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Non-Textual Marking Systems, Writing and Pseudo Script from Prehistory to Modern Times

edited by
Petra Andrássy, Julia Budka & Frank Kammerzell

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Defining Non-Textual Marking Systems, Writing, and Other Systems of Graphic Information Processing

Frank Kammerzell, Berlin

1 Preying on writing

The aim of this paper is to survey the diversity of systems of graphic information processing in order to clarify a few terminological and methodological aspects connected with the description and typological classification of non-textual marking systems. I will try to deduce criteria which may be used for discriminating between non-textual marking systems, writing and other sorts of graphic information processing. Having an idea about where to locate a particular system within the multiplicity of graphic information systems is of crucial importance whenever more than one of them are set in relation to each other. If one wants to state, e.g., that a particular system is the oldest of its kind, it is necessary to contrast it with systems of the same type. Though this principle might be deemed self-evident it has often been disregarded even in quite recent studies. The term writing is frequently used in a very general or even metaphorical sense to describe different kinds of graphic marks that are considered to be used as meaningful signs.

Despite the fact that the times when cultures were classified and assessed according whether or not they possessed writing should have passed by now, one gets the feeling that, even among scholars, "literate" societies are still more esteemed than others which did or do without writing. This has resulted in archaeologists and experts in related fields almost competing with each other for the earliest alleged example of writing. Their readiness to label certain artefacts which show what looks like graphic symbols without any further evidence as examples of "writing" is sometimes astonishing and difficult to comprehend. The following announcement about "a 4,000-year-old writing system previously unknown to modern researchers" is a rather typical example. It is not cited here in order to defame the persons concerned but because it unambiguously portrays the rather complex interaction of the archaeologist's special – and easily comprehensible – appreciation of his or her own excavation, interpretative ardour, expectations (real or alleged) of local authorities and the sensed exigency to offer results spectacular enough to convince the sponsors of renewing their funding.

> **U.S. Researcher Finds Example of Ancient Civilization Writing in Turkmenistan**
> (24 May 2001) A U.S. archaeologist, Pennsylvania University professor Fredrik Hiebert, has discovered a pebble-sized seal in Turkmenistan containing evidence of a 4,000-year-old writing system previously unknown to modern researchers.
>
> Fredrik Hiebert said at a news conference in the Turkmen capital Ashgabat on 23 May that he and colleagues from the Central Asian nation discovered the seal last June during excavations 15 kilometers (9 miles) east of Ashgabat, near the Iranian border at the site of an ancient settlement near Annau. The seal with four or five red symbols or letters engraved on it most likely dates back to 2300 B.C. and was someone's personal property, Hiebert said.

> A find of Hiebert and his Turkmen colleague Murad Kurbanov supports the hypothesis of a hitherto unknown civilization in Central Asia. It took them almost a year to study the find, which dates back to 2300 BC.
>
> Hiebert said the symbols carved on the stone seal, which he said was barely more than 1 centimeter by 1 centimeter (a half-inch by half-inch), do not belong to any known system of writing. The signs have no resemblance to any written language that was used in that period in Mesopotamia, Iran, or the Indus River valley. The local origin of the stone and some other evidence confirm the existence of a earlier unknown civilization, which was rather highly developed, Hiebert said.
>
> Hiebert signed an agreement on 23 May with Turkmen archaeologists to conduct further digs in the area where the seal was found. The three-year research program will begin in October, he said. The three-year research program of Turkmen and U.S. archaeologists will be financed by a grant from the U.S. National Geographic Society, he said. (...) (AP, Interfax)[1]

A close reading of those passages which are explicitly rendered as citations by means of quotation indexes nicely reveals that the archaeologist probably did not explicitly assert that the "four or (!) five red symbols or letters" had been elements of a writing system but quite suggestively made any non-specialist recipient believe exactly that. Given that it was uttered in more or less the same words at the news conference, the text is a masterpiece of camouflage: even the strictest expert cannot point a finger at a particular passage and bluntly call it incorrect, but the overall effect is well illustrated by the title and the first sentence of the communication, which were almost certainly composed by a member of the press.[2] Perhaps the circumstance that claims as such are willingly launched by the mass media (regularly long before the scientific work on the respective objects has been completed) proves that there is scarcely any better guarantee for a favorable rating of an archaeological project – by the general public as well as by sponsoring institutions – than being able to affirm that one has unearthed written documents. True as this may be, it is no excuse for inaccurate accounts.

Other cases of a broadened usage of the term "writing" may be less self-serving but are nevertheless misleading, since they all too often do not take into consideration a few basic assumptions which seem inevitable if one wanted to classify a system as writing (see below section 8).

2 Systems of graphic information processing

The notion *system of graphic information processing* (SGIP) will be used in a rather general way for any given set of one or more graphic signs und their relationships with each other, their producer and their recipient. A *graphic sign* is a visible mark that is deliberately produced by a human being on an appropriate carrier and embodies a particular shape and a corresponding piece of information intended by its producer.

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1 Burke (2001).

2 How this sort of information policy works can be seen from a BBC news article on the same topic, which was published a few days earlier (15 May, 2001) and obviously had been phrased by a member of the editorial staff. There we find a forthright proposition that a "previously unknown civilisation was using writing in Central Asia 4,000 years ago, hundreds of years before Chinese writing developed." In addition, the marks on the respective seal are called "inscription" (cf. http://news.bbc.co.uk/2/hi/asia-pacific/1330705.stm, retrieved on 2009-03-14).

Producer and recipient are often but need not necessarily be two distinct individuals (or group of individuals).

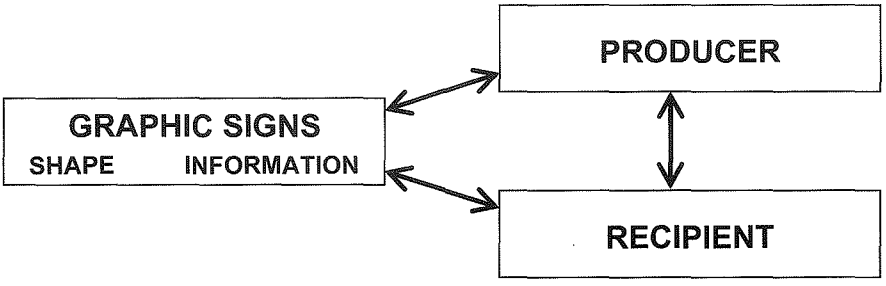


Fig. 1: General structure of systems of graphic information processing.

This model is both simple and flexible enough to cope with the task to discriminate between a great many of different systems[3] on the bases of a limited set of consistent criteria: Depending on whether or not the information is a text consisting of linguistic units we can establish a borderline between writing and non-writing. Systems, the utterances of which in general are made up of a single graphic sign (e.g., traffic signals) can be contrasted with more complex SGIP.

It should be taken into consideration, however, that a typology of SGIP will not result in discrete classes each of which contains an unambiguously definable set of members, but rather in groupings of prototypical and less typical representatives. One system may consist of several subsystems with distinct properties which belong to different types. Signals, signs and markings for modern traffic regulation are a good example. The whole complex forming part of "The Official Highway Code" of the United Kingdom comprises light signals for controlling the traffic, arm signals to be given by authorised persons as well as by road users, road markings, vehicle markings, and traffic signs in the narrower sense, the last being broken further down into the categories of signs giving orders, warning signs, direction signs, information signs, and road works signs.[4] Whereas traffic light and arm signals are outside the scope of this study, all others may be characterized as belonging to an SGIP. It is obvious that road markings (e.g., stop lines, edge lines, centre lines, and waiting restriction lines) considerably differ from vehicle markings (e.g., hazard warning plates, large goods vehicle rear markings), but even within a single category of traffic signs we may find different types of relationships between shape and information of a sign or between signs and recipients. Some of the most conspicuous properties of the system can be characterized as follows:

- The system of traffic signs has a closed core inventory of elements, which form a fixed list and can be modified only by the authority responsible for the whole area of application of the respective code. Each of these signs is defined with full details of its shape and meaning.[5] On the other side, there are also signs that are not

3 Stötzner (2000) has sketched the possible scope of research on graphic signs, intended as an outline of "signography as an autonomous discipline."

4 See Department for Transport (2007).

5 Cf., e.g., the official US manual of highway signs (Federal Highway Administration 2004), which

in general use but only found at particular spots, e.g. signs providing information about the distance to a certain town. The latter are not elements of a closed list but rather created according to specific needs in line with given rules of how to achieve this. A system as such, combining list-based elements and rule-based elements, may be called a *hybrid.*

- In general, traffic signs – or at least the core members of the system, i.e. the most common signs forming the fixed inventory – do not constitute a text and are not related to a particular language. They provide information about the condition of the route as well as "information", warnings or orders about how one should behave on a certain stretch of road or/and in a particular situation.
- The shape of a sign may be abstract and arbitrary (e.g., ⊖ 'no entry') or iconic to various degrees (e.g., ⚠ 'road narrows on right', 🚲 'no cycling').
- One piece of information is usually provided by means of a single sign, and a complete message often consists of only one sign, e.g., ⊖ 'no entry', ⊘ 'national speed limit applies', ▽ (in Germany)[6] 'give way to traffic on major route'. On the other hand, there are also complex signs or combinations of more than one signs, e.g. ⚠ 'warning: cattle' or ⚠ 'warning: school crossing', which consist of triangular △ 'warning' and 🐄 'cattle' or 🚸 'school crossing' respectively.
- A small number of single signs (e.g., STOP 'stop and give way') and most sequences of more than one sign (e.g., 

'road works 1 mile ahead, possible delay until March 08') show a combination of a standard sign and writing, thus possibly breaking the rule that traffic signs are not language-related.
- There are signs which explicitly make up a relation between another sign and the intended recipient, e.g. 🚲 no cycling', which may be segmented into ⊖ 'no entry' and 🚲, the latter indicating that the former is valid only for byciclists.

Trying to give an overall characterisation of traffic signs will probably end in classifying them as constituting a pictographic system (cf. below section 4), even though this holds true only in the case of the core members of the system. As a consequence, a person who intends to comprehensively describe the system of traffic signs of a particular country in order to compare it with other SGIP cannot confine oneself to just listing the inventory of signs, their combinations and respective functions but should also provide some quantitative data about the ratio of different types of signs employed by that very system.

3 Non-textual marking systems

The elements of a *non-textual marking system* (NTMS) such as ceramic marks, quarry marks, mason's marks, banker's marks, hallmarks, livestock brands, artists' signatures, monograms on seals, tags, or logos do not constitute messages which correspond with a text and are not typically interrelated with discrete linguistic units themselves. Instead, the signs of an NTMS directly link the particular object they mark

gives not only lists of signs but also detailed information about their design.

6 The counterpart in U.K. shows a supplementary text ⟨GIVE WAY⟩.

with an individual, a group of persons, a workshop, an institution or a locality and often serve as a sort of identifying mark or unique signature indicating ownership, actual or symbolic possession, authority, responsibility, affiliation, authorship or producership. In addition, they can be a sign of a special quality of the marked product.

A significant contrast may exist between marks attached on the respective object already during its production process and those which are attached to an artefact only later. Signs hinting at the producer tend to belong to the former group, while ownership marks would often have been applied secondarily.

As to their shape-meaning relationship, signs of NTMS can exhibit a purely conventional abstract form, may be iconic or combine both strategies in several ways. Various modes of iconism are illustrated by the logos depicted in figure 2.

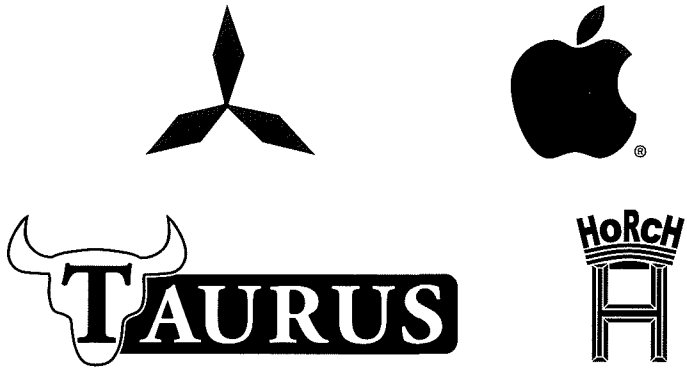


Fig. 2: Logos of *Mitsubishi* (a), *Apple Inc.* (b), *Taurus Tool & Engineering Co. Inc.* (c), and *Horch* (d).

The shape of the old Mitsubishi logo (used 1873-1914) was motivated by the fact that Japanese *mitsu bishi* means 'three rhomboids'. In the same manner the stylized form of an apple hints at the brand name of the well-known manufacturer of consumer electronics and software products. The Illinois-based *Taurus Tool & Engineering Co. Inc.* had an iconic sign added to its written name. The shape of the icon had been undoubtedly prompted by *taurus* denoting 'bull' in Latin. However, it seems that the company's designers did not trust the interpretative skills of their customers, since they refrained from using the T-shaped bull's head instead of the first letter and unnecessarily added a ⟨T⟩.[7] In the logo of *Horchwerke AG Zwickau*, a German car manufacturer which was integrated into the *Auto Union AG* in the early 1930s, the spelled form of the name is written above the initial in a way that it not only resembles a crown but may be also interpreted as a conventionalized pictorial rendering of sound waves, thus pointing to the name *Horch* being homonymous with the imperative of the German verb *horchen* 'to listen'.

Another remarkable example of the interplay of different types of shape-meaning relations is a logo that was created in 1936 for what is today the car manufacturer *Mazda Motor Corporation* (Japanese *Matsuda Kabushiki-gaisha*). The company had been founded in 1920 by Jujiro Matsuda (1875-1952) under the name of *Toyo Cork*

7 That the bull's head had been originally designed as a substitute of the letter ⟨T⟩ is obvious from a modern form of the brand logo, cf. http://www.taurus-tool.com/, retrieved on 2009-05-07.

Kogyo Co. Ltd. and since 1931 produced a motorized tricycle named after him *Matsudago*. It is obviously on these vehicles that the logo depicted in figure 3 was first used. Since the name Matsuda has a very short /u/ and thus sounds akin to how speakers of certain European languages would pronounce the second element of the Zoroastrian supreme deity's name Ahuramazdā, the resemblance in shape of the logo and the Ancient Iranian Faravahar symbol (which may be most likely interpreted as a transformation of the Egyptian winged sun-disc) is all but accidental. According to the homepage of the company's German branch, the Latinization of the brand name had been deliberately chosen to hint at Ahuramazdā.[8] In addition, the zigzag lines in the centre of the logo allude to capital ⟨M⟩, the first letter in the Latinized form of the name *Matsuda*.

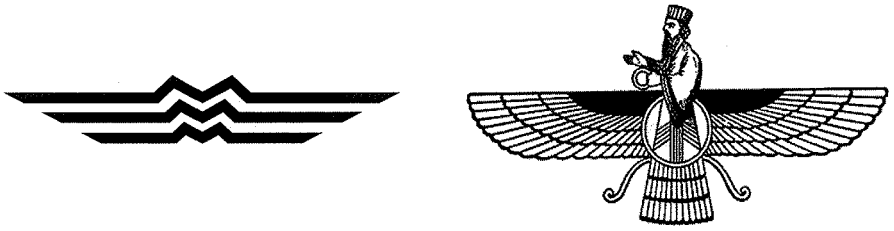


Fig. 3: The *Matsuda*/*Mazda* logo of 1936 (a) and the Zoroastrian Faravahar symbol (b).

An NTMS does not require the existence of writing but can incorporate elements of a script to a varying degree or even be made up completely of elements of writing (like in the case of the location code on German license plates). It is noteworthy that even if a sign of an NTMS consists only of letters of a script, it is often not read by the recipients but rather recognized as an image. As a consequence, a widely-known brand logo to many viewers will be identifiable even if it is written in a script unfamiliar to them (see figure 4).

Fig. 4: Brand logo in Latin (a), Arabic (b), Hebrew (c), and Chinese script (d).

Cases of a certain brand or product logo being closely connected with a highly characteristic appearance (e.g., a individualistic font) from time to time have given rise to satirical malapropism. This practice further substantiates the hypothesis that the identification of a logo by its recipients is not achieved in a process of spelling but rather through comparing the sign as a whole with already familiar models. By means of such quotative transformations it is possible to draw a connection between two enti-

8 Cf. Mazda Motors (Deutschland) (2001-2009).

ties which are normally not interrelated with each other. Figure 5b shows an example where the humorous effect has been produced by a similarity in both shape and name, whereas in figure 6b the allusion to the original is achieved only by means of the constellation of a jumping animal and letters from a specific font.

Fig. 5: Brand logo (a) and its malapropism (b).

Fig. 6: Brand logo (a) and its satirical transformation (b).

A significant feature of most NTMS is the particular importance of the relation between sign producer and sign-bearing object. Of course, the role of the recipient is not irrelevant, but it is not misleading to state that an NTMS often aims at benefiting the producer: by applying a logo a brand owner wants customers to buy his product, mason's marks may document the productivity of a workman and can serve as a basis for his remuneration, etc. As a consequence, NTMS should be called producer-oriented systems.

4 Pictographic systems

Pictograms are extensively used in the modern world[9] and include, e.g., symbols for crafts and professions, which have been widespread in Europe since medieval times, Otto Neurath's ISOTYPE (International System Of TYpographic Picture Education)[10], the system of public information symbols developed by Otl Aicher for the Olympic Games of 1972, its modern offspring as defined in ISO 7001:2007[11], traffic signals[12], laundry symbols, and hazard symbols, as described in Annex II of EU Directive 67/548/EEC. Icons used on computer displays for faciliating the interaction between users and the alphanumerical computer system also constitute pictographic systems.[13]

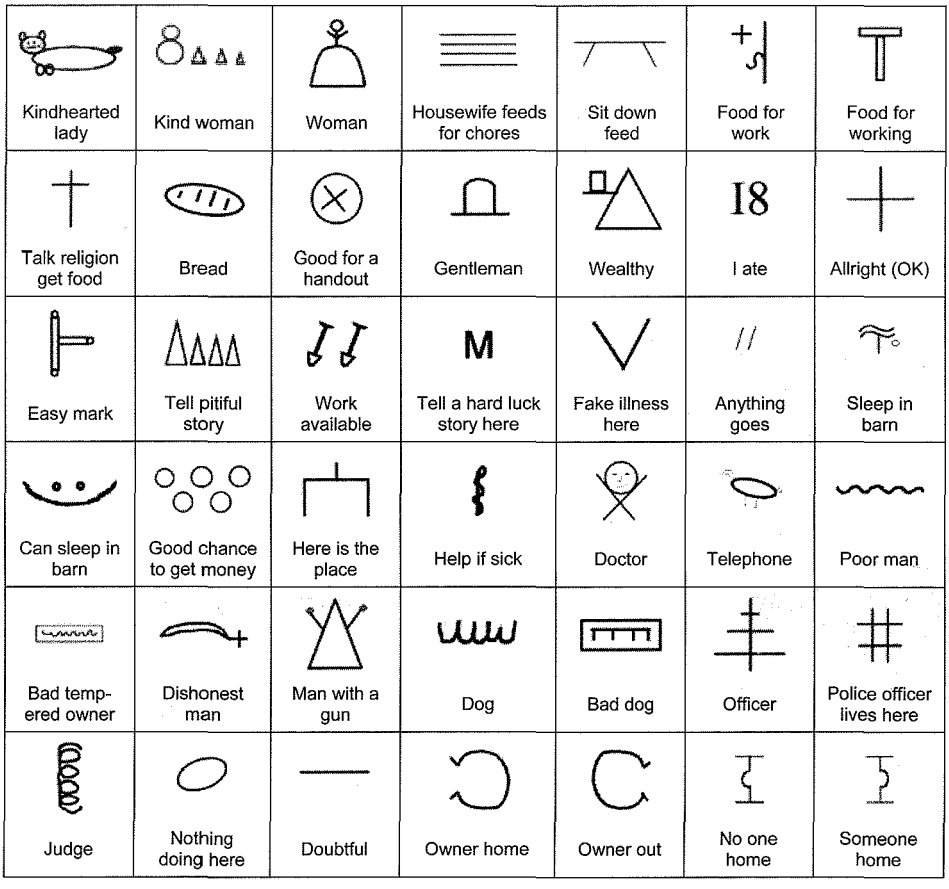


Fig. 7: A selection of hobo symbols.

9 For an overview, see Stötzner (2003a and 2003b).
10 See Neurath (1936). A short overview is given by Lewi (2006).
11 Cf. International Organization for Standardization (2006).
12 For a collection of traffic signs from around the world, see COLORS (2004).
13 Under Wichary (2006) one will find a chart on the diachrony of icon systems from various interfaces.

Rogues' codes or hobo symbols (*Gaunerzinken*, see figure 7) as well as their present-day successor WarChalking ("Wireless access revolution chalking", hints at an accessible WLAN network, see figure 8)[14] as a rule have different addressees but were quite similar in function, since they also provided information about how to behave in a particular location or what to do with a certain object.

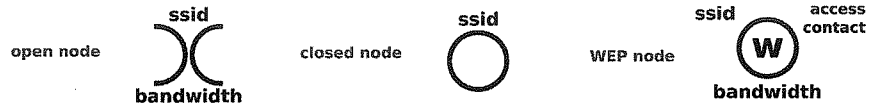


Fig. 8: WarChalking.

Indicating where specific wants can be supplied (e.g., to make a telephone call, to use the bathroom, to park one's car) or suggesting how to act in a particular situation (e.g., not to cross the road) seems to be the principal function of pictograms. Pictograms may be (but are not necessarily) iconic, they do not constitute texts and are in general not related to an individual language. For this reason, the term "pictographic writing" is badly chosen. The question of whether or not one should use the expression "picture language" (*Bildsprache*) – as is not infrequently done[15] – is tricky. On the one side, one might consider it appropriate since the respective pictures are constituted of meaningful elements; these are combined according to particular rules and form a message. On the other side, linguistic utterances exhibit several common properties – e.g., sequentiality, a finite set of elementary units, rather strict syntactic rules – which have no direct counterparts in pictures.[16] As a consequence, one should probably avoid not only the label "pictographic writing" but also "picture language", unless it were in a context where a metaphoric terminology would do no harm.

In general, pictographic systems relate to particular facilities or properties of a place, are strongly recipient-oriented and serve to make life easier for the addressees in a specific situation. Though there must be some conventions within the respective community about the usage of a pictographic system, the identity of the actual producer of a particular message is of little importance – and often not even known to the recipient. This provides a major contrast to non-textual marking systems and may be used to make decisions about classification in borderline cases.

14 Cf. Ward (2002).

15 The online catalogue of the Berlin State Library (http://stabikat.de/) lists more than 50 monographs – predominantly from the fields of art history, literary studies, and theology – that have been published between 1922 and 2008 and contain the title keyword "Bildsprache". "Bildersprache" is even more frequent with over one hundred examples.

16 For a comparison of the respective properties of language and iconic systems, based on Lessings differentiation between the narrative and the descriptive mode of representation, see Giuliani (2003: 21-37).

5 Graphic memory aids

Fig. 9: Kills Two displaying a winter count (photograph by John Anderson, National Anthropological Archives, Smithsonian Institution NAA INV 03494000).

Graphic memory aids (GMA) – e.g. Luba memory boards (*lukasas*), North American totem poles, year labels from Early Dynastic Egypt[17], Lakota winter counts[18], pictorial Bibles[19], the experimental stage of the so-called "Alaska script" developed in the early

17 An up-to-date collection of Egyptian year labels is presented by Raffaele (2009). On the underlying graphic system, cf. Morenz (2004: 189-195).

18 Cf. Burke (2000) and the outstanding online exhibition "Lakota winter counts" of the Smithsonian's National Anthropological Archives and National Museum of the American Indian (2005).

19 A famous example is the book made c. 1250 in Paris for Louis IX (reigned 1226-1270), which consists of almost 300 pictures rendering parts of the Old Testament (Cockerell & Plummer 1969). Originally, there was no writing, but about two generations after the completion of the images Latin descriptions were added. During the 17th century, when the book was in the possession of

20th century by Uyakoq (alias Neck)[20] – are related to simple mnemonic devices (like the well-known knot in the handkerchief or Alaskan *ayauppiaq*[21]) but use to be employed for a more long-term storage of information, may be highly complex and are commonly employed to represent narratives. For this reason they have sometimes been considered as constituting "pictographic writing". Nevertheless, GMA cannot be classified as writing, since they are neither obligatorily linked to an individual language nor unambiguously readable by a person who does not know the details of the underlying message in advance.

Lakota winter counts were in use in Lakota Sioux communities during the 18th and 19th centuries and are records containing year names, each of which was rendered by means of a pictorial sign. (see figure 9). They were not only long-term calendars to locate in time particular events but also served as mnemonic devices for oral history and storytelling. Hence, one individual sign can function as a sort of "episodogram" that stands for a whole narrative.

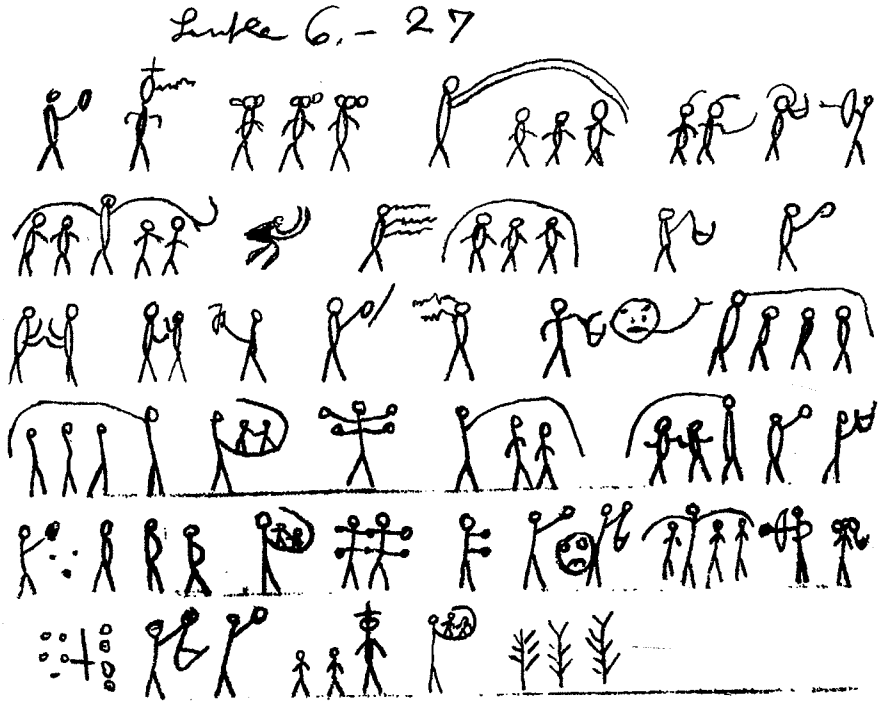


Fig. 10: Alaskan pictorial signs renarrating Luke 6,27-35.

Shah Abbas of Persia, these were supplemented by a Persian translation. Later, also a Judeo-Persian version was adjoined.

20 See Schmitt (1981).

21 An *ayauppiaq* is a messenger stick carried by a "feast runner", who would be sent from an Inupiaq village planning a festival (*kivgiq*) to another village to invite its inhabitants. Items attached to the stick symbolized gifts the hosts wanted to be brought and served to remind the runner of his message. A photograph of a runner with sticks is presented in the Alaska Virtual Library and Digital Archives (2004).

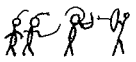
The icons in figure 10 designate smaller components of a narrative string. The graphic elements of the first line should more or less conform with what is rendered in the King James Bible as "But I say unto you which hear, Love your enemies, do good to them which hate you."[22] However, only parts of the line are unambiguous:


is known from other sources as denoting Tlingit *taugam* 'but' (Schmitt 1981: I 182, no. 75/76),


consists of an icon for Tlingit *Klistúsaq* 'Christ' combined with a zigzag line for 'saying' or 'word' (Schmitt 1981: I 173, no. 42 and I 180 no. 67),


hints at a plurality of individuals 'which hear' (Schmitt 1981: I 176, no. 54),


is an icon of one person 'loving' several individuals (Schmitt 1981: I 172, no. 38),


was segmented into 'your opponents' and 'and your enemies' by Schmitt (1981: I 173, no. 42 and I 180 no. 67), but perhaps should better be analized as discontinuative plus 'several individuals opposing one person'.

Even though there is one graphic sign – the initial one – that is said to denote a word and thus might be classified as an element signifying a linguistic unit (which would be a condition of a writing system[23]), the relationship between the graphic message and the underlying text is not systematic. Without previous knowledge of the text, its exact wording cannot be inferred from the sequence of graphic signs, as there is no way to differentiate between different tense and mood forms of the verbal lexemes 'say', 'hear', 'love'. Moreover, a sign can only signify its referent without showing whether it appears as a noun or as a pronoun in the underlying utterance. In addition, the interpretation of the message is for the most part independent of knowing the individual language, since the elements of the narration are denoted by icons which do not unambiguously denote grammatical elements.

The narrative qualities of images play an even more conspicuous role in those kinds of GMA that make use of intricately structured tableaus instead of single signs for referring to an event.[24] Figure 11 depicts a scene from the already mentioned 13th century pictorial bible commissioned by Louis IX, which refers to Genesis 44, the story of Joseph testing his brothers. With this example we have definitely reached an extreme of what may be considered a sign serving as a memory device. With respect to its formal properties the representation scarcely differs from images serving as text illustrations in illuminated manuscripts. Yet, due to the total lack of text in the original book, the semiotic status of its tableaus was significantly different before the supplementary texts were added:[25] The scene did not merely illustrate a given text but instead denoted the respective episode, and thus the whole sequence of scenes in the book served as a reminder of the string of events in the same way that the signs of a Lakota winter count would bring to mind the succession of year names.

22 For an analysis of the entire document see Schmitt (1981: 240-241).
23 See below section 8.
24 For a comprehensive study on narrative images see Giuliani (2003).
25 Cf. footnote 19.

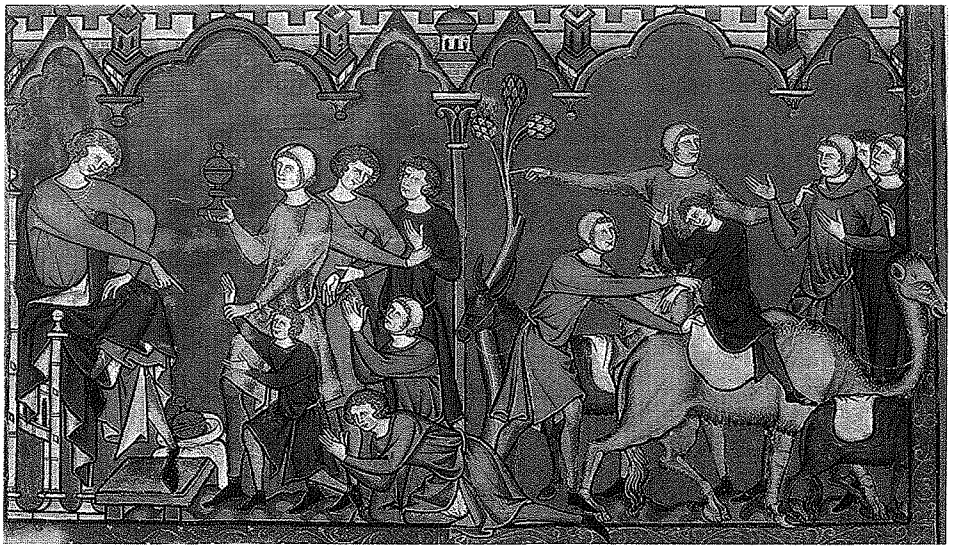


Fig. 11: Scene from the pictorial bible of Louis IX (Pierpont Morgan Library M 638, fl06).

It may seem a bit unsubtle to lump together down-to-earth mnemonic devices like the knot in the handkerchief and objects of decorum like the one illustrated in figure 11 under the heading *memory aids* (which suggests a merely practical purpose). However, there is no doubt that most systems mentioned in this section serve not only to remind the recipients of some information but also have a conspicuous display function. The purpose of remembering important events in the history of a community is always to commemorate and to ascertain shared cultural knowledge. For this reason, graphic memory devices have been not infrequently used for mapping fundamental concepts of the respective culture.

A remarkable case in point is the *lukasa* or "memory board" of the Luba,[26] one of the larger ethnic groups in the Congo area. *Lukasas* are flat wooden objects of an upright oblong shape with anthropomorph, zoomorph or abstract protrusions on one of the shorter sides. They carry iconic or abstract signs carved in high relief (see figure 12) and are often furnished with beads or shells which also serve as meaning denoting elements. The information expressed by a *lukasa* may relate to the political and religious geography, to essential sacred rules as well as events of the past and eminent individuals. All in all, Luba memory boards belong to the ceremonial sphere and are closely connected with the foundations of kingship – including its interrelationships with the supernatural.[27]

The well-known group of decorated slate palettes from Late Predynastic and Protodynastic Egypt shows a remarkable degree of typological similarity with Luba memory boards. Their range of size and shape is comparable, some of them have similar protrusions, they form a class of individually designed objects without much standardization, and those which can be sufficiently interpreted seemingly carry

26 Cf. Nooter Roberts & Roberts (1996).

27 Cf. Nooter Roberts, Harney, Purpura & Mullen Kreamer (2007: 21).

pieces of information that belong to the same sphere. Distinctive features are the material (stone) and the clear preference for less abstractly shaped signs on the Egyptian palettes.

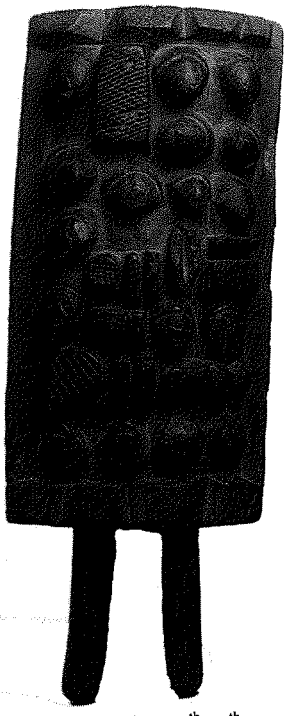


Fig. 12: *Lukasa*, Luba, 19th/20th century, wood, height 54.8 cm (Metropolitan Museum of Art, New York, Gift of the Britt Family Collection, 1977.467.3).

Fig. 13: "Narmer Palette", Hierakonpolis, c. 3000 BC, slate, height 63.5 cm (Egyptian Museum, Cairo, JdE 14716, CG 32169).

Besides the images, a small number of the Egyptian slate palettes exhibit hieroglyphic writing (see figure 13).[28] It is noteworthy that some other GMA presented here also show a certain affinity with being complemented with written information: In documents similar to that of figure 10 the artisan used not only iconic signs of the type we have discussed above but also wrote in Latin script the words *abraham*[sic], *Lot*, *God*, *Jesus*, *Holy Ghost*, *angel*[sic], *Jerusalem*, and *King*.[29] Apparently, the fact that graphic memory aids can have narrative functions and that narratives often include proper names (which are difficult to represent iconically) triggers a widespread

28 In addition to the "Narmer Palette", there is only a single example with signs which can confidently be labelled writing: the hieroglyphs identifying the one extant fortress on the "Bull Palette" in the Louvre are more likely to represent the phonograms ⟨nw⟩ and ⟨rw⟩ than to be used as an emblem ("Pot-and-lion"). The sign for 'Libya' and the fortress names of the "Towns Palette" in Cairo might be hieroglyphs but can also be emblematic symbols. The same holds true for the plain *serekh* on the Metropolitan Museum Palette.

29 Cf., e.g., Schmitt (1981: II nos. 53-66).

tendency to combine elements of GMA with writing as soon as the respective community has access to this medium.

The producer and recipient of a GMA may be one and the same individual, but this is not the rule. However, the link between producer and recipient of such a device in general is closer than in cases of non-textual marking systems or pictograms. Usually both sides must have a shared knowledge about the actual content of the message, since graphic memory aids are systems for information storage and ceremonial reinforcement of knowledge rather than for just communicating information. In all probability, it is not by chance that all kinds of GMA that have been discussed in this section are predominantly iconic and serve to keep alive the cultural memory of the respective community. It seems that SGIP employing icons in this specific manner as condensed signs for complex concepts are especially appropriate for supporting the preservation of the fundamental lore of a society.

6 Comics and graphic novels

In contrast to some outwardly similar representatives of the group of graphic memory aids (e.g., pictorial bibles), comics and graphic novels do not interrelate images with a more or less fixed text but consist of sequences of images which independently – or, as a mixed medium, supplemented by written words – convey a narrative. Whereas comics as a mass medium came into existence only in the 19th century[30], narratives in sequential pictures are much older. Often quoted examples of early precursors are the so-called scenes of daily life in Egyptian tombs, the decorations on Trajan's Column and the Bayeux Tapestry. Even if one should perhaps better discriminate between these commemorative records and the more mundane products of modern times, because the former all relate to historical events that could have been known by the recipients before interpreting the images, the history of graphic novels with fictional or imaginary content can be traced back to a distant past.

A few pages from a typical example of a narrative in images without written words are presented in figure 14. The woodcuts were created by the Flemish artist Frans Masereel (1889-1972), who produced about two dozen graphic novels and is considered one of the most important protagonists of this genre.

The overall function of the animal scenes of pTurin 55001[31] (see figure 15) is a matter of controversy[32] and it may not be taken for granted that all images were meant to constitute a single coherent narrative (not to speak of their possible connection with the erotic pictures of the papyrus). However, there are obviously sequences of pictures which represent a sequel of imaginary events[33] and link this document of the late second millennium BC with modern representatives of the genre of comics and graphic novels.

30 Cf. Sabin (1996: 11-25).
31 See Omlin (1973).
32 Cf. Omlin (1973: 74-76).
33 Cf., e.g., the three scenes of summoning and punishing in the upper register or the sequence of a cat mounting a chariot and fighting activities in the lower register (Omlin 1973: pl. XIII).

Fig. 14: Six tableaux from Frans Masereel's graphic novel *Die Sonne* (1925).

Fig. 15: Narrative sequences of animal scenes in pTurin 55001.

7 Numerical information storage systems

The sign inventories of *numerical information storage systems* (NISS) comprise graphic marks or three-dimensional objects. Pertinent examples of NISS are Ancient Near Eastern "tokens"[34], Oceanian *kupes*, Peruvian *khipu* (Quechua) or *quipu* (Span-

34 See Schmandt-Besserat (1992).

ish)[35], as well as tally sticks of medieval European and many other societies. For obvious reasons, the methods employing three-dimensional objects do not belong to the class of SGIP.

The most basic strategy for storing numerical information is by means of signs (be they marks or token-like objects) each of which represents one unit or amount by corresponding to one individual object without specifying the type of object (see figure 16). A bit more advanced are systems which use distinct marks (or tokens) for counting dissimilar objects and/or different signs for different numbers. It seems that in Ancient Mesopotamia a token system had been transformed into an SGIP in the course of replacing the tokens by means of representing two-dimensional symbols on clay tablets.[36] More on this topic may be found in Klaus Wagensonner's contribution to this volume (Wagensonner 2009).

Fig. 16: Labels with numerical information from Tomb U-j at Abydos, c. 3300 BC, bone or ivory, height 1.6–1.9 cm.

If in a NISS the elements which designate one particular type of information (e.g., numerical signs as opposed to product signifying signs) are regularly displayed and related to each other in a conventionalized way, the representation of information may assume the shape of a diagram.[37] Besides being intended as a pictographic system for international public information, the icons designed by Gerd Arntz for Otto Neurath's ISOTYPE were also intensely employed as unit symbols in statistical diagrams.[38] Figure 17 represents one of what Neurath called "number-fact pictures".[39]

35 Cf. Haarmann (1991: 56-60) and the articles in the collective volume edited by Quilter & Urton (2002).

36 Cf. Cancik-Kirschbaum & Mahr (2005). Schandt-Besserat (1994: 266-267) has given a first-rate outline of the empirical data, which is, however, far from satisfactory with respect to more theoretical issues and terminology. Though the article is titled "Forerunners of script", the author subsumes even the earliest Sumerian tablets under "writing" and uses the term "written signs" almost synonymously with "pictograms".

37 Whereas diagrams of all sorts play an important role in visual information processing, they are outside the immediate scope of this paper, since a particular type of diagram does not constitute an SGIP itself but rather is a specific way of displaying the elements of one or more such systems. We may differentiate between the employment of isolated elements of an SGIP (e.g., many traffic signs), the use of unidimensional chains of signs (e.g., a written sentence), and the multidimensional display of elements in diagrams (e.g., a metro map). On theoretical, cognitive and practical aspects of modern diagram usage see the contributions in Anderson, Ceng & Haarslev (2000). The web article by Friendly (2008) is a fine outline of the history of data visualization.

38 See Neurath (1930), Nikolow (2005).

39 Neurath (1936: 7).

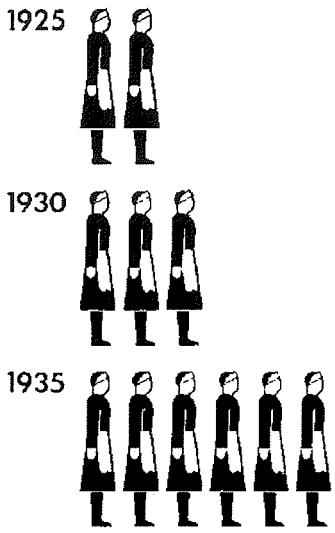


Fig. 17: A statistical diagram by O. Neurath ("Growth in number of servants").

As making sense of information that was decoded by means of certain numerical information storage systems to a great deal depends on previous knowledge, and as producers and recipients of such documents are frequently identical, the most basic kinds of NISS share significant properties with graphic memory aids and might be classified as a special subgroup within this category of SGIP. Others are more closely related to systems that provide means of context-free interpretation like writing, but usually are not related to a particular individual language and lack the power of unambiguously signifying a precise wording. Nevertheless, it seems that it is not by mere chance that more complex numerical information storage systems played a considerable role in the emergence of writing.

8 Writing systems

Writing as understood in this paper is a medium for the graphic manifestation of utterances of an individual language and is systematically interrelated with the respective spoken language. Even though written language is phylogenetically and ontogenetically subsequent to spoken language, it must not be considered entirely dependent on its spoken counterpart – which, of course, is exactly what was done and still is being done by those who rely upon the Aristotelian definition of writing and consider the interrelation between writing and speaking as being characterized by the notion of *aliquid stat pro aliquo* (cf. figure 18).[40] Of course, the principle "something stands for something else" holds true also for writing (since it is valid for any semiotic system). However, the entity that a written utterance stands for, its *signifié*, is not the corre-

40 On the distinction between "surrogationalistic" and "autonomistic" attitudes towards the relationship between script and language see Glück (1987: 57-110) and Coulmas (1994: 259-260).

sponding spoken utterance, but rather its meaning, which matches the meaning of the respective spoken utterance. "Matching of the meaning sides" does not imply an identity correlation between the meaning of a written utterance and the meaning of its spoken counterpart. There may be systematic contrasts between the spoken and the written manifestations of one particular language. The differences may occur at any level of grammar and occasionally are like contrasts which usually exist only between distinct individual languages.[41] In some cases, we find massive typological contrasts between the written manifestation and the spoken manifestation of one language.[42]

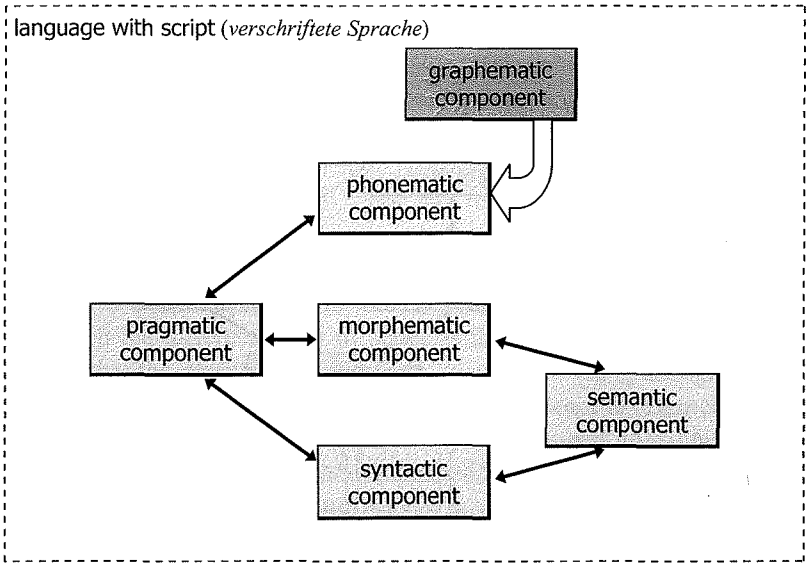


Fig. 18: Architecture of a language with (an alphabetic) script according to the "Aristotelian" model.

A more realistic model of the components of a language which is used in spoken as well as in written communication is delineated in figure 19. The most significant property of a writing system is that its structure corresponds with the structure of language. An entity that is referred to in spoken language by means of a complex sequence of linguistic units – e.g., 'my dearly loved old black cat resting on my bed' – is signified in writing by a similarily (though not necessarily identically) structured string of units and not by means of let's say a picture of a handsome black feline lying on a bed. Hence, although one might theoretically think of "phrasographic" or "textographic" systems, i.e. devices which would have individual signs which each correspond with a phrase or even a whole text, systems as such are not writing, but instead belong to the class of graphic memory aids (cf. above section 5). What ex-

41 Whereas Spoken Egyptian was assumedly a language with much inflection, Written Egyptian is predominantly agglutinating/isolating. In contrast to the spoken language, Written Egyptian had classifiers on nouns and verbs, status hierarchies grammaticalized in (first person singular) personal pronouns, and triplication (of endings, classifiers or stems) as a device of plural formation.

42 Cf. Kammerzell (1993), Morenz (2004: 10-17). This approach owes much to the landmark works of Helmut Glück, see Glück (1987) and the compact summary of his concepts in Glück (1993).

cludes any supposable "phrasographic" or "textographic" system from the category of writing systems is its lack of linguistic structures, which prevents its imaginary users from coding and decoding any message that can be put into spoken language, without having previous knowledge about its form and content. Accordingly, it is not only for practical reasons that there are no writing systems based upon regular correspondences between elementary graphic signs and linguistic units above the level of a word. The power to encode any spoken text in such a way that it is verbatim readable by any recipient who knows the graphic system and the corresponding language is obviously an essential property of writing.

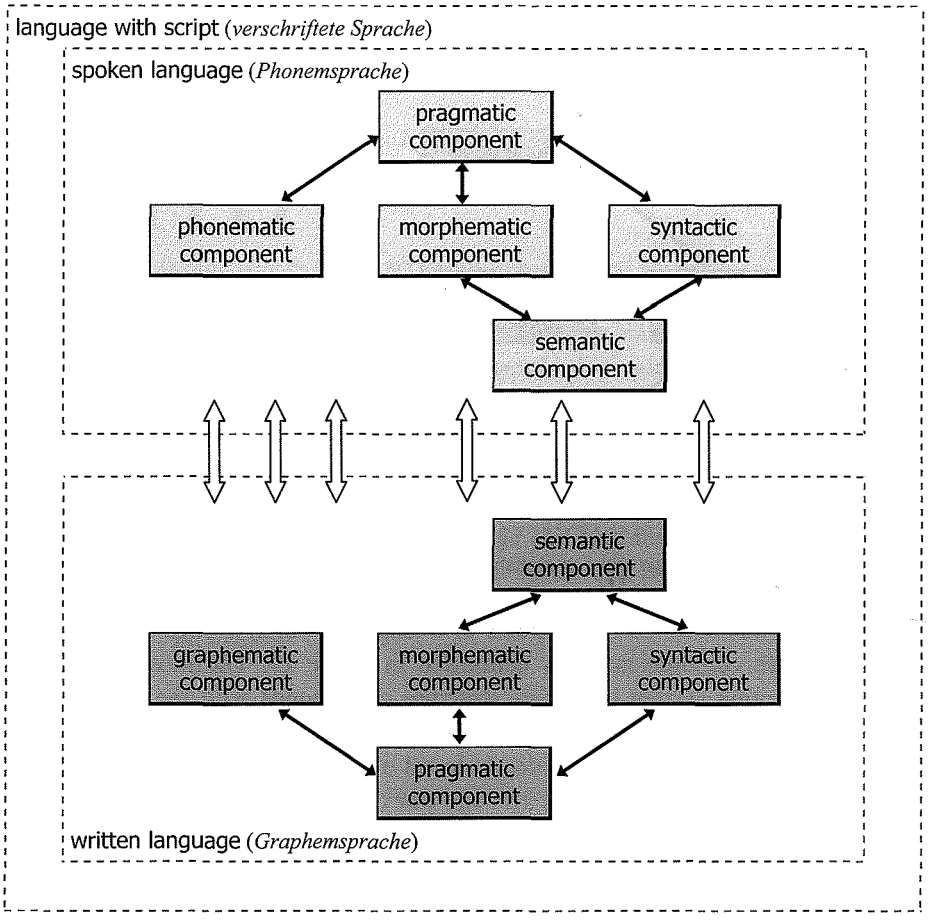


Fig. 19: Architecture of a language with script according to the "Humboldtian" model.

Typologically, writing systems can be differentiated according to the predominant reference level of elementary signs. Most works aiming at classifying different kinds of script (*Schriftarten*) have distinguished between logographic and phonographic systems, the latter classes being further subdivided into syllabic and alphabetic

scripts.[43] Whereas a straightforward classification as such may be convenient for gaining an overall picture about different manners to represent linguistic units by means of graphic signs, serious problems arise from that widespread practice:

- Firstly, many, if not most, individual writing systems do not confine themselves to a single type of correspondence between graphic signs and linguistic elements but rather exhibit a combination of several different types. As a consequence, the systems that are conventionally labelled logographic, syllabographic or alphabetic scripts do not constitute discrete classes but sets which show a considerable degree of overlapping. The standard classifications cannot cope with this.
- Secondly, the degree of variation between distinct genres or individual utterances written in the same script can be considerable. On the one side, there are Egyptian hieroglyphic texts of the third millennium BC, which comprise more than 90 percent of alphabetic graphemes, on the other hand, modern Europeans use an array of written messages which include a substantial amount of logograms (e.g., product labels, railroad timetables). For this reason any meaningful comparison between different writing systems requires a thorough investigation of their actual usage.

Prevalent classification practice has fostered a long tradition of interpreting the contrast between the different kinds of script as the outcome of an historical evolution, suggesting that the development ran from logographic via syllabographic and consonantal writing systems to alphabetic ones.[44] This concept is often combined with the almost teleological opinion that this evolution constituted a qualitative advancement that led to the emergence of Western alphabetic scripts as the ultimate means of writing.[45] To overcome this simplistic model we need thorough investigations of the practical usage of various writing systems, which also allow for quantitative factors.

Most people hold that a script is built up of a finite, conventionalized inventory of signs.[46] Of course, this is sometimes the case (e.g., in the local alphabets of Archaic Greece), but many writing systems (e.g., Egyptian hieroglyphs or modern European scripts) show a more complex architecture and possess not only a closed set of conventionalized signs but also an open number of mostly iconic signs. In the case of our script, the closed class consists of the core set of alphabetic letters and a few dozen additional characters – like numerals, punctuation marks, and frequently used logograms (e.g., @, §, &, €, +). The open class comprises signs for more special purposes – like, e.g., ☎, ⊕, Ω, Z, ..., ‘, ’, Σ, A, Ω, 🗪, 🌍 – which are generally iconic and for this reason need not be memorized one by one as long as producer and recipient of a written message share a set of rules on how to create and how to interpret new signs. The interplay of list-based information and rule-based information is typical for *hybrid* systems. Experiments on the processing of lexical knowledge have shown that the human mind is obviously particularly suited to dealing with hybrid systems.[47]

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43 For an overview of different typologies of writing systems see Coulmas (1996: 1382-1386).

44 See, e.g., the influential works of Gelb (1963: 190-205) and Jensen (1969: 43-46).

45 For a critical assessment of such concepts, see Nooter Roberts, Harney, Purpura & Mullen Kreamer (2007: 14-18).

46 Cf., e.g., Glück (1993: 531).

47 Cf. Aitchison (1994: 157-231).

To sum up, writing is a system of graphic information processing that interrelates with a particular individual language by making use of signs which correspond to linguistic units in a rule-based manner. It has the power to encode a spoken message so that its precise wording can be re-enacted by a recipient who has no previous knowledge of the meaning of the written message.

9 Augmentative and alternative communication systems based on graphic signs

Since the 1950s a variety of augmentative and alternative communication (AAC) systems for people with restrictions on the production or comprehension of spoken and/or written language have been developed.[48] Several systems pertaining to aided AAC utilize pictorial signs. The spectrum ranges from systems employing combinations of pictogram-like signs which convey complex meaning without direct reference to a natural language to systems like *Blissymbols* (or: *Blissymbolics*), which originally were created as an easy-to-learn medium for international communication and constitute what comes close to a purely logographic writing system. *Blissymbols* include grammatical elements like pronouns and tense indicators and may be classified as a constructed auxiliary language that is used only in written form. Other devices (e.g., *Picture Exchange Communication System*) also employ images that correspond to single words, but are more context-bound and restricted with respect to how explicitly they render the relationships between several elements of a complex message.

10 Pseudo script and asemic writing

Pseudo script and *asemic writing* represent another type of what looks like graphic signs and include such phenomena as children's scribbles, "automatic writing" like Henri Michaux's experiments under the influence of psychedelic drugs[49], the "secret characters" of Max Ernst's artist's book *Maximiliana or: The illegal practice of astronomy* (1964)[50], Luigi Serafini's *Codex Seraphinianus* (1981), notations of people suffering from certain forms of dyslexia[51], "blundered" legends (*Trugschriften*) of coins and other artifacts[52], "tourist hieroglyphs" and deformed "exotic" characters that serve as decoration for fashionable articles.[53]

Some members of this all but homogeneous group might indeed be intended by their producers to form a text, but they typically do not correspond to linguistic units

48 For general information on AAC, see Romski, Sevcik & Cheslock (2003: 277-279), Smith (2005: 51-74). An overview of AAC systems can be found in Mirenda (2003).

49 See, e.g. Sieburth (1987), Morley (2003: 90-91 and 106-108).

50 See Schamoni (1974).

51 For an overview, see Eberle (1996).

52 On examples from pharaonic Egypt see Sternberg-El Hotabi (1994) and von Lieven (in this volume).

53 An instructive survey of the formal diversity of pseudo scripts and asemic writing produced with artistic intentions is given by the contributions to the *Asemic magazine*, compiled and published by Tim Gaze (n.d.).

in a conventionalized rule-based way and are often not legible. Semiotically, notations as such could be classified as complex "*textograms*" if they are meant to correspond as a whole to a particular message.[54] But in general, the meaning of asemic writing is either open or arbitrarily set by the producer. A composition in pseudo script may even be void of actual meaning and deliberately function as a mere sequence of *indexical signs* which transport nothing but the message that the producer makes use of "writing". In any case, pseudo script and asemic writing presuppose the existence of writing and so differ from the other systems of graphic information processing examined above.

"Blundered" legends of coins are a widespread phenomenon and were especially common in times when the currency of one community was imitated by another, which was not familiar with the writing system (or did not use writing at all), and or in situations — like the European Middle Ages — when the employment of writing was restricted to a very small segment of society.

Fig. 20: Pseudo-Kufic on a Gold imitation dinar of King Offa (reigned 757-796), Kingdom of Mercia, England, gold, diameter 20.0 mm, weight 4,28 g (British Museum, London, CM 1913-12-13-1).

Fig. 21: Abbasid dinar, AH 158 (AD 774/5), gold (reverse turned upside down).

Figure 20 depicts the pastiche of an Abbasid dinar, minted on the British Isles in the 8th century, whereas figure 21 shows a genuine dinar similar to – but struck one year after – the prototype of King Offa's gold coin. Even though the copy of the Arab inscription is not bad (much better than some mechanical renderings of Greek texts produced by mediaeval Western copists), it is obvious that neither the initiator nor the engraver were familiar with the Arabic writing system. Had they been able to read the

54 In this respect, they would resemble graphic memory aids like the one presented in figure 11 without necessarily exhibiting their qualities.

inscription, the additional Latin legend *OFFA REX* would hardly have been inserted upside down. Consequently, for the producers of Offa's dinar the strings of Arabic letters had no retrievable meaning, but were nevertheless considered necessary in order to ensure that the coin would be of the same value as its Near Eastern prototype. Whether or not the legend was intended to be meaningful to the recipients depends on the purpose of the coin. If it were destined for long distance trade with Muslim Spain, as some people believe, the inscription would have been legible to (at least some of) the recipients. If the coin had only been struck for representational display at home, the signs of writing would have been asemic for both producers and recipients. These possible scenarios illustrate that interpretability as well as the status of the system underlying a particular document, as writing or pseudo writing are not only a matter of the signs but also depend on producer and recipient.

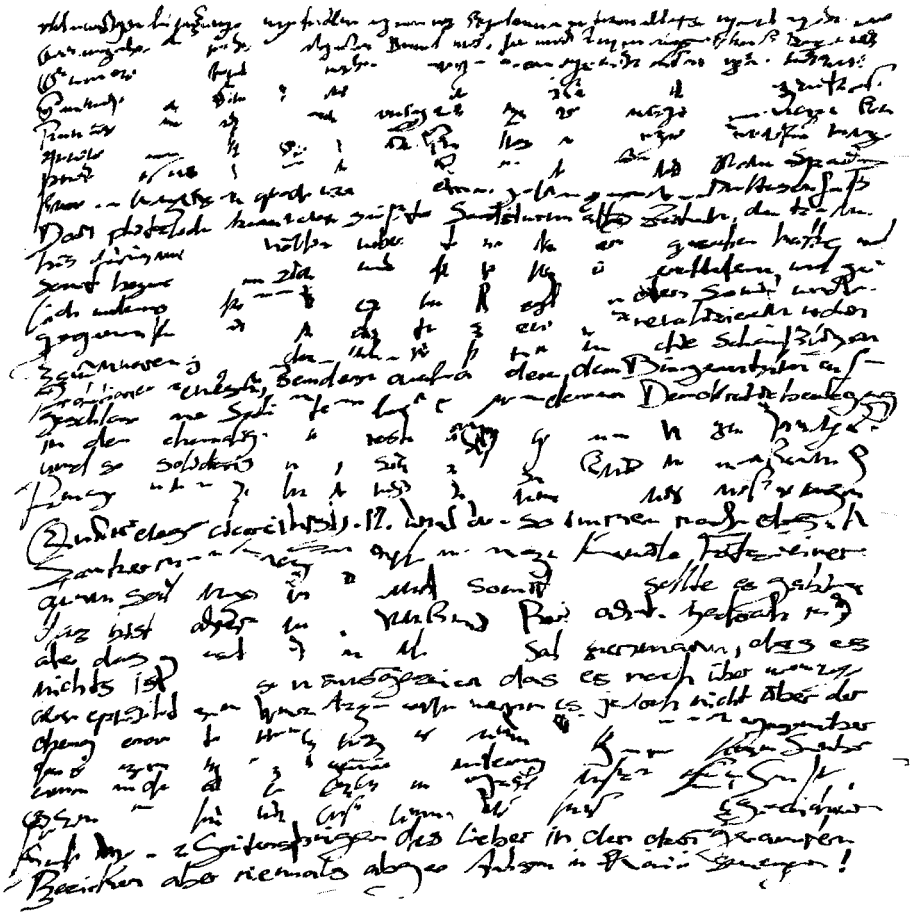

Fig. 22: Dirk Kammerzell, *What is missing?* (ink on paper, 32×31 cm, c. 1990).

An intricate game with several strata of (il)legibility is played in the asemic writing of figure 22: at first glance, the whole looks like a text layed down in a somewhat old-fashioned handwriting. A close view reveals a number of German words and groups of

words. Before long, however, the strings of readable signs are disrupted by meaningless elements und do not constitute a single comprehensible sentence. But then, after the viewer has taken a more distant position, suddenly clearly legible letters appear literally from nothingness, being shaped by the gaps in the strings of pseudo writing.

It is difficult to draw a line of demarcation between asemic writing on the one side and unreadable "real" writing on the other side. This problem arises in case of documents composed in a badly legible handwriting[55] as well as when one is dealing with unknown scripts. As long as an SGIP is undeciphered to a degree that we cannot decide about the nature of relations between graphic signs and linguistic units, a classification of the underlying system as writing is dubious. Sometimes it may be possible to find positive symptoms in favor of the respective SGIP being writing, but in the case of systems attested only in form of very short records there are hardly sufficient empirical data for identifying language-like structures. For this reason, the attempts to establish the existence of an "Old European writing system" going back to the 6th millennium BC[56] and similar speculations about other alleged cases of extremely old "scripts" have no sound methodological basis.

11 Secondary functions of systems of graphic information processing

Systems of graphic information processing can be secondarily used in a way that the product's association with the original message and its meaning becomes supplemented or even superseded by other factors. Elements of writing have been used for mainly decorative purpose like the design from ceramic wall tiles depicted in figure 23. In certain forms of calligraphy, "pattern poems"[57] and other representatives of concrete poetry the display of more or less clearly readable characters forms an image which recapitulates the message of the text (see figure 24).

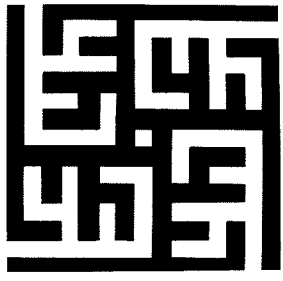

Fig. 23: علي *Alī* rendered eight times in Square Kufic script, Imām Alī Mosque at Najaf (Iraq).

Fig. 24: Eulogies on Imām Alī (the "Lion of God") in figurative Arabic calligraphy.

55 A famous example is the popular name of Ludwig van Beethoven's bagatelle in A minor (WoO 59), *Für Elise*, which, according to most scholars, resulted from a wrong reading of the original title by Ludwig Nohl in 1865 (E.-S. Lincke, p.c.).

56 See Haarmann (1991: 70-81 and 1994: 268-271).

57 One might think of works like Guillaume Apollinaire's *Calligrammes* of 1916 (see Morley 2003: 54).

Elements of writing are found in many works of Cubist, Futurist, Constructivist and Dadaist artists. Sometimes the embodying of textual elements in a work of art is similar to the examples mentioned at the beginning of this section[58], but sometimes writing is employed as a mere constructive element void of its original meaning.[59]

The use of characters in certain magical practices[60] is another example of elements of writing in secondary functions.

12 Substitutive systems

For various purposes, systems of graphic information processing are used, the elements of which do not directly refer to a message but rather designate signs of another SGIP: Morse code or Braille signs substitute characters of an alphabetic script and facilitate specific manners of information transmission. The methods of classic cryptography using monoalphabetic or polyalphabetic ciphers work in a comparable way[61] and are employed to make messages readable only for certain recipients.[62] In general, these systems belong to the same category as the underlying system.

13 Conclusion

The preceding sections of this paper have not been particularly technical, since the focal intention was to illustrate the enormous variety of systems of graphic information processing. Now it is appropriate to describe the different types of systems of graphic information processing not by means of listing their representatives, but on the basis of consistent criteria. For this reason, the predominant types of semiotic relations within the major classes of SGIP shall be inspected and contrasted with each other.

The prototypical kinds of relations which exist between graphic signs and their *signifiés* on the level of basic meaningful segments — abbreviated ⟨S⟩ — can be summarized as follows:

non-textual marking systems (NTMS)	⟨S⟩ → person, institution
pictographic systems (PS)	⟨S⟩ → facility, opportunity, danger
graphic memory aids (GMA)	⟨S⟩ → text, chapter, phrase
comics and graphic novels (CaGN)	⟨S⟩ → episode, event
numerical information storage systems (NISS)	⟨S⟩ → quantity (plus product)
writing systems (WS)	⟨S⟩ → lexical/grammatical meaning.

Whether or not a particular SGIP makes use of iconic signs with predictable shape-meaning relations is of little relevance for its classification. With the exeption of

58 See, e.g., Gino Severini's painting *Cannon in Action* (Morley 2003: 53, fig. 43).
59 A lucid example is Kurt Schwitters' *Picture with Light Centre* (Morley 2003: 69, fig. 56).
60 For a broad survey on the mystical and magical use of alphabetic letters, see Dornseiff (1925).
61 On the history of substitution ciphers see Wrixon (2000: 168-237).
62 The principles of Ancient Egyptian "cryptographic" writing have been recently dealt with by Daniel Werning (2008).

comics and graphic novels, which are necessarily picture-based, all types may employ iconic as well as symbolic signs.

In the case of *non-textual marking systems*, *pictographic systems*, and some (but not all) *numerical information storage systems*, the carriers of the signs or the places in which they occur are often an essential part of the message. Consequently, these systems are strongly context-bound, while the others have the power to transmit context-free information. The implicit meaning of the context within the distinct types of SGIP can be paraphrased as:

NTMS '*this object belongs to/was made by/comes from* the referent of the sign'
PS '*here you can/may/must (not) do* what the sign refers to'
GMA —
CaGN —
NISS '*you have got/paid/consumed* the amount of ... (of ...)'
WS —.

The contrast between primarily producer-oriented *non-textual marking systems* and predominantly recipient-oriented *pictographic systems* or numerical information storage systems results from the different kinds of implicit information provided by their respective contexts. Perhaps the circumstance that in some SGIP pieces of information are typically provided not only by the signs but also by their context allows for messages consisting of only one elementary element. These are not uncommon in *non-textual marking systems* (cf. figure 2-3), *pictographic systems* (cf. figure 7), and *numerical information storage systems* (cf. figure 16), but rare in *graphic memory aids*, *comics and graphic novels*, and *writing systems*.

The capacity to signify any possible message is another significant feature that groups together *graphic memory aids*, *comics and graphic novels* as well as *writing systems* and separates them from the representatives of *non-textual marking systems*, *pictographic systems*, and *numerical information storage systems*, which are each confined to transmitting only a specific type of information.

Only *writing systems* are capable of transmitting information that is linked with a precise wording. This is achieved by employing individual signs that correspond to minimal linguistic units of a particular individual language and by combining them into ordered sequences according to linguistic rules. Nevertheless, as we have seen in section 8, *writing systems* are not necessarily based on a completely conventionalized inventory of signs but may be hybrid.

Even though it has been the main objective of this section to bring forward possible criteria for discriminating between different types of graphic information processing, we have observed on several occasions that one must not expect that a particular system will fit into a specific class straightforwardly. Firstly, there is nothing which prevents the users of a certain graphic system from integrating elements of a dissimilar system or from combining several systems within a single document: Characters of a script may be employed as livestock brands. Seals or stamps, while typically being used like other *non-textual marking systems* to indicate ownership or responsibility, may carry elements of writing. Pictograms are easily transferable into a written text and thus become parts of the underlying *writing system*. Secondly, we

have to differentiate between the system as a whole, the particular functions of its basic elements, and the patterns of its usage. The amount of documents that might be described as mixed media is enormous, and this phenomenon is all but new. It even predates the earliest instances of "pure writing".[63] What is usually presented as the oldest examples of writing from Egypt[64] are not graphic manifestations of utterances of an individual language but notations recorded by means of a *non-textual marking system* (cf. above section 3) and a *numerical information storage system* (cf. section 7), including a few signs which, according to the opinion of most scholars, refer to linguistic units.[65] It is likely that these very signs triggered the emergence of a script, but calling the SGIP underlying the records of Tomb U-j a *writing system* is not justified.[66] That signs linked with linguistic units may occur in a more or less isolated manner within systems which are not writing is also confirmed by the document from Alaska shown in figure 10.

14 Postscript

After the completion of this paper, Malcolm D. Hyman directed my attention to his key article „Of glyphs and glottography" (2006), in which he also dealt with the problem of discriminating between different types of systems of graphic information processing. His approach and the one advocated here have more in common than a cursory reading might reveal. Some differences are scarcely more than a matter of terminology: What Malcolm Hyman calls „writing" comes close to what I have defined as a *system of graphic information processing* in general, whereas his „glottographic writing" goes with my more restricted use of the term *writing system*.

Acknowledgments

This paper would not have been accomplished in its present shape, had I not been able to fall back upon the altruistic support of various persons. I appreciate all sorts of discussions, comments, suggestions, corrections, and technical assistance received not only from those who took part in the conference of December 2007, but especially from Dörte Borchers, Camilla Di Biase-Dyson, Dirk Kammerzell, Eliese-Sophia Lincke, Karin Lippold, Silvia Kutscher, and Daniel Werning.

63 For an early example see figure 13.

64 See, e.g., Dreyer (1998, in particular 181-182), Kahl (2003), Jiménez-Serrano (2007).

65 Morenz (2004: 37-54) has suggested the term "Frühschrift" for this kind of records.

66 That the excavator himself has felt the difference between the SGIP documented in the material of Tomb U-j and a script is evident from the fact that in trying to ascertain the meaning of particular signs he often falls back on an iconic interpretation (cf. Dreyer 1998: 140-145). In case it were a writing system, this sort of analysis would be unjustifiable, since neither logograms nor phonograms of the Egyptian script show an absolutely predictable correlation between shape and function.

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