

# The Role of Graphemics and its Metalanguage: The Case of *Ductus*

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**Abstract:** The term *ductus* occupies a central yet conceptually unstable place in paleography and in the analysis of ancient writing systems. Although etymologically transparent, its usage varies widely across disciplines – from Hittology and Assyriology to Mycenaean studies and Latin paleography – shifting between a general meaning (“handwriting,” “script”) and a technical notion referring to the execution and rhythm of writing. Such overlapping uses have generated ambiguity and hindered precise analytical distinctions.

This paper surveys the principal definitions of *ductus* and highlights the inconsistencies that arise when mechanical parameters, spatial arrangement, and sign morphology are conflated under a single label. Building on Cammarosano’s proposal to distinguish *sign form* from *equilibrium*, it argues that separating micro-level sign construction from macro-level spatial and kinetic properties yields a more coherent descriptive framework. By situating these concepts within the broader intellectual lineage of *figura* and its *accidentia*, the paper shows how inherited categories continue to shape modern interpretations. A refined terminology, integrating scribal practice, tradition, and localization, offers a clearer basis for diachronic and comparative analyses.

**Keywords:** graphematic metalanguage, sign form, writing styles, scribal traditions, cuneiform writing

## 1. Introduction

The term *ductus* appears throughout dedicated literature dealing with a wide range of writing contexts and systems over time. Although its etymological meaning is straightforward, its usage oscillates between a general and a technical sense, leaving the latter often vague and poorly defined within many epigraphic and philological traditions. Its simultaneous employment in both broad (e.g., as a synonym for handwriting or writing in general) and narrow senses has further contributed to this opacity. Moreover, ‘ductus’ belongs to the domain of graphemic metalanguage, a field that is itself highly contested.

The present paper seeks to outline the problematic aspects surrounding the use of *ductus* and to assess their implications. After examining the various nuances, the term has acquired across different traditions and analytical perspectives, the aim is to promote a clearer and more consistent metalinguistic usage that can be applied across disciplines without generating additional terminological ambiguity.

## 2. Current definitions and state of the art

To set the framework of the discussion, it is helpful to review a selection of definitions of *ductus* drawn from reference works and handbooks. The first evidence derives from several lexical sources.

<https://doi.org/10.29091/9783752003642/002>

## 2.1 Lexica

The *Oxford English Dictionary* provides information about the period when the term entered the English lexicon and about how it acquired its specific meaning:

ductus in the non-anatomical sense (1699) was introduced in English around 1920 in the sphere of handwriting and calligraphy (OED, s.v.).<sup>1</sup>

Furthermore, a specialized lexicon of English terms in the field of paleography notes:

*duct*, or *ductus*: “In palaeography, ‘duct’ or *ductus* (the Latin meaning ‘leading’ or ‘conduct’) are terms used to denote the distinctive features of the strokes in a particular hand. These include the way ...”<sup>2</sup>

In German, the term *Duktus* is used according to *Grimm’s Wörterbuch* (DGW) as a loanword since 1642:

DUKTUS m. lehnwort aus lat. ductus m. vgl. ductus m. nur singularisch. charakteristische eigenschaft.  
a. charakteristische linienführung eines schriftsystems, einer handschrift: 1642 (der lehrer) zeige jhnen (den kindern) den ductum (des buchstaben i) samml. pädagog. schr. 10,27 I.  
1957 für die Handschriften der Gegenwart ist der zügige bis flüchtige Duktus die Regel Hager Grafologie 58. 1976 Duden wb. dt. spr. 2,578b.<sup>3</sup>

Furthermore, we quote from *Reallexikon der Assyriologie* (RLA) the article by Edzard devoted to the cuneiform writing system, and specifically the paragraph about ‘Duktus’. The term occurs only in the subtitle, but it is not employed in the following text.<sup>4</sup> The passage highlights that beyond individual sign forms, the overall visual impression of handwriting – such as spacing, inclination, and the extension or isolation of strokes – is a crucial parameter in paleographic analysis. It also notes that many writing traditions maintained a special, ceremonially used script differing markedly from everyday cursive, sometimes preserving

<sup>1</sup> “Ductus, N.” *Oxford English Dictionary*, Oxford UP, December 2024, <https://doi.org/10.1093/OED/2976192369>.

<sup>2</sup> Beal, 2008, *A Dictionary of English Manuscript Terminology 1450–2000*, s.v.

<sup>3</sup> <https://www.dwds.de/wb/dwb2/duktus> (The two other meanings are related to arts and a general sense of style of life)” (DWG online, s.v.).

<sup>4</sup> *RLA* Bd. V, Ia-Kizzuwatna, 1976–1980: § 8.2. Synchroner Varianten; Duktus; Kenntnis älterer Schriftformen, 559ff. Here is the related quotation: “Neben der Einzelform der Zeichen ist aber auch der ‘Gesamteindruck’ der Schrift paläographisch relevant. Wird eng oder weit geschrieben; bleiben die Zeichen isoliert, oder gehen sie ineinander über (ohne daß dabei Ligaturen entstehen); haben bestimmte senkrechte oder waagerechte “Keile” nur die vorgeschriebene Länge, oder werden sie ‘temperamentvoll’ weit nach rechts und unten ausgezogen, so daß z. B. ein Senkrechter die nächsttiefere Zeile noch ganz durchschneidet? Stehen die Zeichen senkrecht, oder hat der Schreiber (oder gar eine ganze Schreibergeneration) eine Neigungstendenz? Man beobachtet bei vielen altass. Tafeln aus Kaniš eine etwas rechtsgeneigte Schrift; dagegen Linksneigung bei manchen spätaltbab., mittelbab. und vor allem bei neu und spätbab. Tafeln (ein Extrembeispiel ist TU Nr. 58). Die meisten Schriftsysteme haben neben der alltäglichen Schrift ein feierlichen Zwecken vorbehaltenes System von Zeichen, das formal der Gebrauchsschrift einer älteren Zeit nahekommen kann. In der K. können zwar Prunk- und Alltagsschrift eng beieinander liegen (altakk. Zeit) oder gar weitgehend zusammenfallen auch eine große Kluft bestehen. So ist der Unterschied zwischen den Zeichenformen auf der Stele mit dem CH und den Kursivzeichen der Hammurabi-Kanzlei nahezu so groß wie der Unterschied zwischen altakk. und hammurabizeitlicher Kursive, d. h. er macht 400 Jahre aus. Wir wissen wenig darüber, wie man die Kenntnis älterer Zeichenformen überlieferte. Wurde sie als Spezialwissen vermittelt oder als Bestandteil des „Curriculums“ (...).”

much older graphic forms, though little is known about how knowledge of these archaic sign types was transmitted.

Though the description of the writing system and characteristics of cuneiform entails many examples and references to the Old Babylonian and Akkadian period, the peculiarities presented are common to each period of the cuneiform.

## 2.2 Handbooks on graphemics

Among contemporary reference works, the *Wörterbuch für Sprach- und Kommunikationswissenschaft* (WSK, Meletis 2016) online offers the following bilingual definition of *ductus* in its volume dedicated to *Schriftlinguistik*:

German: charakteristische Art der Produktion einer Schrift sowie ihre daraus resultierende Gestalt.

English: characteristic manner of producing a script as well as its resulting appearance.

The first definition conveys the general sense of the term, which pertains to the act of writing and its graphic outcome. In this context, *ductus* is likely to be understood as referring to the *form* or *shape* of the writing, a notion that corresponds to the German term *Gestalt*. After the short definition, the entry continues as follows, explaining that in graphemics (*Schriftlinguistik*) *ductus* (from Latin *ductus*, “guidance”) denotes the characteristic style of writing resulting from its execution. Rather than focusing on the static shape of letters, it emphasizes dynamic features such as line flow, stroke direction, pressure, and writing speed. These factors shape the visual form of the script and can be used to classify or date writings, as well as to explain how changes in writing technique and script form influence one another.<sup>5</sup>

This definition shows the interesting perspective introduced in 1994 by Brekle that highlights the dynamic process of writing (*kinemisches Programm*) as constituting the complex production and specificity of a writing system, including, e.g., writing direction, writing flow, lines, line thickness, speed of production. It is an important observation since in

<sup>5</sup> Here, I mention the entire quotation by Meletis 2016 referred to the definition of *ductus*, providing with my translation into English: “Als Duktus (von lat. *ductus* 'Führung, Leitung') wird in der Schriftling[ui]stik allgemein der charakteristische Stil einer Schrift bezeichnet, der aus deren Produktionsweise resultiert; BREKLE (1994: 188) spricht deshalb in Bezug auf den Duktus einer gegebenen Schrift synonym also von deren kinemischem Programm. Statt einer statischen Analyse individueller Schriftzeichen hebt der Duktus den dynamischen Aspekt des Schreibens hervor und subsumiert als Überbegriff einige in der Produktion relevante Eigenschaften wie die Schreibrichtung, die Linienführung, den Schreibfluss, die Strichstärke, die Schnelligkeit der Produktion, etc. Da diese die Gestalt des Produkts determinieren, können durch die Betrachtung des Duktus Rückschlüsse gezogen und Schriften z.B. eingeordnet oder datiert werden. Von zentraler Relevanz ist der Duktus vor allem in der Erklärung von Veränderungen in der Gestalt einer Schrift, da er bedingt, wie sich die Auswirkungen von beispielsweise schnellem Schreiben äußern; umgekehrt können jedoch auch Änderungen in der Schriftgestalt den jeweiligen Duktus einer Schrift beeinflussen (vgl. John 1992: 8).”

Translation: “As *ductus* (from Latin *ductus* 'guidance, leadership') is generally referred to in writing linguistics as the characteristic style of a script that results from its method of production; therefore, Brekle (1994: 188) also speaks synonymously of the *kinematic program* of a given script with regard to its *ductus*. Instead of a static analysis of individual characters, *ductus* emphasizes the dynamic aspect of writing and, as an overarching concept, subsumes several production-relevant properties, such as the writing direction, the line management, the writing flow, the stroke thickness, the speed of production, etc. Since these determine the form of the product, conclusions can be drawn from the study of the *ductus*, allowing, for example, the classification or dating of scripts. The *ductus* is particularly relevant for explaining changes in the form of a script, as it influences how effects like fast writing manifest; conversely, changes in the shape of a script can also influence its *ductus* (cf. John 1992: 8).”

most cases we consider longer sequences of signs that we can call text rather than single letters or signs. We will come back to this point.

Additional remarks come from John (1992), who claimed that the term *ductus* plays an important role in defining changes in the form of a script/writing due to speed, e.g., but, on the contrary, also changes in the shape of the script could influence the respective style of a writing (system).

As a second reference work, I cite Dürscheid (2006). A closer look at her definitions further clarifies the scope of the term's application: the discussion belongs to the field of *Schriftlinguistik* or *Grapholinguistik*,<sup>6</sup> which she redefines as the study of writing-related phenomena, including script styles, writing systems, orthography, writing techniques, typography, calligraphy, and the didactics of writing, following Koch/Oesterreicher (1994; 2007; 2011). Within this framework, *ductus* can apply to both spoken and written modes of expression. In the *Glossar* (2006: 298), though the term *ductus* itself is not listed, the author indirectly addresses it in relation to the concepts of *konzeptionelle Mündlichkeit* (conceptual orality) and *konzeptionelle Schriftlichkeit* (conceptual literacy):

- konzeptionelle Mündlichkeit: Duktus einer sprachlichen Äußerung, kennzeichnend ist die informelle Ausdrucksweise.
- konzeptionelle Schriftlichkeit: Duktus einer sprachlichen Äußerung, kennzeichnend ist die formelle Ausdrucksweise.

The English correspondence is: 'Qualities and characteristics of speaking or writing expressed in the flow of speaking or writing'.

The following quotations illustrate the interpretative scope of the term *ductus*:

Zum anderen werde darunter oft der Duktus, die Modalität der Äußerungen verstanden, kurz: die Konzeption, die die Äußerung prägt.<sup>7</sup>

Auch in der Produktionsphase hat das Medium einen wichtigen Einfluss auf den Duktus der Äußerung.<sup>8</sup>

Ein konzeptionell mündlicher oder schriftlicher Duktus ist aber nicht mit diesen <Versprachlichungsstrategien> gleichzusetzen, er kann sich allenfalls aus ihnen ergeben: Dass beides nicht gleichzusetzen ist, sehen wir am obigen Beispiel. Obgleich hier ein konzeptionell mündlicher Duktus auftritt, liegen dem Text Versprachlichungsstrategien zugrunde, die nach Koch & Oesterreicher dem Schriftlichkeitspol zuzuordnen sind.<sup>9</sup>

Although these statements remain rather general and do not provide a comprehensive definition of *ductus* – nor do they clarify its functional implications within a writing system – they nonetheless offer valuable insights for a diachronic interpretation. From the perspective of historical graphematics, the essential question is whether such a definition can be applied to all writing systems. In this context, our analysis will focus specifically on *ductus* as it pertains to the process of writing production.

<sup>6</sup> The term *Schriftlinguistik* goes back to Nerius (1988), according to Dürscheid (2006).

<sup>7</sup> Koch & Oesterreicher (1994: 587), cited in Dürscheid (2006: 43).

<sup>8</sup> Dürscheid (2006: 51).

<sup>9</sup> Dürscheid (2006: 52 f.).

Now we take into consideration other definitions of *ductus*, mostly given in specific handbooks of ancient writing systems, or as used in paleography.

Jensen (1925) uses the term *ductus* in the following contexts and meanings, which may vary from one language system to another (I limit myself to the most significative cases). For the Armenian script, we are dealing with a clearly cursive script, whose letters are shaped so that they can connect with one another, sometimes showing slight variations when joined to the preceding or following sign.<sup>10</sup>

On the Chinese writing Jensen observes that *ductus* is not used in the narrow Latin-paleographic sense of “stroke order and direction”, but in the broader sense of “type/form of script,” i.e., the characteristic style or appearance of the writing produced under certain material and technical conditions. In this context, *ductus* is equivalent to script style / characteristic writing form shaped by material conditions.<sup>11</sup>

In the case of the Egyptian script, *ductus* again does not mean the technical sequence/direction of strokes, but rather the overall graphic appearance or script style. Here, *ductus* is handwriting style/characteristic form of a cursive script shaped by scribal habits.<sup>12</sup>

For the Ancient Latin alphabet, *ductus* again means the script type/characteristic graphic form of the writing, not the technical execution of strokes; *ductus* is the recognizable visual form/style of a script (capital script and its variant *rustica*).<sup>13</sup>

Similar is the case of Gothic handwriting where the term *ductus* refers to a special form of script (*unciale*).<sup>14</sup> We are dealing with a clearly cursive script, whose letters are shaped so that they can connect with one another, sometimes showing slight variations when joined to the preceding or following sign.

A final case is the Glagolitic writing, *ductus* again referring to the script type/visual-graphic style of the writing system.<sup>15</sup> In this context an opposition is made between round

<sup>10</sup> Here the quotation from Jensen (1925: 127): “Die während dieser ganzen Zeit vorherrschende, bis etwa 500 sogar allein herrschende Form der syrischen Schrift ist die sog. Estrangelo (*Estrangela*)<sup>3</sup>. Die Formen dieses Duktus sind Abb. 172 wiedergegeben. Wir haben hier einen durchaus kursiven Schrifttypus vor uns; infolgedessen werden die einzelnen Buchstaben möglichst so geschrieben, daß sie miteinander verbunden werden können, und die mit dem vorhergehenden oder folgenden Zeichen verbundenen Buchstaben haben bisweilen leicht differenzierte Formen.”

<sup>11</sup> Jensen (1925: 36): “Von der Beschaffenheit der Beschreibstoffe hängt auch der besondere Duktus der Schrift ab. Vor der Erfindung des Papiers und des Pinsels hat daher der chinesische Duktus ein erheblich anderes Aussehen als nach jener Erfindung. Wir kennen aus der ältesten Zeit vor allem drei verschiedene Duktus: das sog. *ku-wen*, die älteste, die zu Grunde liegenden Bilder meist noch deutlich erkennen lassende Schriftform; das *ta-chuan*, das dem *ku-wen* immerhin noch sehr ähnlich ist, und das *siao-chuan*, das eine Siegelschrift darstellt.”

<sup>12</sup> Jensen (1925: 48): “Wir haben hier also im Gegensatz zur Monumentalschrift eine Schreibschrift vor uns, die im Handel und Verkehr benutzt wurde, wie die Monumentalschrift für religiöse und offizielle Texte. Der ältere Duktus dieser natürlich sich auch weiterentwickelnden und zudem noch individuellen Schreibergewohnheiten stärker als die Monumentalschrift unterworfenen Schreibschrift wird mit einem bei dem erwähnten Clemens von Alexandria sich findenden Ausdruck hieratische („heilige“) Schrift genannt, was insofern unzutreffend ist, als die Schreibschrift ja ursprünglich gerade profanen Zwecken diente; ...”

<sup>13</sup> Jensen (1925: 174): “Die Form der lateinischen Schrift<sup>1</sup>), wie sie uns in den Inschriften auf Stein, Ton, Metall usw. entgegentritt, ist die sog. Capitalschrift, wie wir sie auch bei der griechischen Schrift kennen gelernt haben. Auch in den ältesten Codices finden wir diesen Duktus angewandt, freilich außer der alten Monumentalschrift bereits eine Abart derselben, die *Rustica* (s. Abb. 245).”

<sup>14</sup> Jensen (1925: 186): “Während der Duktus der Bibel-Handschriften, vor allem des Codex argenteus, uns offenbar die älteste Form der gotischen Buchstaben gibt, nämlich eine Unciale, weisen andere Codices, die beiden Urkunden und das Alphabet der genannten Salzburg- Wiener Handschrift eine mehr kursive Form auf.”

<sup>15</sup> Jensen (1925: 189) “Die glagolitische Schrift erscheint in zwei Duktus, einem runden, meist bulgarischer Duktus genannt, und einem eckigen, illyrischer oder kroatischer Duktus genannt. Jedoch werden durch diese Bezeichnung-

Glagolitic *ductus* and angular Glagolitic *ductus*: *ductus* is the stylistic form (rounded vs. angular) that the letters take in a given script tradition, independent of (or only loosely connected with) geography and chronology. According to these last definitions, *ductus* means the overall graphic appearance of the letterforms, not the individual strokes or the act of writing.

Daniels (1996) defines philology, epigraphy and paleography as the sphere of use of such term.<sup>16</sup> In this passage, *ductus* is described as the distinctive set of features characterizing the writing practices of a particular scribal community. Both epigraphy and paleography seek to identify and trace subtle variations in *ductus* across generations or workshops to establish the date and provenance of undated texts. However, such studies have often remained descriptive, overlooking the physical dynamics of writing, how the tension between ease of movement and the need for legibility shapes the evolution of *ductus* itself.<sup>17</sup>

Section 3 presents a case study examining how the term *ductus* is employed in the relevant literature concerning the writing system under analysis.

### 3. A case study: the Hittite paleography and the cuneiform tradition

The term *ductus* is first encountered in the form *Schriftductus* in Messerschmidt (1906: 186), though it has been referred to the so-called Hittite Hieroglyphs. The case study especially deals with Hittite cuneiform writing, within the more general cuneiform tradition that spans an exceptionally long tradition, having been employed by multiple cultures speaking different languages over the course of three millennia.

Nonetheless, as we will show, the employment of *ductus* has long lacked a consistent definition in cuneiform studies. No standardized terminology has yet been established for describing cuneiform handwriting within the respective philological traditions. The problem is further compounded by the inconsistent usage of terminology among individual scholars. While some distinguish *ductus* from *sign form*, applying it to features such as wedge angle, writing density, or word spacing, others use it synonymously with broader notions like *script* or *hand*, often without explicit definition. This lack of uniformity has resulted in significant terminological ambiguity.

Within the broader and long-lasting cuneiform tradition, the extensive discussion found in Hittitology, focused specifically on the writing system used during the Hittite period (ca. 18<sup>th</sup>–12<sup>th</sup> cent. BC), deserves particular attention. The motivation of such discussion was laid in the introduction of three chronological linguistic phases, consequently on texts date, and finally to adjust paleographic criteria and uses with linguistic ones.

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gen nicht unbedingt geographische oder chronologische Unterschiede zum Ausdruck gebracht, wengleich der eckige Duktus vorwiegend auf kroatischem Gebiete (besonders Dalmatien) angewandt wurde und im großen und ganzen der jüngere Typus ist.”

<sup>16</sup> Daniels (1996: 76, ch. 3 “Writing systems”).

<sup>17</sup> Here the quotation from Daniels (1996: 76): “A distinction is often made between writing incised on solid surfaces and writing applied with a tool to flexible surfaces. The former is the province of epigraphy, the latter of paleography. A goal of both fields is tracing minute variations in *ductus* – the complex of features characteristic of a single scribal community – from generation to generation, from atelier to atelier, which might enable the dating of a text that has no explicit indication of when and where it was written, such as a colophon. This has largely been pursued as a purely descriptive study, with little attention to the physical processes of writing – movements of hand and fingers that always want to expend less effort, in competition with the cognitive need to keep characters recognizably distinct. In this tension lies legibility.”

This discussion is particularly significant, as it may help to elucidate the metalinguistic use of the term *ductus* and to improve our understanding of its cross-disciplinary application, where the concept continues to pose difficulties. For this reason, I offer some reflections on the subtle yet essential distinction between *ductus* and *sign form* using Hittite cuneiform as an example, before discussing the different uses of the term *ductus* in the broader cuneiform and other writing traditions and philologies.

### 3.1 Methodological and metalinguistic considerations

While certain scholars differentiate *ductus* from *sign form*, restricting the term to features such as wedge slant or stroke direction, the majority use it interchangeably with “script” or “hand,” often without explicit definition. This occasional distinction between *ductus* and *sign form* reflects the existence of multiple analytical levels in the study of writing, particularly within paleography and handwriting analysis, including the examination of cuneiform scripts.

#### 3.1.1 Sign form (or form)

The term *sign form* denotes the shape and structural composition of a sign, i.e., its static, finalized appearance. In the case of cuneiform, it refers to how the sign is visually realized on the tablet: the number and arrangement of wedges, their orientation, and the overall configuration. In other words, the *sign form* represents the template or fixed design of the character.

#### 3.1.2 *Ductus*

By contrast, *ductus* pertains to the act or process of writing, that is, the way a sign is executed.<sup>18</sup> This encompasses:

- The order in which the wedges are made
- The direction and angle of each stroke
- The speed, rhythm, and pressure of the stylus
- Minor variations in technique, such as wedge slant or stylus twist

So, when some scholars say *ductus* is opposed to *sign form*, they are drawing a line between:

- The static appearance of the sign (*sign form*)
- The dynamic act of writing it (*ductus*)

In the study of cuneiform, this can be particularly valuable when distinguishing between different scribes or scribal traditions, even when the signs they write look very similar.<sup>19</sup> Furthermore, the difference becomes substantial when *ductus* refers to a series of paleographic characteristics that can mark the writing habits of a certain historical period.

<sup>18</sup> Some synonyms of *Duktus* in German are: Attribut, Attributivum, Besonderheit, Charakteristikum, Charakterzug, Eigenart, Eigenheit, Eigenschaft, Eigentümlichkeit, Kennzeichen, Manier, Merkmal, Spezifikum, Wesensmerkmal, Wesenszug.

<sup>19</sup> This is like how in calligraphy, a letterform might look the same between two people, but the stroke order, pressure, or speed might vary, those variations are what *ductus* captures.

### 3.2 Practical exemplification

To illustrate this fundamental difference, we bring here two examples of execution of signs and a possible application of the term *ductus*. In this regard, I refer to van den Hout (2012) and Pisaniello (2022) on sign shape and following some of their examples. As Pisaniello (2022: 271) states:

each Hittite cuneiform sign occurred with a number of different shapes that slightly differ from each other, but sometimes the differences are more considerable and affect the space required for the sign. The most significant differences concern a limited set of signs, whose different shapes also show a quite clear chronological distribution.

This statement explains the origin of some variation within the sign inventory and the arising of “new” forms over time. For the sake of orientation, we remind that the Hittite cuneiform has been imported into the Hittite culture from the so-called Syrian school or tradition, connected with the Alalah VII time and representing an innovation within the Old Babylonian sign inventory. Such modified sign inventory constituted the Hittite inventory and underwent few adjustments,<sup>20</sup> though also later Old Babylonian variants were already present even if in a few numbers also in the Hittite inventory.<sup>21</sup>

In the first example, the difference lies in the hand that executes the text (*ductus*) while maintaining the same shape of the sign; in the second, in the second example, however, the sign (with the same phonographic value) is different, although the hand movement is the same. However, even in this case, the use of a different sign is defined as *ductus*, i.e., choice of execution of a different sign. In the third case, a tendency for a new (diachronic tradition) is possibly settled.

Example 1: Same *sign form*, different *ductus* (in the sense of different hands)

Imagine two scribes A and B writing the same cuneiform sign, for instance the sign KA, which consists of several wedge impressions arranged in a specific pattern.

Scribe A: 

- Presses the vertical wedge first, followed by the horizontal wedges.
- Applies consistent, moderate pressure.
- All wedges are neat and aligned with little slant.

<sup>20</sup> See Cotticelli-Kurras & Giusfredi (2017) with previous literature.

<sup>21</sup> A highly plausible channel of transmission likely operated through the North Syrian tradition, exemplified by the Old Babylonian cursive script of Alalah VII. Several factors support this hypothesis: the composition of the sign inventory (including the proportion of logograms and Akkadograms), the assignment of specific phonetic values within the Hittite syllabary aimed at reducing sign polyphony, and structural correspondences between the respective traditions. Strong parallels between the Hittite and Hurrian sign inventories further reinforce the case for a North Syrian or Hurrian intermediary. Both systems, for instance, abandoned the phonetic value /pi/ for the sign PI (HZL 317), and both share an innovation whereby PI, which in Mari and Alalah VII could represent /we/ and /wi/ alongside /wa/, later becomes restricted to the value /wa/. In Hittite orthography, the value /wi/ was rendered as  $\bar{u}-i-$  in native words, while Hittic and Hurrian loanwords were written with newly created composite signs formed from UA /we, wi, wu/ plus a subscript vowel (a, e, i, u), yielding forms such as  $\langle wa_a \rangle$  or  $\langle wee \rangle$  (HZL 318–326). The signs  $\langle wu_a \rangle$  (HZL 321) and  $\langle wu_u \rangle$  (HZL 323) may likewise have developed the values /wu/ and /fu/, as possibly reflected in the word *w/fulasina*, “a type of bread.” (See Cotticelli-Kurras & Giusfredi 2017: 6).

Scribe B: 

- Begins with the horizontal wedges, then adds the vertical one last.
- Uses a faster hand, resulting in slightly uneven pressure.
- The wedges are more slanted and elongated.

Result: The final sign looks almost identical in structure (same *sign form*), but the motion, rhythm, and sequence used to write it (*ductus*) are different. A trained eye could detect these differences and attribute them to different scribes or training traditions.

Example 2: Same *ductus*, variation in *sign form*

Now imagine two scribes A and B trained in the same school, following the same writing method:

- Both use the same stroke order, pressure, slant, and timing (same *ductus*).
- But one of them, due to a stylistic habit or writing surface difference, or imitating another tradition or school, makes slightly wider horizontal wedges.

The two distinct forms of the Hittite sign LI, an older and a later variant, provide an excellent example of this perspective. Both forms share the same phonetic value, but the latter appears only after the reign of King Šuppiliuma I, that is, from the 14<sup>th</sup> cent. onward.



As Pisaniello (2022: 271) highlights, three signs had clear form variants, one longer or more complex and one shorter or simpler, that could sometime be used according to the space left on the tablet.

This case illustrates how *sign form* alone may fail to capture such nuanced chronological information, underscoring the analytical importance of distinguishing between *ductus* and *sign form*. This is the case of allographs.

The conclusion is that the *ductus* can be the same, but the *sign form* has at least minor stylistic differences. This could indicate the same scribe writing under different conditions, or two scribes trained identically but showing slight individual variation.

In fact, paleographers or philologists in cuneiform studies can use *ductus* analysis to identify scribes, date tablets, or reconstruct scribal schools or regional varieties. The problem in the discussion within Hittitology lies in the fact that the word *Duktus*, specifically indicated as *Duktus* I, or II, older or younger, has been used indicating different sign forms.

### 3.3 Overview of the discussion on *ductus* in Hittitology

Within Hittitology, a particularly detailed and technically sophisticated tradition has developed around the concept of *ductus*. Scholars such as Otten (1968, 1969), Kammhuber (1970), Heinhold-Krahmer et al. (1979, with a detailed resume of the debate until 1979), Neu (1980), and Starke (1985) have treated *ductus* not merely as a paleographic notion but as a crucial diagnostic criterion for dating tablets and situating them within their historical and linguistic contexts.

Erich Neu advanced this approach through several influential observations publishing some Old Hittite rituals in StBoT 25 (1980). He emphasized the centrality of *ductus*, together