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# Charting the Unknown: Alice Kober, Her Phonetic Chart, and the Decipherment of Linear B

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***Abstract:** This paper analyzes a phonetic chart of Linear B symbols found in the notebook of Dr. Alice E. Kober to determine how accurately she identified phonetic relationships between the signs and how this chart influenced Michael Ventris's later decipherment. Of the 87 signs in Linear B, only twenty signs were plotted on Kober's chart, only ten of which were published in her 1948 article, "The Minoan Scripts: Fact and Theory". The remaining ten signs were written tentatively in pencil and remained unpublished. The only notes about how Kober created these charts were three assumptions she published in the article above, but no explanation was given about the remaining ten signs on her chart. By looking at the current, accepted phonetic values of each sign, I will identify possible reasons behind the placement of certain signs relative to others and the accuracy of Kober's analysis. Then, I will examine some of Ventris's phonetic charts and writings to understand how Kober's work impacted his decipherment of Linear B. Ultimately, I will argue that although Kober's published chart was fairly accurate in the few signs she plotted, Ventris decided to identify the phonetic values himself. In doing so he would adopt Kober's grid layout, her use of alternate spellings, and her theory of how language inflection showed itself in syllabary scripts to create his own phonetic charts until his final decipherment of Linear B in 1952.*

## INTRODUCTION

On the island of Crete, Sir Arthur Evans found three main scripts during his archeological excavations: Cretan Hieroglyphics, Linear A, and Linear B. During the 1930s and 1940s, many scholars were working on the decipherment of these languages, including Sir Arthur Evans, Emmett Bennett, Michael Ventris, and Alice E. Kober. Although many had attempted to create a sign list, Dr. Kober at Brooklyn College was the first to create a phonetic chart. In this chart, the signs of the same consonant were placed in the same row and the signs of the same vowel in the same column to show the possible phonetic relationships. In 1948, she published a tentative phonetic chart, which plotted the relationships of ten signs. However, in a Brooklyn College notebook, Kober worked on a larger phonetic chart where she could add and rearrange signs where she saw fit. By analyzing the inflection and alternate spellings of Linear B words, she identified signs with similar consonants or similar vowels. Although Kober made no attempt to guess the phonetic values, she identified phonetic relationships with great accuracy. Michael Ventris would see the published version of this chart, adopt its layout, and eventually use Kober's methods to create his own phonetic charts until he finally deciphered Linear B in 1952. Such an accomplishment would not have been possible without her contribution, even though she would not live to see it.

## INFLECTION

The first discovery Dr. Kober made that would allow her to begin identifying phonetic relationships was the use of inflection in Linear B. Inflection is when words in a language change depending on their grammatical function. For example, in Greek, the word λόγος would remain λόγος if it were the subject of a sentence, but it would change to λόγον if it became the direct object. In 1945, Kober published her first article on inflection in Linear B, stating that "If a language has inflection, certain signs are bound to appear over and over again in certain positions

of the written words, as prefixes, suffixes or infixes.”<sup>1</sup> A year later, she published another article, elaborating on the use of inflection of Linear B. According to this article, if a certain group of signs appears regularly as a word ending, then the word ending might be common for a particular type of noun and case.<sup>2</sup>

Using these this theory, Kober was able to identify three possible cases for nouns, shown in figure 1 in the Appendix. These cases would become known as “Kober’s Triplets.” In figure 1, each column represents the same word in different cases, and each row represents a different word in the same case. The first few letters are the same down each column, and the suffix appears to begin with the last or second to last sign. Using this information, Kober would create three assumptions for her first phonetic chart.

### **KOBER’S ASSUMPTIONS**

Using her triplets, Kober made three assumptions:

1. Linear B “is a simple syllabary each of whose phonetic signs represents a consonant-vowel combination, with the possibility that either may be zero, that is, that pure consonant or vowel signs are possible.”
2. The stem of her triplets “includes the initial consonant of the penultimate signs of ‘cases’ I and II, and the final signs of ‘case’ III.”
3. The each of the words she was analyzing “belong to the same ‘declension’ and that the vowel following the last consonant of the stem is the same for all of them in ‘cases’ I and II, and changes to another vowel, which is the same for all, in ‘case’ III.”<sup>3</sup>

Assumption 1 had already been concluded by Linear B scholars by the time Kober was writing her article due to the number of signs. Different types of writing systems often have around the same number of signs regardless of the language being written. Alphabets, like the Latin alphabet used in this paper, generally have 20-40 signs, and each sign represents one sound. In syllabaries such as Linear B, signs represents syllables rather than individual sounds. Syllabaries tend to have around 80 different signs, with open syllabaries (which follows a consonant-vowel pattern, represented as CV) having fewer signs than closed syllabaries (which follows a vowel-consonant pattern, represented as VC).<sup>4</sup> Logographic scripts, such as Mandarin, can require thousands of signs since each sign represents a concept, object, or idea rather than a sound.<sup>5</sup> Kober and other scholars had already identified Linear B as an open syllabary script because it has 89 signs and open syllabaries are more common than closed ones.

Assumption 2 was derived from Kober’s theory about inflection. She believed that the ending used to indicate inflection began with the vowel in the penultimate sign or the final sign for case III. When looking at words with several syllables in Greek, the final syllables have

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<sup>1</sup> Kober, A. E, “Evidence of Inflection in the ‘Chariot’ Tablets from Knossos,” *American Journal of Archaeology* 49, no. 2 (1945): 143–144.

<sup>2</sup> Kober, A. E, “Inflection in Linear Class B: 1-Declension,” *American Journal of Archaeology* 50, no. 2 (1946): 270.

<sup>3</sup> Kober, A. E. “The Minoan Scripts: Fact and Theory.” *American Journal of Archaeology* 52, no. 1 (1948): 98.

<sup>4</sup> Joann Guilizio in discussion with the author, April 19, 2016.

<sup>5</sup> Robinson, A., *Lost Languages: The Enigma of the World’s Undeciphered Scripts*, (New York: Thames & Hudson, 2002), 41.

special names, with the last syllable being the ultima, the second to last being the penult, and the third from last being the antepenult. For example, in the word “university” (“u-ni-ver-si-ty”), the “ty” would be the ultima, the “si” would be the penult, and the “ver” would be the antepenult. With this assumption, if the ending of a word changed the vowel of the penult sign, then there would be a completely new penult sign. Ideally, signs in syllabaries each have their own combination of consonants and vowels. If you change only the vowel and not the consonant, this usually results in a completely new sign.

Assumption 3 was based off a trend seen in languages such as Greek and Latin, where nouns of a similar declension have similar endings for the same case. For example, in Latin, *fama* and *puella* are both first declension nouns, because their genitive forms, *famae* and *puellae*, end with –ae ending. However, words such as *amīcus* and *numerus* are both second declension, because their genitive forms, *amīcī* and *numērī*, end in –ī.

If the endings are the same in each case, and if the ending begins with the vowel and consonant remains the same, one can begin to identify phonetic relationships in Kober’s table in figure 1. Looking at row one, the ultima stays the same while the penultimate changes. If Assumption 2 is correct, then all the vowels in the penultimate signs across row I would be the same, and the difference in sign would indicate different consonants. In column A, the third sign stays the same in case I and II, and changes in case III. If Assumption 3 is correct, then the consonant for the third sign in case I and II should be the same as the final sign in case III, and only the vowel would be changing. With these phonetic relationships in mind, Kober created her phonetic chart.

## KOBER’S PHONETIC CHART

Alice Kober published an “extremely tentative” phonetic chart in 1948, as shown in figure 2. Recently, another chart was found in one of Kober’s notebooks, housed in the Kober-Ventris Archive at the Program of Aegean Scripts and Pre-History. This larger chart contains 20 signs in total. The published section comprises the upper-left section of the chart, from V<sub>1</sub> to V<sub>2</sub> and from C<sub>1</sub> to C<sub>5</sub>. In figure 3, I have redrawn the chart and assigned each sign its phonetic value, as given by J. T. Hooker in his *Introduction to Linear B*, to identify how accurate Kober’s estimations were.

According to figure 3, the section that Kober had published was accurate in predicting similar consonants and vowels of those ten signs. Now that Linear B has been deciphered, one can identify V<sub>1</sub> as corresponding with *i*, V<sub>2</sub> with *o*, C<sub>1</sub> with *t*, and so on. Outside of this section, the accuracy of the phonetic relationships is much lower. Many signs did not fit in with all the other signs their row or column, but they shared a similarity with one or two signs close by. I have attempted to identify as many of these phonetic relationships as possible to identify Kober’s reasons for placing the signs in those specific areas.

### *Wa & Ja*

The first phonetic relationship I identified was between *wa* and *ja*, which Kober placed next to each other in C<sub>3</sub>V<sub>5</sub> in figure 3. Both *w* and *j* are considered glides, which are sounds that occur naturally between vowels. For example, in the word “iota”, there is a faint “j” sound

between the “i” and the “o”.<sup>6</sup> Since Linear B is an open syllabary system, glides are often put in place of the consonant in words with vowel clusters.<sup>7</sup> A sign with the consonant “j” would be inserted after sign with the vowel “i”, and a sign with “w” would be inserted after a sign with “u”.<sup>8</sup> For an example, *di-u-ja*, the name of a goddess, could also be spelled as *di-wi-ja*, with a glide inserted between “i” and “u”.

However, since Kober did not know the phonetic values of the signs, it would be difficult to determine if she placed these signs next to each other for this specific reason. It could be likely that she noticed certain signs being changed into *ja* and *wa*, and she assumed they had a similar cause for the change. Whether or not she actually knew these signs had glides in them cannot be determined.

### *Wi & U*

As mentioned earlier, “w” and “u” have a close relationship due to “w” being a glide, but when Linear B was finally deciphered, “w” and “u” were revealed to have a much closer relationship in the script. Just like “w” is inserted into vowel clusters in after a “u”, a “u” is inserted into consonant clusters in front of “w”. These inserted vowels are often called “dummy vowels”, and they usually match the next vowel in the word (or the preceding vowel if inserted at the end). In the specific case of “w”, the dummy vowel prefers to take a “u”. Occasionally, the vowel before a “w” is changed into a “u” despite a vowel already being there, as seen in *pa-ra-ku-we* (also spelt *pa-ra-ke-we*).<sup>9</sup>

Despite this close phonetic relationship, there is no sign combining the consonant and the vowel together into *wu*. Instead, the syllable would be spelled with a *u* or with another sign that starts with a “w”, such as in *o-u-ru-to*. Ventris transcribed this word as “ho wruntoi”, which would have been spelled *o-wu-ru-to*, with a dummy vowel after “w” and the “n” omitted.<sup>10</sup> When the sound “w” later evolved into a digamma, the letter could still be replaced by a “u” when it was positioned in front of a “jo” or a “ja”.<sup>11</sup> Kober most likely noticed the *u* replacing specific signs, and placed it in their consonant row.

### *Te & Ta*

Kober placed *we* and *ta* in *V*<sub>4</sub> and *ja/wa* and *te* and *V*<sub>5</sub>. This switch in vowels can be easily explained by *te* and *ta* being similar endings to the same word. According to J.T. Hooker, *te* is the masculine nominative dual ending (used when the subject of the sentence is in a pair) and *ta* is the masculine nominative plural ending (used when the subject of the sentence is a group of three or more).<sup>12</sup> Without a numerical or pictorial way of indicating whether an object is in pairs or groups, it would have been difficult for Kober to fully identify the specific case,

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<sup>6</sup> In linguistics, a *j* can represent the sound of a *y* (as in yes or yak). In my paper, I chose to use *j* because most of my sources used *j* instead of *y*.

<sup>7</sup> Hooker, J.T., *Linear B: An Introduction*, (Bristol, England: Bristol Classical Press, 1980), 50.

<sup>8</sup> Ventris, M. & Chadwick, J., *Documents in Mycenaean Greek*, (Cambridge: University Press, 1959), 44.

<sup>9</sup> Sihler, A., *New Comparative Grammar of Greek and Latin*, (Oxford: Oxford University Press, 1995), 23.

<sup>10</sup> Ventris, M. & Chadwick, J., *Documents in Mycenaean Greek*, (Cambridge: University Press, 1959), 79.

<sup>11</sup> Ruijgh, C., *Études sur La Grammaire et Le Vocabulaire du Grec Mycénien*, (Amsterdam: Adolf M. Hakkert, 1967), 25-26.

<sup>12</sup> Hooker, J.T., *Linear B: An Introduction*, (Bristol, England: Bristol Classical Press, 1980), 59.

number, and gender in order to compare the suffix with other endings and clarify the phonetic relationship.

However, it is also interesting to note that “a” and “e” often get switched in Linear B and later Greek. Nicholas A. Massouridis wrote that “The interchange of the vocal sounds  $\alpha$ - $\epsilon$  is frequent in ancient Greek.... It is not therefore unreasonable to assume that a sign of Linear B which renders a syllable  $-\epsilon$ , sometimes corresponds to a Greek syllable with  $-\epsilon$  and other times to a Greek syllable with  $-\alpha$ ” and vice-versa.<sup>13</sup> Without knowing the language, this could have added confusion to identifying the phonetic values of the vowels, but the degree to which this impacted her analysis is unknown.

### *Nu & Nwa*

Although Linear B is mostly an open syllabary, there are a few signs which contain consonant clusters. One of these signs found themselves on Kober’s chart: *nwa*. Considering her first assumption predicted only CV, C, or V phonetic patterns with each sign, Kober might not have been expecting any sort of consonant cluster sign with the pattern CCV. However, these consonant clusters are not always used.<sup>14</sup> The scribes may use other signs with the regular CV pattern to write the syllable, such as in the word *e-nu-wa-ri-jo* (which could also be spelled *e-nwa-ri-jo*). Kober must have taken note of this and placed it in the same consonant row as *nu*, but by including *nu* and *nwa* to V<sub>2</sub> in pencil, rather than under a different vowel column or writing them in pen, shows she was uncertain of the phonetic relationship to the other signs charted.

## IMPACT ON THE DECIPHERMENT

While Alice Kober did not fully decipher Linear B, her work was a major step in the right direction. In *Documents in Mycenaean Greek*, Michael Ventris credited Kober with many accomplishments: working with John Myres to create a systemic classification of Linear B tablets, showing that the language had inflection, creating a phonetic chart of “fundamental importance throughout the process of decipherment”, and the gender forms of the word “total”.<sup>15</sup> Ventris set up his own phonetic charts with the same layout as Kober’s, with consonants in rows and vowels in columns. In *The Decipherment of Linear B*, John Chadwick also mentions Ventris’s charts and his process of analyzing phonetic relationships. He wrote that, “[Ventris] makes it plain that the first step must be to establish the relationships between alternating signs, independently of the phonetic values” and that everyone else had “concentrated attention on finding phonetic values” rather than look for patterns in the signs themselves<sup>16</sup>

Kober refused to assign phonetic values to her chart, and Chadwick indicated Ventris followed a similar practice. However, Chadwick failed to mention that almost all of Ventris’s phonetic charts (with the exception of the phonetic chart from Work Note 15) included attempts to assign phonetic values. In her book on the discovery and decipherment of Linear B, *The Riddle of the Labyrinth*, Margalit Fox claimed that 70% of his assigned phonetic values in his grid from Work Note 1 were wrong. However, she also notes that “what is truly significant is

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<sup>13</sup> Massouridis, N. A., *Linear B: A New Outlook, Book 1: An Analysis of the Method of Decipherment, Theory, Reading and Interpretation of Tablets*, (Athens: Kapon Editions, 2005), 63-64.

<sup>14</sup> Sihler, A., *New Comparative Grammar of Greek and Latin*, (Oxford: Oxford University Press, 1995), 23.

<sup>15</sup> Ventris, M. & Chadwick, J., *Documents in Mycenaean Greek*, (Cambridge: University Press, 1959), 15-17.

<sup>16</sup> Chadwick, J., *The Decipherment of Linear B*, (London: Cambridge University Press, 1960), 48.

that they helped speed the decipherment despite the fact that they were only partially correct”.<sup>17</sup> I doubt that Dr. Kober, who wrote that her work was “extremely tentative”<sup>18</sup> and refused to assign phonetic values even in her private notebook, would have made these attempts often enough to make as much progress as Michael Ventris had.

In the same book, Chadwick claimed that Ventris used alternate spellings, especially those caused by inflection, to find phonetic relationships and decipher the language. He mentioned that “Miss Kober already found some examples [of word variations] and suggested that they represented inflexion” and that “Ventris was able to go far beyond her observations and distinguish various types of inflexion”.<sup>19</sup> However, Chadwick failed to note that in 1948, Michael Ventris sent Dr. Alice Kober a six-page letter, arguing that he didn’t believe the alternate spellings indicated inflection. Instead, he argued that the change in endings were “alternative name-formations” and that Etruscan, the language he believed at the time Linear B was related to, showed no sign of inflection.<sup>20</sup> Despite this argument, Ventris eventually accepted the theory, for in August 1951, he created a list of 159 words from Pylos and Knossos tablets that might have shown inflection. Ventris made no assumption that they were all correct, but he assumed that some were more likely than others.<sup>21</sup>

## CONCLUSION

Years after her death, John Chadwick described her work as “partial, but none the less a real step forward.”<sup>22</sup> This is an understatement. By using inflection of Linear B, Alice Kober was able to plot a few Linear B signs fairly accurately. Once Ventris adopted her methodologies, he was able to make remarkable progress in his decipherment as well. Despite her hard work, Ventris didn’t include the actual information she plotted, but that seems like a logical choice. When deciphering a language, Ventris would need to find the values of each sign himself because if Kober was wrong, that would hinder his own progress. Without Kober’s analysis, there would not have been a decipherment of Linear B. Unfortunately, Alice Kober passed away in 1950, two years before Linear B was finally deciphered.

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<sup>17</sup> Fox, M., *The Riddle of the Labyrinth: The Quest to Crack an Ancient Code*, (New York: Harper Collins Publishers, 2013), 225-228.

<sup>18</sup> Kober, A. E. “The Minoan Scripts: Fact and Theory.” *American Journal of Archaeology* 52, no. 1 (1948): 98.

<sup>19</sup> Chadwick, J., *The Decipherment of Linear B*, (London: Cambridge University Press, 1960), 54-55.

<sup>20</sup> Michael Ventris in letter to Alice Kober, May 23, 1948.

<sup>21</sup> Chadwick, J., *The Decipherment of Linear B*, (London: Cambridge University Press, 1960), 55-56.

<sup>22</sup> Chadwick, J., *The Decipherment of Linear B*, (London: Cambridge University Press, 1960), 35.

Appendix

Figure 1. Source(s): Kober, A. E. "The Minoan Scripts: Fact and Theory." *American Journal of Archaeology* 52, no. 1 (1948): 97.

	A	B	C	D	E	F
Case I						
II						
III						

Figure 2. Source(s): Kober, A. E. "The Minoan Scripts: Fact and Theory." *American Journal of Archaeology* 52, no. 1 (1948): 98.

Consonant	Vowel 1	Vowel 2
1		
2		
3		
4		
5		

Figure 3. Kober's chart redrawn by Author. Each column represents a vowel and each row represents a consonant. The signs in rows C<sub>1</sub> to C<sub>5</sub> in columns V<sub>1</sub> and V<sub>2</sub> were all written in pen. Signs *u*, *we*, *ja*, and *wa* were also written in pen. The remaining signs were written in pencil to allow for later change.

	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	V <sub>4</sub>	V <sub>5</sub>
C <sub>1</sub>	ti	to			
C <sub>2</sub>	si	so			
C <sub>3</sub>	wi	wo	u	we	ja wa
C <sub>4</sub>	ni	no			
C <sub>5</sub>	mi	mo			
C <sub>6</sub>			ta	te	
C <sub>7</sub>	nu	nwa			ka
C <sub>8</sub>	ri				ri

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