Abstract

The paper gives a survey and presents a critical analysis of Peirce's studies in Egyptology from 1885 to 1904, as documented mainly in MSS 1227, 1228, 1244, and 1294. It examines Peirce's studies and advances in the language and script of Pharaonic Egypt as well as his assessments of the scientific achievements of the Ancient Egyptians. Among the linguistic topics in focus are Peirce's assumptions concerning the iconicity of hieroglyphic writing, his conjectures on the origins of indexical words from nouns, and his hypotheses concerning the proximity of Ancient Egyptian to the *ursprache* of humans. The paper traces some of Peirce's hypotheses concerning the structure of Egyptian to his fundamental assumptions about iconicity and indexicality in language. Altogether, Peirce was not only very familiar with the state of the art of contemporary Egyptology, but he also achieved a remarkable competence of the Egyptian language and its hieroglyphic writing. While some of Peirce's insights into the language and civilization of the Ancient Egyptians are still tenable, others reflect certain misinterpretations of the scholarship of his time, which call for correction in light of the state of the art of today's Egyptology.

Keywords: Charles S. Peirce, Ancient Egypt, Egyptology, history of science, hieroglyphs, iconicity in language, origins of indexical words, ursprache.

Charles S. Peirce's Egyptological Studies

Frank Kammerzell,
Aleksandra Lapčić, and
Winfried Nöth

1. Introduction

In his Lowell Lectures on "Some Topics of Logic," Lecture VIII of 1903, Charles S.

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Peirce, looking back at his career as a historian of science, declared the following:

> On five occasions in my life, and on five occasions only, I have had an opportunity of testing my Abductions about historical facts, by the fulfillment of my predictions in subsequent archeological or other discoveries; and on each one of those five occasions my conclusions, which in every case ran counter to that of the highest authorities, turned out to be correct. The last two cases were these. Prof. Petrie published a history of Egypt in which he treated the first three dynasties as mythical. I was just about writing a history of science and in the first chapter I showed why those Dynasties including the name of Menes and other facts ought to be considered historical. Before my book was near completion, Petrie himself found the tomb of Menes. (CP 7.182, fn. 7)

This remarkable retrospect shows that Egyptology was not simply a hobbyhorse within Peirce's extraordinarily broad spectrum of interest but also a research field in which he made some discoveries that anticipated later findings of Egyptology and outlasted his time. Peirce's approach to Egyptology was semiotic in the sense in which he characterized his life's work on 23 December 1908 in a letter to Lady Victoria Welby. As he put it there, "it has never been in my power to study anything, – mathematics, ethics, metaphysics, gravitation, thermodynamics, optics, chemistry, comparative anatomy, astronomy, psychology, phonetics, economic, the history of science, whist, men and women, wine, metrology, except as a study of semeiotic" (SS 1977: 85–6).

None of Peirce's manuscripts on Egyptological topics appeared in print during the author's lifetime, but some have become published since 1985, when Carolyn Eisele first included selected pages from them in her two-volume edition *Historical Perspectives on Peirce's Logic of Science*. The subtitle of her edition, *A History of Science*, is indicative of one of the reasons why Peirce began to study Egyptian Antiquity. The history of science since Egyptian and Babylonian Antiquity was a research field in which Peirce was "one of America's most eminent scholars" of his time (Eisele 1979: 143). However, Peirce's Egyptological studies did not remain restricted to inquiries into the role of the Egyptians in the history of science for long. In 1892, he also began to study the language and the hieroglyphic writing system of Ancient Egypt, and in 1904, he felt himself competent enough to pass a general judgment on the "important advances" of Egyptology since the 1870s (Peirce 1904: 957). The importance that Peirce attributed to Egyptological studies in general and to the rediscovery of the Ancient Egyptian language and hieroglyphic script in particular can be gauged from the fact that Jean-François Champollion, the decipherer of the Egyptian hieroglyphs and founding figure of Egyptology, is included in Peirce's list of the 300

"Great Men of History" of 1892 (see vol. 5 of his *Writings*) as the only "linguist" or as one of only four linguists, if we count the three "philologists" in this list, F. C. Dietz, J. Grimm, and Sir W. Jones, among the linguists, too.

Research in Peirce's Egyptological studies has so far remained restricted to editorial work. As a result, some of the papers dealing with the role of Ancient Egypt in the history of science have become available in print. However, Peirce's manuscripts on the Egyptian language and its writing have remained unpublished. They can only be consulted in their original MS form or in the form of its microfilm edition. A research project conducted at the Department of Northeast African Archaeology and Cultural Studies of the Humboldt-University of Berlin, a successor to the Berlin Egyptologists whose writings Peirce consulted in his time, aims at a critical assessment of the results of Peirce's studies on Pharaonic Egypt.[1] Its purpose is to offer a perspective on Peirce's Egyptological studies with a special focus on Peirce's studies in the language and script of Pharaonic Egypt, especially in MSS 1227, 1228, 1244, and 1294.

2. Chronology of unpublished manuscripts and published papers

Robin's *Annotated Catalogue of the Papers of Charles S. Peirce* of 1967 is a first point of reference for a survey of Peirce's Egyptological writings. It offers brief synopses and gives dates for manuscripts in which Peirce deals with topics concerning Ancient Egypt, but its summary descriptions and dates are not always reliable and up to date. The best bibliographical information on Peirce's unpublished manuscripts can be found in the volumes of Peirce's *Writings* edited so far, but these cover only the time until the summer of 1893, if advance information on contents of vol. 9 is included.[2] From the fall of 1893 onwards, Robin's catalogue is still the only available source of bibliographical reference.

In the following chronological list of Peirce's published and unpublished Egyptological writings, some of the inaccuracies of Robin's dates and descriptions are corrected in light of a study of the microfilm edition of Peirce's manuscripts (MS) and of the editorial studies published or prepared for publication by the Peirce Edition Project until 2017 (W1-W9). A chronological survey suggests that Peirce's writings on Ancient Egypt may be divided into a prelude and four research phases.

1885–86 (date according to W5, p. 498)

The unpublished MS 1089 is the first of Peirce's MSS dealing with an Egyptological topic, although only marginally so. Only the second of its 12 pages contains a brief reference to the Egyptian "great Artab," a dry measure of Ancient Egypt, whose capacity Peirce describes as amounting to 36.176 liters. The 1901 edition of the *Century Dictionary*

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(http://www.global-language.com/century/) contains an article by Peirce on this measure under the entry *artaba*.

1892–93 (research phases I and II)

The papers of 1892–93 are mainly notes, drafts, and manuscripts for the Lowell Lectures on the History of Science, which took place from November 28, 1892, to January 5, 1893, on Monday and Thursday evenings. Five of them have been included in the still unpublished vol. 9 of Peirce's *Writings* (W9), whose Table of Contents has been made available to the authors of this article in its manuscript form. For the other unpublished papers, the contents are summarized in accordance with Robin's *Catalogue*.

- August 1892 (MS 1287), pp. 43–52, publ. in W9 as item 22, "Lecture II, Part 3, Section 3: Pyramid Measurements and the Fabric of Theory] (R[obin] 1287: 43–52), August 1892."

- Fall 1892 (MS 1297), pp. 2–3, 6–7, and 8–9, publ. in W9 as item 20, "[Lecture II, Part 3, Section 1: The Egyptian Mind] (R 1297: 2–3, 8–9, 6–7), fall 1892."

- Fall 1892 (MS 1303), pp. 2–5, publ. in W9 as item 21, "[Lecture II, Part 3, Section 2: The Character of Egyptian Intellect] (R 1303: 2–5), fall 1892."

- December 3–5, 1892 (MS 1276), pp. 2–29, publ. in W9 as item 24, "[Lowell Lecture III: Egyptian Science] (R 1276: 2–29), 3–5 December 1892."

- December 1892 (MS 1277), publ. in Eisele, ed. (1985: 201–215) as "'Further Ancient Science – Chaldean and Greek Astronomy' (with remarks on the Chaldees' scientific superiority over the Egyptians) Lowell Lecture V." Included in W9 as item 28, "[Lowell Lecture V: Chaldean Science and Early Greek Science] (R 1277: 2–36, 38–53; R 1275: 45, 44, 46–56), 12 December 1892."

- c. Dec 1892/Jan 1893 (MS 1298), unpublished: "Egyptian History; Chaldean Astronomy," 4 pp.

- c. Dec 1892/Jan 1893 (MS 1228), unpublished: "Notes on Egyptian Hieroglyphs." Written in parallel with MS 1294.

- January 1893 (MS 1294), pp. 2–6, 15–20, 24 publ. in W9 as item 41, "Egyptian Science (R 1294: 2–6, 15–20, 24), January 1893."

- not before Jan. 1893 (MS 1296), unpublished: "Thothiana," 7 pp. This MS contains the beginning of a paper for the *Bulletin of the American Mathematical Society* on "Aahmes" and Egyptian mathematics. "Aahmes" is a 19th century transcription of the name of the copyist of the Rhind Mathematical Papyrus (pBM EA 10058), 𓅓𓂝𓎛𓄟𓋴𓅱 *Jꜥḥ-msj.w* / ˌjaʕħə-ˈmasjəw/, 'The-moon-is-born.'

- c.1893 (MS 595), pp. 16–17, unpublished section of the "Short Logic," partially published as CP 2.286–291, 2.295–296, 2.435–443, 7.555–558.[3]

1898–99 (research phase III)

The manuscripts of 1898–99 were mainly written in the context of Peirce's plan to write a *History of Science* in one volume (MSS 1269–1273), as first announced in a letter of 1898 (cf. Eisele, ed. 1985: 297–411). At that time, Peirce intensified his studies in the language and writing system of Ancient Egypt, begun in January 1893. Robin's estimate for MSS 1269–1271 is "c.1892," but since MS 1227 is dated "March 22, 1898" and contains notes for MSS 1269–1271, and MS 1269 contains a reference to Budge (1898), Robin's date must be corrected to 1898. Only two of these MSS have been published so far. The corrected chronological order of these MSS from 1898–99 is the following:

1. MS 1227, "Notes on Egyptian Hieroglyphs," dated "March 22, 1898," a notebook.
2. MS 1271, "A Sketch of the General History of Science," 6 pp.
3. MS 1270 is a partial copy of MS 1271. "Egyptian Science and the Typical Egyptian," 3 pp.
4. MS 1272 of is an earlier draft of MS 1269. Among its topics are "Egyptian science: the Great Pyramid; the lack of theoretical interest among the Egyptians reflected in their failure to advance scientific knowledge, and the 'irrefragable' proof of Egyptian stupidity."
5. MS 1269 is the first chapter of Peirce's unfinished "History of Science." It has been published in Eisele, ed. (1985: 310–47) under the title "Egypt and Science."
6. MS 1292, of 1899, is the draft of an article on "How Did Science Originate?" in which Peirce argues that science originated in Babylon, not Egypt, and that there was a lack of scientific interest in Ancient Egypt.

1902–1904 (research phase IV)

- L 75. Peirce's 1902 application to the Carnegie Institution contains, in the alternative version edited by J. Ransdell as Version 2, Part 3 (L 75, Draft C, pp. A46–47), two pages with remarks on the morphology and iconicity of the Egyptian Language.

- MS 1244, related to MS 1263, is "On Egyptian and other ancient languages and other topics."
- MS 1263 has been published in Eisele, ed. (1985: 956–961) under the title "Chronology of Arithmetic with references to the collection of Mr. George A. Plimpton, to the Astor Library, and to other available collections."

This bibliographical survey shows that Peirce's Egyptological studies, after the first rather marginal note on a topic of metrology in 1885, began in 1892 with his notes for the Lowell Lectures on "The History of Science." With respect to their contents, roughly but not

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always accurately summarized by Robin, the four phases of his writings on Egyptological matters reflect a growing expertise in Ancient Egyptian civilization and a steady progress in Peirce's Egyptian language competence.

The *first phase* of Egyptological research, from August to the fall of 1892, comprises Peirce's early papers on "Egyptian science," MSS 1287, 1297, 1303. The information on which these papers is based is mainly from books on the history of Ancient Egypt written for a wider audience (von Bunsen 1848–1867; Rawlinson 1882; Wiedemann 1884). Some information is from Byrne (1885–92: I 308–316), a study in General Linguistics with a selective compilation of data on Egyptian and Coptic from sources that were already outdated at the time. Peirce also included in these papers some information from the expert studies mentioned in the references of his sources, such as the one by de Rougé (1866), an author frequently quoted by Rawlinson (1882).

During the *second phase*, from December 1892 to 1893, Peirce began to study the Egyptian language and addressed new themes of the science and technology of the Ancient Egyptian civilization. The group of papers from this period shows how Peirce, by means of systematic library studies, became familiar with specialized Egyptological literature. Peirce now collected the relevant bibliographical data directly from the most recent Egyptological reference works written by Ibrahim-Hilmy (1886–88) and Brugsch (1891). He also started working through several of the studies discussed by these authors and took notes from grammars of Hieroglyphic Egyptian. Unfortunately, he made much use of the grammar by Le Page Renouf of 1875, which was not the best available at this time.

The *third phase* of Peirce's Egyptological studies comprises six papers from 1898 to 1899. By now, Peirce had become an expert on Egyptological matters. He produced another detailed extract from the Egyptian grammar by Erman (1894a) based on the most reliable source of his days.

Only a decade later did Peirce resume his Egyptological studies in a *fourth phase* of research from 1902 to 1904, in which he produced three more papers, which give evidence that Peirce's expertise had reached a level on a par with the Egyptological scholarship of his time.

3. The "old Egyptian mind" and its place in the history of science

From his notebooks MSS 1228 and 1227, it is possible to reconstruct a good part of Peirce's early Egyptological horizon. MS 1228 contains notes on the chronology of the Pharaonic Egyptian dynasties. This is the research field to which Peirce also contributed the answer to the question of whether the first three dynasties were real or mythical quoted in the Introduction to the present paper. Furthermore, the MSS contain

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notes on outstanding Egyptian papyri and their editions as well as excerpts from literature on the Giza pyramids (pp. 3–11). The sources for Peirce's studies in Hieroglyphic Egyptian quoted in notebook MS 1228 are Le Page Renouf's *Elementary Grammar of the Ancient Egyptian Language* (1875), Rawlinson's *History of Ancient Egypt* in its American edition of 1882, Joachim's translation of the Papyrus Ebers of 1890, and the general Egyptological reference works by Ibrahim-Hilmy (1886–88) and Brugsch (1891).

Ironically, the methods of some of the scholars who were Peirce's source when he wrote on the allegedly underdeveloped science of the Ancient Egyptians have meanwhile been unmasked as unscientific. For example, on p. 11 of MS 1228, Peirce quotes the writings on the Giza pyramids by the archaeologists Howard Vyse (1840–42), Smyth (1867), and Petrie (1883). Howard Vyse had made important discoveries in the pyramids of Cheops and Mykerinos by means of what is described today as "gunpowder archaeology." Smyth followed the pseudoscientific metrological and numerological approach of John Taylor, who claimed that divine inspiration had played a role in the construction of the Great Pyramid. Smyth had been a central figure in pyramidology until Petrie's triangulation survey of 1880 disproved his theories with evidence showing that Smyth had made incorrect measurements. In cases such as this, Peirce succeeded in revealing the dubious nature of some contemporary research methods and results, whereas some of his other conjectures about the Pharaonic culture, such as his verdict on the lack of "poetical imagination" of the Ancient Egyptians, in MS 1294, have proven to be untenable.

MS 1227 of 1898 deals in its first part with Ancient Egyptian mathematics (p. 1–25). This part includes notes on the dimensions and the orientation of the Great Pyramid at Giza, taken from W.M.F. Petrie (1883), thoughts on Egyptian and Mesopotamian chronology (pp. 3–12), and excerpts from Eisenlohr's edition of the Rhind Mathematical Papyrus of 1877 (pp. 13–25). The Rhind Papyrus is a copy by the hand of a certain *Jꜥḥ-msj.w* ("Ahmes" or "Aahmes"), c.1550 BC. Peirce's verdict on this mathematical treatise is devastating: "Throughout the book the procedures are unsystematic and clumsy. They show that the Egyptians had no turn for mathematics" (1904: 959). MS 1227 also contains etymological and semantic considerations on some key expressions of Ancient Egyptian mathematics, for which Peirce consulted Brugsch (1867–82).

Some of Peirce's early remarks on the "old Egyptian mind" reflect certain prejudices against the Orient in the age of colonialism. In 1892, Peirce describes the mind of the Ancient Egyptians as strange: "A strange mind it was, as strange as the Chinese mind, which in some respects it somewhat resembles, as strange as the country of Egypt is," he ponders in MS 1297 (p. 3 [Peirce's paging]). At that time, Peirce confessed that

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his general "opinion of the Egyptians was not extravagantly high" (MS 1277, in Eisele, ed. 1985: 209; 1892). He even went so far as to speak of "the general stupidity of the Egyptians" (MS 1269, c.1892).

The latter judgment resulted from Peirce's readings in the history of science, from which he concluded, in 1898, that there was a "lack of scientific interest in Egypt" with the result that the Egyptians "never made any advance in truly scientific knowledge" (MS 1272, p. 5). Peirce contrasted the "unscientific" mind of the Ancient Egyptians with the scientific one of the Babylonians and attributed the alleged lack of science in Ancient Egypt to religious reasons: "The Egyptian kings covered their walls with accounts of what they proposed to do in the future life without caring to record any chronological dates. The Babylonian kings undertook laborious researches in order to assign their precise chronological relations to other nine or ten centuries before them" (MS 1263, in Eisele, ed. 1985: 957; 1904).

Undoubtedly, Peirce would have revoked such rash conclusions had he known of later discoveries concerning the actual level of the scientific knowledge of the Ancient Egyptians. In 1902, for example, the publication of the Fragments of the Old Kingdom Annals, also known as the "Palermo Stone," by Schäfer, brought evidence that the chroniclers of the Old Kingdom had a calendric and factual knowledge no less advanced than the one of the Old Babylonians (cf. Schäfer 1902: 10–11). These Annals do not only contain the full list of all royal names of the first four dynasties, inform about the exact number of years, months, and days of each reign, and describe annually the most memorable royal deeds in detail; they even document the annual flood levels of the Nile. Today, the chronology of the 2nd and 3rd millennia BC documented in Egyptian sources is considered to be much more reliable than the surviving Mesopotamian sources.

Another reason for the early stagnation of science in Ancient Egypt that Peirce sees is a geographical one. In contrast to the maritime Greeks, who progressed early and quickly in science because of their fertile intercultural exchange with the Phoenicians, Egyptians, and Babylonians, the Egyptians remained relatively self-sufficient in their geographical isolation of their Nile Valley, said Peirce in the concluding remarks to his Lowell Lectures on "The History of Science," in January 1893:

> The manner in which the great and startling advances in scientific thought have been made appears very clearly. It is by the violent breaking up of certain habits, combined with the action of other habits not broken up. Thus, the highest level of Egyptian thought seems to have been reached at a very early age. So it appears to us, and so it always appeared to the Egyptians, for they always reverence the ideas of antiquity, as superior to those of their own time. Now the great

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factor in the development of the Egyptian mind was undoubtedly the physical geography of the country which probably produced its effects in a reasonably small number of generations after it was first felt. (CP 7.270)

Peirce did not go so far as to dismiss the cultural achievements of the Ancient Egyptian civilization altogether. For example, he held the accomplishments of the Egyptian architects and pyramid builders in great esteem. They were "wonderfully clever engineers" (MS 1277; Eisele, ed. 1985: 203), was his praise. However, in a contrast to his pragmatic maxim of 1878, that postulates the necessity of considering the effects and "practical bearings of actions" more than the mere ideas underlying them (CP 8.119; c.1902), Peirce did not always evaluate the Pharaonic scientists according to the results of their material culture. For example, after studying the Rhind Mathematical Papyrus, he concluded that the Ancient Egyptians were unable to generalize. This conclusion may or may not be correct with respect to Aahmes, the author of the Rhind MS, but if the Egyptians were "wonderful engineers," it is most unlikely that they lacked the capacity of generalization, as Peirce concludes in the following:

> We have seen what the Egyptians were; – wonderfully clever engineers, but always working by a rule of thumb. Aahmes, the arithmetician, never lays down a rule in general terms, and of course never proves anything in general terms. In fact, the Egyptians never generalized, and the lore and wisdom for which they were so celebrated, was, considered as a science, upon a level with the household receipts which fill up corners of country newspapers. Of generalization there was scarce a trace. (MS 1277; Eisele, ed. 1985: 203)

The domain of literary genres is another area of Egyptian culture in which Peirce reached wrong conclusions because the knowledge of his time was still incomplete. Peirce was convinced that "you find a complete absence of comic literature," from which he even conjectured that the Ancient Egyptians seemed "to be utterly unable to take a joke" (MS 1303, p. 8). Today, there is no reason to assume that humor played a lesser role in Ancient Egypt than in any other culture (cf., e.g., Houlihan 2001). Peirce, by contrast, could associate humor in Ancient Egypt only with foreign authors who wrote about the culture of the Nile Valley, for example, Herodotus. "There is a story in Herodotus about a thief in the treasury of Rhampsinitus = Ramessu Neter-hek-pen, Egyptian King, which a modern wag has made a funny book about" (MS 1303, p. 8). The identification of "Ramessu Neter-hek-pen" with Herodotus' Rhampsinit was suggested by von Bunsen (1848–67: II 574). (Today, the respective Name of Ramses VI – who reigned from 1142/40 to 1134/32 BC – is usually read as $R^c w\text{-}ms\text{-}s(w)$

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Jmnw-ḥr-ḫpš=f nṯr ḥqȝ-Jwnw, i.e., 'Rīʿamasese Amun-is-upon-his-sword-arm, God and Ruler of Heliopolis.') The "wag" that Peirce mentions is probably August von Platen, the author of the tragicomedy *Der Schatz des Rhampsinit* of 1825.

Premature judgments and the incomplete knowledge base of his time also explain why Peirce reached wrong conclusions about the history of Pharaonic medicine. In one of his "Lessons from the History of Science," Peirce argues that a prerequisite for medical progress in any culture is "scientific imagination" (CP 1.46; c.1896). In the (pre)history of medicine, thus Peirce, scientific imagination is apparent in the magical practices of the ancient and the so-called primitive cultures. From his study of the Papyrus Ebers, the most significant Egyptian medical compendium of Ancient Egypt, translated by Joachim in 1890, Peirce derived the premature conclusion that magic was nonexistent in Ancient Egypt. Today, we know better. There is a rich and significant stock of literature documenting magical formulas and recipes from the Pharaonic Period (cf., e.g., Borghouts 1978; Ritner 1993). Before these became accessible, Peirce's premature declaration was:

> Find me a people whose early medicine is not mixed up with magic and incantations, and I will find you a people devoid of all scientific ability. There is no magic in the medical Papyrus Ebers. The stolid Egyptian saw nothing in disease but derangement of the affected organ. There never was any true Egyptian science. (CP 1.47, 1896)

It is noteworthy that Peirce's conclusion, according to which a lack of magical practice would indicate a lack of scientific imagination, is in sharp contrast with the opinion of many Egyptologists of his time. From Erman (1885/87: 476) until far into the 20th century, Egyptian magic used to be considered "a barbarous offshoot of religion" (Erman 1907: 148) and, as such, an indicator of primitive or even "degenerated" culture.

Some of Peirce's rash verdicts on the allegedly low scientific achievements of the Ancient Egyptians have their origin in prejudices against the scientific achievements of the Ancient Egyptians that were rather common in 19th century scholarship. Even renowned Egyptologists were not immune to such prejudices. Adolf Erman's otherwise pioneering book on Egyptian cultural history is a good example (cf. Schenkel 2006). It exemplifies the tendency of a generation of Egyptologists who had given up earlier idealistic approaches in favor of an allegedly rigorous method of studying ancient cultures in light of the scientific progress achieved in the spirit of positivism:

> Now that we have learned to understand the monuments, to read the inscriptions, and to study the literature of ancient Egypt, the old

glamour has departed, and in place of the 'dim religious light' of past time, the pitiless sun of science has risen, and we see the old Egyptians as they really were, neither better nor worse than other folk. Their old 'wisdom' appears in some respects less wonderful, in others it even grows repulsive, while their customs are not more peculiar than those of other nations, and merit neither our ridicule nor our reverence. (Erman 1894b: 2–3)

Parallels between some of Peirce's opinions on "Egyptian science" and Erman's contemporary judgments on the same topic are easy to find. Erman, too, speaks of the "little value" that should be attributed to the "Egyptian contributions to learning." He found it equally "natural to suppose that [...] they have not rendered much service to science" (Erman 1894b: 448). Erman also deplored the lack of genius among the Ancient Egyptian mathematicians. His opinion on Aahmes's mathematical insights was quite in accordance with Peirce's above-quoted judgment on the Rhind Mathematical Papyrus:

Mathematics as well as medicine seems to have remained stationary at the same stage that it had reached under the Old Empire; progress was made in certain details, but a genius seems never to have arisen to give a fresh impetus to this science. There was indeed no need. The problems presented to the skill of the arithmetician were ever the same, and if the solution, which was often only an approximate one, had contented the government of the Old Empire, it sufficed also for that of the New Empire. Mathematics served merely a practical purpose for the ancient Egyptians, they only solved the problems of everyday life, they never formulated and worked out problems for their own sake. (Erman 1894b: 364)

In sum, there is good reason to assume that Peirce's low esteem for the role played by the Ancient Egyptians in the history of science reflected prejudices held even by renowned Egyptologists of his time. Erman's work had an enormous influence on later studies in Germany as well as in Great Britain and the United States. The leading 20th century Egyptologists of the latter two countries, Alan H. Gardiner and James Henry Breasted, were Erman's students. Hence, it seems quite possible that the general tendency of historians of science to hold Mesopotamian science in higher esteem than the Egyptian one is due to the respective discipline's attitude towards its object of study rather than to the inherent qualities of the extant sources. Altogether, Peirce had certainly acquired an excellent knowledge of the state of the art in Egyptology, but he was also a victim of the cultural narrow-mindedness of some of the contemporary experts whose writings he consulted. However, as his Egyptological studies advanced,

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Peirce was also able to revise some of his earlier rash or unfounded conclusions.

4. Hieroglyphic writing

4.1 The hieroglyphs and their transcription, Egyptian morphology, and methods of text analysis

From the description of Robin's catalogue, which lists them under the heading of "Notes on Egyptian Hieroglyphs," one might gather that MSS 1228 and 1227 are crucial in the evaluation of Peirce's linguistic expertise in Ancient Egyptian and its writing system, but this is only partially the case. On the one hand, Peirce wrote also elsewhere on hieroglyphs, especially in MSS 1244 and 1294, on the other, MSS 1227 and 1228 also deal with several other Egyptological topics.

In contrast to what one might expect from Peirce's great concern with signs of all kinds, the papers of 1893 and 1898 deal neither with hieroglyphic writing as a sign system nor with the typical Egyptian manner of intertwining verbal signs with pictorial representations in multimodal text-image compositions. That Peirce gave so little attention to Ancient Egyptian text-image composition is not altogether astonishing since even the most renowned Egyptologists of his time paid little attention to these aspects of their object of study. Instead, they used the image part of the ancient monuments almost exclusively as sources of information about material culture or as a means of solving lexical problems. For instance, Erman's important study of the texts and images on the tomb walls of the Old Kingdom, *Rede, Rufe und Lieder auf Gräberbildern des Alten Reiches* (1918), went without a single picture.

MS 1228 consists of a notebook of 48 unnumbered pages. The first written sheet of paper is headed "1893 Jan 21 Astor Library" [New York], but the estimate of the editors of W9 for the date of the whole notebook is "c. Dec 1892/Jan 1893." The 21st of January was apparently the day when Peirce consulted three books in Astor library, from which he took two notes on typographical topics that he wrote down below the date. The first quote is from Hansard's *Typographia* of 1825. (Peirce quotes it as "1824.") It was copied from a chapter on the typography of Arabic numbers from one to ten. The second quote is from a chapter on the "excellence" of certain printing fonts for arithmetical figures. Peirce gives Stowe's *Printer's Grammar* of 1808 as its source, but the correct source of this quote is John Johnson's *Typographia* of 1824, vol. 2, p. 44. Both quotes seem unrelated to any Egyptological topic, but the books from which they are taken also deal with the history of writing in general and contain some references to hieroglyphs, too. Thus, Peirce may have consulted them after all other pages of this notebook had already been written on. His purpose, on January 21, 1893, may well have been to complement his earlier notes with further

references from books on the history of writing. In the end, however, he may not have found anything useful concerning hieroglyphs in the literature he consulted at Astor Library – which is not too surprising since these works were written before the decipherment of the hieroglyphs.

On p. 11 of MS 1228, Peirce quotes Brugsch's *Aegyptologie* of 1891 in a context suggesting that the book was new to him. Brugsch was a member of the first generation of Egyptologists after Champollion. The same source is quoted in MS 1276, dated December 3–5, 1892. The thematic connection of the first 11 pages of MS 1228 (as described above) with the topics of the Lowell lectures in December 1892 suggests that Peirce wrote them before his visit to Astor Library, in the autumn of 1892.

Only from p. 13 onwards does MS 1228 begin to address the topic of hieroglyphic writing. On pp. 13–15, Peirce listed all the hieroglyphic graphemes with their respective sound values that Brugsch, in his *Index des hiéroglyphes phonétiques* (1872b), had identified as attested in Old Kingdom sources. In a second list, beginning on p. 17, we find those signs that Brugsch had listed without any further characterization or reference. Figure 1 shows an excerpt from this list.

Figure 1. Hieroglyphs copied by Peirce from Brugsch (1872b). Excerpt from MS 1228, p. 17.

The page shown in Figure 1 is evidence of Peirce's genuine interest in the historical development of the Egyptian writing system, but it also shows that he still lacked a deeper understanding of Brugsch's principles for arranging the graphemes. As can be seen from Figure 2, Brugsch (1872a) presented his information on hieroglyphs in four columns. Col. 1 gives an identification number, and col. 2 lists the hieroglyphic grapheme, here with a variant and the letter B, which specifies that the second variant is "late." Col. 3 lists a selection of more or less isofunctional graphemes or grapheme groups (here: three) and their respective phonetic transcription by means of the Latin alphabet. The graphemes of this column are additionally marked as "A." (for "old") or, as in Figure 2, as "B." (for "late"), or also as "*" for "not attested in the dictionary." Col. 4 gives an additional reference to the page number of the *Dictionnaire hiéroglyphique et démotique* of 1867–82.

Figure 2. Extract from Brugsch's list of hieroglyphic graphemes (1872a: 119).

In the case of very frequent graphemes, attested in all periods of the Egyptian language (e.g., in the case of phonograms representing a single consonant), Brugsch gives no additional information. However, the lack of extra information does not imply that the respective sign had not been in use since the earliest times. Brugsch's list is not entirely consistent in its structure except that it classifies the hieroglyphs according to their pictorial shape. The author provides no systematic information concerning the grapheme inventories of particular periods. Above all, his classification is far from being comprehensible to a readership without first-hand knowledge of Hieroglyphic Egyptian. Whatever intention Peirce may have had in dividing the graphemes of his list into two discrete classes ("ancient empire" and "totally unmarked"), it is quite clear that he could not have drawn any valuable conclusions from Brugsch's inconsistent principles of classification.

Most of the second half of MS 1228 (pp. 25–43) is filled with excerpts from Le Page Renouf's *Elementary Grammar of the Ancient Egyptian Language* of 1875. This book is representative of an earlier phase of Egyptian philology that was already outdated in the 1890s. Peter Le Page Renouf (1822–1897) was Keeper of Oriental Antiquities in the British Museum from 1886 to 1891, published important works on Egyptian religion and was a renowned Egyptologist in his time (cf. Brugsch 1891: 138). Nevertheless, his grammar is a rather mixed bag,

an unsystematic selection of phenomena from all periods of the history of the Egyptian language. It shows that Le Page Renouf's skill to distinguish between the significant and the insignificant was rather low. More than once, the author jumps from one detail to another, and all too often, his descriptions of linguistic data and the conclusions drawn from them are weird. The modern reader has the impression that Peirce might even have been aware of some of these shortcomings since he limited himself to extracting the basic function words but did not tackle Le Page Renouf's section on verbs (1875: 47–60), which happens to be particularly labyrinthine.

Notebook MS 1228 ends with a table of the then newly adopted Egyptological transcription system proposed by Adolf Erman (1889b) and Georg Steindorff (1892), followed by a sample text (pp. 44–47; page numbers conjectured since the Harvard microfilm seems to be faulty). On p. 45, there is the list of 25 hieroglyphic phonograms representing single consonants with their transcription symbols according to the "School of Berlin," which was to become the Egyptological standard for the next century. Figure 3 shows how Peirce copied it in his own handwriting. His compilation differs only in some minor details from forms of the conventional transcription alphabet that is still in use today, with the restriction that the sign sequences 1–2 and 19–21 are in a reverse order, sign 13 is omitted, and that the hieroglyph ⟨ḥ⟩ has been inserted between 16 and 17 (Schenkel 1988; Kammerzell 1995, 2005: 172–199). The source of the unusual order of Peirce's list was Brugsch (1891: 94–95). Brugsch essentially follows Erman (1889b), especially Erman's interpretation that the signs ꜣ, j, ꜥ and w in Earlier Egyptian, formerly transcribed as *a, ȧ, ā, w*, did not correspond to vowels in Earlier Egyptian. However, Brugsch had still kept a few minor idiosyncrasies no longer accepted today; he was notorious for merging genius with carelessness.

On the opposite page (p. 44), Peirce illustrates, by means of three examples, how the new transcription affected the form of rendering royal names: "This turns *Menes* into menꜣ, Teta into ṯetet, Cheops [into] ḫwfw, Souphis II [into] shefraꜥ or ḫaꜥfraꜥ." Pages 46 and 47 present the sample text discussed and depicted below (Figure 6).

MS 1227, a notebook subsumed by Robin under the same title as MS 1228, that is, "Notes on Egyptian Hieroglyphs," is dated "March 22, 1898." This date is plausible because the notebook contains a reference to Peters (1897). Like MS 1228, its pages (48 in total, 7 blank; MS microfilms 0048-0072) are unnumbered. Only pp. 34–42 deal with hieroglyphs. Here, we find extracts from J. H. Breasted's English translation of A. Erman's *Ägyptische Grammatik* (1894a). These complement Peirce's earlier notes taken from Le Page Renouf's grammar of 1875, which had become obsolete with the publication of Erman's compendium.
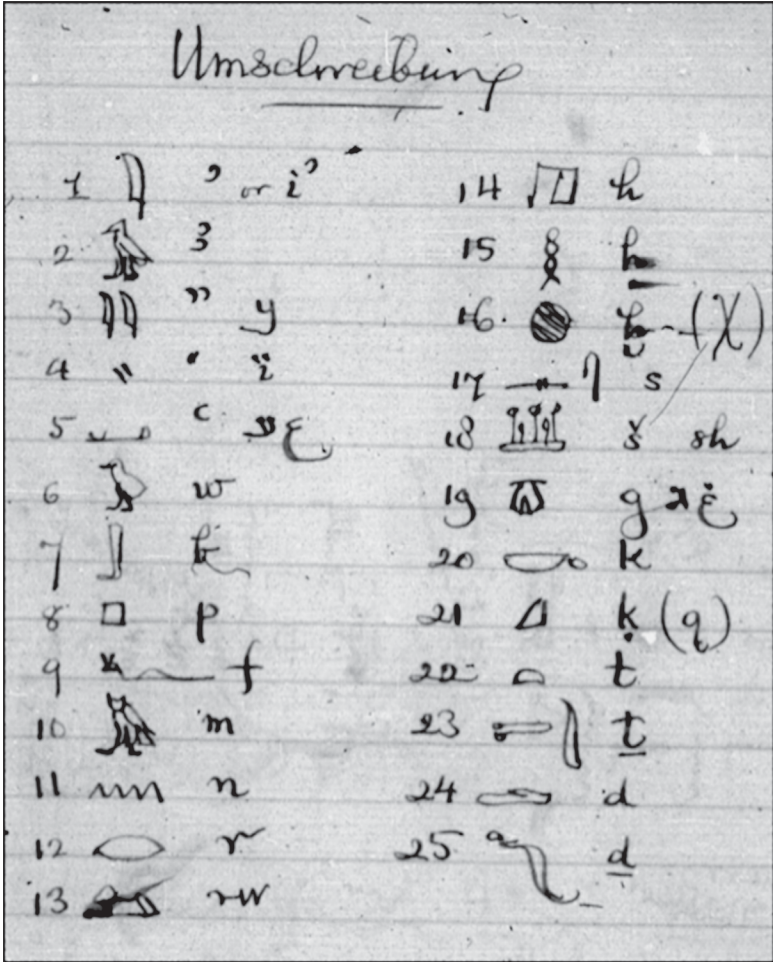
Umschreibung

1	? or i?	8	p	15	ḥ	22	t
2	ȝ	9	f	16	ḫ (χ)	23	ṯ
3	ꞽ y	10	m	17	s	24	d
4	ʺï	11	n	18	š sh	25	ḏ
5	ꜥ y ꜥ	12	r	19	g ȝ g̣		
6	w	13	rw	20	k		
7	b	14	h	21	ḳ (q)		

Figure 3. The hieroglyphic "alphabet," as copied by Peirce (MS 1228, p. 45).

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Pronominal morphology, to which several pages in MS 1228 of 1892/3 are dedicated, is not a topic of MS 1227. Particular attention is given to verb morphology, verbal semantics, and syntax. Peirce's choice of topics from Erman's work is noteworthy. It shows both what Peirce was interested in and what he did not care about. In contrast to MS 1228, there are no notes on writing, phonology, or on numerals. Prepositions, relative pronouns as well as interrogative and negative sentences are among the topics in which Peirce was interested. Peirce had examined these topics already in MS 1228, but now he could work with the more comprehensive data that had meanwhile become available from Erman (1894a). Peirce adopted mainly an onomasiological approach, i.e., he started with selected concepts to find out which word forms served to express them. Instead of documenting the meaning of all relevant
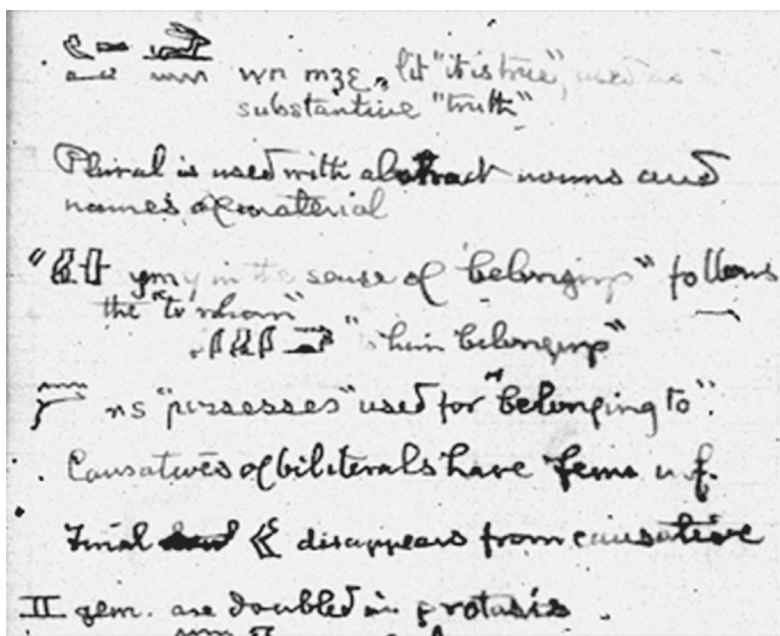
᙭ *wn m3ᶜ*, lit. "it is true" used as substantive "truth"

Plural is used with abstract nouns and names of material

″ ᙭ *jmy* in the sense of "belongings" follows the "to whom"

᙭ "to him belongings"

᙭ *ns* "possesses" used for "belonging to"

Causatives of biliterals have fem. inf.

Final (recte: Initial) ᙭ disappears from causative

II gem. are doubled in protasis

Figure 4. Sample from MS 1227 illustrating Peirce's selective method of data collection (p. 35).

word forms and constructions in Egyptian texts, he restricted himself to jotting down how or whether specific concepts—such as 'truth' or 'possession'—and selected functions of language—such as giving orders, asking questions, or conditionals—are expressed in Egyptian. Figure 4 shows Peirce's extracts from Erman (1894a: §§ 103, 111, 138, 139, 161, and 178). Here, the keywords are "truth," "abstract nouns," "belonging to," and "protasis." They illustrate how Peirce set specific thematic foci in his data collection.

His selective method of study suggests that Peirce did not aim at developing a degree of linguistic competence that would enable him to analyze and translate any hieroglyphic text. Instead, he was more interested in finding out how the language of the Ancient Egyptians expressed certain notions that he regarded as key concepts of the history of ideas. Nonetheless, during his study of Ancient Egyptian, Peirce acquired sufficient knowledge to state, in 1904, with a good dose of modesty, that he had himself made his own translation of the Rhind Mathematical Papyrus to improve Eisenlohr's translation of 1877. In his own words, "Although I possess but the merest smattering of Old Egyptian, I have translated the whole book for myself, so that I may venture to entertain some opinions upon particular passages of it" (MS 1263, p. 1; Peirce 1904: 957).

A comparison of Peirce's hieroglyphic chirography in MSS 1228 and 1227 shows that Peirce's writing skills had considerably improved during the five years that had elapsed between the former and the latter MS. In the notebook of 1892/93, the hieroglyphs are more or less careful copies of the respective models of Peirce's sources. These exercises in hieroglyphic chirography exhibit typical beginners' characteristics: large size, unnecessary details, and tentativeness of shape with little standardization. MS 1227, the later of the two MSS, shows a much more skilled handwriting, quite similar to a professional Egyptologist's way of rendering hieroglyphs by means of simplified forms (Figure 5).

In contrast to his earlier practice, Peirce began to write hieroglyphs from right to left in MS 1227. This is remarkable because Peirce does not follow his main source, Erman's grammar of 1894, in this respect. Erman (1894a), for practical reasons, spells hieroglyphic texts from left to right so that Peirce's departure from this Egyptological authority of the 1890s also marks a greater self-confidence in dealing with hieroglyphs. This may be due to two reasons. First, Erman had explicitly stated, that "the writing properly runs from right to left and only exceptionally (when employed for certain decorative purposes) from left to right" (1894a: § 5). This information cannot be from Le Page Renouf because his grammar contains only the nondescript and ambiguous statement that "the letters are read in the order in which they are written" (1875: 8). Second, Peirce was left-handed,
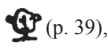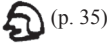
Specimens of Peirce's hieroglyphic handwriting		Fonts for comparison	
in MS 1228 (1892/93)	in MS 1227 (1898)	Le Page Renouf (1875)	*JSesh* (2014)
(p. 39), (p. 35)	(p. 38), (p. 35)		
(p. 35), (p. 37)	(p. 39)		
(p. 39), (p. 33)	(p. 38), (p. 35)		

Figure 5. The advance of Peirce's skill in writing hieroglyphs from 1892 to 1898.

sometimes complaining about it as his "incapacity for linguistic expression" (MS 632, pp. 5–6) and sometimes attributing to it his capacity for diagrammatic thought (cf. Kent 1987). Hence, it is likely that Peirce found it more convenient to spell hieroglyphs from right to left.

Towards the end of MS 1228, Peirce transliterated ("copied accurately," as he put it) a passage in three columns from the Old Kingdom biographical inscription found in Weni's tomb at Abydos (Figure 6). The excerpt is written in columns just like the original. The hieroglyphs are glossed by their phonetic transcription, a literal translation, and there are some morphological comments. According to a note in MS 1294, Peirce had chosen de Rougé (1866: pl. VIII) as his source after comparing this edition with Birch (1873), Erman (1882), and Brugsch (1891). This excerpt shows that Peirce was not only familiar with the most recent Egyptological transcription conventions but had also acquired some competence in Earlier Egyptian. There is only one mistake. Peirce mistook ⌒ *ḥ͒ꜥ*, 'appear (in glory), shine' for *ḥꜣ*, '1000' (Peirce: "number"), as a consequence of confusing the transcription symbol *ꜥ* with *ꜣ*, which are both, even today, conventionally pronounced as /a/. In fact, in the early days of Egyptology, the respective hieroglyphs had been interpreted as corresponding to vowels rendered by *ā* and *a*. This was (and still is) a rather common lapse with beginners in Egyptian language studies.

A modern translation of the three columns of hieroglyphic writing is "His Majesty sent me to Jabharta to fetch a coffin (lit. *lord-of-life*), including the sarcophagus box (lit. *chest-for-the-living*) as well as its lid, and a superb precious pyramidion for (his pyramid, named) 'Maliniliidu-will-appear-in-perfect-state,' my mistress." A comparison of Peirce's glosses with a modern Egyptological analysis of the same lines shows how far he had advanced in his studies and to which degree his conjectures were exact (Figure 7).
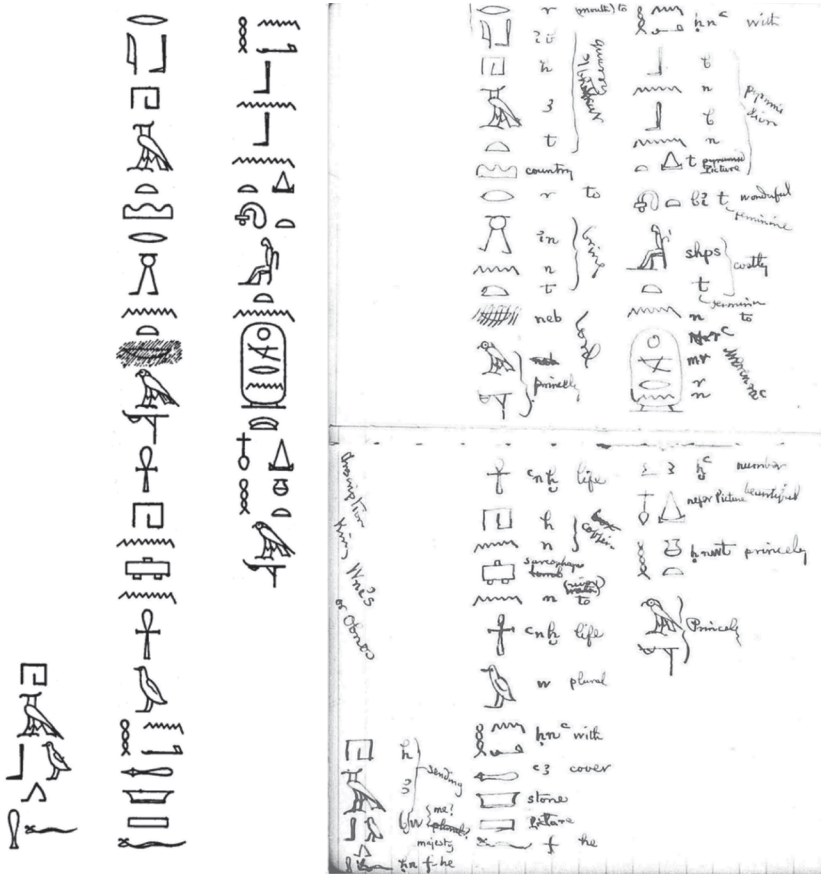
Figure 6. Excerpt from the columnar inscription of Weni from Abydos in the line drawing by de Rougé (1866: pl. VIII, l. 37–38) (left), faced with Peirce's handwritten copy of it and his intercolumnar glosses of 1892/93 (MS 1228, pp. 46–47).

Even though his choice of translation equivalents and his note in MS 1294 prove that Peirce used the analysis offered by Brugsch (1891: 493), whose words "wundervollen, köstlichen" are reflected in Peirce's translation "wonderful and costly," Peirce did not follow Brugsch in every detail. For example, he interpreted the form 𓅱 in ꜥnḫ-w correctly as a plural morpheme, as opposed to Brugsch, who took it for a participle marker, which seems less likely today. The reading that Peirce opted for is in agreement with Erman (1882: 22).

From a modern point of view, it is also interesting to note that Peirce adopted the method of interlinear (respectively, intercolumnar) glossing in his textual studies. The use of this method may appear progressive, but Peirce was not the first to adopt it. It used to be a standard method of early Egyptologists until the 1890s, but the practice was

Hierogl.							
MS 1228:	ḥ ꜣ [b]	w	[ḥn] f	r	ỉb ḥ ꜣ t **country**		
	Sending	me? ~~plural?~~	majesty he	(mouth) to	quarry 'Ibhhat		
Modern:	ḥꜣb:CLF	-w	ḥm-f	r-	jbḥꜣ-t-CLF		
	send:CLF:NMLZ.PRS	-1SG	majesty-3SG.M	to-	TOPON-F-CLF		

Hierogl.							
MS 1228:	r	ỉn n t	nêb **princely**	ꜥnḫ	ḥ n **sarcophagus tomb**	n	ꜥnḫ w
	to	bring	Lord	life	~~box~~ coffin	(orig. water) to	life plural
Modern:	r-	jn-t	nb-CLF-	ꜥnḫ	ḥn(w)-CLF	n-	ꜥnḫ-w
	to-	bring-INF	lord-CLF-	life	box-CLF	for-	live:PA-PL

Hierogl.						
MS 1228:	ḥnꜥ	ꜥꜣ **stone / Picture** f	ḥnꜥ	bn bn t **pyramid / Picture**	bỉ t	
	with	cover he	with	pyramidion	wonderful	
Modern:	ḥnꜥ-	ꜥꜣ-CLF-CLF-f	ḥnꜥ-	bnbn-t-CLF	sḏꜣ-t	
	with-	door-CLF-CLF-3SG.M	with-	pyramidion-F-CLF	precious-F	

Hierogl.							
MS 1228:	šḥps t	n	r ꜥ m r r n	ḫ ꜥ	nêfêr	**Picture**	ḥnwt **Princely**
	costly feminine	to	Merenraꜥ	number	beautiful		princely
Modern:	šps-t	n-	ḫ ꜥ-Mr:n:rꜥw -nfr-CLF				ḥnw-t-CLF(-j)
	noble-F	for-	appear:FUT-Malniliidu-CLF- be_perfect:STAT:3SG.M-CLF				mistress-F-CLF (-1SG)

Figure 7. Comparative analysis of Peirce's notes in MS 1228 on the excerpt from the inscription of Weni from Abydos (Figure 6; in vertical rows) with a modern transcription in horizontal lines according to the principles of Di Biase-Dyson, Kammerzell, and Werning (2009). The morphological markers are 1: 1st pers.; 3: 3rd pers.; CLF: classifier; F: fem.; FUT: future; INF: infinitive; M: masc.; NMLZ: nominalizer; PA: active participle; PL: plural; PRS: present tense; SG: singular; STAT: stative; TOPON: toponym.

then abandoned. 20th century Egyptologists considered glossing amateurish since well-defined and more or less synchronic corpora, such as those treated by Erman (1880, 1889a), had become available. From that time on, Egyptology sought to become a field of studies on equal footing with the well-established disciplines of Semitics or the Classics, in which interlinear glossing was frowned upon. Only recently has it been relaunched (cf. Di Biase-Dyson, Kammerzell, and Werning 2009: 343–346).

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The iconicity of hieroglyphic writing and of the pictorial art of Ancient Egypt are topics that have attracted the attention of Egyptologists for long, even though systematic studies are of recent date (Tefnin 1984; Fischer 1986; Assmann 1988; Goldwasser 1995; Lincke and Kutscher 2012). The term *icon* is from Peirce's typology of signs. In contrast to a symbol, which Peirce defines as a conventional sign related to its object in an arbitrary way, an icon is a sign that "stands for something merely because it resembles it" ("Contribution to a philosophy of notation," CP 3.362, 1885). Icons "serve to convey ideas of the things they represent simply by imitating them" ("What is a sign?" EP2: 5, 1894). Any picture that is similar to the object it represents is an icon of this object. The additional insight that "all pictures, depend [also] upon conventions" ("Prolegomena to an apology of pragmaticism," CP 4.530, 1906) does not make pictures symbols or partially symbolic signs because the predominant mode of representation determines the class to which a sign belongs.

What does Peirce have to say about the iconicity of hieroglyphs in particular? Since his earliest writings, in which he still called the icon a *copy* or a *likeness*, Peirce has given hieroglyphs as an example of iconic signs. In 1866, he wrote:

> I must call your attention to the differences there are in the manner in which different representations stand for their objects. In the first place there are likenesses or copies – such as *statues*, *pictures*, *emblems*, *hieroglyphics*, and the like. Such representations stand for their objects only so far as they have an actual resemblance to them – that is agree with them in some characters. The peculiarity of such representations is that they [...] stand for whatever they resemble and resemble everything more or less. ("The Logic of Science, Lowell Lecture VII" W 1: 467)

Peirce makes no pretense to Egyptological originality when he exemplifies, in his early paper of 1866, the iconic sign by means of hieroglyphs and "statues, pictures, and emblems," but even after his first in-depth studies of the Egyptian language of 1892 and 1893, he continues to affirm that the Egyptian hieroglyphs are essentially iconic signs.

From today's perspective, Peirce overemphasizes the iconicity of the hieroglyphs and he tends to simplify the semiotic complexity of the Egyptian writing system, at least when he refers to the hieroglyphs in papers on signs in general. In 1894, for example, Peirce's assessment is:

> [In] the Egyptian language [...] the writing is all in pictures. Some of these pictures came to stand for sounds,—letters and syllables. But

others stand directly for ideas. They are not nouns; they are not verbs; they are just pictorial ideas. ("What is a sign?" EP2: 7)

The view that the hieroglyphs, except for the ones that stand for consonants (not for "letters"!), are "all in pictures" certainly echoes pre-Egyptological views on the pictorial nature of hieroglyphic writing, such as the ones disseminated by Le Page Renouf (see sect. 4.4). Peirce is correct when he states that some hieroglyphs stand for consonants or sequences of several phonemes. This statement refers to the phonographic part of the hieroglyphic writing system. However, what he says about the other hieroglyphs that stand "directly for ideas" requires a closer examination from the point of view of modern Egyptology. Table 1 contrasts some of Peirce's statements with views generally accepted in modern Egyptological linguistics.

Table 1. Peirce's comments on the Egyptian language of 1894, confronted with insights from modern Egyptology.

Peirce, "What is a sign?" (EP 2: 7, 1894)	Insights from modern Egyptological linguistics
The writing is all in pictures.	All hieroglyphic graphemes are pictorial in shape.
Some of these pictures came to stand for sounds,—letters and syllables.	A limited number of hieroglyphic graphemes correspond to a single consonant or a sequence of two consonants. Especially the phonograms representing a single consonant have a particularly high token frequency.
But others stand directly for ideas.	Besides phonograms there are meaningful signs—logograms and classifiers. Logograms prototypically correspond to lexical morphemes of spoken language. Classifiers are without counterparts in oral language. They are attached to lexemes, word forms, or phrases.
They are not nouns; they are not verbs; these are just pictorial ideas.	Since the hieroglyphic writing system employs no signs corresponding to vowels, the vocalic tiers of spoken word forms left no direct traces in written language. Hence, the contrast between different parts of speech based on the same root may be neutralized in writing.

When Peirce states that hieroglyphs, except for the phonographic ones, "stand directly for ideas," he adopts the terminology of his time. James Mark Baldwin's *Dictionary of Philosophy and Psychology* of 1901, to which Peirce contributed numerous entries, defines an "ideogram (or -graph)" as a "written sign or symbol, not a name, which conveys its meaning by its own form, being often a pictorial representation (a pictograph) of the object symbolized." The article goes on to disseminate the prejudice of its time that the "ideograph characterizes an important stage in the primitive evolution of writing […]. Our own language and those from which it is derived are of course phonographic. As examples

of ideographic records may be cited […] Egyptian hieroglyphics" (Jastrow 1901: 507).

Today, the term ideogram has become replaced by the one of logogram in Egyptological and in general linguistics. The term is more precise insofar as it substitutes the implicit reference to the notion of "idea" for a reference to lexical and morphological units of language of the respective writing system. In the Egyptian language, there are lexical and morphological logograms (lexicograms and morphograms). Although lexicograms may be images of what they represent, as in the case of 𓌒 *ssm.t*, 'horse,' they are not icons of their objects at all, in other cases. However, those lexicograms that are not iconic at first sight usually do depict something that is still somehow related to what they represent. For example, the logogram for 'wine,' 𓏊, certainly represents nothing wine-like, but since it depicts a bundle of two jars, is in a metonymic relation with 'wine' (for these types of relations, cf. Lincke and Kutscher 2012: 130–133). Nevertheless, lexicograms may also, albeit rarely, be iconic representations of things that are quite different from their referential object. For example, the lexicogram 𓅬 stands for *z3* 'son,' but it has the shape of a bird.

From the point of view of Peirce's typology of signs, the term icon is therefore especially applicable to hieroglyphs of the 𓌒 (horse)-type. Since, in Earlier Egyptian, an average of about two thirds of all the tokens in hieroglyphic texts consist of uniconsonantal phonographic ("alphabetic") signs and, in addition, the logographic hieroglyphs are not all iconic ones, the conclusion is that hieroglyphic texts do not predominantly consist of iconic signs. Probably no more than 20 percent of an average text written in hieroglyphs are iconic signs. If we apply Peirce's icon-index-symbol trichotomy to hieroglyphic writing, the conclusion is that hieroglyphs are for the most part symbols, that is, signs by convention or habit, even though they are "all in pictures." Undoubtedly, this holds true at the level of tokens.

At the level of types, things are a little trickier. In addition to the limited set of fully conventionalized signs, there is an open set of iconic signs (see sect. 4.4). The great majority of the latter are repeater-like classifiers that specify pictorially the meaning of the preceding sequence of phonograms. All repeater-like classifiers are in complementary distribution. They are the allographs of a very general grapheme whose function is to specify something like "⟨idem⟩." In other words, they are the product of a rule that says "Add to the preceding lexeme, word-form, or phrase X a sign representing the referential object of X." Hence, the predominance of symbolic signs is also true of the hieroglyphs as types.

4.3 The hieroglyphs in light of Peirce's typology of iconic signs

Only from 1903 onwards did Peirce begin to elaborate and extend his typology of signs that had mainly been restricted to the icon-index-

symbol trichotomy during the years of his in-depth Egyptological studies in the 1890s. In the first stage of the extension of his classification, Peirce introduced two trichotomies of iconic signs whose application to the hieroglyphs may contribute valuable insights. One is the division of icons into iconic qualisigns, sinsigns, and legisigns ("Nomenclature," CP 2.254–263 and EP 2:294–296, 1903). The other is the division of icons into images, diagrams, and metaphors ("Sundry Logical Conceptions," CP 2.277, and EP 2:274, 1903).

By applying the first of the two trichotomies, it is possible to solve the debate about the alleged overlap between iconic and symbolic signs of writing. It has often been asked whether iconic hieroglyphs and other iconic signs of writing are not *also* symbols since they are equally determined by conventional rules. In the framework of his system of the ten main classes of signs of 1903, Peirce answers this question by introducing his distinction between iconic and symbolic legisigns. Legisigns are a class of signs determined by a law, a rule, or a convention. Any kind of writing, whether phonographic, logographic or ideographic, is a system of legisigns, but there are other legisigns, such as symbolic gestures, national flags, or noniconic traffic signs, that are not signs of writing.

There are iconic, indexical, or symbolic legisigns. An iconic lexicogram, such as [hieroglyph], 'horse,' is an iconic legisign, the noniconic lexicogram [hieroglyph], 'son,' is a symbolic legisign. Both are legisigns because they are conventional or lawlike signs. The lexicogram [hieroglyph], being similar to its object of reference, is an icon, whereas the lexicogram [hieroglyph], dissimilar to its object, is a symbol. These two signs represent two distinctive groups in the hieroglyphic writing system, the ones of symbolic and iconic legisigns. Notice that the hieroglyph [hieroglyph] is also used to write the meaning of duck. Hence, there are two homographic logograms with two distinct meanings. When used to represent the idea of a duck, the hieroglyph [hieroglyph], which is a symbolic legisign when it stands for 'son,' is an iconic legisign.

Legisigns, also called types, form a class of signs that belongs to the trichotomy of the interpretant, within which there are two more classes of signs, sinsigns, and qualisigns. A sinsign, also called token, is a singular sign. Pictures, considered as individual visual representations and concrete material objects, are iconic sinsigns. The third member of this trichotomy is the qualisign, that is, "a quality which is a sign" ("Nomenclature," EP 2: 291, 1903). No hieroglyph and no picture are mere (or pure) qualisigns, since a mere quality in its suchness cannot represent anything except, perhaps, for itself. Furthermore, a quality needs to be embodied before it can act as a sign (ibid.), but once it is embodied, it is actually a sinsign since all tokens of a type are sinsigns.

Here it becomes evident that there is a relation of inclusion between qualisigns, sinsigns, and legisigns. The categorically higher types of sign include the categorically lower ones, but not vice versa. Symbolic as

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well as iconic legisigns, which are phenomena of Thirdness, include sin-signs, phenomena of Secondness, insofar as legisigns need to be embod-ied if they are to act as signs in communication. Embodied legisigns (types) are sinsigns, singular signs or the tokens of a type. As legisigns, the lexicograms 🐎 and 🦢 have no concrete existence. They are actu-alized only in the form of their tokens or replicas, which are sinsigns. Furthermore, since tokens can only represent through the qualities of shape and color, sinsigns also include qualisigns.

Egyptian Hieroglyphs were executed in a variety of techniques, for example, in raised or sunk relief (with or without coloration), in carv-ing or line drawing (with or without internal details), in painting (with near-natural or plain-colored filling). In a text written in black hiero-glyphs, the token 🐎 of the iconic legisign 🐎 evinces the quality of blackness in addition. The token of this legisign thus includes a qual-isign of blackness. However, this does not mean that the legisign 🐎 represents a black horse. The idea of a black horse would have to be represented by means of a sequence of legisigns. The first is the iconic legisign 🐎 *ssm.t*, 'horse,' alternatively also written phonographically as the sequence of consonantal phonograms plus an iconic horse classifier 🐎. The second is the symbolic legisign ◣🦅▬ , which stands for the adjective *km.t*, 'black.'

The subdivision of icons into images, diagrams, and metaphors is relevant to the study of iconicity of hieroglyphic writing as well as to the study of pictures in general. Images "partake of simple qualities" (CP 2.277), which they share with the object they represent. This definition applies to ordinary pictures as well as to the iconic hieroglyphs. The hieroglyph of a horse in the shape of a horse or of a pyramid in the shape of a triangle, △, representing the silhouette of a pyramid, are examples of icons of the image class. The same is true of ordinary drawings of horses or pyramids. What distinguishes the two is that the hieroglyph is an iconic legisign, whereas the drawing is an iconic sinsign.

Diagrammatic icons are signs that "represent the relations, mainly dyadic, or so regarded, of the parts of one thing by analogous relations in their own parts" (ibid.). In other words, diagrams are icons whose similarity to their object is restricted to the representation of the rela-tions between their elements. Typical examples of diagrammatic icons are subway maps, infographics, statistical graphs and logical graphs. Syntactic structure constitutes a diagram, whether represented in the form of a tree diagram, a box diagram, as a dependency diagram, or only mentally. In fact, grammar in general (cf. Shapiro 1983) and all semiotic systems are of the nature of a logical diagram. Spoken Egyptian is no different from any other language in this respect, but the classifiers in its writing system (see below, sect. 4.4) constitute an extra character-istic of its diagrammatic iconicity.

Although Peirce introduced the terms image and diagram only in 1903, he had distinguished between the two kinds of icons earlier. In c.1895, Peirce discusses diagrams as "icons of the algebraic kind" and images as "icons of a non-logical kind." In this context, Peirce interprets language structure in general as diagrammatic and hieroglyphic signs in particular as images. However, in contrast to his above-quoted statement of c.1894, that in "the Egyptian language [...] the writing is all in pictures," he now restricts himself to saying that "there are" iconic hieroglyphs:

> That icons of the algebraic kind, though usually very simple ones, exist in all ordinary grammatical propositions is one of the philosophic truths that the Boolean logic brings to light. In all primitive writing, such as the Egyptian hieroglyphics, there are icons of a non-logical kind, the ideographs. In the earliest form of speech, there probably was a large element of mimicry. But in all languages known, such representations have been replaced by conventional auditory signs. These, however, are such that they can only be explained by icons. But in the syntax of every language there are logical icons of the kind that are aided by conventional rules. ("That Categorial and Hypothetical Propositions are one in essence," CP 2.280; c.1895)

In sum, whereas the morphology and syntax of all languages is diagrammatically iconic, only "ideographic" languages have iconic signs of writing that belong to the class of images. Two issues of particular interest from the perspective of general linguistics in this context are the hypothesis that all languages have evolved from iconic signs (on which more will be said in the last section of this paper) and the claim that the conventional signs of any spoken language "can only be explained by icons." An explanation of a language is evidently a grammar or a grammatical analysis of it. With this thesis, Peirce apparently reiterates the claim that grammars are diagrams, which is only a specific instance of the more general Peircean semiotic postulate that "all valid necessary reasoning is in fact thus diagrammatic" ("Lessons from the history of science," CP 1.54; c.1896).

4.4 The Egyptian classifiers

In the glosses to Peirce's analysis of the inscription of Weni from Abydos (Figures 6–7), the comment *Picture* appears three times. The first is at the bottom of the second of the three columns next to the hieroglyph ⬚ and below the word "stone" (Figure 6; in Figure 7, line 3, left). The second is in the upper part of the third column. Here, the gloss states *pyramid / Picture*, next to the hieroglyph △ (in Figure 7, line 3 right). The third is further down in the same column to the right of the word

nêfĕr and below the hieroglyph △ (in Figure 7, last line, center right). The three instances that Peirce glosses as *Picture* are cases of so-called hieroglyphic classifiers.
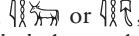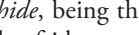
Classifiers, formerly "determinatives," have only been a subject of more detailed analysis for the past two decades (Goldwasser 2002; Lincke 2011). They occur only in Written Egyptian and are without a counterpart in Spoken Egyptian, i.e., they are not "pronounced." As elements of graphic form with meanings of their own, they are grammatically bound morphemes, whose function is to indicate that the form to which they are attached belongs to a particular semantic class. Hieroglyphic classifiers are rather similar to the classifiers of languages with morphological classifiers (which are pronounced), but in contrast to these languages, which have only noun and numeral classifiers, Hieroglyphic Egyptian has also verb classifiers (Lincke and Kammerzell 2012).

For example, in the Old Egyptian chronolect of the 3rd millennium, the word form ⸺ *ᶜȝ*, 'door, cover, lid,' contains in its written form the classifier ▭. This classifier marks the object represented by this word (its referent) as belonging to one and the same category as the one of words such as ⸺ *jn(r)*, 'stone,' ⸺ *db.t*, 'brick,' ⸺ *wȝd*, 'malachite,' ⸺ *bjȝ*, 'ore,' ⸺ *rwjj.t*, 'architrave,' or ⸺ *z(ȝ)t*, 'libation stone.' The classifier △, also glossed by Peirce as *Picture*, is a word form classifier in ⸺△ *bnbn.t*, 'pyramidion.' It is also a referent classifier in the name of the pyramid ⸺△, whose most likely reading is *ḫᶜ-Mr.n-rᶜw-nfr* 'Maliniliidu-will-appear-in-perfect-state'. Other occurrences of this classifier in the Old Kingdom can be found in the words ⸺△ *m(h)r*, 'pyramid,' ⸺△ *n'.t*, 'pyramid complex,' ⸺△ *ḥr.j*, 'plateau of the Giza necropolis' and in many pyramid names.

These examples show that Peirce's term *Picture* for the classifiers in his MS 1208 of 1892/93 is a semiotic misnomer. A hieroglyphic classifier is not a picture of an actual object within the category marked by the classifier. Instead, it represents a prototypical member of this category. The categories created by classifiers are not natural ones. They are language and culture specific and in this sense conventional. An element of motivation is inherent in most classifiers. However, to categorize various kinds of stones together with such diverse objects such as *door*, *cover*, *lid*, *ore*, or *architrave* is certainly hardly natural.

When Peirce chose the misleading term *Picture* to gloss the classifiers of his text, he may once more have done so under the influence of Le Page Renouf, who also uses the expression "pictures of the object spoken of" to designate classifiers, albeit not as a technical term:

> Almost every Egyptian word is followed by an *ideographic* sign, which is either the picture of the object spoken of, or a conventional symbol of the class of notions expressed by the word. The word *ȧḥ*, an

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ox, for instance, may be written ⟨⟨⟩⟩ or ⟨⟨⟩⟩, the sign ⟨⟩ being the picture of the animal, and ⟨⟩ a *hide*, being the recognized symbol of all quadrupeds. These two kinds of ideographic signs, when placed at the end of words are called *determinatives*. Those of the first kind we shall call *ideograms*, those of the second *generic determinatives*. (Le Page Renouf 1875: 2)

On the other hand, Peirce was certainly familiar with the basic principles of hieroglyphic classifiers. He knew that these were not always pictures of material objects, but could also be "conventional symbols of the class of notions," as Le Page Renouf put it. To call classifiers "pictures" or to define them as icons of the image type is acceptable in case of an image iconic classifier such as the one that shows a sitting woman, ⟨⟩, to indicate that the preceding lexeme, word form, or phrase represents a female person. This is a typical member of the group of taxonomic classifiers, which are, in varying degrees, image-iconic (Lincke 2011; Lincke and Kammerzell 2012). A particularly high degree of iconicity is characteristic of classifiers that represent the same object as their host. This type of classifier has similarities with the so-called "repeaters" among spoken language classifiers (but they are, of course, not repeaters in the strict sense of the word since they differ in form from the phonographically written host). A lucid example is the sign ⟨⟩ that occurs as classifier only in the context of a single word form, namely, ⟨⟩ *ṯb.t*, 'sandal.'

The number of classifiers that are completely dissimilar to the class of objects they classify is rather limited in Egyptian. Good examples are ⟨⟩ (used on a variety of nouns and verbs referring to undesirable things or states) and ⟨⟩, which in Late Egyptian may be a residuous class marker. However, even these two abstract classifiers acquired their classifying functions only secondarily (cf. Figure 8, below; cf. Lincke and Kammerzell 2012: 72–75 for another case of this kind). Diagrams need not have a visual representation on paper; grammatical diagrams are first of all mental diagrams. However, it must always be possible to represent a mental diagram visually. Figure 8 illustrates how the system of verb classifiers of a single Late Egyptian text, the Story of Wenamun of Papyrus Moscow 120 (a hieratic text of the 11th century BC), may be represented in the form of a diagrammatic icon (for more details, cf. Kammerzell 2015). The 114 verbal lexemes of the narrative are grouped into fifteen major classes marked by the classifiers Ø ("Zero"), ⟨⟩, ⟨⟩, ⟨⟩, ⟨⟩, ⟨⟩, ⟨⟩, ⟨⟩, ⟨⟩, ⟨⟩, ⟨⟩, ⟨⟩, ⟨⟩, ⟨⟩, and ⟨⟩. A further subdivision is achieved by the use of secondary signs as parts of multiple classifier constructions. The font size of the English translation equivalents indicates the relative frequency of the respective lexeme. The dotted lines enclose verbs that exhibit a variation in classifier usage.
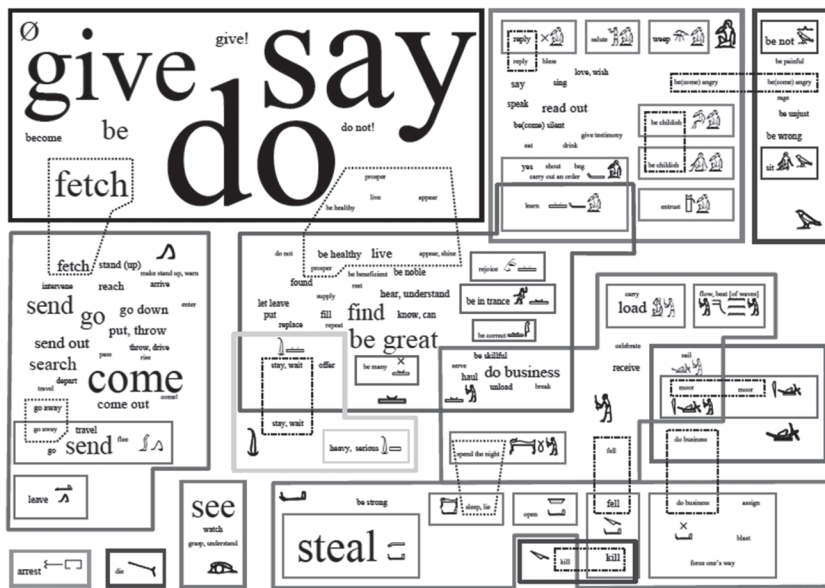
Figure 8. A diagram of the system and usage of verb classifiers in Papyrus Moscow 120.

Linguistic iconicity and the applicability of its principles to the study of hieroglyphic texts involve still another issue, namely the one of multimodality. In the rich visual culture of Pharaonic Egypt, the borderline between images (iconic sinsigns) and written verbal icons (iconic legisigns) is sometimes hard, if not impossible to draw. Due to the iconic substratum of the hieroglyphs, which makes the written signs formally similar to pictures, there is quite often a gradual transition between these two modalities. Evidence of the fuzziness of the borderline between writing and image in Egyptian text-image compositions is the following:

- A key word of the Egyptian verbal-visual culture is the verb 𓏞, *zẖꜣ*, which does not only mean 'to write' but also 'to draw,' or 'to paint.' Insofar, it is an equivalent of the English verb *to record*, of the French verb *tracer*, or of the German *aufzeichnen*. Hence, the verb used to represent the verbal-visual cultural production of the Ancient Egyptians does not differentiate between the modalities of writing and drawing.
- With respect to their physical characteristics, elements of Egyptian pictorial representations tend to be highly standardized (cf. Schäfer 1930; Robins 1994). The production of images follows rules similar to the ones that apply to hieroglyphic writing. This allows the transfer of signs from

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the verbal to the pictorial modality and vice versa with hardly any modification of their form (Tefnin 1984; Fischer 1986; Assmann 2009: 74–79).

- Multimodal text-image compositions combining writing with images are common in Pharaonic Egypt. Among their characteristics is the existence of so-called *ambimodal signs* (Lapčić 2014), that is, elements of the text-image composition that are not only ambiguous as to whether they should be interpreted as signs of writing or as images but belong to either modality at the same time. The occurrence of ambimodal signs does not mean that hieroglyphic writing is systematically indistinguishable from images. Ambimodal signs are clearly restricted to specific contexts at the interface of written and pictorial representations.

- Hieroglyphic writing is a *hybrid* system without a fixed set of graphemes that readers and writers had to learn as a whole. The hybridity of this system consists in a specific mix of *list-based* and *rule-based* data processing. The core of the system consists of a closed set of highly conventionalized, though not in all cases arbitrary, hieroglyphs. This comprises a set of phonograms (representing a single consonant or a sequence of more than one consonants), a set of common logograms, and a set of generic classifiers—altogether no more than 300 graphemes. In addition, there a is a large open class of less conventionalized signs, up to 2,000 distinctive sign shapes in 3rd millennium texts, consisting of logograms and highly specific, mostly repeater-like classifiers. All of the latter are both meaningful and image iconic. Most of these signs were created for their specific cotexts during the process of text formation according to general rules for the design and the interpretation of hieroglyphs. The same rules also apply to the creation of pictures. In sum, all hieroglyphs look like pictures, but only the hieroglyphs of the aforementioned open class convey their information in the same way as pictures do. Hence, there is not only multimodality at the interface of words and images, but there is also writing-internal multimodality.

This in mind, it seems remarkable that Peirce glossed only classifiers with a high degree of iconicity as *Pictures*, as in the expressions ⚊⚊ *ꜥꜣ* 'cover, lid,' ⚋⚋△ *bnbn.t* 'pyramidion,' and ⚋⚋△ *ḥꜥ-Mr.n-rꜥw-nfr* '(the pyramid called) Maliniliiḍu-will-appear-in-perfect-state.' He refrained from applying the same term to the less iconic classifier ⚋, which serves to categorize entities of the royal and divine spheres and occurs in the word forms ⚋⚋ *nb* 'lord' and ⚋⚋⚋ *ḥnw.t* 'mistress,'

whether on purpose or not. In this sense, it may appear odd that also the repeater-like classifier ⬚ in ⬚⬚⬚, *hn(w)*, 'box, coffin,' (a sign with a high degree of image-iconicity) is without the gloss *Picture* (cf. Figure 6).

5. Grammar, morphology, and etymology

5.1 Syntactic evidence of the Egyptian "pictorial mind"

Peirce is convinced that the vocabulary and the syntactic structure of Egyptian, too, are more iconic than the ones of other languages. To him, this peculiarity of Egyptian is quite consistent with the "pictorial mind" of their speakers (MS 595, p. 16; c.1893). To understand how he substantiates this claim, it is necessary to begin with a few remarks on Peirce's theory of syntactic iconicity (see also Nöth 2015).

5.1.1 Words as signs and the interpretants of words

It is well known that Peirce distinguishes between the sign, its object, and its interpretant. The sign is the "the substance of the representation, or the Vehicle of the Meaning," whereas the interpretant is essentially its meaning, "that which […] makes its Intelligence" ("Synopsis of Logic," MS 1345, microfilm 1163; c. 1896). For example, "looking at a map, the map itself is the Vehicle, the country represented is the Natural Object, and the idea excited in the [interpreter's] mind is the Interpretant" (ibid.). In relation to its object, the sign is an icon, and index, or a symbol.

Spoken or written words are essentially symbols because their relation to their object is determined by a habit and a cultural convention. However, only words that represent a general idea and the "vehicle" of which is entirely unrelated to its object are symbols. Onomatopoeic and deictic words as well as proper names are not symbols. The former are icons because their "vehicle" is similar to the object they represent. The latter are indices because they do not stand for general concepts but denote singular objects.

Since "all thought is in signs," as Peirce put it in his "Questions concerning certain Faculties claimed for Man" (CP 5.253 and W 2:193–211; 1868), the interpretants of words are signs, too, mental signs. Although a word as a sign and the interpretant of this sign ultimately represent the same (dynamical) object, the interpretant represents it in a different way, with the result that it may also turn out to be of a different type of sign. Symbols are too abstract to be fully understood, agues Peirce. We cannot think by means of symbols alone. This is one of the "defects of symbols" (CP 6.338, 1908). To understand what a sequence of symbols, a text, means, the reader needs to interpret some of its symbols in the form of mental images and others with reference to

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previous "collateral" experience that a symbol and a text cannot convey by itself since it is too abstract. The former way of interpreting words is iconic; the latter is indexical:

> All thinking is conducted in signs that are mainly of the same general structure as words; those which are not so, being of the nature of those signs of which we have need now and then in our converse with one another to eke out the defects of words, or symbols. These non-symbolic thought-signs are of two classes: first, pictures or diagrams or other images (I call them Icons) such as have to be used to explain the significations of words; and secondly, signs more or less analogous to symptoms (I call them Indices) of which the collateral observations, by which we know what a man is talking about, are examples. The Icons chiefly illustrate the significations of predicate-thoughts, the Indices the denotations of subject-thoughts. The substance of thoughts consists of these three species of ingredients. ("Some Amazing Mazes, Fourth Curiosity," CP 6.338; c. 1909)

Here and elsewhere, Peirce's semiotic syntax postulates that the interpretants of logical predicates and, derived therefrom, of verbs and adjectives, are essentially icons, whereas the ones of logical subjects and, by derivation, of proper nouns as well as pronouns, are essentially indices. Nouns, by contrast, form a mixed category since they may occur, like verbs and adjectives, in predicative positions and, like proper nouns, equally in subject positions.

A predicate, argues Peirce in several papers, is a rhematic icon that calls up a mental image formed as the result of the experience of many scenes of the same kind that have left "a sort of composite photograph" in the interpreter's mind (e.g., "Reason's Rules," CP 5.542; c.1902). For example, the predicate—*gives*—*to*—"conveys its meaning" iconically "because the interpreter has had many experiences in which gifts were made; and a sort of composite photograph of them appears in his imagination" (ibid.).

Furthermore, a verb also evokes the iconic scenario of the syntactic roles that it presupposes as its logical subjects (a term that includes grammatical subjects and objects). We know that an act of giving presupposes a giver, a gift, and a recipient of the latter. The verb *to give* is thus a "fragment of a possible proposition having blanks, which being filled with proper names make the verb a proposition" ("On Existential Graphs," MS 483, p. 3; c.1901). The blanks ("—") associated with the verb *give* are the slots to be filled by logical subjects. Peirce interprets the latter as indexical signs, whose objects are singular objects of reference, as in *Anthony gave a ring to Cleopatra* ("Reason's Rules," CP 5.542; c.1902).

The subjects, in the form of the proper nouns *Anthony* and *Cleopatra*, are indexical signs since they refer to individuals who have existed in a

specific time and place. All proper nouns designate and identify individuals indexically. The noun phrase *a ring*, in this context, is less indexical because it does not specify a singular object, although it must have been one particular piece of jewelry, and the scene represented by the sample sentence can only be interpreted in this way. On these premises, Peirce attributes indexicality not only to proper nouns, but also to noun phrases in subject position, since subjects are "either names of objects well known to the utterer and to the interpreter of the proposition […] or they are virtually almost directions how to proceed to gain acquaintance with what is referred to" (ibid.).

However, a noun phrase in a predicative position functions logically like a verb. It has thus an iconic interpretant. This is what Peirce argues in a passage of the undated MS 516, in which he calls icons rhemes, without making the distinction between rhematic icons and rhematic indices that he introduced in 1903 (see above, sect. 4.3):

> Every verb is a rhema. But a common noun is a singular and superfluous formation. Its function is the same as that of the Proper Name. That is, it merely draws attention to an object and so puts its interpreter into condition to learn whatever there may be to be learned from such an attention. Now, attention can only be drawn to what is already in experience. A proper name can only function as such if utterer and interpreter are already more or less familiar with the object it names. But the peculiarity of a common noun is that it undertakes to draw attention to an object with which the interpreter may have no acquaintance. For this purpose it calls up in his mind such an image as a verb calls up, appeals to his memory that he has seen different objects the subjects of that image. ("On the Basic Rules of Logical Transformation," MS 516, pp. 39–40; n.d.)

5.1.2 The case of the Egyptian language

After the above considerations, Peirce moves from these premises to conclusions regarding the Egyptian language in the undated and unpublished MS 516. After stating that nouns are logically ambiguous since they are in some contexts indices that draw attention to a particular object but in others icons that evoke mental images and the argument that nouns are apparently, for this reason, logically superfluous, Peirce goes on to examine the nature of nouns of ancient languages:

> A language which, like the Greek does not need to insert the verb "is" in such a sentence as "The man is wise," plainly has not yet fully developed the conception of the common noun. Its noun retains something of the *rhema*. This is the case with the Semitic languages,

which moreover have few common nouns which are not regular formations of verbs. […] When we come to a language which in place of the verb "is" puts a demonstrative pronoun, as the ancient Egyptian does, it is pretty clear that its nouns are more *rhemata* than names. ("On the Basic Rules of Logical Transformation," MS 516, pp. 40–41; n.d.)

The line of argument that Peirce develops here amounts to saying that the parts of speech and the syntax of Ancient Greek, the Semitic languages, and Egyptian are more iconic because their common nouns are in various ways less indexical than the ones of the Indo-European and other languages. Whereas in Ancient Greek syntax, a copula may simply be incorporated in the sentence subject, and the Semitic languages have few nouns not derived from verbs, the noun phrases forming the logical subject in Egyptian are more iconic than the ones of other languages because a copula may merge with the demonstrative pronoun in subject position. What the three languages have in common is that their verbs merge in some way with their subjects, respectively, with a demonstrative pronoun in its position. Peirce explains the linguistic details of this characteristic of the Egyptian language as follows:

[In] Old Egyptian, there are few words […] which are distinctively common nouns. Every general word excites a pictorical idea. Even to the modern student, the pictorial ideograph becomes a considerable part of the idea it excites; and the influence of the hieroglyphics, the modes of expression, etc., is to make "a composite of pictures" particularly expressive in describing the idea conveyed. ("That Categorical and Hypothetical Propositions are one in essence," CP 2.354; c. 1895)

Peirce's first argument, that there are fewer "distinctively common nouns" in Egyptian than in other languages, repeats what he also writes in MS 516, namely, that the vocabulary of Egyptian is more verblike and hence more iconic than the one of other languages. His second argument, that "every general word excites a pictorial idea," considers the nouns of the Egyptian language explicitly from the two perspectives of the sign and of the interpretant. As signs, nouns are symbols. Peirce's definition of symbols as "general representations" (e.g., Lowell Institute Lectures on "The Logic of Science; or Induction and Hypothesis," W1: 468; 1866) is echoed in the expression "every general word." When Peirce refers to the "pictorial ideas" excited by these symbols, he describes how Egyptian minds interpret general words, which are symbols qua sign, as icons.

The particular iconicity of Egyptian nouns, thus Peirce, results from the iconicity of their written form. The second evidence of the higher

degree of iconicity of the vocabulary and grammar of Egyptian that Peirce adduced in c.1895 specifies the above-quoted argument of MS 516 that in Egyptian sentences, the copula "is" tends to merge with a demonstrative pronoun in a subject position:

> Now our word "*is*," the copula, is commonly expressed in Old Egyptian by a demonstrative pronoun. It is evident that this demonstrative has in such sentences the force of a relative. Where is the verb? We feel that it is contained in the general words. ("That Categorical and Hypothetical Propositions are one in essence," CP 2.354; c. 1895)

If the idea of the verb, which is an icon in its interpretant, is contained in the sentence subject, the interpretant of the whole sentence should be more iconic than in languages where the idea of the verb remains separate from the one of the noun. Peirce exemplifies his analysis as follows:

> In short, "man is mortal" is expressed in Old Egyptian in a form which expressed the following psychological process of thinking, "What is spoken of is man, *which* what is spoken of is mortal." This is precisely the way in which the same idea is conveyed in my general algebra of logic. (Ibid.)

What Peirce claims here is that the logical subject, *man*, is being shifted to a predicative position, *is a man*, so that its interpretant is more iconic to the Egyptian "pictorial mind" than to the mind of a speaker of an Indo-Europeans language. The surface structural syntactic subject, the nominal clause *what is spoken of*, turns out to be a logical dummy subject since it contains only a reference to the act of uttering the proposition, whose main information is again expressed in a predicative form. The translated version of the original logical predicate, that is, *what is spoken of is mortal*, follows the same syntactic pattern, but the predicate *is mortal* is now a predicate in both languages. Peirce's implicit argument is thus that the Egyptian version of the proposition "Man is mortal" contains two predicates instead of one, which means that its interpretant is twice as iconic.

In MS 595, Peirce develops a rather similar line of argument. Here, the sign whose interpretant he analyses as being iconic is not a symbol (the common noun *man*), but an indexical word, the proper noun *Aahmes*:

> That different races regard nouns in sentences in quite different lights, admits of no doubt […]. Many languages have no "verb substantive"*. [*In the footnote, P. criticizes Priscian's interpretation of the verb 'to be' in Greek as meaning 'happening or inference*] The Old Egyptian

often has in place of *is* a relative pronoun. In our way of thinking this seems very unapt. But the Egyptian had a pictorial mind; and when he saw a hieroglyphic ideograph of a man, what it said to him was, "what we are thinking of is a man." Hence, the sentence "Aahmes is a man" would be thought by him under the form "What we are thinking of is Aahmes *which* what we are thinking of is a man."† [*Note on p. 17*: The pronoun in question is ☞ *pw*, primarily a "demonstrative." But demonstratives are used as relatives in almost all languages, if not in every one.] ("Short Logic," MS 595, pp. 16–17; c.1893)

The differences between the nominal clauses of the various languages of the world continue to be the subject of dispute in modern linguistic typology (Sasse 1993), but Peirce's assertion that "there are few distinctively common nouns" in Egyptian cannot be empirically substantiated. Peirce must have adopted it from Le Page Renouf. In his *Elementary Grammar* of 1875, the author argues:

One of the chief differences between the Egyptian language, on the one hand, and the Indo-European and Semitic, on the other, is that the distinction between roots, stems, and words can hardly be said to exist at all in the latter. The bare root […] is almost invariably identical in Egyptian with the word in actual use. […] The actual Egyptian word taken by itself is no part of speech, but within the limits of the notion it represents is potentially noun, verb, adjective, adverb, &c. (Le Page Renouf 1875: 49)

What remains to be examined, in addition, is whether the Egyptian nominal clauses constructed with the demonstrative *pw* really testify to a "pictorial mind." What is the linguistic evidence in support of this assertion? And why does Peirce argue that "this demonstrative has in such sentences the force of a relative"?

Peirce's above-quoted premise is that "demonstratives are used as relatives in almost all languages," but modern linguistic insight is that only in some languages, relative pronouns are the result of a grammaticalization of demonstratives (cf. Heine et al. 1993: 66). The Egyptian demonstrative *pw*, 'that,' by contrast, is always clearly distinguished from the relative pronoun *ntj*, 'which.' Furthermore, Peirce's above-quoted paraphrase of the Egyptian equivalent of the proposition "Man is mortal" as 'what is spoken of is man, *which* what is spoken of is mortal' is not acceptable from a modern point of view. How can this idea be expressed in a correct sentence of the Egyptian language?

Since the Egyptians distinguished between different ontological states of dead individuals (cf. *Thesaurus Linguae Aegyptiae*, s.v. *ꜣḫ* = lemma no. 203 and s.v. *mwt* = lemma no. 69320), the translation of the English adjective *mortal* into Egyptian is not easy. To express the idea

of mortality, the Egyptians would not use a word form of the root *mwt*, 'to die,' but speak of the '(still) living ones.' This in mind, the proposition "Man is mortal," expressed by means of a nominal clause with the demonstrative *pw*, would have either of the following syntactic forms:

(1)

ʿnḫ	pw	z(j)
live:PTCP	DEM	man:SBST
PREDICATE	SUBJECT	

Man is mortal.

(2)

z(j)	pw	ʿnḫ
man:SBST	DEM	live:PTCP
TOPIC	COMMENT	

Man is mortal.

Variant (1) expresses the concept of 'mortal' by the active participle of the verb *ʿnḫ*, 'live,' i.e., 'the living one.' This form is then used as the predicate in the first position of a clause with the demonstrative *pw* in its second position, forming the nucleus of the subject, expanded by the appositional noun *z(j)*, 'man.' A literal rendering of this construction would be, "That, namely man, is a living one." Variant (2) uses the noun *z(j)*, 'man,' initially as the sentence topic, followed by a cataphoric *pw* and by the syntactic comment *ʿnḫ*, 'the living one.' This might be rendered literally as "That is man: a living one."

In Written Egyptian, it is impossible to decide whether the syntactic structure of a nominal clause is predicate–subject or topic–comment, but it is reasonable to assume that in Spoken Egyptian, intonation, facial signs or other gestures were reliable means of differentiation. Contrary to what Peirce believed, the demonstrative *pw* did not have "the force of a relative" in either case.

5.2 The origins of indexical words from symbols via grammaticalization in Ancient Egyptian

Peirce dedicated several pages of MSS 1227 and 1228 to conjectures on the evolution of prepositions from nouns in Egyptian. In modern linguistics, this diachronic change is known as grammaticalization. The reason for Peirce's particular attention to this topic lies most probably in his general interest in classifying words as signs, as discussed above. In 1895, Peirce defined prepositions and prepositional phrases as indexical signs:

> The demonstrative pronouns, "this" and "that," are indices […].
> Other indexical words are prepositions, and prepositional phrases,

such as *on the right* (or *left*) *of*. […] Other prepositions signify relations which *may*, perhaps, be described; but when they refer, as they do oftener than would be supposed, to a situation relative to the observed, or assumed to be experientially known, place and attitude of the speaker relatively to that of the hearer, then the indexical element is the dominant element. ("Of Reasoning in General," EP2: 14, 16; 1895)

Since nouns as signs representing general ideas are symbols but tend to become (parts of) indices as interpretants in propositional contexts, as described above, the morphological shift from a noun to a preposition, being a shift from a symbol to an index, should be a rather natural one. However, a noun cannot change to a preposition without any index to trigger the shift. As a symbol, a common noun is "a sign which refers to the Object that it denotes by virtue of a law, usually an association of general ideas" ("The Essence of Reasoning," CP 2.249, 1903). Peirce argues that the generality of a genuine symbol creates, in the interpreter's mind, the effect of "a mere dream; […] it does not show what it is talking about. It needs to be connected with its object. For that purpose, an index is indispensable. No other kind of sign will answer the purpose" (ibid., CP 4.56; 1893). In sum, a symbol by itself, without an index, cannot change into an index.

After having collected first data on Egyptian prepositions from the rather superficial conjectures of Le Page Renouf (1875: 20–30) in 1893 (MS 1228, p. 36–43), Peirce made a second compilation, based on Erman (1894a: §§ 306–314) in 1898 (MS 1227, p. 34–39). To these data, he added notes on the "literal," respectively "original" meaning of the forms. Some of them are certainly too speculative or not even plausible, but others offer quite original and most plausible insights into processes of grammaticalization. As shown in the following, there are even some notes formulating insights that anticipate etymological findings recognized by professional Egyptologists only years later and which can still be found in Egyptological grammars today.

Table 2 presents a summary of Peirce's notes on the origin and evolution of Egyptian prepositions. The etymological conjectures may well be his own. Some of them cannot be traced to contemporary sources, while others have successors in much later Egyptological writings (e.g., Edel 1955/64: § 755 and Gardiner 1957: § 173). As the comments in Table 2 show, conjectures 1–7 are essentially still acceptable to modern Egyptological linguists. Only minor revisions seem necessary.

However, in light of modern Egyptological linguistics, it is not likely that Egyptian prepositions always derive from nouns. Some have developed from a verb (preceded by a relator), an adverb, or an adjective (cf. Gardiner 1957: §§ 179–181), although these cases are not common. Gardiner lists a handful of "compound prepositions

Table 2. Peirce's notes on the origin of Egyptian prepositions compared with current standard of research.

No.	Form	Peirce's comment (P) on the nominal origins of Egyptian prepositions with **verified** or possible source and current standard of research (C)
(1)		P: *top* 'upon' < 'head' (MS 1227: 39), **Erman 1894a: § 314** (cf. Brugsch 1867–82: IV 1535–1539) C: *dp-* 'upon' < *dp* 'head.RELATOR'
(2)		P: *ḥ3* 'behind' < 'back of head' (MS 1227: 39), **Erman 1894a: § 314** (cf. Brugsch 1867–82: III 916) C: *ḥ3-* 'behind' < *ḥ3* 'occiput.RELATOR'
(3)		P: *ḥêr* 'above' 'face' (MS 1228: 35), cf. Brugsch 1867–82: III 977–978 C: *ḥr-* 'on' < *ḥr* 'face.RELATOR'
(4)		P: *χnt* 'among' < 'nose' (MS 1227:39), **Erman 1894a: § 314** (cf. Brugsch 1867–82: III, 1108–1109) C: *ḫnt-* < *ḫnt* 'front.RELATOR'
(5)		P: *ter* 'since' < 'heart[sic], goal' (MS 1228: 37), **Brugsch 1867–82: 1554–1556** C: *ḏr-* 'since' < *ḏrw* 'end.RELATOR'
(6)		P: *χeft* 'opposite' < 'face'[sic?] (MS 1228: 38), **Le Page Renouf 1875: 28** (cf. Brugsch 1867–82: III 1078–1080) C: *ḥft-* 'facing' < *ḥft* 'opposite.RELATOR'
(7)		P: *χer* 'under' < 'testicles' (MS 1228: 35), cf. Brugsch 1867–82: III 1120–1124 C: *ẖr-* 'under' > (!) *ẖr.wj* 'testicles' (that is 'under.ADJZ.DU.M')
(8)		P: *er* 'to, for' < 'mouth' (MS 1228: 33), cf. Brugsch 1867–82: III 838–840; Stern 1880: § 531 C: *r-* '(attached/close) to', related to Sem. **la-*
(9)		P: *ermen* 'until' < 'arm' (MS 1228: 38), **Le Page Renouf 1875: 28** (cf. Brugsch 1867–82: III 858–859) C: *r- mn-* < *r-mn* 'to-remain.INF'
(10)		P: *nesu* 'belonging to'[sic] < 'tongue' (MS 1228: 37), **Le Page Renouf 1875: 27** (cf. Brugsch 1872: 12 or Brugsch 1867–82: III 803–806, VI 537) C: this is not a preposition but *n(j)-sw* 'belonging_to-3SG.M'
(11)		P: *em* 'from' < 'body, trunk, side[sic]' (MS 1228: 33), cf. Brugsch 1867–82: IV 1669–1670 C: *m-* 'in, from, with' [*etymology unavailable*]
(12)		P: *ḥenā* 'with' < 'palm branch; servant' (MS 1228: 36–37), cf. Brugsch 1867–82: III 961 C: *ḥnꜥ-* 'with', related to Sem. (cf. Arabic *ꜥinda*)
(13)		P: *en* 'to' (MS 1228: 33), *en* [relative] (MS 1228: 28) < 'ocean, great water' or 'piss' (cf. Brugsch 1867–82: III 774, VI 703–704) C: *n-*, related to Sem. **li-*

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consisting of an infinitive" (1957: § 180), but only two of these have become fully grammaticalized in Later Egyptian (*r-jwd- ... r-*, 'to separate … from' > Coptic ⲞⲨⲦⲈ, 'between,' and *r- šȝᶜ-* 'to begin' > ϢⲀ, 'until'). A shift in the opposite direction, from prepositions to nouns, may also have occurred in some cases (since the derivation of a noun from a preposition is a productive process of word formation in Earlier Egyptian). For example, in form no. 7, the noun *ḫr.wj*, 'testicles,' probably derives from a preposition (and not vice versa). In no. 8, the consonantal form of the preposition is also the one of a noun designating a body part, but in this case, there are two objections against deriving the preposition *r-*, '(attached/close) to' from *r'*, 'mouth.' First, the semantic shift from 'mouth' to 'attached to, close to' is not very convincing. At any rate, it cannot be found in Heine et al. (1993). Second, this preposition, in contrast to the noun, may be connected with a Semitic cognate (for more details, see Werning 2014, esp. p. 318). Hence, Egyptian *r-* '(attached/close) to' is most probably derived from an Afroasiatic protoform. It cannot be the result of a process of grammaticalization within Egyptian.

In contrast to the first seven conjectures listed in Table 2, there are no reliable data to support the conjectures 9–12. In 9 and 10, what Peirce believed to be prepositions are in fact constructions consisting of more than one grammatical morpheme, whereas this does not hold true for the nouns *rmn*, 'arm,' and *ns*, 'tongue.' These only happen to be phonetically similar to the alleged "prepositions," but they are etymologically unrelated. A noun for 'body' or 'trunk' (11) as the origin of the preposition *m-*, 'in, from,' is not documented in Old Egyptian. Peirce gives no source for this derivation. He may have assumed the existence of a lexeme *〰 *m*, 'body, trunk,' from the translation "der Leib, der Körper, das Selbst" offered by Brugsch (1867–82: IV 1667–70), who also wrote that ⸢ and 〰 were synonyms. However, the respective nouns ⸢ *ᶜ(w)*, 'portion, part,' and 〰 *gs*, 'half,' are etymologically unrelated to the preposition 🦉 *m-* 'in, from, with.' In his notes of 1892/93 (MS 1228), Peirce had still relied on sources that standardly transcribed 〰 *gs* as "ma." That this was mistaken became known only after the discovery of the Pyramid Texts in 1880/81. In 1898 (MS 1227), Peirce used already the correct reading ▣⏐⸗ *ᵍ⁻ˢ-gs* according to Erman (1894a: § 315) without repeating the earlier mistake. It is also remarkable that Peirce did not opt in favor of ⸤, i.e., *ḥnk.t*. Brugsch (1867–82: VI 550) had still interpreted this word form as *mat*, 'place,' but today we know that it is to be read *ḥnk.t*, 'bedchamber.' The semantic change from 'place' to a locative marker is well-attested (Heine et al. 1993: 172–173) and would have been a better conjecture, but of course, there is no etymological relation between *ḥnk.t* 'bedchamber' and any preposition.

To our knowledge, a good grammaticalization source for the preposition 𓎟 *ḥnᶜ-*, 'with' (12), has not yet been suggested, but Peirce's derivation of it from the noun 𓎛𓈖𓈖 *ḥnj*, 'plant of the marshes, sedge,' is not convincing. He may have misunderstood Brugsch (1867–82: III 96), who means something else when he postulates the noun *ḥun* (as he transcribes the form *ḥnj*), 'palm or vine branches carrying fully developed dates and grapes,' as the etymon of the phonogram 𓎛 *ḥn*. Despite the homophony of their first two consonants, the two forms *ḥn* and *ḥnᶜ-* are unrelated.

Derivation 13 must be rejected both on morphological and on semantic grounds. The speculation about a semantic shift from 'ocean, great water' or 'piss' to a preposition acting as a dative or benefactive marker lacks any plausibility. It is also unclear which of the lemmas designating the meaning of 'body of water' and 'urine' Peirce may have had in his mind. *Nên* or *nun*, 'great water, ocean' (Brugsch 1867–82: III 774), *nt*, 'flood, efflux, fluid' (VI 703–704), or even *muīt*, 'efflux, urine' (VI 555), are possible candidates.

A reason why some of his conjectures on the origins of Egyptian prepositions went wrong may be that Peirce tried to find a nominal root for *all* prepositions, which is not a correct assumption (cf. Gardiner 1957: §§ 179–181). An example of an overinterpretation of this kind is Peirce's etymological derivation of 𓅓 *m-*, 'in, from, with', from an assumed noun with the meaning of 'body, trunk' (11) for which he could hardly have found evidence in Le Page Renouf (1875). In the MS of 1898, there are two addenda to the notes copied from Erman (1894a: § 307), which show that Peirce was still in search of other possible nominal roots for the preposition 𓅓 *m-*. In the first, his annotation states "*ꜣm* means fist, *ḥm*[*t*] (means) woman." The second note states "𓂝 is imperative of 𓀁 (synonym of 𓂝 to eat), which is a negative: what is devoured is negated and in […] (*illegible*)" (MS 1227, p. 38 [=0068, left]). These observations may be evidence that Peirce took the path from a body part noun to a preposition as the default case of grammaticalization, an assumption that is still rather common in modern linguistics.

With such insights, Peirce was considerably ahead of his time, at least of the Egyptological authors he had quoted in his notebooks, but also of those whom he might have studied otherwise. In the grammars or dictionaries of his time, there are occasional allusions to possible "original" or "literal" meanings of some Egyptian prepositions, but as far as we know, none of the Egyptologists of his time ever tried to demonstrate in detail that Egyptian prepositions had generally evolved from nouns. In his *Grammaire démotique*, Brugsch (1855: § 316) mentions that one group of simple prepositions in Demotic, the later Egyptian chronolect spoken and written from the 8th century BC to

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the 5th century AD, descended from nominal etyma and consequently formed the set of "prépositions simples substantives." "Cette classe assez nombreuse se compose d'un nombre de signes démotiques qui, pour la plupart, anciennement ne signifiaient qu'un nom substantif, et qui, par un emploi singulier, étaient destinés à servir de prépositions." However, in his own discussion of these prepositions (Brugsch 1855: §§ 317–325), there is almost nothing to substantiate this claim, and Brugsch gives no hint that he assumed a similar path of development for those elements which already in Earlier Egyptian occurred as simple prepositions (the "prépositions simples relatives" of Brugsch 1855: §§ 314–315).

Birch (1857) and de Rougé (1868) are two other important works on Egyptian grammar of the decades before Peirce began to study Egyptian, but in his notes on the topic, Peirce does not quote them. Furthermore, the chapters on prepositions and body part nouns by Birch (1857: 256–259) and de Rougé (1868: §§ 144–148) say nothing about the evolution of prepositions from nouns. The same holds true for the first comprehensive study of Hieroglyphic Egyptian, J. F. Champollion's posthumously published *Grammaire égyptienne* (1836: 448–499). For Coptic, Stern (1880: § 531) stated, "Auch die präposition ist im koptischen aus dem nomen hervorgegangen," without suggesting that similar processes of semantic change might have taken place already in earlier stages of the Egyptian language. So far, it thus seems that Peirce's ideas on the evolution of Egyptian prepositions from nouns must have been his own.

As observed above, prepositions have not evolved directly from nouns by a simple shift of word category. Instead, the nominal etymon of the preposition must have been preceded by a preposition or followed by a postposition or a case marker. In the course of grammaticalization, the former nominal form then took over the function of the whole construction and thus became a preposition. There are data from several stages of the history of Egyptian corroborating this assumption. For example, 𓅓𓏏𓏤𓎛𓈖𓏌𓏤 *m- ẖnw*, 'in the interior,' became 𓅓𓏏𓏤 *m-ẖn-*, 'in,' and ended in 𓏏𓏤 *ẖn-* 'in, at, on, from.' Similar cases can be found in Westendorf (1965–77, s.v. ⲃⲟⲗ, ⲥⲁ, ⲧⲏⲣ=, or ⲉⲛ) and have been described by Werning (2014: 236–237). Most nouns that changed into prepositions in this way are expressions for body parts or relational nouns, such as 'interior.'

The premise that a noun cannot evolve directly into a preposition is quite in accordance with Peirce's semiotic linguistics. They can only have evolved from noun plus relator phrases (i.e., adpositional phrases), for not only prepositions are indexical words but also prepositional phrases, pronouns, demonstratives, and proper nouns, as Peirce explains in the passage from "Of Reasoning in General" of

1895, quoted at the beginning of this section. In that paper, Peirce adds the following footnote, which testifies to the breadth of his concept of the indexical expressions, from which prepositions may have evolved:

> If a logician had to construct a language *de novo*, – which he actually has almost to do, – he would naturally say, I shall need prepositions to express the temporal relations of *before, after,* and *at the same time with*, I shall need prepositions to express the spatial relations of *adjoining, containing, touching,* of *in range with,* of *near to, far from,* of *to the right of, to the left of, above, below, before, behind,* and I shall need prepositions to express motions into and out of these situations. For the rest, I can manage with metaphors. ("Of Reasoning in General," EP2: 16; 1895)

In the context of his remarks on the indexicality of prepositions, Peirce also addresses the meanwhile well-documented finding that the spatial prepositions of some languages tend to be motivated by the geographical characteristics of the country of their speakers and concludes with a note on a geolinguistic peculiarity of Ancient Egyptian:

> Only if my language is intended for use by people having some great geographical feature related the same way to all of them, as a mountain range, the sea, a great river, it will be desirable to have prepositions signifying situations relatively to that, as *across, seaward,* etc. […] The Egyptians had no preposition nor demonstrative having any apparent reference to the Nile. Only the Eskimo are so wrapped up in their bearskins that they have demonstratives distinguishing landward, seaward, north, south, east, and west. ("Of Reasoning in General," EP2: 16; 1895)

Ancient Egyptian had indeed no indexical words referring to the River Nile. What comes closest to grammatical elements expressing absolute orientation with respect to the river are the two verbs 𓏃 *ḫntj,* 'sail upstream,' and � *ḫdj,* 'sail downstream.' Originally, both designated a particular kind of movement by ship and a direction. In the course of a semantic shift, no later than in the early second millennium BC, the meaning of the two words was extended. Their implication of the manner of movement ('sailing') was lost and in combination with verbs such as *šmj,* 'to go (by foot or by chariot),' the prepositional phrases *m- ḫnty.t,* 'in sailing upstream,' and *m- ḫd,* 'in sailing downstream,' acquired the prepositional meanings of 'southward' and 'northward' or even 'upward' and 'downward.' However, apparently these expressions became never fully grammaticalized to the genuinely prepositional meanings of 'up' and 'down' so that these two expressions are no better counterexamples

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to Peirce's claim than the German nouns *Luv,* 'windward side,' and *Lee,* 'leeward side,' are, which have remained nouns without becoming prepositions. The expressions for 'right' and 'left' in Egyptian are rather similar to the ones for 'western' and 'eastern,' respectively, but they may be etymologically motivated either by a reference to the Nile (looking upstream, as was the Egyptian custom) or as referring to the upper culmination of the sun.

6. The hypothesis of the proximity of Egyptian to the ursprache of humanity

Peirce believed that he could substantiate his judgment on the "strange minds" of the Ancient Egyptians, delivered when he had hardly begun to study the language, with a critique of Egyptian word order: "The very structure of the language is topsy turvy," was his comment in the fall of 1892 (MS 1297, p. 3, Peirce's page number). The reasons why he found the language of the Pharaohs strange are these:

> The same word is generally (as well as I can make out without any grammar or dictionary) a noun and a verb; there are no conjunctions, only a few vague prepositions. The adjective always follows its noun, the subject regularly follows the verb. Their modes of expression are odd and awkward. Khufu, builder of the great pyramid, says in an inscription that he planned the temple of Isis. Here is how he says it "Living Horus King majesty Khufu who living find did-he house Isis ruling pyramid near house Sphynx above north west which house Osiris Lord Rusut build did-he pyramid-he near god house which god that." Here he describes the great pyramid as that pyramid that is near the Sphynx that is near the temple of Osiris,—defining the big by the little. (Peirce MS 1297, pp. 3–4; 1892)

Peirce's early impression that the Ancient Egyptian language is "odd and awkward" since the word-to-word translation of one of its texts into English sounds strange makes one wonder whether this early linguistic judgment was dimmed by an Anglocentric bias.

Robin's *Catalogue* shows that Peirce did in fact carry out quite a number of in-depth studies in general and comparative linguistics. Although he had "no pretension to being a linguist" (CP 2.328; c.1902), no less than 127 of his manuscripts are classified as 'linguistic' by Robin. The *Catalogue* also contains many references to manuscripts dealing partially with linguistic topics (MSS 1135–1261 or MS 427). The topics range from phonetics, graphemics, morphology, grammar, lexicography, semantics, translation studies, historical and evolutionary linguistics and general as well as comparative linguistics. Peirce wrote papers dealing with aspects of Greek, Latin, German, Italian, Spanish, French, Basque (MS 1226–1247), and there is even a manuscript for an Arabic grammar (MS 1243) (cf. Nöth 2002). However, most of these

MSS are undated, and the few that are dated, except some early ones on the English language topics, carry dates after 1892. If this evidence from Robin's *Catalogue* justifies the assumption that Peirce's in-depth studies in general and comparative linguistics began only in 1892, it is understandable that in the very beginning of these studies in general and comparative linguistics, his opinions on the language of Ancient Egypt were still more marked by prejudices common in his time than after his later studies.

Why could Peirce have found the Ancient Egyptian language strange in comparison to other languages? His early claim that Ancient Egyptian had a "topsy turvy" structure is reminiscent of 19th century theories of language evolution that postulated a primitive, i.e., structurally underdeveloped primordial language, also discussed under the name *ursprache*. A year after Peirce began to study hieroglyphs, Otto Jespersen, in Copenhagen, still defended this theory in a book with the telling title *Progress in Language*. His thesis was, "The evolution of language shows a progressive tendency from inseparable irregular conglomerations to freely and regularly combinable short elements" (Jespersen 1894: 127).

Peirce was hardly one of Jespersen's readers, but his own remarks on the alleged "topsy-turvy" structure of Ancient Egyptian fit together with the theory of the alleged primitive structure of an *ursprache*, from which Hieroglyphic Egyptian was believed to be a not too distant off-spring (cf. Nöth 1977: 136). Peirce's remark on the "strange" word order of the Egyptian language is also in line with the assumption that a language close to the primitive *ursprache* could not yet have sufficiently developed the logic of its syntax. A language that defines "the big by the little" evokes faulty mental diagrams. It invites its interpreters to put the cart before the horse (cf. Nöth 1993, 1999).

Actually, there is nothing odd with the above-quoted passage, which Peirce presents in the word-to-word translation from Byrne (1885: 314), who had quoted it from Bunsen (1867: V 719–721). The passage is from the inscriptions of the so-called "Inventory Stela," a monument near the Great Pyramid at Giza, which is part of a small temple dedicated to Isis (cf. Hassan 1953: 113–117 and pls. LV-LVI). This stela outlines the building and furnishing activities of the temple and the restoration of the Great Sphinx in its immediate vicinity under King Ghawafwa, better known under his Greek name form Cheops (ruled c. 2575–2550 BC).

In Peirce's time, this stela was considered an authentic document of the Old Kingdom. However, today it is known that the "Inventory Stela" was only erected during the Late Period (713–332 BC). Some linguistic features reveal that it cannot even be the accurate copy of an earlier text. Thus, we are faced with a pseudohistorical document, produced, in all likelihood, during the Twenty-Sixth Dynasty (664–525 BC). It was most probably aimed at boosting the significance of the Temple of Isis with the claim that this sanctuary had been there even before Cheops built

Peirce	living	Horus	—		King majesty Khufu			who living	
Hieroglyphs									
Modern	ꜥnḫ	Ḥrw	Mḏdw		nzw-bjt Ḫwfw			ḏ-ꜥnḫ	
	live:PRS	Horus	unerring:PA		king-monarch Ghawafwa			give:PP live: STAT.3SM	

P	find did-he	house	Isis	Ruling	pyra-mid	near		House	Sphynx
H									
M	gm-n-f	prw-	Js-t	ḥnw-t-	m(h)r-	r-gs-		prw-	Ḥwrwn
	find-PRET-3SM	house-	Isis-F-CLF	mis-tress-F-	pyra-mid	towards-side-		house-	Sphinx

P	above	north west	which	house	Osiris	Lord	Rusut		build did-he
H									
M	ḥr-	mḥ-t-jmnt-t	n(j)-	prw-	Wsrw	nb-	R':sṯꜣw		qd-n-f
	on-	north-F-west-F	that of-	house-	Osiris	Lord-	Netherworld		build-PRET-3SM

P	pyramid-he	near		god house	which	god	that	—	
H									
M	m(h)r-f	r-gs-		ḥw-t-nṯr	n-t-	nṯr-(t)	-tn	qd-n-f	
	pyramid-3SM	towards-side-		estate-F-god	that of-F-	god-F	-this:F	build-PRET-3SM	

P	—	—	—		—		—	—	—
H									
M	m(h)r	n-	zꜣ-t- nzw		Ḥnw:t:sn		r-gs-	ḥw-t-nṯr	-tn
	pyramid	for-	daughter-F-king		Hunwitsina		towards-side-	estate-F-god	-this:F

'As true as Horus The-Unerring-One, King-Monarch Ghawafwa—may he be granted to stay alive—lives: He discovered the Temple of Isis-Mistress-of-the-Pyramid besides the Temple of the Sphinx on the northwest of the Temple of Osiris-Lord-of-the-Netherworld, and not only built his pyramid besides the estate of the said goddess, but, besides the same estate, also built a pyramid for Princess Hunwitsina.'

Figure 9. Peirce's rendering of an Egyptian text passage in MS 1297 compared with the hieroglyphic original and a modern analysis (abbreviations: 3: 3rd pers.; F: fem.; PA: active participle; PP: passive participle; PRS: present tense; PRET: preterite; SM: singular masculine; STAT: stative).

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his pyramid. Figure 9 reproduces the hieroglyphic text with a modern transcription below Peirce's word-to-word translation.

Against the background of the topographical and historical context of the inscription, it is evident, that there is no paradoxical figure-ground-relation in this text. The much smaller Temple of Isis became the point of reference for the location of the monumental pyramid of Cheops because the builders of this stela wanted to make believe that their monument was older and therefore more important than the Great Pyramid. A further objection to Peirce's judgment about the "odd and awkward" and, therefore, primordial nature of the Egyptian language in MS 1297 is that his example is from a source more than two millennia younger than the earliest attestations of Ancient Egyptian. It is true, however, that these crucial pieces of information were still unavailable in Peirce's days.

Peirce was convinced of the proximity of Ancient Egyptian to the *ursprache* of humanity, as we can see from an aside of 1893 on the "Old Egyptian language, which seems to come within earshot of the origin of speech" (CP 4.49). From the perspective of modern evolutionary linguistics, from which it is now clear that humans must have had a relatively well developed language already 200,000 (Donald 1991: 122) or even 400,000 (Müller 1990: 89) years ago, it seems strange that Peirce committed such a gross error in estimating the age of human language. However, it is true that 19th century scholars knew little about the temporal origin of the human species. In his Eighth Lowell Lecture of 1903, Peirce speaks of "the twenty or thirty thousand years during which man has been a thinking animal" (CP 5.591). This estimate may well be borrowed from Haeckel's *History of Creation* (1887: 298), where the "German Darwin" summarizes the general scholarly consensus of his time on this topic with the words, "beyond doubt, the human race, as such, has existed for more than twenty thousand years."

Furthermore, even renowned 19th century Egyptologists believed that the language of Ancient Egypt was relatively close to the hypothetical *ursprache* and—even worse—that it was a "primitive" language. The 19th century Eurocentric dogma of the primitiveness of the languages of Africa left its traces even in the writings of Le Page Renouf (1875) and Brugsch (1891: 90). The most famous of the defendants of this theory was perhaps Carl Abel (1884), whose booklet *Über den Gegensinn der Urworte* (1884) so much attracted the attention of Sigmund Freud that Freud published a full summary of it in 1910. Among the 19th century Egyptologists, Le Page Renouf adhered to the thesis of the evolutionary primitivity of the Egyptian language and mind. His opinion was that "it is difficult to conceive the Egyptians otherwise than incapacitated by their language from profound philosophy" (1884: 60).

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Peirce's own early verdict, ten years after Le Page Renouf's judgment, was still that "the Egyptian language is an excessively rude one" (EP2: 7; 1894). He was also of the opinion that "Egyptian hieroglyphics" was "primitive writing" (CP 2.280; c.1895). This prejudice, together with the claim that alphabetic writing is culturally more advanced and cognitively superior, has had supporters until recently (as discussed by Assmann and Assmann 1990: 9 and Assmann 2015: 115–120).

The high degree of iconicity that Peirce attributed both to spoken and written Ancient Egyptian also fits well together with the widespread theory of the origins of language from iconic signs and gestures, already discussed in Plato's *Cratylus*. Peirce's own remarks on the topic are the following:

> In intercommunication, too, likenesses are quite indispensable. Imagine two men who know no common speech, thrown together remote from the rest of the race. They must communicate; but how are they to do so? By imitative sounds, by imitative gestures, and by pictures. These are three kinds of likenesses. It is true that they will also use other signs, finger-pointings, and the like. But, after all, the likenesses will be the only means of describing the qualities of the things and actions which they have in mind. Rudimentary language, when men first began to talk together, must have largely consisted either in directly imitative words, or in conventional names which they attached to pictures. The Egyptian language is an excessively rude one. It was, as far as we know, the earliest to be written; and the writing is all in pictures. Some of these pictures came to stand for sounds,—letters and syllables. But others stand directly for ideas. They are not nouns; they are not verbs; they are just pictorial ideas. ("What is a sign?" EP2: 6–7; c.1894)

With this remarks on the "rudeness" of Ancient Egyptian right next to remarks on the "rudimentary" *ursprache*, "when men first began to talk together [...] in directly imitative words," Peirce clearly takes up once more the topic of the proximity of the Ancient Egyptian language to the origins of language addressed in 1893. After all, both the adjective "rude" and the noun "rudeness," from Latin *rudis*, connote the idea of 'uncultured.' The idea that the *ursprache* of humans had a vocabulary consisting largely of "directly imitative words" and "conventional names attached to pictures" was widely debated in Peirce's century as the theory of the iconic and indexical origins of human protolanguages (cf., e.g., Koch 2008).

However, the evidence that Peirce gives for the alleged "rudeness" of Ancient Egyptian is not from a vocabulary of "directly imitative" words, i.e., from words of image iconicity, but from the morphology and syntax of the language, i.e., its diagrammatic iconicity, from which he

adduces "strange" examples. When Peirce attributes a "topsy turvy" or an "odd and awkward" structure to the Egyptian language in 1892, he complains about a lack of diagrammatic iconicity in the syntactic structure of this ancient language, which would make the language more transparent. Evidence that diagrammatic order lacks in the Ancient Egyptian language would corroborate Le Page Renouf's claim as to the incapacity of their speakers to develop a "profound philosophy."

Three years later, in c.1895, however, Peirce attributes diagrammatic iconicity to all languages, when he says that there are "logical icons in the syntax of every language," as quoted above from CP 2.280. As early as 1893, Peirce even seems to have given up his complaint about the lack of diagrammatic iconicity in the Egyptian language. One year after his first studies of Egyptian, he already suggests, that the Egyptian way of constructing sentences may even be more natural than the syntactic constructions of the Indo-European languages:

> Now to one who regards a sentence from the Indo-European point of view, it is a puzzle how "which" can possibly serve the purpose in place of "is." Yet nothing is more natural. [….] "Aahmes what we write of is a soldier which what we write of is overthrown," means "Aahmes the soldier is overthrown." Are you on the whole quite sure that this is not the most effective way of analyzing the meaning of a proposition? ("The essence of reasoning," CP 4.49; c.1893)

Whereas in this quote of 1893, Peirce still attributes pictorial thought to the Ancient Egyptians only in an interrogative mood, he is quite affirmative in 1902, when he states that "in Ancient Egyptian, it seems that the pictorial way of thinking, so prominent in the hieroglyphics, was more influential in their thought than it is with us" (L 75). Since pictorial thought was a characteristic of Peirce's own mind, as he declared in autobiographical remarks, his own way of way of thinking may have attracted him to the study of the Ancient Egyptian language. In 1909, Peirce declared, "I do not think I ever reflect in words: I employ visual diagrams, firstly, because this way of thinking is my natural language of self-communion, and secondly, because I am convinced that it is the best system for the purpose" (MS 619; 1909).

Humboldt-Universität zu Berlin
fkammerzell@hotmail.com
aleksandra.lapcic@hu-berlin.de
noeth@uni-kassel.de

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