The Notion of Syllable across History, Theories and Analysis

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Edited by

Domenico Russo

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PREFACE

DOMENICO RUSSO

This book is a collective investigation about the notion of syllable carried out according to four points of view: historical, descriptive, analytical-instrumental and theoretical, and all that is necessary to say on this topic is already stated by the authors of the chapters.

The reason for that investigation lies in the fact that there are different remarkable perplexities emerging nowadays about some of the crucial points of linguistic theory, which particularly concern the notion of phoneme and, more generally, the bottom-up analysis schemes. That means, in other words, to bring into question both the status of minimal unit of linguistic systems and the methods of linguistic analysis.

In response to that, it has been supposed that syllabic phenomena are able to offer a good field for more fitting alternative solutions. The chapters of this book just try to give evidences to enhance the discussion of that hypothesis.

As any notion linguistically expressed, even a metalinguistic notion like the syllable is always the result of several different viewpoints. In order to take that into account, this book draws inspiration from the scheme of *quaternion* conceived by Sir William Rowan Hamilton and later introduced in theoretical linguistics by Ferdinand de Saussure.

The first term of our quaternion is given by the historical observations of Paola Cotticelli Kurras (*The Syllable in Syntagmatic and Paradigmatic Perspective: Cuneiform Writing in the II Millennium B.C. in the Near East and Anatolia*), Carlo Consani (*Syllables and Syllabaries. Evidence From Two Aegean Syllabic Scripts*), Giovanna Marotta (*Syllable and Prosody in Latin Grammarians*), Claudia Crocco (*Definitions of Syllable in Italian Grammars: A Brief Historical Survey*), Nicolas Ballier and Véronique Pouillon (*Syllabification in Thomas Sheridan's* General Dictionary of the English Language – *1780*), which are collected in the Part I – *The Dawn of the Syllable*.

The second term is made up of different descriptive analyses of the syllable carried out in some particular languages and dialects. Part II – *Beyond the Sound of Syllables* gathers together the chapters by Bahareh

Soohani and Marc van Oostendorp (*The Syllable Structure of Imperatives in Sarhadi Balochi of Mirjaveh: Some Thoughts on the Interface with Morphology*), Marilisa Vitale, Elisa Pellegrino and Anna De Meo (*Overlooking The Syllable. A Study on Interlanguage Rhythm*) and Domenico Di Russo (*The Syllable as a Sense*). The Part III – *The Syllable in Its Diatopic Variability* includes the chapters by Edoardo Cavirani (*Carrarino's Syllabic Structure*), Giovanni Abete (*The Role of the Syllable in the Metathesis of /r/ in Neapolitan*), Rosangela Lai (*Lateral Relations in Sardinian Metathesis: A Unified Account*) and Diana Passino (*Is Strict CV Just a Notational Variant of Classical Syllable Theory? A Contribution From the Italian Peninsula*); while the Part IV – *Syllables in Contact* consists of the chapters by Elise Ryst and Erwan Pepiot (*How do Parisian French and American English Speakers Prefer Parsing CVCV Words? A Perceptual Experiment to Test the Effects of Linguistic Context and L2 Exposure*) and Marta Maffia, Massimo Pettorino and Anna De Meo (*To Mumble or Not to Mumble. Articulatory Accuracy and Syllable Duration in L2 Italian of Senegalese Learners*).

The third term, analyzed in the Part V – *The Body of Syllables*, presents the analytical-instrumental chapters by Philippe Martin (*Syllables, Prosodic Structures and Brain Waves*), Francesco Cutugno, Antonio Origlia and Valentina Schettino (*From Theory to Applications, the Syllable Connection*), Massimo Pettorino, Elisa Pellegrino and Marta Maffia (*From Syllables to VtoV: Some Remarks on the Rhythmic Classification of Languages*), Paolo Bravi (*Sung Syllables. Structure and Boundaries of the Metrical Unit in Sung Verse*), Ferdinando Longobardi and Ugo Cesari (*The Syllable in the Phonetic Range of Laryngectomee Speakers. Some Spectrographic Evidence*).

The fourth term, represented by the Part VI – *De Syllaba Ventura*, proposes the theorethical considerations of Katarzyna Dziubalska-Kołaczyk (*On the Epiphenomenal Status of the Syllable in Phonology: An Alternative Proposal*), Federico Albano Leoni (*The Boundaries of the Syllable*), the editor of this book (*The Syllables of Adriano. Seven Notes on the Ontogenesis of Language*), Patrizia Laspia (*The Definition of Syllable in Aristotle's Poetics*) and Jacques Coursil (*The Saussurian Theory of the Syllable*).

It is always the reader that makes the sense of a text, so it is even the reader that will fix which representation of the syllable could be determined through the chapters of this book. For the accomplishment of that recognition, the Part VII – *On and Around the Notion of Syllable. A Bibliographical Review*, prepared by Domenico Di Russo starting from the bibliographical references of the chapters, offers a valuable support.

Finally, it is just Domenico Di Russo that the editor and all the authors deeply thank for his generous dedication to all the stages of the conception and the realization of the book.

PART I.

THE DAWN OF THE SYLLABLE

CHAPTER ONE

THE SYLLABLE IN SYNTAGMATIC
AND PARADIGMATIC PERSPECTIVE:
CUNEIFORM WRITING IN THE II MILLENNIUM
B.C. IN THE NEAR EAST AND ANATOLIA

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1. Metalinguistic Introduction

The term "syllable" first finds its encoding as a technical term in the linguistic sense in the work of Aristotle (Poetics XX, 1456b, 34-37), who calls it «(a syllable is) a non-significant sound, compounded of a stop and a voiced element». (Συλλαβὴ δέ ἐστιν φωνὴ ἄσημος συνθετὴ ἐξ ἀφώνου καὶ φωνὴν ἔχοντος· καὶ γὰρ τὸ ΓΡ ἄνευ τοῦ Α συλλαβὴ καὶ μετὰ τοῦ Α, οἷον τὸ ΓΡΑ).[1]

This definition is a good starting point for some basic thoughts about some relationships between the phonological and the written syllable that still remain unexplored in the cuneiform documents of the second millennium B.C.E: what is the difference between the syllable identified by the syllabogram through the expression "syllabic script" as it is characterized in Cuneiform or Linear B syllabary, and its meaning at the phonetic or, better, the phonographic level? What is the relation between the phonosyllable and the graphosyllable?

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[1] The text and translation are by Halliwell 1995: 98-9. Halliwell's passage agrees with Kassel's edition, though he notes that the Arabic version doesn't consider ΓΡ as a syllable. Kassel puts two *cruces* after Α † and καὶ †. For a further discussion of this passage s. Melazzo, 2003: 52ff.

2. Per Signa ad Syllabam: the Genesis of Cuneiform Writing

The ideal way to define the concept of syllable both in the languages and in the writing systems of the second millennium B.C. is to start from Sumerian. In the third millennium B.C., Sumerian had a complex writing system, logographic and syllabo-/morphographic, where the "syllable" may coincide with the lexical morpheme and/or with a bound (grammatical) morpheme. Due to the process of development, the Sumerian cuneiform writing system ended up with large phenomena of polyphony and homophony, providing, in turn, a fertile ground for allography. This complex system was used in other languages, mostly Semitic (like Akkadian) and Indo-European (like Hittite). For this reason, during the second millennium B.C. we observe the emergence of a number of different 'cuneiform' traditions with individual peculiarities. About the end of the second millennium B.C. we also find the foundations of Semitic semi-alphabetical writing systems, which will eventually spread all over the Mediterranean in the first millennium. We must however start with the prehistory of writing, starting from the evaluation of those artifacts understood as symbols or marks affixed to surfaces for communicative purposes, which did not yet constitute a writing system and yet confirm the conventional nature of the relationship between sign and language.

2.1 Artifacts in the Prehistory of Cuneiform

The prehistory of the cuneiform writing system consists of the following artifacts, which are summarised in the following list:

I. The long first phase (from Neolithic to the II millennium B.C.) shows many *tokens* (coins) with different forms, which were employed for registering and calculations.[2] Some of them represent numbers, other ones objects.

II. The second phase shows *Bullae* as clay enclosures containing simple *tokens* (V/IV millennium B.C.), often together with cylinder seals and sometimes with signs on the surface.[3]

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[2] Schmandt-Besserat 1978: 15, and 1996. These artifacts have been found in a wide area between Turkey and the Indus valley in the period from IX to II millenium B.C.

[3] Schmandt-Besserat 1992.

III. In the third phase we find *Calculi* (Im'nah) and tablets. There is a short co-presence (3300 B.C.) of imprinted tablets instead of or in conjunction with *bullae*, dealing with the same type of information for commercial purposes.

IV. The fourth phase corresponds to the invention of writing: first the tokens were no longer impressed on the bullae, but on a square surface of clay. Then the shapes of the tokens were drawn with a stylus and practice represented the first stage of writing with the introduction of pictograms. These pictographic signs, often abstract, were two-dimensional reproductions of the complex coins for which they were substitutes.[4] Sumerian writing begins at 3200 B.C. and shows in the early stage, ca. 900, signs which consist of geometric shapes like circles, triangles, lines and dots. They are also not pictographs, but abstract symbols to be learned by the scribes for cultural purposes. In the following paragraph we give an overview of the evolution of Sumerian signs.

2.2. Evolution of "Pictographic" Signs into Syllabogramms

As the following picture shows, the coding of the cuneiform writing system ever since Sumerian times clearly attests to the drafting of semiotic values in the graphical representation of the content, from its early pictographic phases along its development towards a logographic or morpho-syllabographic system.[5]

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[4] Sanga 2009: 45; Schmandt-Besserat 2009: 72-8: «The substitution of signs for tokens was no less than the invention of writing».
[5] Milano 1995.

Figure 1. Evolution of Cuneiform Signs.

In this process it is necessary to distinguish the level of the phonological expression vs. the level of the graphic expression → referent, which implies a development of the phonological level in interrelation with the graphic expression vs. the referent.

Content	
Phonological level of expression	Graphic level of the expression → referent

The cuneiform writing system of the second millennium B.C. undergoes many processes from pictographic signs with logographic values to syllabic cuneiform with phonetic value. We try to sketch them in the following:

Figure 2. From Pictographic Signs with Logographic Values to Syllabic Cuneiform with Phonetic Value.
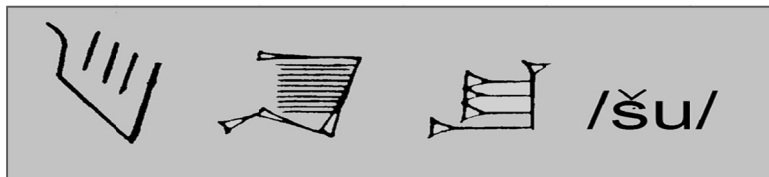
From the Sumerian time to the Babylonian, the number of signs decreased from about 1200 to about 600, through the convergence of similar signs into a single one.

A gradual stylization of the pictograms and their transformation in cuneiform also took place, mainly caused by the change of the writing instrument. Further, a change of 90 degrees in the orientation of the signs and in the general direction of the writing strongly modified the syllabary.

Assigning a phonetic value to pictograms corresponded to the birth of the writing system. The pictograms, which generally have a simple syllabic skeleton (CV, VC) due to the monosyllabic word structure which was typical for Sumerian, resulted in a polysemy and polyphony in the written Sumerian language. Both the logograms and the most of the phonetic values of the syllabic signs continued to exist in the writing system when it was passed to the Semitic languages in the II millennium B.C.. This fact promoted the diffusion of the writing system in the Ancient Near East.[6]

The development of cuneiform from a logographic system into a syllabic one also enabled the system itself to express abstract concepts and words which had no concrete correspondence in denotates or real entities, such as grammatical or syntactical connections or verbal forms. Cuneiform became in this way the writing tool of other neighbor languages such as Eblaite, Akkadian, Elamic, Hurrian, Ugaritic (with a proto-alphabetic version of the system), Hittite and other Anatolian languages of the second millennium, promoting its spread throughout the Near East.[7]

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[6] Glassner 2003, Borger 2004.
[7] See Milano 1995.

3. Semasiography and Glottography[8]

Analysis of the development of cuneiform allows us to classify its stages as semasiographic and glottographic. A semasiographic system represents conceptual structures directly by images or conventional symbols. These images are not linguistic elements such as words or syllables and therefore are independent from the language used. A glottographic system builds up individual linguistic units, words, syllables, morphemes, phonemes. Such a system is characterized because it is read; that is to say, it is realized consistently all the way through a phonetic realization.

Dwelling on the glottographic system[9], we will focus on the different degrees of articulation and on the different components of it (phraseography, logography, morphography, syllabography and alfabetography). In order to present the different levels of the analysis, we introduce a distinction between a plerematic and a cenematic level.

The **pleremic** level is dealing with the representation of linguistic units that have the character of "signs". We can distinguish under:

– Phraseography: graphical representation of groups of words through phraseograms;
– Logography: graphical representation by logograms;
– Morphography: graphical representation by morphograms (like Sumerian).

The **cenemic** level **deals** with a phonographical interpretation of writing, distinguished in:

– Syllabography: a system whose units (syllabograms) represent syllables (like in Hittite, Akkadian).
– Alphabetography: alphabetic writing systems, whose features are the representation of phonological segments (like the Ugaritic and Greek alphabets)[10].

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[8] We refer here to the distinction in the two different types of writing as "semasiographic" and "phonographic", introduced by Gelb 1963[2]; but the latter term has been replaced by Pulgram 1976 by "glottographic". See also Haas 1983: 28f.

[9] About this term see Pulgram 1970, further Haas 1976 and 1983, Pulgram 1951.

[10] Haas 1983:27, pointed out that the old writing systems in Near East were strongly pleremic and showed no spontaneous tendency to change into cenemic

Based on the perspectives considered above we will touch on the strictly phonological level of the syllable in the writing system of the Hittite language. Through a comparison with the Anatolian hieroglyphic system used for the Luwian language we collect useful information not only on the application of the principle of acrophony in the formation of syllabaries, but also on the phonographic level as an indicator of articulatory aptitudes within the specific language. The analysis arrives finally at a tassographical-level solution to the rules underlying a particular language, as implemented at the base level of words.

4. Hittite Cuneiform Writing System

4.1. Historical and Geographical Data

The archives of Boğazköy/Hattuša contained numerous Hittite texts, ranging from the XVI to the XIII century B.C., the oldest from XVI century, the youngest from XIII century. Furthermore they also conserved tablets written in Palaic, Cuneiform-Luwian, Hattic, Akkadian and Hurrian languages. The cuneiform system used for the coding of all these texts in different languages is very similar, but it also reveals some differences. In any case, we can conclude that the Hittites adopted the writing system by means of Hurrian scriptoria. It was not adapted directly from the Semitic peoples settled in Anatolia in the so-called Cappadocian colonies, a place of exchange set up by the Assyrian merchants.

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systems. The stimulus came through «the borrowing of a pleremic script – that is, its adoption by a language for which it had not been designed».

Figure 3. Chronological Table about the Attestation of the Hittite Literature.

Figure 4. Geographical Expansion of the Hittite Empire.
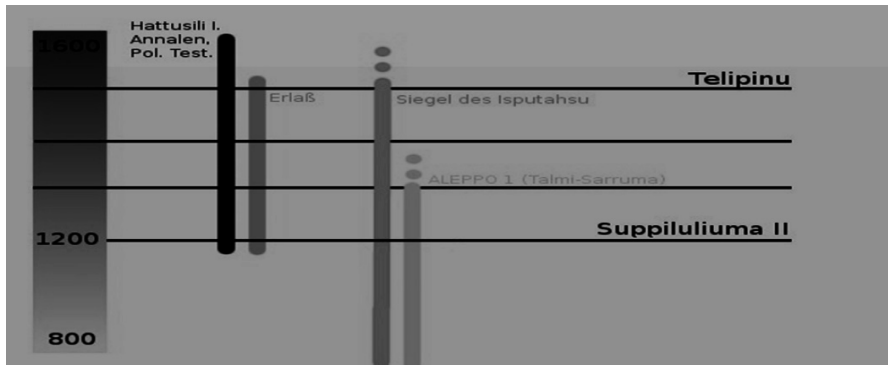

Let us now turn to a description of the paradigmatic aspects of Hittite cuneiform, describing the types of signs used.

4.2. Hittite Cuneiform in a Paradigmatic Perspective: Typology of the Hittite Syllabograms[11]

The Hittite cuneiform system includes approx. 380 signs that differ functionally according to their use. They can be:

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[11] We refer to Rüster-Neu 1989.

– Phonetic signs, or syllabograms, such as /TA/ with Hittite phonetic value /ta/;
– Logograms (Sumerograms and Akkadograms), such as respectively GIŠ "wood" and *Ú-UL* "denial 'not'", of which the akkadograms have the prevailing Akkadian phonetic value, while the Sumerian ones more often have the Hittite phonetic value;
– Determinatives (Sumerograms), which act as semantic classifiers, as ^DUTU, where ^D = DINGIR, "god", always with the name of a deity and which has a Sumerian phonetic value according to our convention; UTU is the name of the solar deity, which corresponds to Hittite *Sius*, < ie. **di̯ĕu-s* "god".

4.2.1. Structure of the Hittite Syllabary

A syllabic sign in Hittite cuneiform displays the following syllable structures: CV; CVC; V; VC, like /ta, pat, a, at/ etc.

As we pointed out, the different value of a sign depends on its glottographic function, which may be, within the functional composition of the syllabary, that of:

– syllabograms;
– logograms (Sumerograms and Akkadograms);
– determinatives with both semantic and grammatical value;
– phonetic complementizers.

In the following table we show that in Hittite syllabary some signs /an/ synchronously present a certain polysemy. This phenomenon is to be explained through the history of the diachronic evolution of the sign /AN/ in the Sumerian semantic meaning "god [DINGIR], star [AN]", and with the phonetic value Akkadian /il/, Hittite /an/:

Figure 5. Description of the Sign by Rüster-Neu 1989: 93 f., number 8.
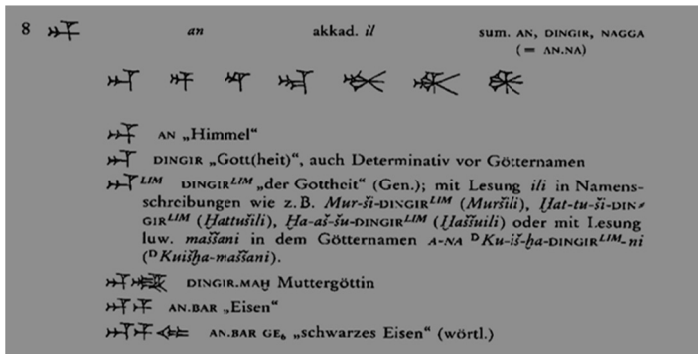
In order to describe the structure of the signs in the Hittite syllabary, we introduce some tables with matrix representations of the signs belonging to the coordinates CV (1), VC (2) and CVC (3):

Structure CV

Figure 6. The List is from Rüster-Neu 1989: Anhang 1., p. 378.

Structure VC

Figure 7. The List is from Rüster-Neu 1989: Anhang 2., p. 379.

Structure CVC: Some Examples

We point out that most of these CVC signs are employed in akkadographic writings or in geographical or proper names (ie. *A-mur-ru*, *Aš-šur*). The way they occur has not yet been thoroughly investigated.

Table 1. Some CVC Signs.

tar	kal	man	tap/b	pát	ták/dag	mah	haš
mar	šal	nim (hurr.)	hub	kat	sag	tah	šeš
kar	hal	kán	ban/p	rad			meš
har/hur/mur	kul	nam	t/dub/p				kiš
pár/maš	b/pal	dam	hab/p				liš
šar	túl	zum					d/tiš d/táš
šur	kal	lam					
gur, kùr	gal (kál)	lum					
dur	hul	tin					
nir	lal	kam					
bur/pur							
kur							
tir							

4.2.2. Evaluation of the Distribution of Some CVC Signs and Their Variants

In order to better describe the use of the CVC-signs, we present in the following paragraphs an analysis of the distribution of two of them, /kan/ and /pat/, and their alternative writing possibilities (i.e. /ka + an/ or /pa + at/). These signs have been chosen because they represent closed syllables which end respectively with a stop and with nasal. We point out that right up to today there is no analysis of the use and distribution of all the signs, even though some collections can be found in the vocabularies.[12]

4.2.2.1. The sign /PAT/, /pat/ also read as /pit/, has been analysed in different positions in the word.

We can here summarise some results of the first systematic research:

1. The sign /pat/ seems to be used in words beginning with the phonetic cluster /pt°/. In this case we never find the alternative writing with two signs CV VC (/pa-at/). A clear example to describe this fact is the word for "wing", which has a good etymology from the root *pet-*, to fly, cf. gr. *pteron*.

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2. Only the writing /pa-at/ /pi-it/ can be found in words such *apāt* Nom.-Acc.Sg.n. from *āpa-* 'that': *a-pa-(a)-at* (partially *plene* written).

3. When a phonetic chain like CVC occurs we can find both realizations, with a CVC-sign and with a CV + VC sign combination: the example of the word (GI/GIŠ)*paddar-* 'basket' shows both ways of writing it since Old Hittite times. The CVC-sign is more often employed, the CV-sign is only Old Hittite and marks the differentiation from the writing of the word ᵁᶻᵁ*pattar-* 'wing', which is always written with the CVC-sign.

4. A further orthographic differentiation is working as a phono-glottographic distribution when the scribe wanted to differentiate two languages, namely Luwian and Hittite. The word *paddur-* 'mortar' is written *pat-tur*, but the Luwian Abl./Instr. is *ba-at-tu-na-a-ti*.

4.2.2.2. The typology of the writing of the syllable /KAN/ is wider because we find different signs as variant writings.

1. The sign combinations -KA-AN-, -GA-AN-, -QA-AN- have been found in verbal forms in the following cases:

1.1. The stems that end with /°k/ show the following forms of the 3.Pl.Ind./Imperativ; Participle; further *obliqui* cases of the verbal noun in –*ātar-*.

1.2. Other positions.

Example: Acc.Sg. *ḫatūkan* < *ḫatūka-* 'shocking, shock' < *$h_2$tug-o-*

Shows the variants /-KA-AN-/ and /-GA-AN-/;

The endingless Locative *tagān* < *$d^hg^{\prime h}\acute{\delta}m$* ← *tēkan-* / *takn-* 'earth' is written only with the signs -GA-AN-.

1.3. The forms of the 3.Pl. and of the participles of the *ḫatrae*-Verb classes whose stems end with a /°k°/ , like for istance: *mugān°* ← *mugae-ᶻⁱ* 'to call, to pray, to summon', are represented by the writings:

mu-u-ga-a-an[-*zi*]; *mu-ga-a-an-zi* (mh?/jS); *mu-ga-a-an-za* (oh.?/jS KUB 33.21 iii 19ᵖ),

mu-ga-a-an (mh./jS KUB 15.31 i 44ᵖʰ, mh./jS KUB 15.32 i 44ᵖʰ).

2. Consequent writings with the sign -KÁN- have been found in following cases:

2.1.1.1. The stems that end with /°k-/ show the following forms of the 3.Pl.Ind. /Imperativ:

ḫarkan° < *? ← *ḫar(k)-zi* 'to keel, have';

ḫar-kán-°: 3. Pl. Ind. *ḫar-kán-zi* (ah.); 3 Pl. Imperativ *ḫar-kán-du* (mh.).

2.2. *Other* Positions.

Nom.-Acc.Sg.n. *tēkan* < **dhéhom-* ← *tēkan-* / *takn-* 'earth'

Nom.-Acc.Sg.n. *tuekan*, ergativ (?) *tuekkanza*< ← *tuekka-* n./c. 'body, body form'

tu-e-kán (1× jh.); *u-ek-kán-za* (1× oh.).

3. Different writings with -KÁN- / -KA-AN- / -GA-AN- / -QA-AN:

3.1. They recur in the following cases: the stems that end with °k- show the following forms of the 3.Pl.Ind. /Imperativ;

ḫarkan° < **ḫr̥g-e/ont-*, **ḫr̥g-ótn-* ← *ḫarkzi* 'to perish; destroy';

ḫar-kán-zi (mh.); *ḫar-kán-za* (ah./jS KBo 6.4 iv 25[p]);

ḫar-ga-an-na; *ḫar-qa-an-na*.

3.2. Other Positions.

Nom.-Acc.Sg. *ḫenkan* ← *ḫenkan-* n. 'death, illness' < **?* (accent?)

ḫe/i-e/in-kán:

ḫe-en-kán (jS); *ḫé-en-kán* (ah./jS); *ḫi-in-kán* (mh.; often);

ḫe/i-e/in-k/ga-an:

ḫe-en-ka-an (ah./mS); *ḫi-in-ga-an* (mh; jh.).

4. Alternation between -KÁN- / and -KA-N=A.

āškan 'gate' < **Hos-ko-* (?);

a-aš-kán° : *a-aš-kán*;

a-aš-ka-n= : *a-aš-ka-n=a=kán*.

We can sum up by saying that we can have a writing VC-CV instead of CVC when the underlying word contains a voiceless stop that is written by double/geminate spelling; and, further, when the writing distinguishes two different forms within the paradigm which overlap (participle and plural form).

4.3. Syntagmatic Aspects: Reproduction of Complex Syllabic Clusters

The Hittites had adopted a system of writing tailored to the needs of Sumerian, a type of language which was agglutinative and basically monosyllabic. The writing system was later remodelled for the western Semitic Babylonian and Akkadian languages, both of them being typologically (intro-)inflected languages with a phonemic system very different from those of the Indo-European ones. This writing system was somewhat unfit to render the characteristics of an inflected language like Hittite. This resulted in the fact that scholars have so far dedicated themselves to some aspects of historical graphematics, which we illustrate below:

- − reproduction of the opposition voiced/unvoiced stops;
- − reproduction of consonant clusters;
- − reproduction / s + C/;
- − the role of stress position in the word;
- − reproduction of vowels.

Syntagmatic Aspects: Phonological Level of the Syllable.

- − Structure of the syllable V, CV, VC, CVC (less often):
kar-ap-zi, *ka-ra-ap-zi*, *ka-ar-ap-zi /k/garptsi/.*
- − Phonetic value of the syllabogram:
Sign DA: Phonetic value /ta/ or /da/;
Sign TA: Phonetic value /ta/ or /da/.[13]

There is no coincidence between syllabograms and the syllables phonetically realized, since the writing induces the introduction of extra syllables: *ša-pa-an-ta-al-la / span°dal°la/i-* / <ie. **spond-*.

Before moving on to the syntagmatic aspects of the Hittite cuneiform system we want to give an overview of the phonemic system of Proto-Anatolian as a subgroup of the (Proto-) Indo-European language.

4.3.1. Phonemic System of Proto-Anatolian[14]

Table 2. Reconstruction of Proto-Anatolian Phonemic System.

stops	voiceless	p	t		k	k^w
	voiced/lenited	b	d	$\hat{g}$	g	g^w
fricatives	s					
affricates	t^s					
laringeals	ʔ /H_1	H_2	H_3			
liquides	l	r				
nasals	m	n				
vowels	i, ī		u, ū			
	e, ē		o, ō			
		a, ā				

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[13] See also Kloekhorst 2008: 21ff.

[14] We agree with the reconstruction by Kloekhorst 2008: 62-63, 65-101. We assume that Proto-Anatolian had 5 vowels, also /o/ and /ō/. The variant under the laryngeals /ʔ/ is here reproduced because in the followings examples we assume with Kloekhorst its reconstruction.

4.3.2. Sturtevant's Law/Rule

In terms of its writing system the Hittite cuneiform does not distinguish the voiceless from the corresponding voiced stops, that is to say, even when they have signs such as <da> and <ta>, they not use them for the proper phonographic performance; this we can know through one-by-one etymological comparison with other Indo-European words. The solution of a correct graphematic use and consequently also the right phonological reproduction lies in the use of such syllabograms: their different use and combination inside a word allows us to render correctly a simple or a double consonant, that is a voiced or a voiceless one.

A first explanation of the correlation between simple stop writing and voiceless phonemes goes back to Sturtevant 1932 and 1933, from which it took the name of the rule of Sturtevant.[15]

4.3.2.1. Exemplification of the Rule

The interpretation of the correlation between the simple writing of the consonant /pi, bi, ta/ and the double writing that is given by sequences like *ap-pa-* or *ek-ka-* etc. and the underlying phonetic reality rests exclusively in the confirmation of the etymology of the word.

Table 3. Examples of Different Realizations of Voiced and Voiceless Stops.

Hittite	Reconstructum	Stops	Graphic realisation
<a-ap-pa>	*$h_1op\bar{o}$ (gr. *apó*)	voiceless	Double: <°Vp-pV> for *p
<ne-e-pi-iš>	*neb^hes (ved. *nabhas*)	voiced	Simple: <°V-pV> for *b^h
<ú-i-it-ti>	*wet-i (loc. sg.)	voiceless	Double:<°Vt-tV> for *t
<a-da-an-zi>	*$h_1dénti$ (3. pl)	voiced	Simple: <°V-tV> for *d
<ú-e-ek-kan-zi>	*wek̑nti (3. pl)	voiceless	Double: <°Vk-kV> for *k
<i-u-kan>	*yugóm (lat. *iugum*)	voiced	Simple: <°V-kV> for *g

4.3.2.2. Exceptions to the Rule

This etymological evidence allows us also to recognize some exceptions to the rule:

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[15] See now the publication by Pozza 2011.