

= Decipherment of rongorongo =

There have been numerous attempts to decipher the rongorongo script of Easter Island since its discovery in the late nineteenth century . As with most undeciphered scripts , many of the proposals have been fanciful . Apart from a portion of one tablet which has been shown to deal with a lunar calendar , none of the texts are understood , and even the calendar cannot actually be read . There are three serious obstacles to decipherment : the small number of remaining texts , comprising only 15 @,@ 000 legible glyphs ; the lack of context in which to interpret the texts , such as illustrations or parallels to texts which can be read ; and the fact that the modern Rapanui language is heavily mixed with Tahitian and is unlikely to closely reflect the language of the tablets ? especially if they record a specialized register such as incantations ? while the few remaining examples of the old language are heavily restricted in genre and may not correspond well to the tablets either .

Since a proposal by Butinov and Knorozov in the 1950s , the majority of philologists , linguists and cultural historians have taken the line that rongorongo was not true writing but proto @-@ writing , that is , an ideographic- and rebus @-@ based mnemonic device , such as the Dongba script of the Nakhi people , which would in all likelihood make it impossible to decipher . This skepticism is justified not only by the failure of the numerous attempts at decipherment , but by the extreme rarity of independent writing systems around the world . Of those who have attempted to decipher rongorongo as a true writing system , the vast majority have assumed it was logographic , a few that it was syllabic or mixed . Statistically it appears to have been compatible with neither a pure logography nor a pure syllabary . The topic of the texts is unknown ; various investigators have speculated they cover genealogy , navigation , astronomy , or agriculture . Oral history suggests that only a small elite were ever literate , and that the tablets were considered sacred .

= = Accounts from Easter Island = =

In the late 19th century , within a few years to decades of the destruction of Easter Island society by slave raiding and introduced epidemics , two amateur investigators recorded readings and recitations of rongorongo tablets by Easter Islanders . Both accounts were compromised at best , and are often taken to be worthless , but they are the only accounts from people who may have been familiar with the script first @-@ hand .

= = = Jausen = = =

In 1868 the Bishop of Tahiti , Florentin @-@ Étienne Jausen , received a gift from recent converts on Easter Island : a long cord of human hair wound around a discarded rongorongo tablet . He immediately recognized the importance of the tablet , and asked Father Hippolyte Roussel on Easter Island to collect more tablets and to find islanders capable of reading them . Roussel was able to acquire only a few additional tablets , and he could find no @-@ one to read them , but the next year in Tahiti Jausen found a laborer from Easter Island , Metoro Tau ? a Ure , who was said to know the inscriptions " by heart " .

Sometime between 1869 and 1874 , Jausen worked with Metoro to decipher four of the tablets in his possession : A Tahua , B Aruku kurenga , C Mamari , and E Keiti . A list of the glyphs they identified was published posthumously , along with a complete account of the chants for A and B. This is the famous Jausen list . Though at first taken for a Rosetta Stone of rongorongo , it has not led to an understanding of the script . It has been criticized for , among other inadequacies , glossing five glyphs as " porcelain " , a material not found on Easter Island . However , this is a mistranslation : Jausen glossed the five glyphs as porcelaine , French for both " cowrie " and the cowrie @-@ like Chinese ceramic which is called porcelain in English . Jausen 's Rapanui gloss , pure , means specifically " cowrie " .

Almost a century later , Thomas Barthel published some of Jausen 's notes . He compared Metoro 's chants with parallel passages in other tablets and discovered that Metoro had read the lines of Keiti forwards on the reverse but backwards on the obverse . Jacques Guy found that Metoro had

also read the lunar calendar in Mamari backwards , and failed to recognize the " very obvious " pictogram of the full moon within it , demonstrating a lack of any understanding of the contents of the tablets .

= = = Thomson = = =

William J. Thomson , paymaster on the USS Mohican , spent twelve days on Easter Island from 19 December to 30 December 1886 , during which time he made an impressive number of observations , including some which are of interest for the decipherment of the rongorongo .

= = = Ancient calendar = = =

Among the ethnographic data Thomson collected were the names of the nights of the lunar month and of the months of the year . This is key to interpreting the single identifiable sequence of rongorongo , and is notable in that it contains thirteen months ; other sources mention only twelve . Métraux criticizes Thomson for translating Anakena as August when in 1869 Roussel identified it as July , and Barthel restricts his work to Métraux and Englert , because they are in agreement while " Thomson 's list is off by one month " . However , Guy calculated the dates of the new moon for years 1885 to 1887 and showed that Thomson 's list fit the phases of the moon for 1886 . He concluded that the ancient Rapanui used a lunisolar calendar with kotuti as its embolismic month (its " leap month ") , and that Thomson chanced to land on Easter Island in a year with a leap month .

= = = Ure Va ? e Iko 's recitations = = =

Thomson was told of an old man called Ure Va ? e Iko who " professes to have been under instructions in the art of hieroglyphic reading at the time of the Peruvian raids , and claims to understand most of the characters " . He had been the steward of King Nga ? ara , the last king said to have had knowledge of writing , and although he was not able to write himself , he knew many of the rongorongo chants and was able to read at least one memorized text . When Thomson plied him with gifts and money to read the two tablets he had purchased , Ure " declined most positively to ruin his chances for salvation by doing what his Christian instructors had forbidden " and finally fled . However , Thomson had taken photographs of Jaussen 's tablets when the USS Mohican was in Tahiti , and he eventually cajoled Ure into reading from those photographs . The English @-@ Tahitian landowner Alexander Salmon took down Ure 's dictation , which he later translated into English , for the following tablets :

Salmon 's Rapanui was not fluent , and apart from Atua Matariri , which is almost entirely composed of proper names , his English translations do not match what he transcribed of Ure 's readings . The readings themselves , seemingly reliable although difficult to interpret at first , become clearly ridiculous towards the end . The last recitation , for instance , which has been accepted as a love song on the strength of Salmon 's English translation , is interspersed with Tahitian phrases , including words of European origin , such as " the French flag " (te riva forani) and " give money for revealing [this] " (horoa moni e fahiti) , which would not be expected on a pre @-@ contact text . The very title is a mixture of Rapanui and Tahitian : pohera ? a is Tahitian for " death " ; the Rapanui word is matenga . Ure was an unwilling informant : even with duress , Thomson was only able to gain his cooperation with " the cup that cheers " (that is , rum) :

Finally [Ure] took to the hills with the determination to remain in hiding until after the departure of the Mohican . [U] nscrupulous strategy was the only resource after fair means had failed . [When he] sought the shelter of his own home on [a] rough night [we] took charge of the establishment . When he found escape impossible he became sullen , and refused to look at or touch a tablet [but agreed to] relate some of the ancient traditions . [C] ertain stimulants which had been provided for such an emergency were produced , and [?] as the night grew old and the narrator weary , he was included as the " cup that cheers " made its occasional rounds . [A] t an auspicious moment the

photographs of the tablets owned by the bishop were produced for inspection . [?] The photographs were recognized immediately , and the appropriate legend related with fluency and without hesitation from beginning to end .

Nonetheless , while no one has succeeded in correlating Ure 's readings with the rongorongo texts , they may yet have value for decipherment . The first two recitations , Apai and Atua Matariri , are not corrupted with Tahitian . The verses of Atua Matariri are of the form X ki ? ai ki roto Y , ka pû te Z " X , by mounting into Y , let Z come forth " , and when taken literally , they appear to be nonsense :

" Moon , by mounting into Darkness , let Sun come forth " (verse 25) ,

" Killing , by mounting into Stingray , let Shark come forth " (verse 28) ,

" Stinging Fly , by mounting into Swarm , let Horsefly come forth " (verse 16) .

These verses have generally been interpreted as creation chants , with various beings begetting additional beings . However , they do not conform to Rapanui or other Polynesian creation mythology . Guy notes that the phrasing is similar to the way compound Chinese characters are described . For example , the composition of the Chinese character ? tóng " copper " may be described as " add ? tóng to ? j?n to make ? tóng " (meaning " add Together to Metal to make Copper ") , which is also nonsense when taken literally . He hypothesizes that the Atua Matariri chant which Ure had heard in his youth , although unconnected to the particular tablet for which he recited it , was a genuine rongorongo chant : A mnemonic which taught students how the glyphs were composed .

= = Fanciful decipherments = =

Since the late nineteenth century , there has been all manner of speculation about rongorongo . Most remained obscure , but a few attracted considerable attention .

In 1892 the Australian pediatrician Alan Carroll published a fanciful translation , based on the idea that the texts were written by an extinct " Long @-@ Ear " population of Easter Island in a diverse mixture of Quechua and other languages of Peru and Mesoamerica . Perhaps due to the cost of casting special type for rongorongo , no method , analysis , or sound values of the individual glyphs were ever published . Carroll continued to publish short communications in Science of Man , the journal of the (Royal) Anthropological Society of Australasia until 1908 . Carroll had himself founded the society , which is " nowadays seen as forming part of the ' lunatic fringe ' . "

In 1932 the Hungarian Vilmos Hevesy (Guillaume de Hevesy) published an article claiming a relationship between rongorongo and the Indus Valley script , based on superficial similarities of form . This was not a new idea , but was now presented to the French Academy of Inscriptions and Literature by the French Sinologist Paul Pelliot and picked up by the press . Due to the lack of an accessible rongorongo corpus for comparison , it was not apparent that several of the rongorongo glyphs illustrated in Hevesy 's publications were spurious . Despite the fact that both scripts were undeciphered (as they are to this day) , separated by half the world and half of history (19 @,@ 000 km (12 @,@ 000 mi) and 4000 years) , and had no known intermediate stages , Hevesy 's ideas were taken seriously enough in academic circles to prompt a 1934 Franco ? Belgian expedition to Easter Island led by Lavachery and Métraux to debunk them (Métraux 1939) . The Indus Valley connection was published as late as 1938 in such respected anthropological journals as Man .

At least a score of decipherments have been claimed since then , none of which have been accepted by other rongorongo epigraphers . For instance , ethnographer Irina Fedorova published purported translations of the two St Petersburg tablets and portions of four others . More rigorous than most attempts , she restricts each glyph to a single logographic reading . However , the results make little sense as texts . For example , tablet P begins (with each rongorongo ligature marked by a comma in the translation) :

he cut a rangi sugarcane , a tara yam , he cut lots of taro , of stalks (?) , he cut a yam , he harvested , he cut a yam , he cut , he pulled up , he cut a honui , he cut a sugarcane , he cut , he harvested , he took , a kihi , he chose a kihi , he took a kihi ?

and continues in this vein to the end :

he harvested a yam , a poporo , a calabash , he pulled up a yam , he cut , he cut one plant , he cut one plant , a yam , he cut a banana , he harvested a sugarcane , he cut a taro , he cut a kahu yam , a yam , a yam ?

The other texts are similar . For example , the Mamari calendar makes no mention of time or the moon in Fedorova 's account :

a root , a root , a root , a root , a root , a root [that is , a lot of roots] , a tuber , he took , he cut a potato tuber , he dug up yam shoots , a yam tuber , a potato tuber , a tuber ?

which even Fedorova characterized as " worthy of a maniac " .

Moreover , the allographs detected by Pozdniakov are given different readings by Fedorova , so that , for example , otherwise parallel texts repeatedly substitute the purported verb *ma ? u* " take " for the purported noun *tonga* " a kind of yam " . (Pozdniakov has demonstrated that these are graphic variants of the same glyph .) As it was , Fedorova 's catalog consisted of 130 glyphs ; Pozdniakov 's additional allography would have made her interpretation even more repetitive . Such extreme repetition is a problem with all attempts to read rongorongo as a logographic script .

Many recent scholars are of the opinion that , while many researchers have made modest incremental contributions to the understanding of rongorongo , notably Kudrjavitsev et al . , Butinov and Knorozov , and Thomas Barthel , the attempts at actual decipherment , such as those of Fedorova here or of Fischer below , " are not accompanied by the least justification " . All fail the key test of decipherment : a meaningful application to novel texts and patterns .

= = Harrison = =

James Park Harrison , a council member of the Anthropological Institute of Great Britain and Ireland , noticed that lines Gr3 ? 7 of the Small Santiago tablet featured a compound glyph , 380 @. @ 1 @. @ 3 (a sitting figure 380 holding a rod 1 with a line of chevrons (a garland ?) 3) , repeated 31 times , each time followed by one to half a dozen glyphs before its next occurrence . He believed that this broke the text into sections containing the names of chiefs . Barthel later found this pattern on tablet K , which is a paraphrase of Gr (in many of the K sequences the compound is reduced to 380 @. @ 1) , as well as on A , where it sometimes appears as 380 @. @ 1 @. @ 3 and sometimes as 380 @. @ 1 ; on C , E , and S as 380 @. @ 1 ; and , with the variant 380 @. @ 1 @. @ 52 , on N. In places it appears abbreviated as 1 @. @ 3 or 1 @. @ 52 , without the human figure , but parallels in the texts suggest these have the same separating function . Barthel saw the sequence 380 @. @ 1 as a *tangata rongorongo* (rongorongo expert) holding an inscribed staff like the Santiago Staff .

= = Kudrjavitsev et al . = =

During World War II , a small group of students in Saint Petersburg (then Leningrad) , Boris Kudrjavitsev , Valeri Chernushkov , and Oleg Klitin , became interested in tablets P , and Q , which they saw on display at the Museum of Ethnology and Anthropology . They discovered that they bore , with minor variation , the same text , which they later found on tablet H as well :

Parallel texts : A short excerpt of tablets H , P , and Q

Barthel would later call this the " Grand Tradition " , though its contents remain unknown .

The group later noticed that tablet K was a close paraphrase of the recto of G. Kudrjavitsev wrote up their findings , which were published posthumously . Numerous other parallel , though shorter , sequences have since been identified through statistical analysis , with texts N and R found to be composed almost entirely of phrases shared with other tablets , though not in the same order .

Identifying such shared phrasing was one of the first steps in unraveling the structure of the script , as it is the best way to detect ligatures and allographs , and thus to establish the inventory of rongorongo glyphs .

Ligatures : Parallel texts Pr4 ? 5 (top) and Hr5 (bottom) show that a figure (glyph 200) holding an object (glyphs 8 , 1 , and 9) in P may be fused into a ligature in H , where the object replaces either the figure 's head or its hand . (Elsewhere in these texts , animal figures are reduced to a distinctive feature such as a head or arm when they fuse with a preceding glyph .) Here also are the

two hand shapes (glyphs 6 and 64) which would later be established as allographs . Three of the four human and turtle figures at left have arm ligatures with an orb (glyph 62) , which Pozdniakov found often marks a phrase boundary .

= = Butinov and Knorozov = =

In 1957 the Russian epigraphers Nikolai Butinov and Yuri Knorozov (who in 1952 had provided the key insights which would later lead to the decipherment of the Maya writing system) suggested that the repetitive structure of a sequence of some fifteen glyphs on Gv5 ? 6 (lines 5 and 6 of the verso of the Small Santiago Tablet) was compatible with a genealogy . It reads in part ,

Now , if the repeated independent glyph 200 is a title , such as " king " , and if the repeated attached glyph 76 is a patronymic marker , then this means something like :

King A , B 's son , King B , C 's son , King C , D 's son , King D , E 's son ,
and the sequence is a lineage .

Although no @-@ one has been able to confirm Butinov and Knorozov 's hypothesis , it is widely considered plausible . If it is correct , then , first , we can identify other glyph sequences which constitute personal names . Second , the Santiago Staff would consist mostly of persons ' names as it bears 564 occurrences of glyph 76 , the putative patronymic marker , one fourth of the total of 2320 glyphs . Third , the sequence 606 @.@ 76 700 , translated by Fischer (below) as " all the birds copulated with the fish " , would in reality mean (So @-@ and @-@ so) son of 606 was killed . The Santiago Staff , with 63 occurrences of glyph 700 , a rebus for îka " victim " , would then be in part a kohau îka (list of war casualties) .

= = Barthel = =

German ethnologist Thomas Barthel , who first published the rongorongo corpus , identified three lines on the recto (side a) of tablet C , also known as Mamari , as a lunar calendar . Guy proposed that it was more precisely an astronomical rule for whether one or two intercalary nights should be inserted into the 28 @-@ night Rapanui month to keep it in sync with the phases of the moon , and if one night , whether this should come before or after the full moon . Berthin and Berthin propose that it is the text which follows the identified calendar which shows where the intercalary nights should appear . The Mamari calendar is the only example of rongorongo whose function is currently accepted as being understood , though it cannot actually be read .

In Guy 's interpretation , the core of the calendar is a series of 29 left @-@ side crescents (" ? " , colored red on the photo of the table at right) on either side of the full moon , , a pictogram of te nuahine k? ? umu ? a rangi kotekote ' the old woman lighting an earth oven in the kotekote sky ' ? the Man in the Moon of Oceanic mythology . These correspond to the 28 basic and two intercalary nights of the old Rapa Nui lunar calendar .

These thirty nights , starting with the new moon , are divided into eight groups by a " heralding sequence " of four glyphs (above , and colored purple on the tablet at right) which ends in the pictogram of a fish on a line (yellow) . The heralding sequences each contain two right @-@ side lunar crescents (" ? ") . In all four heralding sequences preceding the full moon the fish is head up ; in all four following it the fish is head down , suggesting the waxing and waning of the moon . The way the crescents are grouped together reflects the patterns of names in the old calendar . The two ? crescents at the end of the calendar , introduced with an expanded heralding sequence , represent the two intercalary nights held in reserve . The eleventh crescent , with the bulge , is where one of those nights is found in Thomson 's and Métraux 's records .

Guy notes that the further the Moon is from the Earth in its eccentric orbit , the slower it moves , and the more likely the need to resort to an intercalary night to keep the calendar in sync with its phases . He hypothesizes that the " heralding sequences " are instructions to observe the apparent diameter of the Moon , and that the half @-@ size superscripted crescents (orange) preceding the sixth night before and sixth night after the full moon represent the small apparent diameter at apogee which triggers intercalation . (The first small crescent corresponds to the position of hotu in

Thomson and Métraux .)

Seven of the calendrical crescents (red) are accompanied by other glyphs (green) . Guy suggests syllabic readings for some of these , based on possible rebuses and correspondences with the names of the nights in the old calendar . The two sequences of six and five nights without such accompanying glyphs (beginning of line 7 , and transition of lines 7 ? 8) correspond to the two groups of six and five numbered kokore nights , which do not have individual names .

= = Fischer = =

In 1995 independent linguist Steven Fischer , who also claims to have deciphered the enigmatic Phaistos Disc , announced that he had cracked the rongorongo " code " , making him the only person in history to have deciphered two such scripts . In the decade since , this has not been accepted by other researchers , who feel that Fischer overstated the single pattern which formed the basis of his decipherment , and note that it has not led to an understanding of other patterns .

= = = Decipherment = = =

Fischer notes that the long text of the 125 @-@ cm Santiago Staff is unlike other texts in that it appears to have punctuation : The 2 @,@ 320 @-@ glyph text is divided by " 103 vertical lines at odd intervals " which do not occur on any of the tablets . Fischer remarked that glyph 76 , identified as a possible patronymic marker by Butinov and Knorozov , is attached to the first glyph in each section of text , and that " almost all " sections contain a multiple of three glyphs , with the first bearing a 76 " suffix " .

Fischer identified glyph 76 as a phallus and the text of the Santiago Staff as a creation chant consisting of hundreds of repetitions of X ? phallus Y Z , which he interpreted as X copulated with Y , there issued forth Z . His primary example was this one :

about half @-@ way through line 12 of the Santiago Staff . Fischer interpreted glyph 606 as " bird " + " hand " , with the phallus attached as usual at its lower right ; glyph 700 as " fish " ; and glyph 8 as " sun " .

On the basis that the Rapanui word ma ? u " to take " is nearly homophonous with a plural marker mau , he posited that the hand of 606 was that plural marker , via a semantic shift of " hand " ? " take " , and thus translated 606 as " all the birds " . Taking penis to mean " copulate " , he read the sequence 606 @.@ 76 700 8 as " all the birds copulated , fish , sun " .

Fischer supported his interpretation by claiming similarities to the recitation Atua Matariri , so called from its first words , which was collected by William Thomson . This recitation is a litany where each verse has the form X , ki ? ai ki roto ki Y , ka pû te Z , literally " X having been inside Y the Z comes forward " . Here is the first verse , according to Salmon and then according to Métraux (neither of whom wrote glottal stops or long vowels) :

Atua Matariri ; Ki ai Kiroto , Kia Taporu , Kapu te Poporo .

" God Atua Matariri and goddess Taporu produced thistle . "

Atua @-@ matariri ki ai ki roto ki a te Poro , ka pu te poporo .

" God @-@ of @-@ the @-@ angry @-@ look by copulating with Roundness (?) produced the poporo (black nightshade , Solanum nigrum) . "

Fischer proposed that the glyph sequence 606 @.@ 76 700 8 , literally MANU : MA ? U. ? AI ÎKA RA ? Â " bird : hand.penis fish sun " , had the analogous phonetic reading of :

te manu mau ki ? ai ki roto ki te îka , ka pû te ra ? â

" All the birds copulated with the fish ; there issued forth the sun . "

He claimed similar phallic triplets for several other texts . However , in the majority of texts glyph 76 is not common , and Fischer proposed that these were a later , more developed stage of the script , where the creation chants had been abbreviated to X Y Z and omit the phallus . He concluded that 85 % of the rongorongo corpus consisted of such creation chants , and that it was only a matter of time before rongorongo would be fully deciphered .

= = = Objections = = =

There are a number of objections to Fischer 's approach :

When Andrew Robinson checked the claimed pattern , he found that " Close inspection of the Santiago Staff reveals that only 63 out of the 113 [sic] sequences on the staff fully obey the triad structure (and 63 is the maximum figure , giving every Fischer attribution the benefit of the doubt) . " Glyph 76 occurs sometimes in isolation , sometimes compounded with itself , and sometimes in the ' wrong ' part (or even all parts) of the triplets . Other than on the Staff , Pozdniakov could find Fischer 's triplets only in the poorly preserved text of Ta and in the single line of Gv which Butinov and Knorozov suggested might be a genealogy .

Pozdniakov and Pozdniakov calculated that altogether the four glyphs of Fischer 's primary example make up 20 % of the corpus . " Hence it is easy to find examples in which , on the contrary , ' the sun copulates with the fish ' , and sometimes also with the birds . Fischer does not mention the resulting chaos in which everything is copulating in all manner of unlikely combinations . Furthermore , it is by no means obvious in what sense this ' breakthrough ' is ' phonetic ' . "

The plural marker mau does not exist in Rapanui , but is instead an element of Tahitian grammar . However , even if it did occur in Rapanui , Polynesian mau is only a plural marker when it precedes a noun ; after a noun it 's an adjective which means " true , genuine , proper " .

No Polynesian myth tells of birds copulating with fish to produce the sun . Fischer justifies his interpretation thus : This is very close to [verse] number 25 from Daniel Ure Va ? e Iko 's procreation chant [Atua Matariri] " Land copulated with the fish Ruhi Paralyzer : There issued forth the sun . " However , this claim depends on Salmon 's English translation , which does not follow from his Rapanui transcription of

Heima ; Ki ai Kiroto Kairui Kairui @-@ Hakamarui Kapu te Raa .

Métraux gives the following interpretation of that verse :

He Hina [He ima ?] ki ai ki roto kia Rui @-@ haka @-@ ma @-@ rui , ka pu te raa .

" Moon (?) by copulating with Darkness (?) produced Sun " ,
which mentions neither birds nor fish .

Given Fischer 's reading , Butinov and Knorozov 's putative genealogy on tablet Gv becomes semantically odd , with several animate beings copulating with the same human figure to produce themselves :

[turtle] copulated with [man] , there issued forth [turtle]

[shark ?] copulated with [man] there issued forth [shark]

etc .

Cryptologist Tomi Melka deduced that Fischer 's hypothesis cannot be true for the entire Staff , let alone other texts .

Computational linguist Richard Sproat could not replicate the parallels Fischer claimed between the Santiago Staff and the other texts . He automated the search for string matches between the texts and found that the staff stood alone :

As an attempt at a test for Fischer 's " phallus omission " assumption , we computed the same string matches for a version of the corpus where glyph 76 , the phallus symbol , had been removed . Presumably if many parts of the other tablets are really texts which are like the Santiago Staff , albeit sans explicit phallus , one ought to increase one 's chance of finding matches between the Staff and other tablets by removing the offending member . The results were the same as for the unadulterated version of the corpus : the Santiago staff still appears as an isolate .

= = Pozdniakov = =

In the 1950s , Butinov and Knorozov had performed a statistical analysis of several rongorongo texts and had concluded that either the language of the texts was not Polynesian , or that it was written in a condensed telegraphic style , because it contained no glyphs comparable in frequency to Polynesian grammatical particles such as the Rapanui articles te and he or the preposition ki . These findings have since been used to argue that rongorongo is not a writing system at all , but

mnemonic proto @-@ writing . However , Butinov and Knorozov had used Barthel 's preliminary encoding , which Konstantin Pozdniakov , senior researcher at the Museum of Anthropology and Ethnography of the Russian Academy of Sciences in Saint Petersburg (until 1996) , noted was inappropriate for statistical analysis . The problem , as Butinov and Knorozov , and Barthel himself , had admitted , was that in many cases distinct numerical codes had been assigned to ligatures and allographs , as if these were independent glyphs . The result was that while Barthel 's numerical transcription of a text enabled a basic discussion of its contents for the first time , it failed to capture its linguistic structure and actually interfered with inter @-@ text comparison .

In 2011 , Pozdniakov released a pre @-@ press publication analyzing Text E Keiti , including a glyph @-@ by @-@ glyph comparison of the transcription in Barthel (1958) , with misidentified glyphs corrected per Horley (2010) .

= = = Revising the glyph inventory = = =

To resolve this deficiency , Pozdniakov (1996) reanalyzed thirteen of the better preserved texts , attempting to identify all ligatures and allographs in order to better approach a one @-@ to @-@ one correspondence between graphemes and their numeric representation . He observed that all these texts but I and G verso consist predominantly of shared phrases (sequences of glyphs) , which occur in different orders and contexts on different tablets . By 2007 he had identified some one hundred shared phrases , each between ten and one hundred glyphs long . Even setting aside the completely parallel texts Gr ? K and the ' Grand Tradition ' of H ? P ? Q , he found that half of the remainder comprises such phrases :

Phrasing : Variants of this twenty @-@ glyph phrase , all missing some of these glyphs or adding others , are found twelve times , in eight of the thirteen texts Pozdniakov tabulated : lines Ab4 , Cr2 ? 3 , Cv2 , Cv12 , Ev3 , Ev6 , Gr2 ? 3 , Hv12 , Kr3 , Ra6 , Rb6 , and Sa1 . Among other things , such phrases have established or confirmed the reading order of some of the tablets .

These shared sequences begin and end with a notably restricted set of glyphs . For example , many begin or end , or both , with glyph 62 (an arm ending in a circle :) or with a ligature where glyph 62 replaces the arm or wing of a figure (see the ligature image under Kudrjartsev et al .) .

Contrasting these phrases allowed Pozdniakov to determine that some glyphs occur in apparent free variation both in isolation and as components of ligatures . Thus he proposed that the two hand shapes , 6 (three fingers and a thumb) and 64 (a four @-@ fingered forked hand) , are graphic variants of a single glyph , which also attaches to or replaces the arms of various other glyphs :

Allographs : The ' hand ' allographs (left) , plus some of the fifty pairs of allographic ' hand ' ligatures to which Barthel had assigned distinct character codes .

The fact the two hands appear to substitute for each other in all these pairs of glyphs when the repeated phrases are compared lends credence to their identity . Similarly , Pozdniakov proposed that the heads with " gaping mouths " , as in glyph 380 , are variants of the bird heads , so that the entirety of Barthel 's 300 and 400 series of glyphs are seen as either ligatures or variants of the 600 series .

Despite finding that some of the forms Barthel had assumed were allographs appeared instead to be independent glyphs , such as the two orientations of his glyph 27 , , the overall conflation of allographs and ligatures greatly reduced the size of Barthel 's published 600 @-@ glyph inventory . By recoding the texts with these findings and then recombining them , Pozdniakov was able to detect twice as many shared phrases , which enabled him to further consolidate the inventory of glyphs . By 2007 , he and his father , a pioneer in Russian computer science , had concluded that 52 glyphs accounted for 99 @. @ 7 % of the corpus . From this he deduced that rongorongo is essentially a syllabary , though mixed with non @-@ syllabic elements , possibly determinatives or logographs for common words (see below) . The data analysis , however , has not been published .

The shared repetitive nature of the phrasing of the texts , apart from Gv and I , suggests to Pozdniakov that they are not integral texts , and cannot contain the varied contents which would be expected for history or mythology . In the following table of characters in the Pozdniakov &

Pozdniakov inventory , ordered by descending frequency , the first two rows of 26 characters account for 86 % of the entire corpus .

= = = Statistical evidence = = =

With a rigorously derived inventory , Pozdniakov was able to test his ideas about the nature of the script . He tabulated the frequency distributions of glyphs in ten texts (excluding the divergent Santiago Staff) and found that they coincided with the distribution of syllables in ten archaic Rapanui texts such as the Apai recitation , with nearly identical deviations from an ideal Zipfian distribution . He took this as evidence both for rongorongo being essentially syllabic and for its being consistent with the Rapanui language . For example , the most common glyph , 6 , and the most common syllable , / a / , both make up 10 % of their corpora ; the syllables te and he , which Butinov and Knorozov found so problematic , could at 5 @. @ 7 % and 3 @. @ 5 % be associated with any number of common rongorongo glyphs . In addition , the numbers of glyphs linked or fused together closely match the numbers of syllables in Rapanui words , both in the texts overall and in their respective lexicons , suggesting that each combination of glyphs represents a word :

In both corpora there were many more monosyllables / single glyphs in running text than in the lexicon . That is , in both a relatively small number of such forms are very frequent , suggesting that rongorongo is compatible with Rapanui , which has a small number of very frequent monosyllabic grammatical particles . Rongorongo and Rapanui are also almost identical in the proportion of syllables / glyphs found in isolation and in initial , medial , and final position within a word / ligature .

However , while such statistical tests demonstrate that rongorongo is consistent with a syllabic Rapanui script , syllables are not the only thing which can produce this result . In the Rapanui texts , some two dozen common polysyllabic words , such as ariki ' leader ' , ingoa ' name ' , and rua ' two ' , have the same frequency as a score of syllables , while other syllables such as / tu / are less frequent than these words .

This suspicion that rongorongo may not be fully syllabic is supported by positional patterns within the texts . The distributions of Rapanui syllables within polysyllabic words and of rongorongo glyphs within ligatures are very similar , strengthening the syllabic connection . However , monosyllabic words and isolated glyphs behave very differently ; here rongorongo does not look at all syllabic . For example , all glyphs but 901 are attested in isolation , whereas only half of the 55 Rapanui syllables occur as monosyllabic words . Furthermore , among those syllables which do occur in isolation , their rate of doing so is much lower than that of the glyphs : Only three syllables , / te / , / he / , and / ki / , occur more than half the time in isolation (as grammatical particles) , whereas a score of glyphs are more commonly found in isolation than not . Contextual analysis may help explain this : Whereas Rapanui monosyllables are grammatical particles and generally precede polysyllabic nouns and verbs , so that monosyllables rarely occur together , isolated rongorongo glyphs are usually found together , suggesting a very different function . Pozdniakov hypothesizes that the difference may be due to the presence of determinatives , or that glyphs have dual functions , as phonograms in combination but as logograms in isolation , parallel to the Maya script . On the other hand , no glyph approaches the frequency , when in isolation , of the articles te and he or the preposition ki in running text . It may be that these particles were simply not written , but Pozdniakov suspects that they were written together with the following word , as is the case with prepositions and articles in Classical Latin and written Arabic .

Further complicating this picture are repetition patterns . There are two types of repetition in Rapanui words : double syllables within roots , as in mamari , and grammatical reduplication of disyllables , as seen in rongorongo . In the Rapanui lexicon , double syllables as in mamari are 50 % more likely than chance can explain . However , in the rongorongo texts , analogous double AA glyphs are only 8 % more likely than chance . Similarly , in the Rapanui lexicon reduplicated disyllables such as rongorongo are seven times as common as chance , constituting a quarter of the vocabulary , whereas , in rongorongo texts , ABAB sequences are only twice as likely as chance , and 10 % of the vocabulary . If rongorongo is a phonetic script , therefore , this discrepancy needs to be explained . Pozdniakov suggests that perhaps there was a ' reduplicator ' glyph , or that

modifications of glyphs , such as facing heads to the left rather than to the right , may have indicated repetition .

= = = Sound values = = =

The results of statistical analysis will be strongly affected by any errors in identifying the inventory of glyphs , as well as by divergence from a purely syllabic representation , such as a glyph for reduplication . There are also large differences in the frequencies of individual syllables among the Rapanui texts , which makes any direct identification problematic . While Pozdniakov has not been able to assign any phonetic values with any certainty , statistical results do place constraints on which values are possible .

One possibility for a logogram of the most common word in Rapanui , the article *te* , is the most common glyph , 200 , which does not pattern like a phonogram . Glyph 200 occurs mostly in initial position and is more frequent in running text than any syllable in the Rapanui lexicon , both characteristics of the article . A possibility for a reduplicator glyph is 3 , which is also very common and does not pattern like a phonogram , but occurs predominantly in final position .

Because a repeated word or phrase , such as the ubiquitous *ki ? ai ki roto* in the *Atua Matariri* recitation , will skew the statistics of that text , phonetic frequencies are best compared using word lists (considering each word individually) rather than the full texts . Pozdniakov used a few basic correlations between Rapanui and rongorongo to help narrow down the possible phonetic values of the glyphs . For instance , the relative frequencies of rongorongo glyphs in initial , medial , and final position in a ligature presumably constrain their possible sound values to syllables with similar distributions within the lexicon . Syllables beginning with *ng* , for example , are more common at the ends of words than in initial position . The overall frequencies , and the patterns of doubling and reduplication , on the other hand , seem to associate arm glyphs specifically with vocalic syllables :

Overall frequency . Syllables without a consonant (vocalic syllables) are more common in Rapanui than syllables beginning with any of the ten consonants . Of the vowels , / *a* / is more than twice as frequent as any of the others . Thus the syllables comprising more than 3 % of the Rapanui lexicon are / *i* / , / *e* / , / *a* / , / *o* / , / *u* / ; / *ta* / , / *ra* / , / *ka* / , / *na* / , / *ma* / ; and / *ri* / . (The three most common , the vocalic syllables / *a* / , / *i* / , / *u* / , comprise a full quarter of the corpus .) The glyphs comprising more than 3 % of the rongorongo corpus are , in order , 200 , 6 or , 10 , 3 , 62 , 400 , 61 . As noted above , 200 and 3 do not pattern as phonograms . Of the remaining five , four are limbs (arms or wings) .

Reduplication . In grammatical reduplication , vowels are also the most common syllables ; so are the glyphs 6 , 10 , 61 , 62 , 901 , all limbs .

Doubling . Among doubled syllables , however , vocalic syllables are much less common . Four syllables , / *i* / , / *a* / , / *u* / , / *ma* / , are less commonly doubled than chance would dictate . Three glyphs are less common when doubled than chance as well : 6 , 10 , and 63 , two of them limbs .

The exceptionally high frequencies of glyph 6 and of the syllable / *a* / , everywhere except when doubled , suggest that glyph 6 may have the sound value / *a* / . Pozdniakov proposes with less confidence that the second most extreme glyph , 10 , might have the sound value / *i* / .

= = = Objections = = =

As Pozdniakov readily admits , his analysis is highly sensitive to the accuracy of the glyph inventory . Since he has not published the details of how he established this inventory , it is not possible for others to verify his work .

As of 2008 , there has been little response to Pozdniakov 's approach . However , Sproat (2007) believes that the results from the frequency distributions are nothing more than an effect of Zipf 's Law , and furthermore that neither rongorongo nor the old texts were representative of the Rapanui language , so that a comparison between them is unlikely to be enlightening .

= = De Laat = =

Another decipherment , self @-@ published by Mary de Laat in 2009 , covers three texts , A , B , and E. Horley (2010) is a critical review . All three texts are proposed to consist of nothing but extended dialogue . It would be remarkable enough for these rare pieces of wood to record the banal exchanges de Laat attributes to them , yet the ligature 380 @.@ 1 , which de Laat identified as a man named Taea , is found in six of the surviving texts , fully half of the corpus that is indisputably authentic and in good condition , presenting this figure , who is supposed to have murdered his wife , as one of the most important protagonists in the Rapa Nui tradition . Yet there is no such Taea in the surviving Rapa Nui oral literature . This ligature for Taea is the one that was identified by Harrison as a marker for dividing lists , and found by Barthel to have parallels on yet other texts in the forms 380 @.@ 1 @.@ 3 and 1 @.@ 3 . However , despite the parallel content of these texts , de Laat 's translations of them are quite divergent , because his purely phonetic reading does not allow him to read 1 @.@ 3 as " Taea " . The participants in the dialogues must therefore be different , and de Laat 's segmentation of the texts is " unstable " . There are also fatal grammatical errors , and readings that turn out to be post @-@ colonial Tahitian loans . In response to such criticism , de Laat has begun to " substantially revise " his translations .