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THE SCRIPT OF RAPA NUI (EASTER ISLAND) IS LOGOSYLLABIC, THE LANGUAGE IS EAST POLYNESIAN: EVIDENCE FROM CROSS-READINGS

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ABSTRACT: Successful decipherment of forgotten scripts can be demonstrated by cross-readings, in which the same phonetic value for the same sign is independently obtained in at least three different contexts. The Kohau Rongorongo script is a pictorial writing system developed on Rapa Nui (Easter Island) before the arrival of Europeans. The knowledge of the script was lost. Provisional reading values for 20 signs are suggested on the basis of their combinatorial properties, contexts of use and sign imagery. Interpretations for 11 of the signs are confirmed by cross-readings, which reveal that seven of them are logographic and four are syllabic. The implications are that (i) the system is logosyllabic, (ii) the language is East Polynesian and (iii) some phonetic signs are of acrophonic origin.

Keywords: Kohau Rongorongo, Rapa Nui (Easter Island), logosyllabic writing systems, pictorial scripts, decipherment, cross-reading method, Polynesian languages

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> I opened my mouth to my soul that I might answer what he had said: "It is too much for me today for my own soul does not speak in accord with me!"
>
> —Papyrus Berlin 3024

In his 1822 Letter to M. Dacier, Jean-François Champollion presented his decipherment of Egyptian hieroglyphs, marking a turning point in the intellectual history of western world (Champollion 1822). This decipherment provided us direct access to the lives, thoughts and even feelings of people who lived millennia ago, far beyond the cultural competencies of today. Since then scholars have been on the painstaking path of recovering lost scripts and languages. Among the most remarkable achievements are the decipherments, both in 1952, of Maya writing by Yuri Knorozov and of

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Linear B by Michael Ventris, neither of whom had access to bilinguals or biscripts (Knorozov 1952; Ventris and Chadwick 1953). Thanks to these three decipherments, we now know considerably more about people of different places and times across the globe. Such writing systems from past societies, when they can be deciphered, reveal to us worldviews, practices and concerns we might hold in common, but also unique cultural perspectives of the past. These successful decipherments have been possible only because every script encodes messages stemming from a specific spoken language.

Kohau Rongorongo, the indigenous writing system of Rapa Nui (Easter Island), in contrast, has been resistant to decipherment.[1] As a primary script and indeed the only pre-contact writing of Oceania, the information it holds is unique. The hypothesis that it is of post-contact origin (Emory 1968) cannot be sustained in the light of the fact that none of the Rongorongo signs depicts European objects such as ships, knives or hats; the imagery associated with the post-contact birdman cult is also not attested in the script. This observation gives us an *ante quem* date for the origin of the script: the island was discovered by Jacob Roggeveen on Easter Day, 5 April 1722. The fact that the Rongorongo script is unknown anywhere else gives us a *post quem* date: the current estimate for the colonisation of the island is between the late twelfth and early thirteenth centuries AD (DiNapoli *et al*. 2020: 6).

The autochthonous development of the script is also implied by the fact that the name for the indigenous writing system, *kōhau rongorongo*, can be etymologised on the basis of East Polynesian words such as **kaufau* ‘ordered list’, literally, ‘stick with strings’; **kau-* ‘prefix for wooden objects and instruments’; **fau* ‘line, rope’; and **rongorongo* ‘chant, recitation’ (compare with Greenhill and Clark 2011). Herein asterisks indicate linguistic reconstructions of Proto-East Polynesian, from which the Rapanui language of the island descended. These etymologies also suggest that the script was developed from Polynesian mnemonic devices of knots and cords.

The conditions for decipherment of Kohau Rongorongo are relatively favourable (Zender 2017). Firstly, the surviving texts are of considerable length, around 12,500 glyphs in total, and these are found on different types of objects: 20 tablets, one staff, two gorgets, five pendants and a number of figurines (Horley *et al*. 2018). Secondly, the Rapanui language is well documented (e.g., Englert 1978; Kieviet 2016; Roussel 1908; Weber and Weber 1995). Thirdly, Proto-East Polynesian is well reconstructed (Biggs 1978; Clark 1976; Greenhill and Clark 2011; Kirch and Green 2001). Fourthly, ethnographic descriptions and collections of traditional narratives are available for much of Polynesia, including Rapa Nui (Barthel 1974; Campbell 1971; Englert 1948, 2002; Felbermayer 1971; Geisler 1883; Métraux 1940; Paté Tuki *et al.* 1986; Routledge 1919; Thomson 1891). Fifthly, the script is pictorial and thousands of Rapa Nui art objects are

preserved on the island and in the world's museums (e.g., Dederen 2013; Esen-Baur 1989; Heyerdahl 1976; Lee 1992; Orliac and Orliac 2008). Unfortunately, bilinguals (parallel texts in other languages) and biscripts (e.g., parallel texts in Roman characters) are unknown.

WHAT IS A SUCCESSFUL DECIPHERMENT?

The decipherments by Champollion, Knorozov and Ventris paid close attention to the language, script typology, behaviour of signs, contexts, bilinguals and script-external constraints. Although it is not acknowledged, sign imagery played an important role in all three. All three were based on contextual guesses. Yuri Knorozov (1956) was, however, also able to formulate the method of cross-readings, which allows us to verify suggested reading values of signs.

His paradigmatic example was that of three sign groups in Maya codices: signs A-B associated with the image of a dog, C-A found above the image of a turkey and D-B-C attested in the position where the number 11 is expected. Herein hyphens "-" indicate ligatures (several signs written as connected) and capital letters show equivalencies for the signs under discussion: A stands for one sign, B for another, etc. One of the Mayan words for 'dog (a variety)' is *tzul*, one for '(wild) turkey' is *kutz* and 'eleven' is *b'uluk* (Barrera Vásquez 1980). Thus A-B = 'dog' = *tzul*, C-A = 'turkey' = *kutz*, and D-B-C = 'eleven' = *b'uluk*. We assume that each sign bears the same reading value in all three contexts. Therefore, we can deduce that A is **tzu**, B is **lu** and C is **ku**. We can also see that the vowel of the last syllabic sign in the spelling is not read but echoes the vowel of the root. This vowel is not read because otherwise we would have *tzulu*, but in Maya it is *tzul* (also *kutzu* and *b'uluku* instead of *kutz* and *b'uluk*). We can see that all syllabic signs in Maya writing are of the "consonant-vowel" type and can also deduce the reading **b'u** for the sign D. However, in this example D is so "damaged" that it cannot be readily recognised and furthermore its reading value would not have been confirmed by independent contexts. In this paper, a spelling is a group of signs intended to be read as one phonological word.

Statistically, it is unlikely that three signs would have acquired corresponding reading values in three independent contexts by chance and, thus, the identified reading values can be considered verified. Three sign groups exclude alternative interpretations such as *pek'* 'dog (generic)' and *tzo'* '(domestic) turkey' (Barrera Vásquez 1980). These readings leave no doubt that the language of the script is Mayan and that some of the system's signs are syllabic.

It is generally accepted that Knorozov was guided by the Diego de Landa alphabet in his work, although Knorozov himself commented that Landa's data was of secondary importance. In any scenario, the decipherment of Maya writing was possible without Landa's help, as the above cross-readings illustrate (see Stuart 1987).

In this paper, the reading value of a sign is considered as identified if and only if it is supported by three or more independent contexts, one of which can be the sign imagery. If a reading is supported by only one or two contexts it is considered provisional, no matter how plausible the suggestion appears: this is indicated by question marks after reading values.

WHAT IS A PICTORIAL LOGOSYLLABIC WRITING SYSTEM?

Known writing systems show comparable structures and follow similar patterns (Friedrich 1954; Gelb 1963; Knorozov 1952: 109). Three major types are attested: logosyllabic, syllabic and alphabetical. All allow the scribe to encode any message in the target language for which the script was developed.

Script Typology

We can assume that the language of the script is an ancestral form of Rapanui. We can also assume that Kohau Rongorongo is a logosyllabic writing system because the number of signs seems to be significantly larger than the number of syllables in Rapanui (Aalto 1945; see also Champollion 1824: 266–67): 54 in total if we do not differentiate between short and long vowels, 107 if we do (but see below). The exact number of individual signs is impossible to know because of complex ligatures and many graphic variants, but context-based graphological studies (e.g., Davletshin 2017) suggest that the number is larger than has been expected. I count at least 35 signs depicting fish and fishing gear and 12 signs depicting other sea creatures (allographs and ligatures are excluded). Yet the majority of the signs have nothing to do with the sea.

It was proposed that anthropomorphic figures can be split into meaningful elements such as heads, arms and legs and the number of signs can be reduced to 52 (Pozdniakov 2019: 405). This proposal violates the sign imagery and disrupts some discernible grammatical patterns (see comments on reduplications and preposed verbal markers below). Importantly, most signs—among them those depicting marine creatures and plants—cannot be split.

Logosyllabic writing systems possess at least three functional types of signs: syllabograms (those that indicate abstract sequences of sounds), logographs (those that indicate lexical words, both their meaning and sound) and notational signs (related symbols developed for structured communication within a domain of knowledge such as numerals and tamgas). Logographs are also called word-signs, while syllabograms are sometimes referred to as phonetic or syllabic signs. These record syllables CV (in some systems VC, CVC, or Cx). Herein C stands for a consonant, V for a vowel, and x for an unspecified vowel. Some logosyllabic writing systems, such as Chinese and Egyptian (but not Maya), also possess determinatives that do not transmit phonetic values but indicate the semantic class of the written word.

No writing systems distinguish between short and long vowels in sign inventory, although some indicate vowel complexity by other means, such

as the contemporary diacritical marks in Hawaiian, double vowels in Finnish and disharmonic spellings in Maya writing. Most writing systems use some kind of graphic device to indicate linguistic boundaries and units of speech, for example, ligatures separated by blank spaces, compositional groups and punctuation signs.

Transliteration and Transcription

In this paper, phonetic reading values of signs (transliterations) are in boldface, word-signs are in all caps, and syllabic signs are in lowercase (following Fox and Justeson 1984). Intended pronunciation of spellings (transcriptions) are given in italics and translations in single quotation marks. If necessary, lexical readings of logographs are in all caps in English. Thus, the sign depicting a jaguar head in the Maya script is transliterated as **B'ALAM** JAGUAR and transcribed as *b'ahlam* 'jaguar', which can be also written by means of syllabic signs as **b'a-la-ma**.

As a single graphic design can be associated with several reading values, one should rely on the context. For example, in English (following IPA notation) "i" can be read as *aɪ* in "kite", *ɪ* in "bit" and *fɜ:st* in "first". Such signs are called polyvalent. A few polyvalent signs are attested in all writing systems, such as the "Stone" sign in the Maya script, which is read both **TUN** STONE and **ku**. However, in some logosyllabic scripts polyvalent signs are especially common (e.g., those of Chinese and Nahuatl).

Variability of Spellings

Writing systems optionally use phonetic signs to clarify values of logographs, indicating and at least partially reiterating their reading. For example in English, *fɜ:st* can be read from both "1st" and "1"; similarly, Mayan spellings **B'ALAM**, **B'ALAM-ma** and **B'ALAM-la-ma** all are read *b'ahlam*. Such mute phonetic signs are called phonetic complements or indicators; they are quite common in logosyllabic scripts and can be employed with logographs that possess only one reading value.

A logograph can be used for the phonetic reading of the word it spells: the Mayan sign **YAL**, for example, depicts a hand holding something but is read as both *yal-* 'place, set away' and *y-al* 'her son'. This writing principle, in Chinese, is known as borrowed reading.

Phonetic complements and syllabic spellings result in considerable variability of writing: **B'ALAM**, **B'ALAM-ma**, **B'ALAM-la-ma** and **b'a-la-ma** are read in the same way. Another source of variation are allographs, which are incomparable graphic designs with the same reading value, e.g., English "A" and "a". Allography can be productive: Tablet of the 96 Hieroglyphs from the Maya city of Palenque shows nine different syllabic signs **'u** and five different logographs **'AJAW** LORD.

Pictoriality

In pictorial scripts such as Hieroglyphic Luwian and Maya, signs are recognisable images of objects and actions to which reading values are assigned. Here I use descriptive nicknames to identify graphic designs and these are given in double quotation marks. The nickname "Bird" does not mean that the sign is read as BIRD, only that it depicts one. When a depicted object cannot be identified, the nickname is arbitrary and is indicated by an asterisk, e.g., "*Staff". A question mark indicates that iconographic interpretation is likely but not 100 percent certain, e.g., "?Fish Gills".

Phonetic signs can derive their readings from the initial syllable of the name for the objects they depict by the process known as acrophony, e.g., the "Fish" sign in Maya writing is read **ka**, compare with *kay* 'fish' (see also Valério and Ferrara 2019). Logographs tend to be iconically related to the words they transmit, e.g., the "Dog Head" sign is read **TZ'I'**, compare with *tz'i'* 'dog'. Nevertheless, some graphic designs are abstract and some are pictorial but bear no connection to their reading values (e.g., "*Quincunx" **b'i**, "*Bar" 'five' and "Stone" **ku**, which have no related words in Mayan languages).[2]

BASIC FACTS AND REFERENCES TO CONTEXTS

Eugène Eyraud (1866) was the first to report the indigenous script on Rapa Nui. We now know that the texts are read in double boustrophedon, starting from the bottom left corner where the signs stand upright proceeding to right; upon reaching the end of the line the object is rotated upside-down and the text continues with the next line, which becomes the second from the top; then the object is rotated again (Jaussen 1893: 14; Thomson 1891: 516). This reading order can be demonstrated thanks to parallel texts and passages when they pass from one line to another (Kudrjavcev 1949). The script is unique among the world's writing systems in that the signs depicting humans and birds do not face the reader but rather face the direction of reading.

Glyphs are writing units separated by spaces, both ligatures and individual signs. Ligatures consist of two to five signs without blank spaces between them. They can result in an altered reading order and are created by different means: (i) connected writing of two or more signs, (ii) use of a linking line, (iii) superimposition, (iv) conflation and (v) stacking of signs on top of one another with an empty space between them.

Herein the capital letters refer to Thomas Barthel's designations of the texts (Barthel 1958; see also Fischer 1997):

A: Tahua Tablet
B: Aruku Kurenga Tablet
C: Mamari Tablet
D: Échancrée Tablet
E: Keiti Tablet
G: Small Santiago Tablet
H: Large Santiago Tablet
I: Santiago Staff

K: London Tablet
L: Small London Reimiro Gorget
N: Small Vienna Tablet
P: Large St Petersburg Tablet
Q: Small St Petersburg Tablet
R: Small Washington Tablet
S: Large Washington Tablet
T: Honolulu Tablet 3629
Y: Paris Snuffbox

Lowercase letters "r" and "v" stand for the front and back sides, recto and verso; when the beginning of the text cannot be identified, conventional lowercase letters "a" and "b" are used to differentiate between the sides. Lines on Santiago Staff (I) are given after Paul Horley (2011). Numbers following lowercase letters indicate the corresponding line, and numbers following the colon sign ":" refer to the corresponding glyph, counting from the beginning of the line where the sign in question occurs. The multiplication sign "×" indicates substitutions in parallel texts. For example, Pr3:4 × Qr2:42 means that a sign found in position 4 of line 3 on the recto of Large St Petersburg Tablet and a sign found in position 42 of line 2 on the recto of Small St Petersburg Tablet substitute for each other.

THE SIGN AS A SOURCE OF READINGS

The behaviour of a sign makes it possible to determine whether it is a syllable or a logograph (e.g., Stuart 1995: 47–48). Syllabic signs function in combination with other signs because they do not bear meaning on their own; in contrast, logographs can be used in isolation. Grammatical markers are written with syllabic signs on the edges of words, which can paradigmatically alternate with each other and zero. Numerical signs are composite. Semantic determinatives can be recognised as "classifying" signs located on either the left or right edge of spellings. Punctuation marks segment the text into fragments of approximately equal length.

Combinatorial Properties of Signs

Many ABAB sign sequences are attested in Rongorongo texts; a few AAAA and AAA sequences are also found (Fig. 1a–b). Phrases such as 'fish, fish, fish, fish' and 'man, man, man' do not make sense in any language (Davletshin 2012a). Importantly, such sequences resemble complete reduplications, extremely productive in Polynesian languages: the process is used to indicate intensity of action, reciprocals, frequentatives and derived adjectives, e.g., Rapanui *nui-nui* 'big (singular)', *hatu-hatu* 'fold, plait', *kā-kaka* 'fibre at base of banana stem' and *kiki-kiki* 'convulsions' (Davletshin 2016a: 354). Occasionally, a phrase can be repeated, and very rarely a phrase is a bare root without grammatical particles in Polynesian languages. Isolated ABAB sequences can also result from rhetorical repetitions (see below),

but if the sign A is attested in several ABAB and BABA combinations we can assume that it bears a syllabic value (see phonetic complements, substitutions and grammatical markers below). Such signs tend to be used not in isolation but as part of sign groups, and this is expected of syllables. Numerous ABAB and AAA sequences indicate that the language of the script is Polynesian. Pre-contact East Polynesian languages did not tolerate closed syllables of the type CVC (see Greenhill and Clark 2011). Therefore, the expected shape of Rongorongo syllabograms is **CV**, where C can be any consonant including zero.[3]

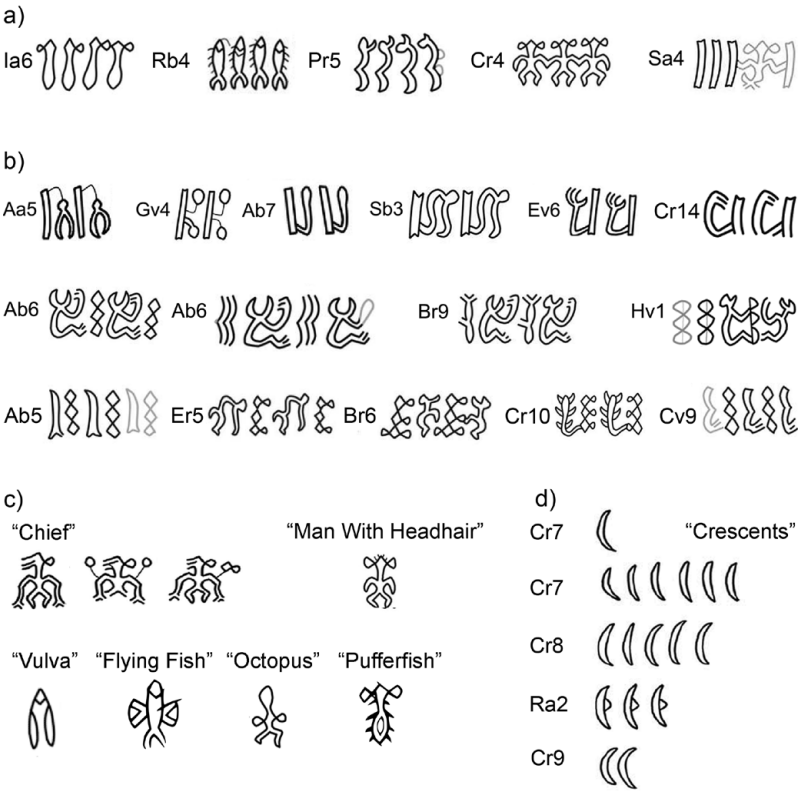

Figure 1. Combinatorial properties of Rongorongo signs: (a) AAAA and AAA sequences; (b) ABAB and BABA sequences of the signs "*Staff", "Sitting Man" and "*Diamonds" (see more examples in Davletshin 2019: 410, 414); (c) signs used in isolation; d) multiplication of semicircles. Based on Paul Horley's drawings. Used with his permission.

Some frequent signs do not form ABAB sequences (Davletshin 2016b). They tend to be used in isolation, and some of them are restricted to certain groups of Rongorongo texts (Fig. 1c). We can assume that such signs are logographs (see phonetic complements and substitutions below). Basic canonical structures of Polynesian roots are CVCV and CVCVCV, where C can be a zero consonant and two identical vowels surface as a long vowel. Accordingly, the expected phonetic shapes of logographs are **CVCV** and **CVCVCV**.

The "Crescent" sign differs in behaviour from both logographs and phonetic signs (Davletshin 2012b). It forms multiple combinations: "Two Crescents", "Three Crescents", "Five Crescents" and "Six Crescents" (Fig. 1d).[4] We can assume that these sequences represent basic numerals because neither syllables nor lexical roots make sense when repeated two to six times in nearly identical contexts and because they structurally resemble numerals in other writing systems. In most occurrences, the "Crescent" sign is not multiplied. "One Crescent" is omitted in parallel texts in a few examples. This observation supports the interpretation that these are basic numerals because 'one', *e tahi*, can be used as an indefinite article in Polynesian languages (see phonetic complements for numerals below).[5] No examples of probable determinatives have been located in Kohau Rongorongo.

Substitution Method

This method involves examining changes in the writing of the presumed same unit of speech in identical contexts, where the surroundings imply the same reading value of the signs in question (Knorozov 1952: 116; Lounsbury 1984). If two signs systematically substitute for each other in parallel texts, we can assume that their reading values are equivalent. If two similar but slightly different graphic designs do not substitute for each other as expected we can assume that they encode different reading values (Davletshin 2017: 70). Sometimes two signs substitute only in some particular contexts; such incomplete substitutions imply similar but not identical reading values of the two signs. Examples of incomplete substitutions in Maya writing are ONE and TWO as numerals, RED and BLACK as signs for colour terms, **xa** and **xi** as syllabic signs that share the consonant, etc. Absolute synonyms, which are interchangeable in all contexts, do not exist in natural languages, and this is why synonymous words follow patterns of incomplete substitution.

A fragment of Kudrjavcev's collations (Fig. 2) shows both consistency and variability in Rongorongo writing: a few signs are omitted in parallel texts or transposed. Remarkably, parallel texts demonstrate considerable consistency in the use of ligatures, although the type of ligature can vary (see above). Probable phonetic complements tend to be written in ligatures with their host logographs (see below). In ABAB sequences, A and B tend to be written together, indicating the unity of lexical roots (Fig. 1b). Certain signs

Figure 2. Fragment of Kudrjavcev's collations. An interlinear comparison of Line 1, verso on Large St Petersburg Tablet (P) with parallels on Large Santiago Tablet (H) and Small St Petersburg Tablet (Q). Arrows indicate signs omitted in parallel texts; asterisks, significant graphic variations; and exclamation marks, different ligature compositions. Based on Paul Horley's drawings. Used with his permission.

which tend to appear before or after reduplications may spell grammatical particles; these tend to be written in ligatures with reduplications. While ligatures seem to be significant, their absence is not. These observations imply that ligatures mark prosodic groups of single primary stress because lexical roots and every member of a complete reduplication receives stress in Rapanui while grammatical particles are unstressed (Davletshin 2021c).

Rongorongo texts provide us with many opportunities for the study of substitutions. These include i) two lengthy parallel texts, one attested in three copies, H × P × Q (Kudrjavcev 1949), and the other in two, Gr × K (Butinov and Knorozov 1956), (ii) several lists (Butinov and Knorozov 1956), (iii) sign groups shared between texts (Butinov and Knorozov 1956; Horley 2007; Pozdniakov 1996), (iv) a genealogy (Butinov and Knorozov 1956) and (v) other structured texts (Guy 1982).

Three major patterns of substitution have been located (Fig. 3a–c): (i) two signs substitute for each other indicating that two are allographs with the same reading value, (ii) a presumed logograph substitutes for two presumably phonetic signs and (iii) a presumed logograph substitutes for itself in combination with a presumably syllabic sign, indicating that the last one functions as a phonetic complement.

We can see from Figure 3 the following sign substitutions:

(i) "A Kind of Fish" substitutes for "Pufferfish", "?Fish Gills" for "Hatched Staff", "Blenny Fish" for "Seal";

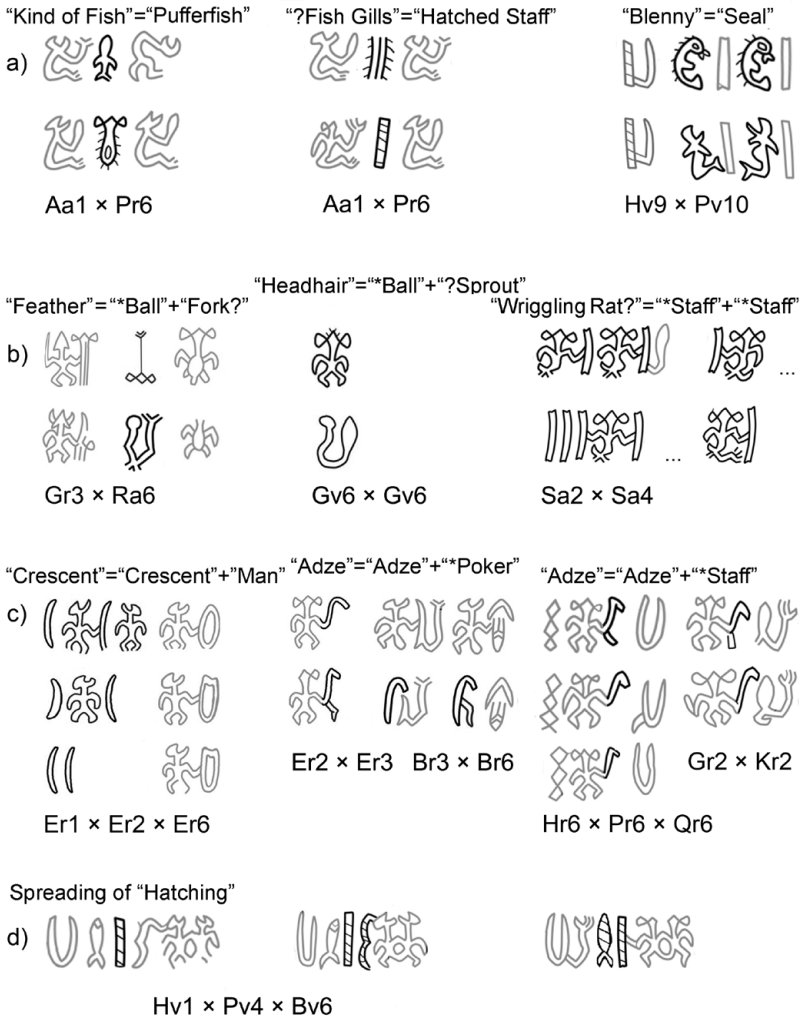

Figure 3. Substitution patterns: (a) two signs substitute for each other; (b) one sign substitutes for two other signs; (c) one sign substitutes for its combination with another sign; (d) spreading of "Hatching" on adjacent signs in parallel texts (for more examples of a, c and d see Davletshin 2017: 75; 2012b: 262–63; 2021b: 119). Based on Paul Horley's drawings. Used with his permission.

(ii) "Feather" for "*Ball on Stalk" and "?Fork", "Man with Headhair" for "*Ball on Stalk" and "?Sprout", "Wriggling Rat" for "*Staff " and "*Staff "; and
(iii) "Crescent" for "Crescent" and "Man with Open Mouth", "Adze" for "Adze" and "*Poker" and for "Adze" and "*Staff ", "Wriggling Rat" for "*Staff " and "Wriggling Rat" and for "Wriggling Rat" and "*Staff ".

Various equations are possible on the basis of the examples, such as the dissyllabic logographs "Feather" and "Headhair", which may share one syllable (but see below). It should be stressed that a substitution attested only in a few examples may be incomplete or deceptive (e.g., due to a scribal error). The "Adze" sign depicts a hafted adze known from the rock art of Rapa Nui (Lee 1992: 117). Intriguingly, it seems to be complemented with "*Poker" in some contexts and with "*Staff" in some others. We might assume that "*Staff" and "*Poker" are different variants of the same sign, but "*Staff" does not substitute for "*Poker" in other contexts. A possible solution is that "Adze" is a polyvalent sign with the values CUT, HEW? and ADZE? and that the phonetic complements "*Poker" and "*Staff" disambiguate the reading.

The sign "Crescent" ONE? **TAHI?** optionally substitutes for the sign group "Crescent-Man with Open Mouth" in one context on Keiti Tablet (7 times where 18 "Crescents" are found in total). These examples can be understood as phonetic complements aimed at avoiding confusion between two words spelt by "Crescent-Crescent"—*tahi-tahi* 'shave, carve wood' and *rua* 'two'.[6] The implication is that "Man with Open Mouth" bears the reading value **hi?** in this context. Thirty-nine "Adze" signs are found between the "Crescent" groups on Keiti, supporting the interpretation *tahi-tahi* 'carve wood'.[7]

Another pattern of substitution is the spreading of "Hatching" on adjacent signs in parallel texts (Fig. 3d). Hatching behaves as a logograph, all hatched signs have plain equivalents, hatched and non-hatched signs show different distribution in texts, hatched signs are less frequent than their plain equivalents and only a part of a sign can be hatched. Similar behaviour and imagery are observed in the word-signs for colour terms in the Maya and Nahuatl scripts. Epigraphic and iconographic data suggest that the basic form of "Hatching" is "Hatched Staff" and that its reading value is RED? (see more in Davletshin 2021b).

Sign Imagery

Iconographic interpretations of some Rongorongo signs is possible only due to parallels in Rapanui art.[8] Three kinds of evidence are of importance (Fig. 4a). Firstly, variations can give us a clue, such as the designs "Frigatebird" and "Tern", which are used interchangeably and thus likely

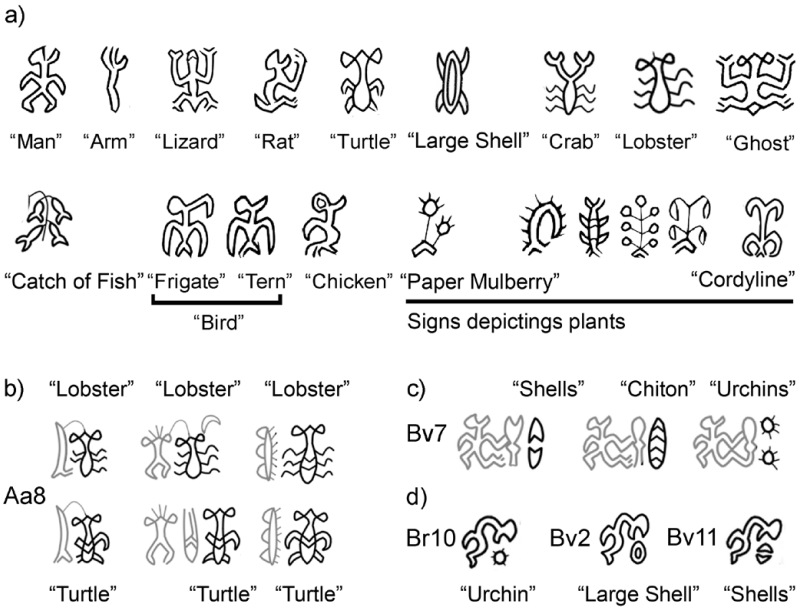

Figure 4. Sign imagery: (a) graphic designs with satisfactory interpretations; (b) "catching lobsters and turtles" sequence; c) "gathering seafood" sequence; (d) ligatures of the sign "?Nestling" with shellfish signs. Based on Paul Horley's drawings. Used with his permission.

refer to a generic term for "Bird". Secondly, graphic elements shared by signs tend to have the same referent, for example roots and leaves being similarly depicted in various plant signs. Thirdly, logical reasoning is more effective than visual resemblance: (i) an "Animal with Legs and a Tail", which is different from "Lizard", corresponds to "Rat" because this was the only mammal on the island, (ii) the sign depicting a "Bird" not "Flying" but "Walking" is "Chicken", (iii) the "Crab without Claws" is "Lobster", etc.

Full faces of living beings show two bulbs on the sides of the head. We might interpret such bulbs as ears in the signs for humans, but as they are also attested in the images of turtles, lobsters and pufferfish, a better interpretation is that they depict eyes. This example illustrates that iconographic interpretations are subject to revision in light of new comparisons and arguments for particular interpretations.

We can see from Figure 3a that the signs "Pufferfish" and "A Kind of Fish" are allographs and thus they may refer to the same species (for more examples of this type see Davletshin 2017: 75). The "Pufferfish" (Tetraodontidae) can be identified thanks to the eyes, spikes and hollow space inside the roundish body: this interpretation is supported by the allograph "A Kind of Fish". The last sign may depict a boxfish (Ostraciidae) because box-, puffer- and porcupinefish can be labelled with a single term in Polynesian zoological taxonomies (see the cognates of **sue* 'globefish' in Greenhill and Clark 2011). Alternatively, the sign might depict a pufferfish that is not inflated. This example demonstrates how the substitution method and iconographic analysis can corroborate one another.

Similarly, "Hatched Staff" RED? substitutes for "?Fish Gills"; notably *mea* means both 'red' and 'fish gills' in Rapanui and many other Polynesian languages. This match allows us to assign the provisional reading **MEA?** to both signs.

A structured sequence of signs is attested on Tahua Tablet (Fig. 4b).

A-B-**C** D-B-**C** E F-G **C**,
A-B-**H** D-I-**H** F-G **H**

The sign C and H are related to each other in the sequence: if something happens to C in the first part of the sequence it also happens to H in the second one. The sign C depicts a "Lobster" with two eyes, six or more legs and the roundish body of living creatures. The sign H depicts a "Turtle" with two eyes and four flippers, lying on its back (see similar images in rock art and on wooden figurines in Lee 1992: 84–85 and Heyerdahl 1976: plate 131). The sign B is a ligature version of the sign "Catch of Fish" which depicts fish strung on a cord and is attested in other contexts, also preceding the signs "Large Shell", "Urchins" and "Lobster" (Sb6:12–19; Ra4:13–16; see Fig. 4a).

The signs "Lobster" and "Turtle" function as logographs, and logographs tend to be iconically related to the words they transmit. We can assume that the passage under discussion is about catching lobsters and turtles. A sign depicting a turtle may bear no relation to the word 'turtle', but the parallel use of the two logographs "Lobster" and "Turtle" does not seem to be a coincidence and allows us to assign the provisional reading values LOBSTER? and TURTLE? to the signs.

The same logic can be applied to the sequence A-B-C D, A-B-C E, A-B-C F, where D is "Shells", E is a "Chiton" and F is "Two Urchins" (Fig. 4c). These three signs are logographs according to their combinatorial properties, and each depicts a kind of shellfish consumed on Rapa Nui (for similar urchins in rock art see Lee 1992: 81). We can assume that these passages are about gathering seafood and assign the provisional readings SHELL?, CHITON? and URCHIN? to the signs. The fact that the signs "Urchin", "Large Shell"

and "Shell" are attested in ligatures with the sign "Long-Necked ?Nestling" also suggests that they encode similar species (Fig. 4d). In these ligatures, the sign "Two Urchins" appears as "One Urchin", while the sign "Large Shell" preserves its double outlines, indicating that the object is hollow but loses characteristic spikes (which may depict tentacles of the shellfish). The sign "Urchins" depicts an edible variety with short spikes, Rapanui *vana* (author's fieldwork data).

The signs "Blenny Fish" and "Seal" follow a different pattern. They substitute for each other and thus bear the same value, and both are syllabic (Fig. 3a; see also Db1:4–5). "Seal" is similar to the rock art motif for seals (*Hydrurga leptonyx*), with two short forefins, a gaping mouth and an undulating body (Lee 1992: 96–97). "Blenny" depicts a spiky, hump-backed, pot-bellied fish with a large mouth that resembles blennies and gobies (Blenniidae and Gobiidae). It was occasionally carved in wood (Horley and Lee 2012: 16). The Rapanui word for 'seal' is *pākia*, while 'blennies' and 'gobies' are *pātuki* and *pāroko* (Randall and Cea 2011: 110–16). This observation suggests the phonetic reading **pa?** for both signs.

THE TEXT AS A SOURCE OF READINGS

The structure of a text and the object on which it is found can give us clues as to its content (e.g., Friedrich 1954: 126; Houston *et al*. 1989). For example, we expect to find the name of the deceased written on their tomb slab and the value of a coin on one or more of its surfaces.

Butinov and Knorozov's Genealogy

A sequence of signs on Small Santiago Tablet was interpreted by Nikolai Butinov and Yuri Knorozov (1956) as a genealogy (Fig. 5).

A	B	C D-E?
A	F	D G-E
A	D?	H-E
A	H	I-E
A	I	J-K-E
A	J-K	L-M-E
N-O	L-M	...

This sequence resembles Rapanui genealogies, where personal names include patronymics: D? (who is) H's son, H (who is) I's son, I (who is) J-K's son, and so on. Let us compare this passage with the genealogy of the paramount chiefs in the Estevan Atan Manuscript (Heyerdahl and Ferdon 1965: 415, fig. 123). Note that glottal stops and macrons have been inserted in the right-hand list.

ko hotu matua a taana harai	Hotu Matu‘a, Ta‘ana Harai’s son
ko tuu ma heke a hotu matua	Tu‘u Mā Heke, Hotu Matu‘a’s son
ko miru a tuu ma heke	Miru, Tu‘u Mā Heke’s son
ko ataranga a miru	‘Ataranga, Miru’s son
ko ihu a ataranga	Ihu, ‘Ataranga’s son

Three important observations can be deduced from this comparison (Davletshin 2012a). Firstly, the genealogy on Small Santiago Tablet is written in reverse order, ascending to the lineage founder. Secondly, we need to assume that the possessive particle *a*, which introduces patronymics, is underrepresented either in the script or in the original oral text. The last pattern can be seen in the Kumulipo, the Hawaiian creation chant (Beckwith 1951: 108, 205–6).

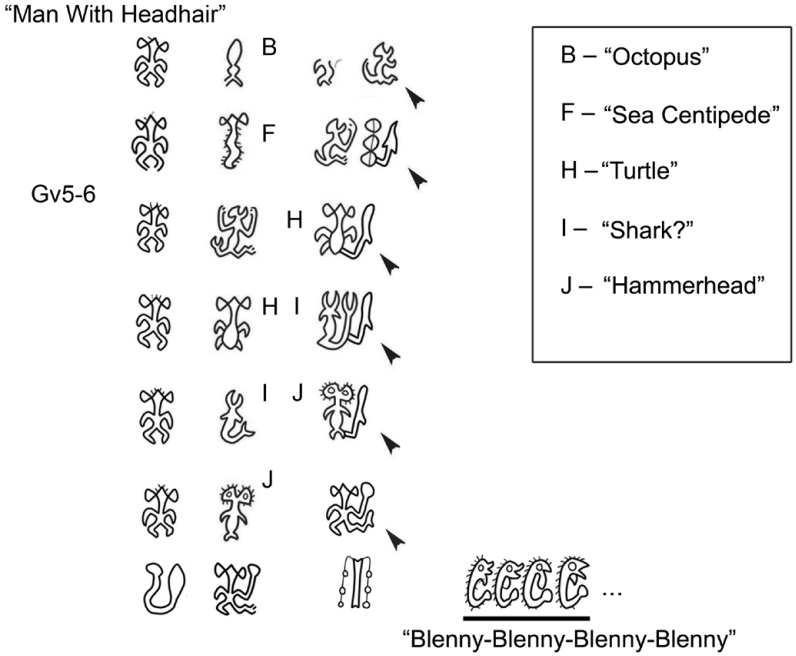

Figure 5. Butinov and Knorozov’s genealogy on Small Santiago Tablet (G). Rearranged. Arrows indicate the “Cane” sign. Based on Paul Horley’s drawings. Used with his permission.

Thirdly, the sign E "Cane" corresponds to the preposed prominence marker *ko*, which marks noun phrases in lists, appositions and isolation, in both Rapanui and other Polynesian languages (Clark 1976: 46; Kieviet 2016: 214). The "Cane" sign is occasionally depicted hollow and with roots (Gr2:10) and attested as part of AAA and ABAB sequences (Br10:7–9, Hr9:19–20, Ia4:102–3, Pr8:47–48). It may be of acrophonic origin, compare with **kohe* 'bamboo' and Rapanui *kohe* 'a kind of plant (esoteric name)'. Uneasily, the sign is attached to preceding names in most examples, but this might be explained by the prosody because grammatical particles do not bear primary stress (see above). The interpretation of E as a semantic determinative of personal names is problematic because it implies that personal names are practically absent in the texts, other than those found on Small Santiago Tablet (on verso), Santiago Staff and Honolulu Tablet T. Otherwise, we would have seen the sign in nearly every sentence in all the texts.

The logograph A depicts a "Man with Headhair". It appears after the "Cane" sign, in the same position where presumed titles are found in two lists of personal names (see below). The title "Headhair" seems to be written syllabically as "*Ball on Stalk-?Sprout" in the founder's name. This substitution is, however, uncertain because the founder might have been qualified with a different epithet.

Five signs in Butinov and Knorozov's genealogy depict marine creatures—"Octopus", "Sea Centipede (Nereididae)", "Turtle", "Shark?" and "Hammerhead".[9] The bestiary does not look like a coincidence: all species are atypical members of the taxon *ika* 'fish (generic)', which in some Polynesian languages includes marine mammals, turtles, sharks and octopuses (see Greenhill and Clark 2011). Genealogies of supernatural beings, marine creatures, birds, plants and rocks are characteristic of Polynesian traditions (Beckwith 1951: 55). According to Aotearoa New Zealand's Arawa people, for example, Punga 'Lump' gave birth to Ika-Tere 'Swimming Fish', father of all fish species, and Tū-te-wehiwehi 'Fear and Awe', father of all reptiles (Orbell 1995: 144). Butinov and Knorozov's genealogy probably belongs to this genre of text.

It is remarkable in this respect that a series of groups with the "Cane" sign on the same tablet is marked by a plant sign (Gv1:2–19, seven examples in total). Roger Fischer (1995) arrived at a close interpretation of the text based on different arguments: he compared repetitive triads of signs with the formula for creation chants, assumed that grammar particles are not represented and analysed "Cane" as "Phallus" meaning 'copulate'.

Four positions in the genealogy are filled in with the signs that do not bear resemblance to the inhabitants of the sea, but they are sign groups and, thus, might spell animal names syllabically. If the proposed interpretation is correct, ANCESTOR? and DEITY? might be the reading value of the "Man with Headhair" sign.

Lists of Personal Names

The "Cane" sign shows remarkable distribution: it is mostly attested in three texts, which cover about 90 per cent of the sign's occurrences: Santiago Staff, Honolulu Tablet T and Small Santiago Tablet, verso. These texts are lists where the groups of three glyphs are regularly separated by the "Cane" sign (Fig. 6a). Knorozov interpreted this sign as a patronymic suffix and suggested that the text on Santiago Staff is a record of personal names, probably a list of births (pers. comm., in Fedorova 1997; see also Fedorova 1982: 56–60; Guy 1998: 554).

There is another way to arrive at the interpretation that Santiago Staff is a record of personal names. Some 600 sequences of three glyphs are found in the text. These sequences are unique, and a considerable number

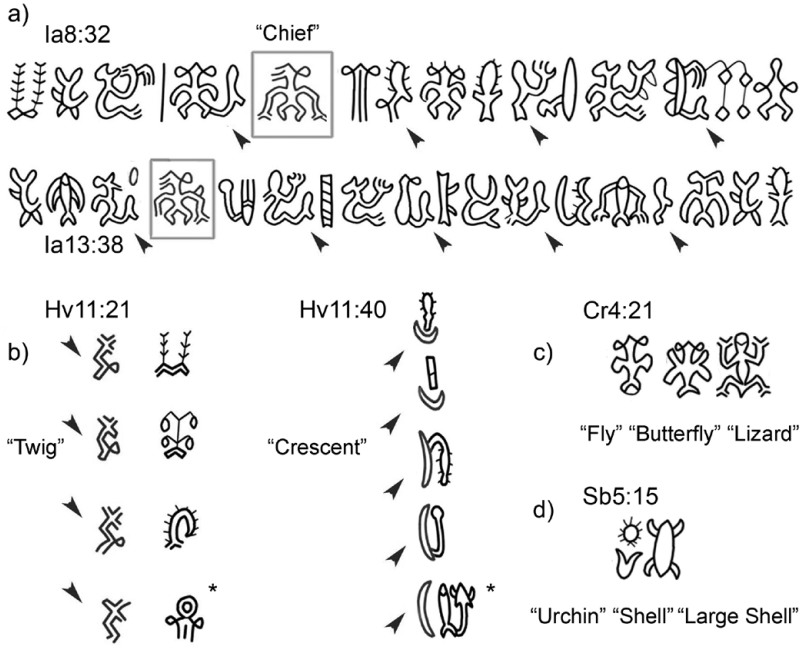

Figure 6. Lexical lists: (a) two text fragments from Santiago Staff (I); (b) two lists of plants on Large Santiago Tablet (H); (c) a short list of small animals on Mamari Tablet (C); (d) a short list of shellfish on Large Washington Tablet (S). The sign "Chief" is marked with frames. Arrows indicate "Cane", "Twig" and "Crescent". Asterisks indicate ligatures in the lists of plants. Based on Paul Horley's drawings, rearranged. Used with his permission.

of the signs are not attested anywhere else. It is hard to imagine a set of so many homogeneous items as anything other than personal names—a list of place names of this length is rather unexpected for the relatively small island. It is not a genealogy because the characteristic linking pattern is absent. The heterogeneity of the items and titles and the fact that there are few repetitions speak against a creation chant, as previously suggested by Fischer (1995, 2010). A list of either subjects or taxpayers seems a more plausible interpretation.

Interpretation of the texts on Santiago Staff and Honolulu Tablet as lists of personal names supports the interpretation of the genealogy on Small Santiago Tablet discussed above, as the three texts show a similar distribution of the "Cane" sign.

Certain signs and sign groups of two or three signs are frequently attested on Santiago Staff and Honolulu Tablet T in the position that corresponds to the "Headhair" sign in Butinov and Knorozov's genealogy. If we interpret these texts as name lists we need to assume that these recurrent signs are titles (Davletshin 2012a).[10]

The most frequent of the titles is found 98 times in two texts and is extremely rare in the other texts. It is used in isolation and depicts a man in a feather headdress, sitting and touching the ground with his hands. In some examples, feather standards are featured behind the man's shoulders and one or two spherical objects are attached to his arms (Fig. 1c). It is known that large headdresses of black feathers were worn by chiefs as insignia of their office and that the chief was "hung round both back and front with little wooden pendants, which jingled as he walked" (Loti 2006: 99; Routledge 1919: 241; Thomson 1891: plate LV). We can tentatively identify the sign under discussion as a logograph CHIEF? **'ARIKI?** It may be surprising to see so many chiefs attested, but it is known that members of several chiefly lineages and all men of the chiefly clan Miru enjoyed the title.[11]

Enumerations of Similar Objects

Two lists of plant signs (with roots and leaves) are attested on Large Santiago Tablet: the "Twig" sign appears before each plant sign in one of them and "Crescent" in the other (Fig. 6b).[12] A sequence of the signs "Fly", "Butterfly" and "Lizard" (Fig. 6c) reminds us that lizards can be grouped together with insects in Polynesian taxonomies and that these species are considered embodiments of spirits in some Polynesian societies (Clerk 1981: 289). The signs "Fly" and "Butterfly" here depict living creatures with roundish bodies and two eyes, one featuring two wings and the other four. Another short list is a sequence of the shellfish signs "Urchin", "Shell" and "Large Shell", in which "Urchins" and "Shells" are written in ligature as "One Urchin and One Shell" (Fig. 6d). In four lists, the signs are used in isolation

and function as logographs (except for two items in the plant lists written using two signs each). It is unlikely that such sequences of signs depicting homogeneous objects occur purely by chance, and therefore the word-signs under discussion should be read 'such-and-such plant' and 'such-and-such animal' (Davletshin 2012b: 258–59).

Similar "lexical" lists abound in traditional texts of Polynesia, either as characteristic stylistic devices in historical and mythological narratives or as didactic texts (e.g., Barthel 1974: 324; Malo 1903). I give two examples from the Estevan Atan Manuscript—a list of names for rain and banana (Heyerdahl and Ferdon 1965: fig. 131, with emendations).

he ua ua runga	rain—rain from above
he ua he ehu	rain—spray
he ua he verehiva	rain—drizzle
he ua ua kiva	rain—silent rain
he ua ua kura	rain—fine rain
he kapua	mist

he maika he korotea	banana—korotea variety
he maika he pukapuka	banana—pukapuka variety
he maika he hihi	banana—hihi variety
he maika he pia	banana—pia variety
he maika he nahoa	banana—nahoa variety
e rima huru o te maika rapanui	these are five kinds of Rapanui bananas

A manuscript about the settlement of the island, handwritten in the Rapanui language using Roman letters (Manuscript E), was transcribed by Barthel (1974). This includes two lists of plants that the chief Hotu Matuʻa ordered to be brought to Rapa Nui from the homeland. Comparing Figure 6b with Barthel (1974: 359–60) we see the lists are similar. In the second list of the Manuscript E plant names are also introduced by the numeral 'one', and thus two lists in this story appear parallel to the lists of plants on Large Santiago Tablet.

In sum, lists of homogeneous objects indicate that Rongorongo texts belong to Polynesian literary tradition. They also give us hope that quasi-biscripts can be identified in documented oral texts.

Literary Devices

Four tablets show a sequence of signs marking the beginning of the text. We can identify it as an opening formula of the type "once upon a time" and "long ago, in a faraway place" (Fig. 7a). This sequence is also attested in the middle of the tablets, but in such cases the structure of the text before and after the presumed opening sequence significantly differs, implying that some tablets record more than one text (Davletshin 2013; see also Wieczorek 2019).

Rongorongo texts display other structures reminiscent of Polynesian rhetoric devices: repetitions, enumerations, figura etymologica, antimetabole, chiasmus, appositional expansion, elaboration, lexical lists, etc. (examples in Davletshin 2019: 416).

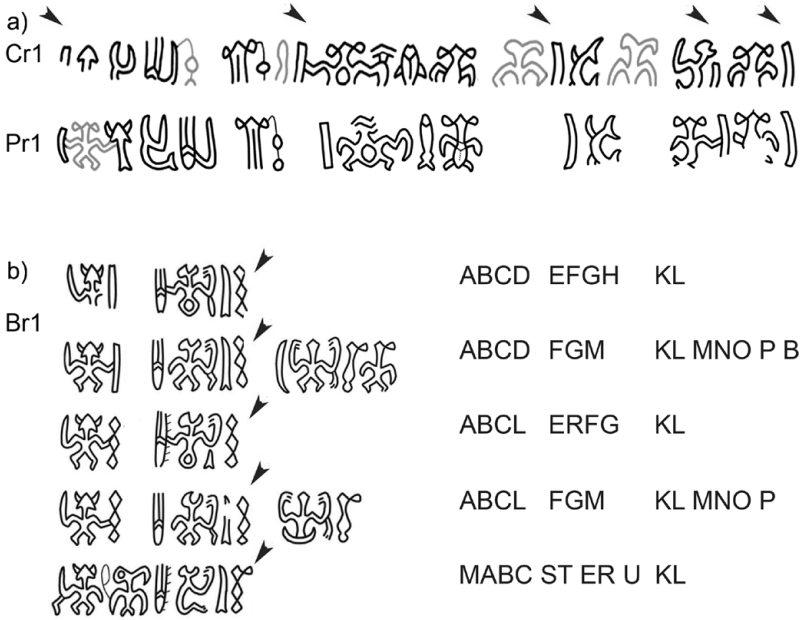

Figure 7. Literary devices in Rongorongo texts: (a) opening sequence (see more examples in Davletshin 2013); b) versified passage on Aruku Kurenga Tablet. Arrows indicate the signs "*Staff" (a) and "*Diamonds" at the end of poetic lines (b). Based on Paul Horley's drawings, rearranged. Used with his permission.

A few versified fragments are found, with lines of regular length, anaphoras and rhymes (Guy 1982; Métraux 1940: 401). I retranscribe the text at the beginning of Aruku Kurenga Tablet below, omitting hyphens to make the structure clearer (Fig. 7b).

ABCD EFGH	K**L**		
ABCD FGM	K**L**	MNO	P B
ABCL ERFG	K**L**		
ABCL FGM	K**L**	MNO	P
MABC ST ER U	K**L**		

The sign L depicts a vertical row of "*Diamonds", whose variants consist of two to four rhomboid elements. In this passage and several others, the "*Diamonds" sign appears at the end of poetic lines. It can be repeated twice or thrice in such contexts (Cr10–12), and this is unexpected of both grammatical markers and lexical roots. The peculiar distribution of the "*Diamonds" sign suggests that it spells a poetic vowel. In West and East Polynesian traditions, the regular poetic vowel is *ē*: it marks the end of stanzas and caesurae of virtually every song, helps with the desired number of syllables and can be repeated two to four times. I give one example from a song about the settlement of Rapa Nui with poetic vowels in boldface (Campbell 1971: 186):

e ʻIra, e Raparenga ***ē***	Oh, ʻIra! Oh, Raparenga!
e Huru o te ʻAte ***ē***	Oh, Huru o te ʻAte!
ka kimi te maʻara ***ē***	Go and find a place to disembark
o Hotu Matuʻa ***ē***	for the chief Hotu Matuʻa
o Avareipua ***ē***	and the chiefess Avareipua!

The "*Diamonds" sign behaves as a syllable in the ABAB sequences (Fig. 1b) and in some contexts seems to function as a preposed verbal particle (Ev1:4–5 × Ev6:22–23 × Na5:19–20). One of the preposed verbal markers is the imperfective *e*, also used in subordinate temporal clauses (Kieviet 2016: 306). This allows us to propose the reading value **e?**, with the implication that long and short vowels are not differentiated in Rongorongo (see above).

Reported Speech

The sign group "Sitting Man-*Staff" is found numerous times on the tablets (Barthel 1958: 304–13; Butinov and Knorozov 1956: 82; Fedorova 1982: 38; Fischer 2004; Harrison 1874; Horley 2007; Pozdniakov 1996, 2011). "Sitting Man-*Staff" and five other sign groups with "*Staff" mark entries in

the lists of long sequences (Fig. 8). Three of these lists are distant versions of each other: they start with the same long sequence and show a few identical long sequences appearing in the same order, although each list includes some unique long sequences (Fig. 8a). Their collation suggests that "Sitting Man-*Staff" does not close but introduces long sequences.

Figure 8. Long Sequence Introductory Glyph: (a) two parallel lists of long sequences; b) paradigmatic analysis of six versions of the introductory glyph where the absence of preposed markers is considered meaningful: c) substitutions of "Sitting Man-*Staff" for "Eating Man" and "*Staff". Arrows indicate non-ligature variants of the sign "Eating Man". Based on Paul Horley's drawings, rearranged. Used with his permission.

I call the sign groups under discussion Long Sequence Introductory Glyphs (Davletshin 2019). Six variants are attested, and all of them include the "*Staff" sign (Fig. 8b):

"Sitting Man-*Staff",
"Sitting Man-*Staff-Leaved Plant",
"Sitting Man-*Staff-Straw Connected",
"*Staff-Leaved Plant",
"*Staff-Straw Connected" and
"*Staff-Spear-Straw".

These variants possess nearly the same meaning because they introduce identical long sequences and form similar lists. Importantly, one variant of the introductory glyph is used in one list (a few exceptions are found in the lists on Ab4 and Kr3–4). Therefore we could conclude that they are different grammatical forms of the same word where the root is spelt by the sign "*Staff".[13] The variants where the "Sitting Man" is absent give us a clue.

In Aotearoa New Zealand Māori, the narrative tense is marked by a preposed zero and the postposed *ana* particle which indicates continuance of action or state (Biggs 1998: 122–23). In Tahitian, the narrative tense is also marked by a preposed zero and postposed combinations of directional and deictic particles: *mai* 'towards speaker', *atu* 'away from speaker', *a'e* 'upwards', *iho* 'downwards', *nei* 'this near to me', *nā* 'that near to you' and *rā* 'that near to them' (Lazard and Peltzer 2000: 31–32, 141). The choice of particular directionals and deictics depends on the perspective the narrator takes in the story. Cognate particles are used for the narrative tense in Hawaiian (Elbert and Pukui 1979: 99) and Tokelauan (Hooper 1996: 18). Another particle of the narrative tense in Māori is the preposed *ka* particle which marks sequences of events; this can be used both with and without postposed directionals and deictics (Harlow 1988: 201).

We can see the same pattern in the introductory glyphs: postposed markers can be absent only in the case where the preposed "Sitting Man" is present. Thus, we can assign the provisional reading **ka?** to "Sitting Man" and assume that the signs "Leaved Plant", "Straw Connected" and "Spear-Straw" correspond to postposed deictics and directionals (for more on these see Davletshin 2019).

The signs "Sitting Man" and "*Staff" are written separately in three examples (Fig. 8c). From these, we can see that the "Sitting Man" in the non-ligature version of the sign holds his hand in front of his mouth, suggesting that the man is eating. The word 'eat' is *kai* in both Rapanui and Proto-East Polynesian and, thus, the reading value of "Eating Man" may be acrophonically derived. Remarkably, both narrative tense markers—zero and *ka*—were lost in Rapanui, replaced with the innovative *he* particle (Weber 1988: 126–32).

The lexical root of the introductory glyph is spelt by the sign "*Staff". It is the most frequent sign in the corpus, and numerous ABAB sequences suggest that its reading value is syllabic (Fig. 1a). We can assume that the root is monosyllabic. I was able to locate 19 monosyllabic native roots in Rapanui dictionaries (Davletshin 2019). Only one of them makes sense as an introductory glyph—*kī* 'say, speak, tell, ask, respond (verb of reported speech)'. This verb is frequent in the texts of East Polynesia, where *kī* phrases often repeat in close proximity over and over again, forming extended lists. I give one short example (Englert 2002: 26–27).

> *I u'i era e te kenu, ku tehe 'ā te ki'ea,* ***he kī****: "Mai hē koe, i tehe 'ai te ki'ea?"* ***He kī*** *te vi'e: "Mai te ahi to'o mai."* ***He kī*** *te kenu: "'Ina. Mai te rua tangata koe."*
>
> When the husband saw that the red powder had run, he said, "Where are you coming from? Why has your red powder run?" "I went to look for fire," the woman said. The husband said, "No. You have been with another man."

In all likelihood, the lists of long sequences are either instructions, incantations or dialogues (for incantations, see Englert 2002: 46–51). We can assign the provisional reading **ki?** to the "*Staff" sign, assuming that long and short vowels are not differentiated in Rongorongo syllabic signs (see above). Accordingly, we can interpret the signs "Sitting Man-*Staff" as **ka?-ki?**, *ka-kī*?, 'he says/they say', taking into account that third-person pronouns are usually omitted in East Polynesian languages.

The syllable *ki* is the fifth most frequent in Rapanui texts. Several grammatical markers have the shape of *ki*, among them a frequent marker of the dative case. This might account for the high frequency of the sign in the texts (775 examples in total) and its rarity in the lists of personal names on Santiago Staff (four cases) and Honolulu Tablet T (two cases).

Hieroglyphic Tags

About a hundred surviving wooden figurines bear carved symbols on the top of their heads: some are easily recognisable Rongorongo signs (Fig. 9a; Kudrjavcev 1949: 186), and most are ornamental elaborated versions of signs (Fig. 9b–e; see Dederen 2013; Esen-Baur 1989). Some designs consist of one symbol and others are combinations of several symbols, including cases where the same symbol is repeated two, three or four times.

Certain designs appear on only one type of figurine; for example, the "Ghost" sign (Fig. 9b) depicts a crouching creature with twisted head, fiery beard and entrails hanging out: this design is restricted to those figurines with ribs that, according to ethnographic records, portray male ancestral spirits (Englert 2002: 103–7). Two designs are found on different types of figurines

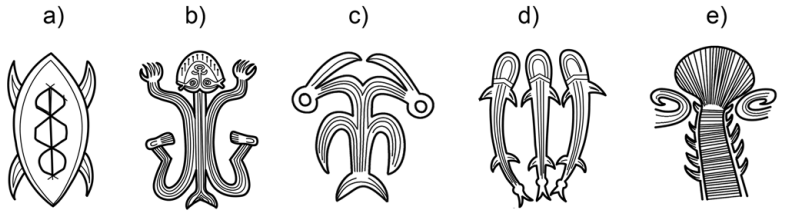

Figure 9. Hieroglyphic tags on Rapa Nui figurines: (a) female figurine, in Peter the Great Museum of Anthropology and Ethnography, St Petersburg, Inv. 402-1; (b–e) figurines with ribs, in the Museum of Art and History, Brussels, ET48.63 (b), Galerie Louise Leiris collection, Charles Ratton No. 48 (c), American Oldman collection (d) and the Five Continents Museum, Munich, Inv. 193 (e). Drawing by the author, based on his photographs (a–b) and figures from François Dederen's 2013 book (c–e). "Three Sharks" are depicted as if attacking the viewer from above—their jaws are open and their dorsal fins are not visible.

and may indicate cover terms such as 'deity' and 'spirit' (Fig. 9c). A dozen of the designs are unique and may spell personal names of ancestral spirits, such as Nuku Te Mangō 'Frenzy of Sharks' and 'Ura Metometo 'Destroyed Lobster', which are reported in Métraux (1940: 318); Figure 9d–e compares favourably with these names.

CROSS-READINGS

Let us now evaluate the provisional reading values suggested thus far by considering the number of contexts that support each case. Here I have tallied up the number of the contexts that favour the proposed reading, including the sign imagery (marked 1 to 4). Class characteristics of the signs are considered important evidence but are not counted as contexts (marked 0).

The "Chief" sign is a logograph (0); it depicts a chief (1) and functions as a title in the name lists (2): the reading **'ARIKI?** meets these conditions. The "Man with Open Mouth" sign is a syllable (0); it functions as a phonetic complement for the "Crescent" sign, ONE? **TAHI?** (1): **hi?** is a plausible reading. The "Cane" sign is a syllable (0); it marks entries in the genealogy and name lists and, thus, functions similarly to the prominence marker *ko* (1); it may depict the *kohe* plant (2): we can interpret it as the **ko?** syllable. These readings are provisional, as they are based on one or two contexts. We cannot consider such readings as established because an alternative interpretation of a single context is always possible, as the following questions illustrate:

– What if the "Chief" sign indicates another title, for example, 'expert', *mā'ori*?

– What if the "Crescent" sign is not intended to be read in the context under discussion as *tahi* 'one' but rather as *ra'e* 'first'?
– What if the "Cane" sign possesses two reading values, one of which is syllabic and the other the semantic determinative of divine beings?

The case of the "Turtle" sign is different: it is a logograph (0), it depicts a turtle (1), it is contrasted with the sign LOBSTER? in the context of catching lobsters and turtles (2), and it is attested in the genealogy of sea creatures along with the signs OCTOPUS?, SEA CENTIPEDE?, SHARK? and HAMMERHEAD? (3). Even if the catching of lobsters and turtles and the genealogy of sea creatures are incorrect interpretations, both contexts have to do with sea animals, of which the turtle is one. Thanks to this, we can consider the logographic reading TURTLE established. The generic term for turtle is *honu* in both Rapanui and Proto-East Polynesian. The phonetic reading **HONU?** is, however, problematic until phonetic complements and substitutions have been located. It is possible, although unlikely, that either an esoteric name or a particular species is at play, e.g., **kea* 'hawksbill turtle (*Eretmochelys imbricata*)'.

The case of the signs "Seal" and "Blenny" is different: both are syllabic and possess identical reading values (0), "Seal" seems to be related to 'seal', *pākia* (1), and "Blenny" to 'blenny', *pātuki* (2). A group of four "Blenny" signs appears immediately after the genealogy (Fig. 5) where *papa-papa* can be translated as 'each one of these is recited in genealogical order'; see **faka-papa* 'arrange or recite in order; genealogy, family tree' and **papa* 'list, genealogy' (3). Reflexes of both words are attested in most East Polynesian languages (see Greenhill and Clark 2011), but in Rapanui *papa* means 'put in order' (Englert 1978). We can now consider the reading **pa** for the signs "Seal" and "Blenny" as established.

The sequences "Seal-*Staff-Seal-*Staff" and "Blenny-*Staff-Blenny-*Staff" are attested in the parallel list on Large St Petersburg Tablet and Large Santiago Tablet (Fig. 10). Seven items from the list are each introduced by a sign group "Hatched Staff-?Sprout", among them the signs "Large Shell", "Shells", "Chiton" and "Urchins". We can tentatively identify this passage as a list of seafood, somewhat similar to other lists in the Rongorongo script and didactic texts of Polynesian oral traditions. We have already seen (Figs 4c–d and 6d) that the shellfish signs (1) are logographs (0), which are attested in the short list on Large Washington Tablet (2) and in combinations with the sign "?Nestling" (3). The list of seafood provides one more context (4). We can assume that the logographic values A KIND OF SHELLFISH, SMALL SHELL and URCHIN are identified correctly. Accordingly, the provisional phonetic readings **PIPI?**, *pipi* 'small sea-snails (generic)' and **VANA?**, *vana* 'edible kind of urchin (with short spikes)' can be assigned to the last two signs.

The signs "Hatched Staff" and "?Fish Gills" are logographs and their reading values are identical (0); "Hatched Staff" behaves as a colour term

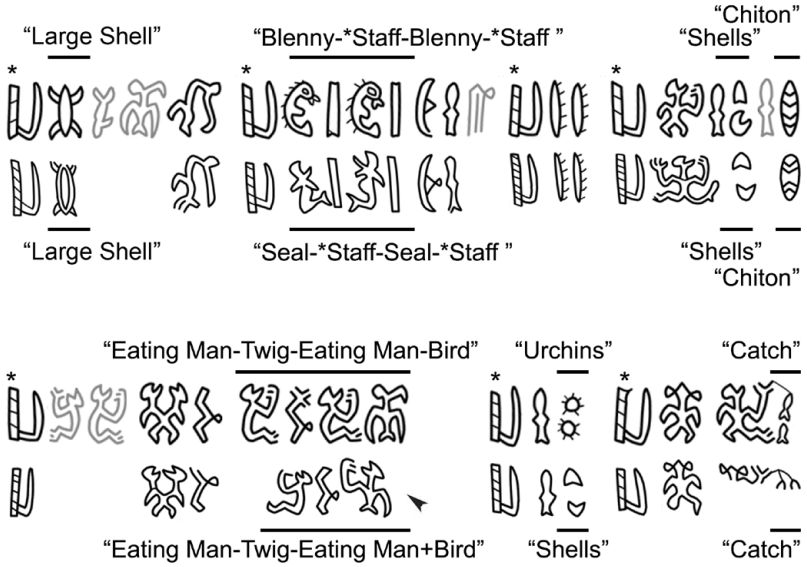

Figure 10. Two parallel lists of seafood on Large Santiago and Large St Petersburg Tablets (Hv9:17–53 × Pv10:29–Pv11:1). The groups "Hatched Staff-?Sprout" are indicated by asterisks, signs in grey are omitted in the parallel texts, and arrows indicate a conflation ligature of two signs. Based on Paul Horley's drawings, rearranged. Used with his permission.

and is associated with red, *mea* (1), "?Fish Gills" is related to gills, *mea* (2), and in Rapanui *mea* also means 'abound (about fish, bananas, etc.)', as in, for example, *ku mea-'ā te ika* 'there are a lot of fish (typically with reference to a certain part of the coast)' (Englert 1978). Therefore, we can assume that "?Sprout" is a grammatical marker and that "Hatched Staff-?Sprout" means 'such-and-such species abounds' (3). We can now consider the reading **MEA** RED for the signs "Hatched Staff" and "Fish Gills" as established.

Let us come back to the sequences "Seal-*Staff-Seal-*Staff" and "Blenny-*Staff-Blenny-*Staff". The "*Staff" is a syllable and is the most frequent sign in the corpus (0); it functions as a monosyllabic verb of speech, presumably, *kī* 'say, tell, speak' in both Proto-East Polynesian and Rapanui (1). The "Hafted Adze" sign is complemented with "*Staff" and 'adze' is *toki* in both Proto-East Polynesian and Rapanui, **TOKI?-ki?** (2). Proto-East Polynesian **pakipaki* is reconstructed as 'Portuguese man-of-war (*Physalia* sp.)', of which the Rapanui reflex is *pāpaki* 'Portuguese man-of-war' (Englert 1978), 'an edible jellifish' (Fuentes 1960) and 'any kind of jellyfish' (author's fieldwork data). Again Proto-East Polynesian gives us a better match than Rapanui. The

interpretation fits the context, and thus we can consider the syllabic reading **ki** for the "*Staff" sign as established (3). The "*Staff" is also part of the opening sequence where verbs of speech are expected (4). At this point, four arguments in favour of the reading **ki** support the reading **pa** and vice versa.[14]

The sign "Adze" is a logograph (0) and depicts a hafted adze (1), it is complemented by "*Staff", **TOKI?-ki** (2), and it is found in the context of the presumed spellings *tahi-tahi* 'carve wood' (3). We can consider the reading **TOKI** ADZE established.

Another sign sequence is found in the list of seafood: "Eating Man-Twig-Eating Man-Bird". The "Eating Man" sign is syllabic (0); it functions as a preposed verbal marker, presumably the Proto-East Polynesian **ka* marker of the narrative tense (1), and it depicts the action of eating, *kai* in both Proto-East Polynesian and Rapanui (2). The word *karakama* 'a kind of seaweed, drifted coral' (Englert 1978: 198; Métraux 1940: 330) fits the context, also because the Proto-East Polynesian words 'bird' and 'twig, branch' are reconstructed as **manu* and **ra'ara'a*, suggesting acrophonically derived reading values for the signs "Bird" and "Twig" as **ma?** and **ra?**: **ka-ra?-ka-ma?** (3).[15] It is too early to consider this interpretation as unproblematic, but I tentatively assume that the syllabic reading **ka** for the "Eating Man" sign is identified correctly.

The Polynesian referential article for common nouns, *te*, is conspicuously missing in the suggested interpretations. *Te* is the most frequent syllable in Polynesian texts, because the article is obligatory in core grammatical roles and after prepositions. Two explanations are possible. Firstly, Polynesian chants show agrammatical zero articles and tense markers that either resulted from metric constraints or aimed to achieve poetic effects (see also Kieviet 2016: 227). Secondly, underrepresentation of grammatical markers, in particular articles, is attested in early writing systems.[16] Either way, for nearly every nominal phrase in Rongorongo texts we do not see any sign in the position before it, where we would have expected the *te* article.

To conclude, the analysis of the seafood list, specifically the resulting sequence "Hatched Staff-?Sprout Seal-*Staff-Seal-*Staff", interpreted as *mea-'ā, pakipaki*, 'the things abound (on the shore), it got covered with jellyfish'. It is assumed here that *pakipaki* is used predicatively and marked with a preposed zero.

CONCLUDING REMARKS

In this article, the reading values of 20 signs are discussed: one is supported by one context, eight by two contexts each, five by three contexts and six by four. Thus, 11 signs can be considered deciphered according to the criteria formulated above. Although there are 11 signs, there are only nine reading values, because two allographic sets are involved; three of the readings are syllabic and six are logographic. Phonetic readings have been identified for two of six logographic interpretations (**MEA** RED, **TOKI** ADZE).

Nine readings were established thanks to (i) phonetic complementation (**ki**, **TOKI** ADZE), (ii) allography (**MEA** RED, **pa**), (iii) the principle of borrowed readings (**MEA** RED), (iv) grammatical patterns (**ka**), (v) a root written by one syllabic sign (**ki**), (vi) acrophony (**ka**, **pa**) and (vii) sign imagery (**ka**, **pa**, **MEA** RED, **TOKI** ADZE, TURTLE, SHELL, SMALL SHELL, URCHIN). All nine reading values are supported by either syllabic or logographic behaviours of the corresponding signs. Lexical lists were crucial in providing semantic control for the contexts.

Although 11 signs is not many, their reading values are substantiated by at least three independent contexts and can be considered established. They demonstrate that the chosen strategy is effective: look for provisional reading values suggested by different kinds of evidence until they have been connected through cross-readings. These 11 signs lead us to three conclusions.

Firstly, Kohau Rongorongo is a logosyllabic system, similar in structure to scripts from other parts of the world. We started with the assumption that it is logosyllabic based on the likely number of signs in the system. This was corroborated by the behaviour of some signs, but the cross-readings presented proof that some Rongorongo signs are syllabic and some logographic. Although a logosyllabic system is what a grammatologist would expect, it is hard to overestimate the importance of this finding, as Rapa Nui is one of few places in the world where writing was independently invented.

Secondly, the language is East Polynesian, and in some respects it seems to be closer to reconstructed Proto-East Polynesian than to Modern Rapanui. The evidence includes (i) the *ka* narrative tense, (ii) the zero narrative tense, (iii) *papa* 'recite genealogy' in contrast to Rapanui *haka-ara* and (iv) *pakipaki* 'jellyfish' instead of *pāpaki*. This is what a linguist would expect, because languages constantly change and because Rapanui went through drastic reorganisation after western contact (Roussel 1908 versus Englert 1978). Significantly, the verb of speech ***kī** is a lexical innovation restricted to the East Polynesian subgroup of Polynesian languages.

Finally, a few insights about the content can be drawn. Genealogies of supernatural beings, lexical lists, titles and chants are what a Polynesianist would expect. In contrast, tags on wooden figurines and the censuses tentatively identified on Santiago Staff and Honolulu Tablet T represent significant and non-presumable findings. They also suggest that Kohau Rongorongo played an important role in the religion, politics and economics of Rapa Nui.

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NOTES

1. The year 2022 marks 200 years since initial decipherment of Egyptian hieroglyphics, 70 years since Maya and Linear B were deciphered, 100 years since their respective decipherers, Yuri Knorozov and Michael Ventris, were born, and 300 years since Rapa Nui was revealed to the western world. Although there is no claim here for full decipherment of Kohau Rongorongo, perhaps it is an auspicious year for a fuller understanding of this unique script to emerge.
2. In Nahuatl writing, all syllabic and logographic signs depict related objects and actions. A few notational signs, however, show no relation to the words they spell.
3. Two glottal stops cannot co-occur in Rapanui roots, nor can two identical short vowels follow each other (Davletshin 2016a: 353). Thus, the signs of AAAA and AAA possess **CV** reading values, where C stands for any consonant but a glottal stop or zero. The only exception to this rule I have been able to find are sequences of poetic vowels *ē*.
4. Two sequences of four crescents are attested, but both are problematic. The full context of one has been lost, raising uncertainty about the original number of "Crescents" (Ya2). It may have included four to nine, but as the tablet was sawn into several pieces and some of these pieces were made into the Paris Snuffbox, it is impossible to know for sure. In the second case, the sequence is written as "Two? Crescent" and "Two Crescents" separated by another sign in the parallel text (Hv10:25–28 × Pv11:33–37).
5. It is widely accepted that the passage on Mamari (Cr5–8) records a lunar calendar (Barthel 1958: 242–47; Guy 1990; but see Davletshin 2012b: 250; Pozdniakov 2011).
6. Bimoraic and trimoraic stems follow different patterns of reduplication in Polynesian languages (Davletshin 2016a: 355): *hatu* 'fold (one time)' > *hatu-hatu* 'plait, fold (several times)', *ma'ea* 'stone' > *mā-'ea-'ea* 'stony', etc. The doubled sign "Crescent" with and without phonetic complements on Keiti spells a reduplication and, thus, its expected value is **CVCV**.
7. Rafał Wieczorek (2016) suggested an astronomical interpretation for the spellings under discussion.
8. Florentin-Étienne Jaussen (1893) collected readings from Metoro Tau a Ure, who was said to know the inscriptions by heart. It is widely accepted that Metoro was not reading but interpreting the imagery of the signs (Guy 1999). In this paper, his interpretations are considered dubious and not taken into account.
9. The "Hammerhead Shark" sign depicts a creature with fish fins, characteristic head and eyes situated on what Polynesians call "hammershark's ears" (see **mata-'i-talinga* 'hammershark, *Sphyrna* sp.', literally, 'eyes on its ears', in Greenhill and Clark 2011). The "Fringes" on the head is a ligature version of another sign (e.g., Br1:16,28).
10. More titles can be identified than are given in Davletshin (2012a).
11. Fischer (2010: 226) interpreted the "Chief" sign as a female glyph.
12. The interpretation of "Twig" as a semantic determinative of plants cannot be sustained because the sign is absent from other plant lists.
13. Konstantin Pozdniakov (2011: 58) suggested that the introductory glyphs act as semantic determinatives, but determinatives are signs located on either the left or right edge of spellings, which indicate the semantic class of the written word. Importantly, determinatives cannot be omitted, except in special cases.

14. The sign imagery may be related to its reading in the sense that one who has a staff is allowed to speak, but I consider this proposal uncertain.
15. Another match is Proto-East Polynesian **ra'akau*, 'tree, plant, wood'. Rapanui replaced **ra'akau* and **ra'ara'a* with new words.
16. I argue elsewhere that such grammatical markers are not underrepresented but encoded as part of logographic readings (Davletshin 2012a: 66–67).

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