than through a repertoire and structure that were not developed for it. However, it also means that we must compile a sign-list and a font completely different from what we are used to.

A problem in compiling a sign-list for hieratic is the existence of similar forms for very different signs, for instance those depicted in fig. 5a. The hieratic forms for M18 and A47 are very much alike, yet in fig. 5a one is used as a phonogram in first position, the other as a classifier coming last. The signs M18 and A47 both also have a multitude of other hieratic forms of which only very few are depicted in the schemes of fig. 5b. The schemes show basic hieratic patterns for both hieroglyphic signs in a first level and individual hieratic specimens for each pattern in a second level. If we map and describe the hieratic patterns in a database, a search for the description of will lead to both and , whereas we must now leave through Möller to see under which hieroglyphic signs the form has been accommodated. Certainly, leaving through Möller has its charm and it makes the more motivated student familiar with the hieratic forms and their hieroglyphic counterparts (some would say this is a phase the student simply must go through), yet it is not very efficient. It does not make Hieratic more accessible, especially not to the student, who can't see the wood for the trees anymore. From a didactic perspective, we therefore wonder whether it would not be more efficient to learn that the "tree of forms", or the "family tree", in fig. 5c can either be read as M18 or A47, rather than to learn the different hieratic forms listed for M18 and A47 separately. Such a tree at once includes the graphic link between and ("if it is not , it could be "), which otherwise may go unnoticed.[35]

A problem with this approach is that, theoretically, each hieratic pattern in itself may form a family tree, as there are again other signs with very similar forms to, for instance, or in fig. 5b–c. These forms would thus be patterns within a family, as well as heads of families themselves.

34 Admittedly, they weren't even always relevant to the hieroglyphic scribe.

35 Graphic similarities between different signs occur often. Compare the list of similar forms and their different values in Verhoeven, *Buchschrift*, 257–271.

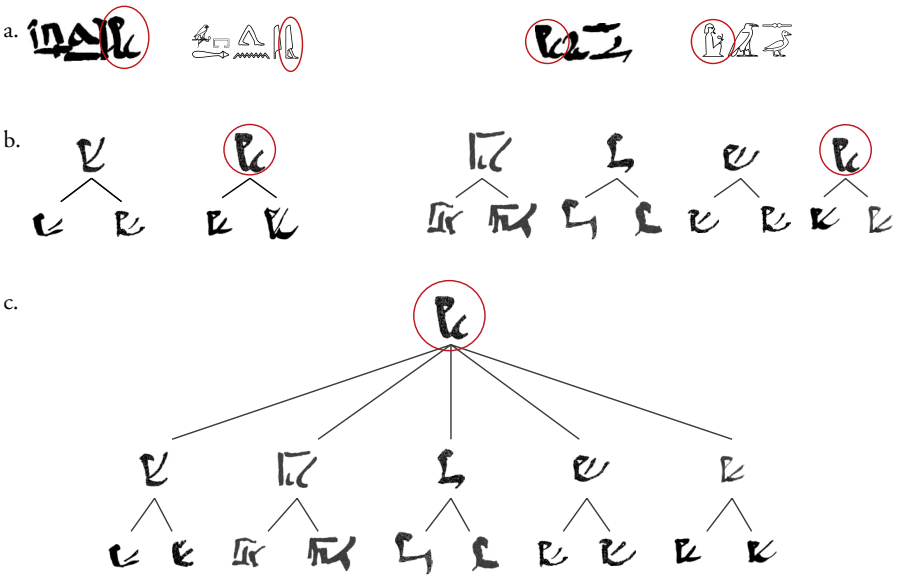


Fig. 5a–c: A classification purely based on hieratic forms could group both signs and in one family tree: the family of .

Another example is depicted in fig. 6a.[36] Among a multitude of hieratic forms for beds with or without a being lying or sitting on it we find a basic form consisting of a rectangular form with a stroke on top. This basic form can represent at least three hieroglyphs: Q19, A55 and G165.[37] Did the scribe actually had these hieroglyphs in mind or was he only thinking of a more general notion "bed" or "lying down" in the context of the words he wrote? In Hieratic, we can hardly speak of three signs; we are rather dealing with one hieratic sign with different functions and values in different contexts. Certainly, for all three hieroglyphs other hieratic forms have been recorded as well. The forms depicted in fig. 6b may represent either Q19, A55 or G165. Instead of attempting to impose the hieroglyphic boundaries on the hieratic forms, which are inevitably ambiguous (or "fuzzy"[38]), we can again identify patterns, each with their own specimens, and construct a "family tree" for . In the database we can document all these patterns and their specimens

36 See also Gülden & Van der Moezel, in: Naether & Berti (edd.), *Altertumswissenschaften*.

37 The hieroglyphic script has more combinations of beds and beings or objects lying or sitting on it, for instance Q20, Q41, Q43, Q44 or G175. At present, however, I am not familiar with hieratic occurrences of these signs. For G165, see Meeks, in: *CdÉ* 90, 2015, 42.

38 Goldwasser, *Prophets*, 29 (with note 20).

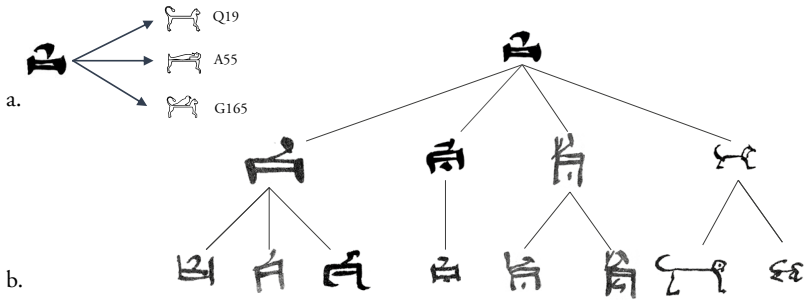


Fig. 6a-b: Three hieroglyphic signs (Q19, A55, and G165) share similar form-classes in hieratic.

with their functions and values. Again from a didactic point of view, it may appear to be more efficient to depart from one hieratic sign as the head of the family tree in fig. 6b, then to depart from three separate hieroglyphic forms each listed with a number of hieratic forms at different places in the hieroglyphic sign-list.

Of course, composing such family trees for hieratic demands a thorough analysis of the script and its forms, functions and values first, which has never been carried out on a large scale. A thorough analysis is what AKU has set itself as a task,[39] and in considering ways to organize and structure the hieratic repertoire the didactic question is certainly to be addressed.

What we need and how AKU proceeds

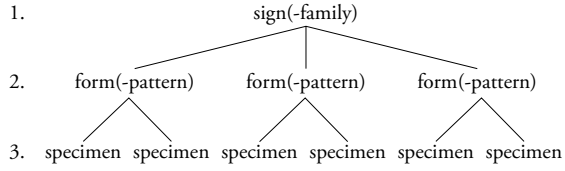
We need more stable, scientifically structured and documented inventories for both hieroglyphic and hieratic script in which the functions and values in word-context are taken into account. For Hieratic, the focus must be on the hieratic spectrum of signs and forms and take into account their functions and values in order to advance study of the script through its own characteristics, developments and usages. We begin with large-scale collection of hieratic forms that we can organize according to the Gardiner list, but also according to the Möller list, or according to yet another list (e. g. Gasse mentioned above). Or we can organize them according to value, function, origin, or description of form on basis of metadata we collect.[40] It does

39 The same is being proposed and initiated for a reorganization of the hieroglyphic script. Meeks, in: *Document numérique* 16 n° 3, 2013, 36–42; Polis & Rosmorduc, in: *ibid.*, 52–65.

40 For more details on the database see Gülden, *Ein „nouveau Möller"?* and the contribution by Svenja A. Gülden in this volume.

in fact not matter how we organize the data, the user will in the future be able to organize the palaeography as he or she wishes, as long as the relevant metadata have been documented. However, with the didactic question and a systematic study of the hieratic script in mind, we started form-analysis simultaneously with collecting the data to work towards a well-organized basic repertoire. We extracted all hieratic forms from the selected palaeographies in Appendix 1 and collected them in overviews per sign. When we had doubts about the identification or codification of a hieratic form, we checked the source and word-context and made adjustments where necessary. Pilot studies were carried out first on signs from the taxonomic classes of "Man and his Occupations", "Anthropomorphic Deties", "Women, Queens and anthropomorphic Goddesses", "Parts of the Human Body", "Fish" and "Invertebrata and Lesser Animals". We identified different patterns of forms per sign, such as the patterns mentioned for figs. 4–6. These form-patterns thus concern structural differences in forms, not differences in handwriting. The latter concern almost every single specimen, and considering the large amount of data we accommodate in the database, it is currently impossible to distinguish (and individually code!) every single specimen. Ideally, individual traits could later be distinguished digitally through *Mustererkennungs-Algorithmen* and *Zeichenerkennungs-Programme*. Structural differences in form, however, appeared to be fairly clearly recognizable, although for some signs more than for others. In order to find and use these form-patterns in the database and to allocate hieratic specimens to a specific pattern, we had to be able to identify them. To this aim we developed an AKU-code that can allocate the hieratic specimens to a specific main sign and a particular form-pattern. A first version of this coding system as it is currently being used in the AKU-database will be published elsewhere.[41]

Up until now, I have rather loosely used the terms "sign", "form", "specimen", "pattern" and "family tree". It is time to describe them and their relations to one another more coherently. The terms can be understood as labels for the levels in a three-level hierarchy. For instance, a *sign* can have different *forms* and each form has several occurrences, which are its *specimens*. As such, the sign is understood as the head of a *family*, and its forms are rather form-*patterns*, shared by a number of specimens:



41 It was not a topic discussed during the conference and needs more detailed explanation than I can give here. The publication is planned for *Hieratic Studies Online*.

Other terms are in use for similar hierarchic levels, although not all terms cover the exact same meaning. We have seen above that *Manuel de Codage* and *Unicode* use a hierarchy with two levels ("character" and "glyph"), which leads only to a purely typological overview, but does not represent a linguistic system. Therefore, both Meeks and the *Projet Ramsès* have elaborated the hierarchy with an intermediate level: *Projet Ramsès* uses the terms *graphème*, *classe* and *forme*[42], Meeks uses the terms *famille*, *type* and *glyphe*.[43] Their three-level hierarchies come forth from proposals for a reorganization of the hieroglyphic repertoire, but these proposals have much in common with the structure for the classification (and coding) system that AKU develops for Hieratic.

To explain this, we will look in more detail at the structure proposed by Meeks.[44] He argues that a thorough inventory of as many hieroglyphs as possible should be made first. The forms must be collected in a database, where they are linked to metadata such as origin, date of the source, bibliographical references, and grammatological information.[45] This is "un travail long, fastidieux, peu gratifiant" and moreover "un travail sans fin", but, says Meeks, it is the price to pay for a sign-list and font that is as reliable as possible as to its sources, its graphics, and the scientific possibilities it offers.[46] The collection of forms we must use to search for sign-*familles* that we can further subdivide into *types*, which each have their *glyphes*. The *familles* of the first level are abstract concepts: they have themselves no concrete representation or no real equivalent in script.[47] One could compare them to the "covert categories" from the taxonomic models used in cognitive linguistics. Such categories are detected for ancient Egyptian by Goldwasser in her book on wor(l)d classification (fig. 7).[48] Covert categories are not labelled. Egyptian has, for instance, no word to express the concept of [QUADRUPED]. Yet, the existence of such a concept can be inferred through the occurrence of words for four-legged animals (in the "basic level" in fig. 7), which can all be written with  F27 as a classifier. The classifier unites the words into one single group, and therewith hints at the fact that some idea of

42 Here, *forme* is the third level, which we called *specimens*. Since specimens can have the same form, we used *form* or *form-pattern* for the second level.

43 Polis & Rosmorduc, in: *Document numérique* 16 n° 3, 2013, 64–65; Meeks, in: *Document numérique* 16 n° 3, 2013, 39–42.

44 *Ibid.,* 35–42.

45 *Ibid.*, 39, 41 (Figure 4).

46 *Ibid.*, 37, 43.

47 *Ibid.*, 38.

48 Goldwasser, *Prophets*, 29–33, 36–37, 51–52, 82–83. Goldwasser did not use the model to study the palaeographic level of the sign, she rather used it to study the relations between lemmas and their classifirs on the level of the system, yet the principles behind the levels can be used to structure palaeographic repertoires as well.

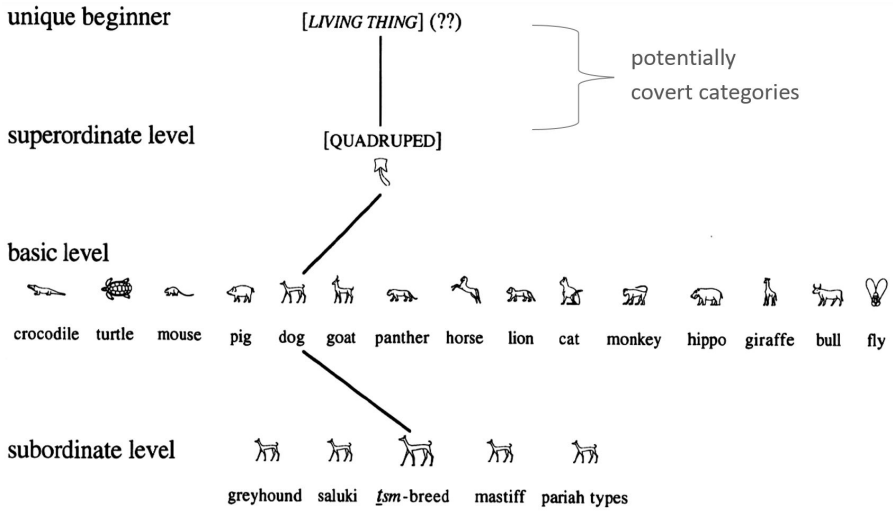
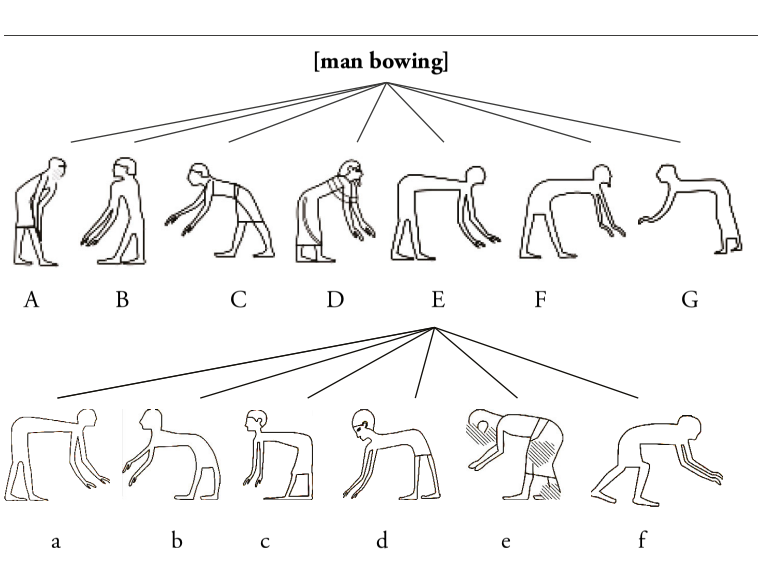


Fig. 7: Levels of classification taken from taxonomic and cognitive studies applied to hieroglyphic script (Goldwasser, *Prophets*, 31, fig. 2–1).

[QUADRUPED] existed as a higher concept in the Egyptian mind, even though it found no lexical expression.[49] The level of expression is, then, the basic level: the words we actually encounter in the script. According to cognitive studies, the basic level contains the most central and generic expressions used in human communication systems in general, in Western societies as well as in traditional non-literate societies.[50] If we can compare the covert categories to Meeks' *familles*, the basic level of expression is the level of his *types*: the actual forms found in script through which the *famille* finds expression. Each of Meeks' *types* has a number of *glyphes*, that is, *variantes paléographiques*, which can be considered equal to the lowest level in the taxonomic cognitive hierarchy of fig. 7: this level concerns variations of one and the same type. A three-level hierarchy, such as suggested by Meeks, thus seems to embed well in the taxonomic and cognitive model that has more general validation.

49 To the critical reader: the superordinate QUADRUPED thus has no *lexical* expression. The classifier 𓃭 can, however, be called its *visual* expression. Goldwasser applied the theory of covert categories onto the semiotic plane of the *system* in order to map the relations between lemmas and their classifiers. Applied to the semiotic plane of the *sign*, all hieroglyphic or hieratic occurrences are potential visual expressions of a conceptual sign-*famille*, but not one is its exact equivalent. This semiotic discussion will, however, not be further dealt with here.

50 Goldwasser, *Prophets*, 30, 32.



	Meeks	Taxonomy	Projet Ramsès
[man bowing]	*famille*	unique beginner/ superordinate level	*graphèmes*
A B C D E F G	*types*	basic level	*classes*
a b c d e f	*glyphes*	subordinate level	*formes*

Fig. 8: The three-level hierarchic structure by Dimitri Meeks applied to the plane of the hieroglyphic sign.

Meeks' hierarchy for the signs of hieroglyphic script is depicted in fig. 8,[51] which takes the family of the Gardiner sign A16 (the concept of a [MAN BOWING]), as an example.

Thus, for the palaeographer, the *types* are the basic level as they are the generic patterns he finds in script, with minor differences in shape being represented by the *glyphes*. Together, the *types* and their *glyphs* represent the *famille* to which we have no actual access: we never see it in pure form. Of course we can select or create a prototype to act as a representation for the entire family, which will be necessary if we would want to create a font, but this may be nothing more than an abstraction formed on the basis of the *types*.[52] In such a palaeographic hierarchy, it is important that the relations between the levels are based on an "analyse grammatologique"; that is, the relations between a *famille*, her *types* and the *glyphes* must not merely be considered from a palaeographic point of view, but must in fact be lexically and semantically grounded.[53]

At this point, the reader may understand the significance of the three-level hierarchy for hieratic script. As is the case with the *famille* in Meeks' model, a hieratic character does not have one single concrete representative; it rather finds expression through a multitude of forms.[54] A pure hieratic character or *Grundzeichen* is nonexistent; rather are we dealing with a metaconcept hidden in a multitude of expressions. These expressions are equivalent to the *types* and *glyphes*: those are the levels where the focus of hieratic script particularly lies. The *types* in the basic level must in Hieratic be the mentioned form-patterns, whereas the specimens of each pattern are on the same level as the *glyphes*, which, in hieratic script, are characterized especially by different handwritings. Certainly, the differences between the hieroglyphic and hieratic repertoires cause that the levels must be given substance differently. With

51 For reference, the labels from the taxonomy used in cognitive linguistics and from Projet Ramsès have been included by the author. The actual choice of signs for the types and the glyphes derives from Meeks, in: *Document numérique* 16 n° 3, 40 fig. 2 and 3.

52 Compare « *graphème* » in Polis & Rosmorduc, in: *Document numérique* 16 n° 3, 2013, 64.

53 Meeks, in: *Document numérique* 16 n° 3, 2013, 38–39. For a specification with concrete examples, see also Polis & Rosmorduc, in: *Document numérique* 16 n° 3, 2013, 58–65.

54 The description of Bunz, although not specifically describing hieratic script, is nevertheless applicable: "… in the course of its long history no standardisation has ever been made. What has come down to us … are exclusively manuscripts in the very sense of hand-writings, showing up features of date, writing school, office, but also the particular features of the scribe's personal manner of handling the pencil. Deriving standard shapes from more than a sixscore of ductus of different scriptoria as well as of individual and often abbreviated graphic shapes, would mean to introduce something alien to [think: hieratic] writing." Bunz, *Encoding Scripts*, 24.

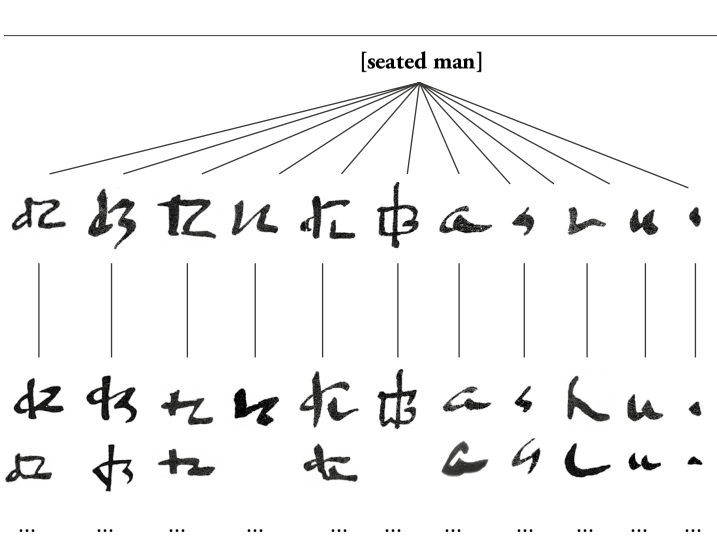


Fig. 9: Blue-print for a three-level structure for hieratic forms in the value and function of the [SEATED MAN]. Only a selection of form-patterns with a few exemplary specimens could be represented here.

a smaller repertoire, Hieratic has fewer *familles*, and their composition in *types* and *glyphes* moreover differs in number and kind, presumably being more elaborate for hieratic than for hieroglyphic script. I agree with Polis that a challenge lies in constructing a bridge between the hieroglyphic and hieratic repertoires on the level of the *familles* (or, in the terms of *Projet Ramsès*, *graphèmes*): "…the issue is to link [the hieratic] data to a sign-list, which provides stable ID's for [hieroglyphic *graphèmes*], since that is the level at which the hieroglyphic and hieratic systems meet."[55] We must find out which concepts the level of the *famille* entails for hieroglyphic script on the one hand and for hieratic script on the other, and whether they can be logically and systematically linked also with regard to their further classifications in the levels of the *types* and *glyphes* of both scripts.

Fig. 9 shows the blue-print for the three-level hierarchy, which we use to accommodate the form-patterns (*types*) and their specimens (*glyphes*) that we identify for hieratic script, here including only a select choice of forms that are used in the functions and values of the seated man. Although it remains to identify what exactly the sign-families of hieratic script are and to what extent they are or are not similar to the *familles* of hieroglyphic script – a question that needs constant reconsideration while systematic study of hieratic script progresses[56] – we found that the identification of the form-patterns in Hieratic is at least a big systematic help to create order in the repertoire. After the pilot studies mentioned above had been carried out, we thus decided to continue the search for patterns; that is, to identify a basic level for hieratic script. Further steps are, first, to analyze the patterns in relation to their values and functions and, second, to provide the patterns with descriptions of form, for which we need to develop a fixed vocabulary with terms that are as objective as possible. A thesaurus of this vocabulary should be included in the database. Good descriptions of the patterns, which are automatically linked to all the specimens within a pattern, will considerably ease the search for a hieratic form, the identification of which is uncertain or ambiguous to a reader. A single search should, then, lead to all possible readings – that is, all patterns that comply with the description – that are included in the database.[57]

55 Personal communication with Stéphane Polis (e-mail 17.03.2016).

56 Should they be form-based such as the examples in fig. 5–6, or should they be the same families as encountered in hieroglyphic script, in which case we identify form-patterns and specimens for each single hieroglyphic sign that occurs in Hieratic? Systematic study should lead to a proposal fit for the nature of hieratic script.

57 For details on the terminology of description, a thesaurus of the vocabulary and the processing of the descriptions in the database, see the contribution by Svenja A. Gülden in this volume.

Conclusive remarks

Above I described some preliminary thoughts on a classification and coding system, which AKU develops in order to organize the hieratic repertoire, in combination with proposals that have been made for reorganizing the hieroglyphic repertoire. Although the hieratic data we collect in the database does not need to be given a fixed, well-organized structure since it is linked with all kinds of metadata, which allows the researcher or user to structure the data in many different ways, it was, from a didactic perspective and with regard to systematic study of the hieratic script, necessary to start analyzing the variety of forms in the basic repertoire. A logical and scientifically organized repertoire and sign-list specifically developed on the characteristics of hieratic script may help to improve hieratic instruction: we need methods and tools that focus on Hieratic in order to make the instruction more open and efficient. In the first phase of the AKU Project we used existing hieratic palaeographies to compile a basic repertoire. This was a labor-intensive work characterized by collection, analysis and standardisation, but it resulted in the first working version of the three-level hierarchy in which form-patterns are the central element. Certainly, the repertoire must be elaborated through the analysis of other and unpublished texts, which will be a test for the form-patterns currently identified: are they in fact core patterns that can be repeatedly recognized in hieratic specimens, or are they perhaps almost irrelevant in comparison to the patterns we need to add as soon as the repertoire grows? It is only when we have included and analyzed a considerable number of data from published and unpublished hieratic documents from as many periods as possible, that we can begin to form a more definite proposal as to what exactly are core concepts of the hieratic script, that is, what are the sign-families, that are ideally to be linked to the sign-families identified in the repertoire of hieroglyphic script, which is currently equally being studied for reorganization. Yet, the working version as it is already creates order in the database. Moreover, it fits into the discussion on *familles*, *graphèmes*, characters, *types*, *classes*, *glyphes* and *formes*, and seems to embed well within a more general cognitive model on the taxonomy of visual communication.

Much work remains to be done, which is possible thanks to the funding of a 23-year project purely devoted to hieratic script. The first steps in the form of building a database, organizing a basic repertoire and developing an approach for further systematic study have been made, which form a basis that we can test, onto which we can reflect and that we can improve by expanding the data in the years to come.

Appendix

The following palaeographies have been included in the study of hieratic forms thus far. We are aware of the fact that one should be cautious in using facsimiles, which are not always accurate or correct interpretations. Checking facsimiles against word contexts in the original sources has therefore been a time-consuming part of our research.

Old Kingdom

- Dobrev, *Builders' inscriptions*
- Edel, *Topfaufschriften*
- Goedicke, *Paleography*
- Möller, *Paläographie* I
- Posener-Kriéger, *Papiri di Gebelein*
- Posener-Kriéger, *Abu Sir Papyri*
- Regulski, in: *SAK* 38, 2009
- Verner & Vymazalová, *Raneferef*

Middle Kingdom

- Allen, *Heqanakht*
- Bomhard, in: *RdÉ* 50, 1999
- Möller, *Paläographie* I
- Roccati, *Papiro ieratico*
- Sethe, *Ächtung feindlicher Fürsten*
- Simpson, *Papyrus Reisner* I–IV

New Kingdom

- Ali, *Ritzinschriften*
- Bomhard, *Papyrus Wilbour*
- Demichelis, *Il calendario*
- Gasse, *Données nouvelles* I
- Gosline, *Writing Late Egyptian Hieratic*
- Marciniak, *Les inscriptions hiératiques*

- Megally, *Considérations*
- Munro, *Totenbuch Jah-mes*
- Wimmer, *Hieratische Paläographie*

Third Intermediate Period and Late Period

- Donker van Heel, *Abnormal Hieratic*
- Gasse, *Un papyrus et son scribe*
- Lenzo, *Manuscrits hiératiques*
- Möller, *Paläographie* II–III
- Verhoeven, *Buchschrift*

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- Haring, *Sennedjem*
- Moje, *Privatstelen*

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Dobrev, Vassil, Miroslav Verner & Hana Vymazalová, *Builders' inscriptions and Masons' marks from Saqqara and Abusir*, Old Hieratic Palaeography 1, Prag 2011.

Donker van Heel, *Abnormal Hieratic*
Donker van Heel, Koenraad, *Abnormal Hieratic palaeography* I-II, online publication, https://leidenuniv.academia.edu/KoenDonkervanHeel [9.8.2017].

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