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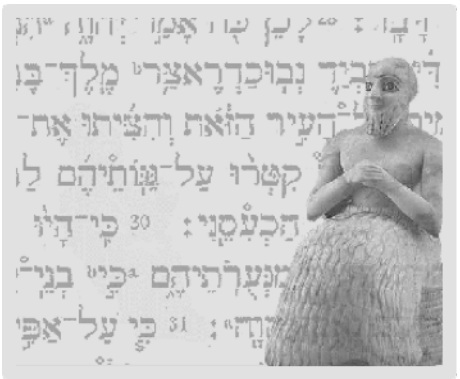

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THE COMPLEXITY OF VERBAL SEMANTICS— AN INTRICATE RELATIONSHIP BETWEEN *QATAL* AND *WAYYIQTOL*

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1. INTRODUCTION

Q*atal* and *wayyiqtol* constitute the two most frequently occurring verbal formations in the Hebrew Bible (cf. McFall 1982: 186–7). Given the statistical relevance of these grams, the question of their status in Biblical Hebrew (BH) has been viewed as one of the most crucial for the understanding of the verbal system of this language. The endeavor to determine the nature of the mutual relation between these two constructions—which derives from the aforementioned problem—has been perceived as of an even greater importance and interest, puzzling grammarians and linguists across many decades and even centuries. The present article aims at advancing our comprehension of the interaction that couples and/or uncouples *qatal* and *wayyiqtol*.

Before explaining the precise objectives of the article and its structure, I will expose the main trends in the analysis of the relationship that exists between *qatal* and *wayyiqtol* (cf. section 1.1). It is necessary to comprehend the complexity of this issue in order to understand the aims of the present study and its methodological strategy (cf. section 1.2).

1.1. THE RELATIONSHIP BETWEEN QATAL AND WAYYIQTOL— GRAMMATICAL TRADITION

It is possible to distinguish four main scholarly opinions concerning the relationship that exists between *qatal* and *wayyiqtol* in Biblical Hebrew, those being: the two formations are semantically identical (section 1.1.1); they are opposite in the sense that *wayyiqtol* is equivalent to *yiqtol* (section 1.1.2); they are distinct semantically from each other and from the remaining components of the BH verbal system (section 1.1.3); and that their meaning is *grosso modo* similar, but is distinguishable by certain more specific properties or functions (section 1.1.4).

1.1.1 Qatal and wayyiqtol are equivalent

Scholars who propose an equivalence between *qatal* and *wayyiqtol* consider tense and/or aspect to constitute the main category (or categories) underlying the BH verbal system. As far as the so-called temporal school is concerned, Zuber (1986) and Zevit (1988 and 1998) propose that both *qatal* and *wayyiqtol* are paradigmatic past tenses. However, according to Zuber (1986), the sequence *waw-x-qatal*, following a *qatal* or a *wayyiqtol* form, additionally functions as a present perfect or a pluperfect.

The aspectual models of the BH verbal system have commonly been used to defend the correspondence between the two constructions. For example, Davidson (1902) maintains that the "perfect" (*qatal*) conveys the meaning of completed actions (Davidson 1902: 58) from which more specific senses—such as a simple past, a perfect and a stative—can be derived (Davidson 1902: 58–61). Davidson also hypothesizes that *wayyiqtol*—independent from the grams that have no prefixed *waw*, i.e., *yiqtol* and *qatal*—has the same intrinsic values as *qatal*. This allegedly stems from the fact that *wayyiqtol* is usually introduced by *qatal*, thus deriving its sense from the meaning offered by the latter formation (Davidson 1902: 70).

The assertion that the two grams are identical has also been maintained in the models where the aspectual explanation is combined with the temporal one. For instance, Joüon (1923) defines *qatal* as an aspectual category of the perfect(ive) (*parfait*) which expresses unique and punctual (although also anterior) events. Given this aspectual foundation, the construction is a typical expression of the tense, viz. the past (Joüon 1923: 291).[1] In Joüon's opinion, *wayyiqtol* semantically approximates *qatal*. To be exact, the two formations concord in the sense that they both principally express the idea of past and, as far as the aspect is concerned, perfective (punctual or unique) events. Nevertheless, *wayyiqtol* can convey additional information—which is missing in *qatal*—and express the meaning of logical or temporal succession and consequence (Joüon 1923: 319, 326).[2]

The proximity between *wayyiqtol* and *qatal* was also noted by proponents of the historical-comparative school of argument,

[1] Additionally, Joüon notices the importance of another parameter, the aktionsart, evident in the behavior of the active and stative roots: when derived from stative predicates, *qatal* offers the value of a present tense, while in cases where it is formed with active verbs, it usually indicates past activities.

[2] Joüon's model may also be classified as belonging to the fourth class of theories (1.1.4). However, given the prominence bestowed upon the categories of aspect and tense in his theory, and the systematic similarity of *qatal* and *wayyiqtol* in respect to these domains, I prefer to include Joüon in the second group. The same holds true for the model postulated by Zuber mentioned earlier in this section.

which has usually worked within aspectual and/or temporal frameworks. According to Brockelmann ([1908–1913] 1966), the tenses prefixed by *waw* constitute the antitheses of their simple counterparts. Thus, *wayyiqtol* is a past tense similar to the perfect, viz. *qatal* (an analogous view may be found in Bergsträsser 1928 and Bergsträsser and Daniels 1983: 55). In a similar vein, Cohen (1924: 286) defines both *wayyiqtol* and *qatal* as a perfective aspect (*accompli*), classifying the latter as "l'imparfait au role de parfait."

1.1.2 Wayyiqtol is the opposite of qatal being identical to or similar to yiqtol

Another view concerning the relationship between *qatal* and *way-yiqtol*, which can be commonly found in the grammars of the BH language, holds that *wayyiqtol* is—fully or partially—equivalent to *yiqtol* and together with this form constitutes an opposition to *qatal*. This opinion is particularly frequent within the aspectual approach. For example, Driver (1892) defines *qatal* as the category of a perfective aspect, which primarily indicates complete(d) events. From the inherent meaning of completion, more specific senses can be derived, especially, the value of a perfective past, a present perfect and a pluperfect. In contrast, *wayyiqtol*—like *yiqtol*—denotes nascent and/or incipient actions. However, it is a relative form that finds itself subordinate to the preceding verbal construction. In this manner, the exact moment of the inception of an action is determined by the particle *waw*, which locates the event conveyed by *wayyiqtol* in relation to the activities previously expressed by another verbal form. Accordingly, *wayyiqtol* is a type of *yiqtol* prefixed by *waw*—it semantically concords with *yiqtol*, failing nevertheless to stand on its own and hence expresses "the *development*, the *continuation* of the past which came before" (Driver 1892: 71). An analogous explanation is posited by Watts (1951). In his view, *qatal* introduces complete(d) states which are single and finished (Watts 1951: 12). Since the action conveyed by this gram is presented as unique (punctiliar), finished and certain, the form usually functions as a perfective aspect and/or a perfect (be it a present perfect, a past perfect or a future perfect). On the contrary, *wayyiqtol*—in conformity with *yiqtol*—is defined as a progressive imperfect with an inherent sense of inception (Watts 1951: 39–42). However, the form augmented by *waw* differs from its simple variant (i.e. *yiqtol*) in that it appears in consecutive chains. A similar type of relation between *qatal*, *wayyiqtol* and *yiqtol* was proposed by Michel (1960). Michel views the "perfectum" or *qatal* as being marked by an accidental character, while *yiqtol* (the so-called imperfectum) and *way-yiqtol* show a substantial nature (Michel 1960: 110 and 127). *Qatal* presents the act itself, namely without any inherent and necessarily manifested intervention of the subject. *Yiqtol* and *wayyiqtol* picture an event as deriving from the quality of the acting subject. As a result, *qatal* typically indicates a simple event, while *yiqtol* and *way-yiqtol* are dependent formations presenting an action in relation

with other events. According to Michel (1960: 51), there is no difference in meaning between *yiqtol* and *wayyiqtol*: the simple conjugation and the conjugation prefixed by *waw* have the same semantic force. *Wayyiqtol*—analogous to *yiqtol*—expresses semantic dependency (which surfaces as an idea of consequence in this particular case) without any precise temporal demarcation (Michel 1960: 41). In a similar manner, Johnson (1979) claims that *wayyiqtol* and *yiqtol* do not differ as far as their meanings are concerned, both of them being the paradigmatic expressions of a cursive aspect. Furthermore, the two formations offer the same range of values derivable from their shared aspectual load, such as present, future and modality. Kuryłowicz (1972), who based his theory on the concept of taxis rather than aspect, defines *qatal* as an expression of anteriority. From this inherent meaning, the functions of a perfect and a past are derived (Kuryłowicz 1972: 83). Although Kuryłowicz recognizes that *wayyiqtol* is a successor of Proto-Semitic **yaqtul* (thus corresponding to the Akkadian preterite and/or perfective past—*iprus*), it semantically approximates *yiqtol*, a successor of **yaqtulu*. As *yiqtol*, *wayyiqtol* principally expresses the idea of simultaneity, which is applicable to the three temporal spheres (past, present and future). This puts the gram in contrast with *qatal*, which only denotes an action prior to the moment of speaking.

Most scholars who relate *wayyiqtol* to *yiqtol* differentiate them by introducing the category of consecution or dependence. However, there are some scholars who, while still emphasizing similarities between the two constructions, use the notion of a relative tense in order to distinguish between their meanings (cf. Driver 1892). Within the temporal school, Samuel Lee (in McFall 1982) understands *qatal* as a deictic past tense and *wayyiqtol* as a relative present comparable to *yiqtol*—a deictic present. When employed with a past reference, *qatal* equals the historical present forms of European languages. Similarly, Barnes (1965) defines *qatal* as a past tense and *wayyiqtol* as a present, analogous to *yiqtol*. *Wayyiqtol*, however, can be distinguished from *yiqtol*. In contrast with its simple counterpart, *wayyiqtol* is not deictic but depends on the speaker's position, constituting an example of a relative tense. Recently, Robar (2012) has defended the opposition between *qatal* and *wayyiqtol* and the equivalence of *wayyiqtol* and *yiqtol*. According to Robar, *qatal* is a past tense that contains both the perfective and imperfective aspects, while *yiqtol* is a present tense with both imperfective and perfective senses (Robar 2012: 209). Thus, as far as the BH verbal system is concerned, the language is not aspectual but tense-based. In this system, *wayyiqtol* is a narrative relative present—it agrees with *yiqtol* being a present tense, by which it also stands in opposition to *qatal*. However, it differs from *yiqtol* by being a relative—and not a deictic—tense (Robar 2012: 210).

1.1.3 Qatal and wayyiqtol are distinct categories from each other and from other grams

Another type of theory concerning the relationship between *qatal* and *wayyiqtol* is that the two formations are not only distinct from each other but also distinguished from the remaining components of the system. This approach emphasizes the shared uniqueness of the two grams without, however, equating *wayyiqtol* with *yiqtol*. This position is typical of the discourse-pragmatic approach, where the notions of narrative and discourse, on the one hand, and foreground and background, on the other, are fundamental. For example, Schneider (1982) classifies *wayyiqtol* as a foreground narrative form and *qatal* as a background narrative construction, characterized by a retrospective perspective. Talstra (1978: 170) views *wayyiqtol* as a primary narrative form clearly distinguished from *qatal*, which is defined as a secondary narrative and discursive form. Longacre (1992: 178) defines *wayyiqtol* as a narrative foregrounding form that advances the mainline of the storyline: it is the expression of the narrative backbone. On the contrary, *qatal* expresses secondary actions in narrative, being also commonly found in discourse (Longacre 1992: 180). Goldfajn (1998: 32) makes a similar argument, although with additional temporal and syntactic parameters added to the principal dichotomy between discourse and narrative. He classifies *qatal* as a non-sequential expression of anteriority, simultaneity and iterativity, as it does not advance the reference time. In contrast, *wayyiqtol* equals a sequential—predominantly narrative—past.

The aspectual school also sometimes defends the paradigmatic distinctiveness of the two grams. For example, Rundgren (1961) classifies *qatal* as a constative aspect in the non-past. *Wayyiqtol* is defined as a neutral aorist, a non-aspectual form of the past tense, thus being clearly distinct from *yiqtol* and any other gram (Rundgren 1961: 101–9). Joosten (2002: 67–9; 2012), who combines the aspectual, temporal and modal models, argues that from the system's perspective, *qatal* expresses anteriority (even in the case of stative verbs), while *wayyiqtol* is a neutral past tense or an aspectually unmarked preterite. To be exact, *qatal* is defined in discourse as "a past action the result of which is relevant to the present" or "to the time frame of the narrative" (Joosten 2002: 67–8). On the other hand, *wayyiqtol* is almost entirely limited to the past and does not have any aspectual substance: depending on the context, it may express both perfective and imperfective situations. At the global level, together with *qotel*, the two constructions constitute the indicative block within the BH organization. Within this indicative subsystem, the three forms stand opposed as perfect (*qatal*), past (*wayyiqtol*) and present (*qotel*; cf. Joosten 2012).

1.1.4 Qatal and wayyiqtol are similar, being distinguishable by more specific properties

The last class of the theories concerning the connection between *qatal* and *wayyiqtol* is held by scholars who, on the one hand, notice aspectual, temporal and/or modal similarities between the two forms and, on the other, accentuate properties that enable these constructions to be distinguishable from one another. This approach is typical of the models based upon the syntactic parameter of sequentiality. Within the temporal subclass of the "sequentiality" school, Silverman (1973: 168) defines both *qatal* and *wayyiqtol* as past grams. By doing so, the two constructions enter into a systematic temporal opposition with the *weqatal-yiqtol* future block. However, the distinction between the members of each group is sequential, such that *wayyiqtol* corresponds to a consecutive past because it regularly follows *qatal*. Certain scholars who adopt the aspectual perspective (cf. Joüon 1923) recognize this sequential difference. According to Waltke and O'Connor (1990), the core of the BH verbal system is constituted by a binary aspectual contrast between *qatal* (perfective) and *yiqtol* (non-perfective). In this system, *wayyiqtol* agrees with *qatal* since both are expressions of a perfective aspect and offer a similar range of specific senses, especially, a perfect and a perfective past (Waltke and O'Connor 1990: 554). On certain occasions, however, *wayyiqtol* offers an additional, marked, consecutive value, which differentiates it from the non-consecutive *qatal* (Waltke and O'Connor 1990: 558–9). According to Gentry (1998), the BH verbal organization is divided into two main blocks: assertive modal constructions and projective modal categories. The two groups are sensitive to two additional parameters: aspect (perfective *versus* imperfective) and sequentiality (sequential *versus* non-sequential). In the assertive set—which includes formations that are traditionally viewed as indicatives—*qatal* is defined as being a non-sequential perfective and *wayyiqtol* as its sequential counterpart (Gentry 1998: 21, 30–1). Hatav (1997) proposes a model based on four parameters: modality, progressive aspect, perfect and sequentiality (defined as temporal progression, i.e., the ability to advance the reference time). Each one of these parameters can be marked or unmarked. *Qatal* is classified as being marked for the sense of perfect and unmarked for the remaining parameters. It is a non-sequential, non-modal and non-progressive form. *Wayyiqtol* has comparable properties: it is a non-modal, non-perfect and non-progressive construction. However, in contrast with *qatal*, it is marked for the parameter of sequentiality. Van der Merwe, Naudé and Kroeze (2000) argue that *wayyiqtol* is aspectually equivalent to *qatal*. Both grams are defined in analogous terms, i.e., as being expressions of complete and completed events. This semantic essence most frequently surfaces in their use as past tenses. However, although *wayyiqtol* "bears reference to the same temporal spheres and aspects as a perfect form [*qatal*,] it is also characterized by 'progression' " (Van der Merwe, Naudé and Kroeze 2000: 165). Fur-

thermore, *wayyiqtol*—but not *qatal*—can control the flow of narration (Van der Merwe, Naudé and Kroeze 2000: 167). Comparable extents of similarities and differences are proposed by grammarians who view the taxis as the major semantic pillar—or at least one of them—in the BH verbal system. For instance, according to Gropp (1991), the BH verbal organization is sensitive to the parameter of modality and—in the non-modal tier—the parameter of taxis, or, more specifically, the idea of anteriority. Moreover, the two major classes (i.e., the modal and the non-modal) involve a contrast between sequential and non-sequential forms. As far as the indicative set is concerned, *qatal* expresses a non-sequential anteriority, while *wayyiqtol* denotes sequential anterior events (Gropp 1991: 57). Thus, both *qatal* and *wayyiqtol* are non-modal anteriors, distinguishable from one another by the feature of sequentiality. A similar relationship between the two constructions is posited within the "aspect-plus-tense" branch of the syntactic school. One such scholar of this school is Buth (1992). Employing the terms "thematic continuity" and "discontinuity" in place of sequentiality and non-sequentiality respectively, Buth classifies both *qatal* and *wayyiqtol* as being definite with regard to aspectual and temporal terms, i.e., as perfectives and pasts. However, while the former marks the discontinuity, the latter conveys thematic continuity (Buth 1992: 103–4). More recently, Cohen (2012) has argued for a degree of similarity between *qatal* and *wayyiqtol*. According to Cohen, consecutive forms (and, thus, *wayyiqtol*) are defined as tenses characterized by their own reference time, while non-consecutive forms (such as *qatal*) draw their reference time from the context, and are therefore examples of relative tenses (Cohen 2012: 43, 47–8, 90). As far as *qatal* and *wayyiqtol* are concerned, the two grams are classified as indicative, marked by the parameter of *realis* and unmarked for the features of habituality and iterativity. What distinguishes them is that in *wayyiqtol* the reference time and the event time are merged into one unit (the gram typically functions as a deictic past tense), whereas in *qatal* the reference time is assigned by the context (the form functions as the relative tense, with the value of antecedence or simultaneity; Cohen 2012: 43–50).

Scholars who base their model on grammaticalization theory also recognize both similarities and dissimilarities of the two formations viewing *qatal* and *wayyiqtol* as simultaneously alike and distinct. Andersen (2000) defines *qatal* and *wayyiqtol* as products of an analogical evolutionary scenario, the so-called resultative path, i.e., a development whereby resultative expressions develop into perfects, perfective aspects and, finally, into past tenses. Since *qatal* developed from a predicate of state that expressed the result of an action, it is best defined as an atemporal perfective aspect. On the contrary, as *wayyiqtol* derives from Proto-Semitic **yaqtul* (marked both aspectually and temporarily), it should be viewed as a (perfective) past (Andersen 2000: 17). Cook (2002 and 2012) proposes a very similar model, arguing that *qatal* and *wayyiqtol* follow the same

grammaticalization cline, viz., the resultative path. The difference between them lies in the stage that the two grams occupy on the path. *Wayyiqtol*, defined as a past tense, reflects the last stage of the path, viz. a past tense. Other senses provided by this gram such as perfect and perfective are not inherent but rather contextually conditioned. In contrast, *qatal* is, principally, a perfective aspect. It also offers persistent perfect functions, which, however, are only induced by the context (Cook 2000: 253–4; 2012).

Another grammaticalization-based model has been proposed by the author of this paper (Andrason 2011a; 2011b; 2012a; 2013a; 2013b; 2013c and 2013d). Similarly to Andersen (2000) and Cook (2002; 2012), I use the resultative path as a basis for the definition of *qatal* and *wayyiqtol*. However, my model may be regarded as more complex and nuanced than other grammaticalization approaches, since it is further enriched by the insights from typology, cognitive linguistics and the usage-based approach. First, I avoid equaling the resultative path with a simplistic, linear, three-stage model but adopt a more fine-grained and complex perspective. The path linking the perfect, the perfective and the past includes some 20 stages and the resultative cline bifurcates itself in three more specific sub-clines (the anterior, the simultaneous and the evidential path), located in three time spheres. Additionally, I distinguish a set of further extensions (or branches) that lead to other senses that are available to constructions developing along the resultative path.[3] This enabled me to relate and explain more values (including the supposedly odd values, such as modal, performative, gnomic, future or duration) offered by *qatal* and *wayyiqtol*. Second, definitions proposed in my earlier papers were not static and exclusive (namely, one form—one meaning), which is incompatible with grammaticalization theory, but rather inclusive and dynamic. By designing complex webs that relate the components of the semantic potential of *qatal* and *wayyiqtol* into consistent wholes (typologically, diachronically and conceptually), I formulated definitions that accessed both the systemic level of the two forms and their microstates. *Qatal* was classified as a semi-advanced or "midway" resultative-path gram. That is, the gram is a summation of most stages of the anterior cline and the simultaneous cline in the three time spheres, with additional extensions spreading from the anterior cline, these being the evidential path, the gnomic branches, the future-perfect path and the modal contamination path. *Wayyiqtol* was defined as a highly advanced resultative-path gram, typically covering later sections of the anterior cline, and compatible with the stages of the simultaneous cline only in a residual manner. Although the two grams overlap in certain portions of the path,

[3] I distinguish (Andrason 2012c; 2013b) so-called gnomic branches and future perfect extensions. Additionally, a part of the semantic potential of *qatal* and *wayyiqtol* is explained by means of the modal contamination path.

their webs are distinct from one another. Even more importantly, since *qatal* is less advanced and *wayyiqtol* is more developed, I hypothesize that their nuclei of prototypicality are located at different stages of the anterior path (Andrason 2011a; 2011b; 2012a; 2013a; 2013b; 2013c; 2013d; for details see section 4.1.1).

1.2. PROBLEM—RESEARCH STRATEGY

It is evident from the review of the grammatical tradition presented in the previous section that despite the proliferation of grammatical studies (or probably due to this very fact) scholars have not reached an agreement with regards to the nature of the relationship existing between *qatal* and *wayyiqtol*. Since the four types of approaches conflict in various aspects and are, to a degree, mutually exclusive, the question of "Who is right?" emerges.

As always in the scientific enterprise, truth is a collaborative "discovery" in the sense that no theory can provide *the only* true answer to a question. Therefore, rather than a radically new model, what is really needed is a representation that could combine important insights and observations offered by the previous studies into a wider perspective, where certain shortcomings would be avoided and new concepts from the most contemporarily advanced frameworks would additionally be introduced. In this manner, new horizons of analysis and explanation could be constructed, while the insights of earlier scholars would still be honored. Accordingly, it is not my intension to disprove the theories discussed in section 1.1 above (either *en block* or separately) and to show that they are entirely inaccurate. Rather, I aim to encompass the views proposed thus far into a stronger model, which can preserve their discoveries and valuable insights while avoiding their shortcomings and inadequacies. This model should, thus, be thought of as an inclusive culmination of previous approaches, additionally bestowed with its own innovative properties.

The theories presented above are valuable and, in various cases, provide a number of significant insights into the semantics of *qatal* and *wayyiqtol*, on the one hand, and into their mutual relation, on the other. The identification of senses of a perfect, a perfective and a past as principal components of the meanings of the two grams is certainly correct. This will be evident when the details of the empirical study are presented in sections 3 and 4. However—without undermining or minimizing their input and relevance to BH scholarship—these theories are still limited in certain important aspects.

All the models discussed in section 1.1—except the representation developed by myself in earlier publications—have been developed within what could be labeled as a structuralist and Jakobsonian approach (cf. Bybee 2010). The structuralist and Jakobsonian ideal is an aspiration to represent language in a model that would be stable (for example, synchrony is clearly differentiated from diachrony), neat (where each component of the system is

well-defined by means of a label or a definition that specifies the main meaning, function, value, etc. of this component, supposedly valid for all cases; cf. the ideal of one form one meaning or the dogma of an inherent/invariant meaning), simple (through which the representation aims at being well-balanced and ordered with either as few complications as possible or with exceptions relegated to the outside of the model) and complementary (the system consists of pairs of binary oppositions, i.e. of components that can be defined by the presence [+] or absence [-] of a feature). In its most orthodox version, Jacobsonian structuralism sees language as a synchronic system of a few oppositions.

When discussing the question of their relationship, *qatal* and *wayyiqtol* are usually contrasted at the level of the system as forms that are bestowed with one major inherent property *x*. This property *x* either makes them semantically equivalent (cf. section 1.1.1), opposite (cf. section 1.1.2) or distinct (cf. section 1.1.3). In some cases, the number of traits used in the systematic classification ascends to two, three or, at the most, four, enabling one to recognize both similarities and discrepancies (cf. section 1.1.4). Even though some models identify a greater variety of senses specific to the two constructions, these are considered to be contextual variations, which are not present at the level of the system. The interaction of these specific values of the two grams is usually left unexplained. To be exact, *qatal* and *wayyiqtol* seem to interact in their global meanings but, apparently, not at the micro-levels of analysis where their contextually induced senses are found.

This structuralist ideal was typical of 20th century modernism. It was pervasive in linguistics and, in general, in science. However, current advances in research on human language (like the development of new linguistic frameworks, such as grammaticalization theory and cognitive linguistics) and the scientific paradigm shift brought on by complexity science, chaos theory, fuzziology and other unorthodox fields of science jointly demonstrate that the structuralist Jacobsonian ideal is incompatible with how natural languages and, in general, realistic systems work in the world. On the one hand, the idea of one inherent and/or invariant meaning has been demonstrated as untenable. On the other hand, languages—just like any other real-world systems—are complex, dynamic (metastable) and fuzzy. This implies that structuralist methods are, on the whole, less satisfactory to model and explain language—its verbal system included—than previously thought. It is better to draw on theoretical advances made in contemporary linguistics and modern scientific approaches, since these are more apt to treat phenomena of the realistic universe. In this manner, one will be able to represent a linguistic system more accurately, that is to say, in a way that more closely approaches reality.[4]

[4] Another typical trait of these modernistic approaches is their over-rational and non-empiric foundation. In this manner, linguistic theories of

While my own descriptions (Andrason 2011a; 2011b; 2012a; 2013a; 2013b; 2013c and 2013d) approximate such a non-structuralist model, the method adopted in them has one significant limitation. I ignored quantitative information of any kind. As will be explained later in the section dedicated to the theory, frequency constitutes a crucial factor in grammaticalization and cognitive models. Humans are, in essence, big statistical machines and language evolution is closely (and in multiple ways) related to frequency (Bybee 2010). Statistics are also a fundamental concept in complex systems, and especially in thermodynamics, to which I explicitly referred (Andrason 2012b). Defending a model based on grammaticalization theory, cognitive linguistics and thermodynamics without taking frequency or statistics into account is a flaw that must be addressed. This means that the main problem with my earlier proposal is that, thus far, it has been purely qualitative. To be exact, the model mainly discussed the components of semantic maps and their typological, diachronic and conceptual rationale (on maps, see section 2.2 and 4.1). Although I fully recognized that in the maps of the BH formations different senses have different weight (some senses are very common and constitute a prototypical center, while others are rare and non-prototypical) and was aware of the necessity of a quantitative study, I did not provide any evidence for this. I rather used general statements such as "common" and "uncommon," or relied on analyses presented by others (especially by McFall 1982), without proving their validity. Consequently, I did not specify (or did not substantiate quantitatively) the cognitive difference that a given sense (corresponding to a section of the map) may have. This in turn impeded me from determining what the users' perception of the form might have been.[5]

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the BH system are similar to philosophical theories. Each grammarian comes up with his or her model that "works" for the system, irrespective of whether the model has a strong empirical basis. Of course, once the models are constructed, they are usually shown to "work" for certain (even the majority of) empirical cases. Typically, however, there are cases where all such models break down. These instances are referred to as exceptions. The significant fact is that all such models seem to be based on the intuition of a linguist rather than rigorous empirical observation, either crosslinguistic or specifically Biblical Hebrew. This profound rational attitude characterizes all the models of the BH verbal system and explains their proliferation as is the case in philosophy. Linguistics is an empirical natural science that should be conducted in the spirit of hard sciences rather than in the form of philosophy or literary study. The fact that a model lacks an empirical basis and that there are observations that contradict its prediction should be regarded as sufficient grounds to falsify it.

[5] Additionally, although I acknowledged that the two forms might overlap in their semantic potential, I did not include the concept of quantitative (or statistical) complementarity in order to elucidate such overlapping(s). As far as empiricism is concerned, my previous model also

The present paper proposes a model of the *qatal-wayyiqtol* relationship that draws from the insights found in previous approaches and advances the author's own theory, expanding it to quantitative aspects. That is, it aspires to explain and to model the relationship underlying *qatal* and *wayyiqtol* within the frame of modern linguistic theories (grammaticalization approach, cognitive linguistics and usage-based approach) and complexity theory (and a related branch, such as fuzziology), putting emphasis on quantitative information and its relevance for macro and micro-analyses. In so doing, the study aims at representing a fragment of the BH verbal system as an exemplary real-world system, avoiding the manner of modeling characteristic of structuralism and modernism. Accordingly, the relationship between *qatal* and *wayyiqtol* is expected to be complex not in trivial terms but in a precise sense as formulated by complex-systems theory.

In order to comply with this goal, the study will be organized in the following way. In the subsequent part (section 2), the theoretical background of the new model will be elucidated. In section 2.1, important concepts related to complexity theory will be exposed and then, one of the most advanced manners of representing verbal semantics will be explained in detail. Namely, the notions of qualitative (section 2.2) and quantitative maps (section 2.3) will be discussed and the ideas of frequency, prototypicality and fuzziness, as well as their relation to the grammaticalization process and to semantic mapping, will be explained. Thereafter, the results of a qualitative-quantitative empirical study involving the *qatal* and *wayyiqtol* forms found in the book of Genesis will be presented (section 3). This study—and especially its quantitative results—will allow me to determine interesting properties of the two grams available both at micro- and macro-levels of description. In particular, the individual frequency of senses (the components of the semantic potential) of the two grams will be offered (section 3.1) and their mutual quantitative interaction presented (section 3.2). Next, the qualitative (section 4.1) and quantitative (section 4.2) semantic maps of the two formations will be designed and the complexity model of their relationship discussed (section 5). Lastly, main advantages of the model will be summarized, its limitations examined and new lines of future research suggested (section 6).

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fails to be entirely satisfactory. Although it is directly built on cross-linguistic empirical evidence (which significantly strengthens its objectivity), its direct Biblical Hebrew empirical foundation is weak. Namely, the model has not been constructed from rigorous observation but focused on qualitative aspects identified previously by others.

2. THEORETICAL BACKGROUND

2.1. COMPLEXITY

Complexity is an inherent property of reality. All real-world systems—be they physical, chemical, biological or any other—are complex. In particular, they display the following properties (Andrason 2014a):

- They are open. They constantly interact with the external[6] world by exchanging material, energy and information (Andrason 2014a: 77; 2016: 14–5);
- They are situated. They emerge and develop in response to the properties of the environment to the extent that their behavior cannot be explained by uniquely analyzing the parts of which they are composed, but must include the whole in which they are embedded (Andrason 2014a: 77; 2016: 14);
- Their boundaries are fuzzy. Rigid and impermeable boundaries do not exist and the line between the system and the external world—or between a component and its environment—is arbitrary and artificial. As the whole in which the system is embedded is also that system's inherent part, the limits of such a realistic system extend far beyond its traditional boundaries (Andrason 2016: 15);
- They are replete with unstable individuals. Individuals are not permanent and discrete but instead form hierarchies of changeable, unstable and fuzzy singularities. Any system is a component of a higher-level system (i.e. the organization in which it is embedded) and, at the same time, embeds, as its own component, a lower-level system. The structure of such hierarchical inclusion is infinite, ranging from the most microscopic to the most macroscopic (Andrason 2014a: 77; 2016: 14);
- They are infinitively cardinal: they contain an infinite number of components, be they individuals or relations. When determining the state of a complex system (or even of one of its subparts or components), it is impossible to provide a complete series by which this state could be fully represented. To be "complete," such a series would have to be infinite (Andrason 2014a: 77–8; 2016: 15–6);
- They are dynamic. All complex real-world systems evolve. Time is the central concept in real-world organizations because everything is a process.[7] If one intends or is neces-

[6] On the relativity of the term "external," see the third entry in this list.

[7] As defended by modern science, everything in the universe is con-

sitated to conceptualize a dynamic object as a state at a time *x*, this object must be regarded as metastable. That is, although taken as static, it is inherently dynamic (Andrason 2014a: 78; 2016: 16);

- They are path-dependent. The momentum of an object is regulated by the precise dynamic conditions where the first "step" was made and by equally dynamic conditions imposed by the constantly changing environment (Andrason 2014a: 78; 2016: 16);
- They are non-linear. When evolving, their outputs are not directly proportional to the inputs, such that a microscopic disturbance can be amplified in an exponential manner. The linear increase in the quantity of input data causes the number of configurations in the outputs to expand exponentially beyond any margin of control (Andrason 2014a: 78; 2016: 16–7). This is related to the fact that complex systems are highly sensitive to initial conditions. That is, an insignificant behavior of a single piece of the system may trigger a dramatic macroscopic fluctuation after a time (Andrason 2014a: 78; 2016: 17);
- They are, in regions, chaotic. They are unpredictable in the long term, although laws governing them are, in principle, deterministic. Due to the non-linearity of the relations that exist in complex systems, the margin of error or rounding assumed in any approximation will, after a time, exponentially inflate the previously controlled inaccuracy, rendering any exact prediction invalid (Andrason 2014a: 78; 2016: 17);
- They are emergent. Characteristics present at a higher level fail to be qualitatively comparable and analogous to the properties present in constituents of a lower level, or are not directly derivable (resultant) from lower-level entities. Higher levels bring new "exotic" properties that cannot be explained by merely adding properties of the components of the lower level (Andrason 2014a: 78–9; 2016: 17–8);
- They are non-modularizable and irreducible. Complex systems cannot be explained by their microanalysis into independent parts because they are not mere superposed computations of their isolated components. It is impossible to divide the system into individual and independent subsystems without an important loss of information (Andrason 2014a: 78–9; 2016: 17);

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stantly evolving. All things are processes. As brilliantly stated by Dobzhanski (1973: 125), nothing makes sense in biology and genetics except in light of evolution. This also holds true for physics, cosmology and any natural-empirical science, linguistics included.

- They are organizationally intricate and highly sophisticated. They are multi-dimensional, multi-level, multi-phasic with intra and inter-level relations, and with bottom-up causation (lower levels organize into higher level) and top-down causation (the higher level affecting the lower levels; Andrason 2014a: 79; 2016: 17–8);
- They are self-organizing and adaptive. Complex systems are auto-regulating organisms in which all the components are embedded and contribute to the whole (Andrason 2014a: 77; 2016: 14; for a detailed discussion of the properties of complex systems, see Strogatz 1994; Crutchfield 1994; Casti 1995; Cilliers 1998, 2005, 2007a and 2007b; Auyang 1998; Kauffmann 2000; Lewin 2000; Richardson, Mathieson and Cilliers 2000, Schlindwein and Ison 2007; Cilliers and Preiser 2010; Hooker 2011a and 2011b; Bishop 2011; Bickhard 2011; Cilliers et al. 2013; Andrason 2012 and 2014a).

The modeling of complex systems is itself a complicated matter. In order to be fully complete, the model of a complex system should be at least as complex as the realistic system it represents. This is of course impossible. Science does not represent the world as it is. It always uses (and, in fact, necessitates) approximations, simplifications, generalizations—in a word, a model. The analysis of any complex system—including the linguistic one—necessarily resorts to such approximated, simplified and general models. By doing so, it idealizes the real picture and simplifies it to manageable dimensions (Andrason 2014a: 79–80; see also Auyang 1998: 67–72; Allen 2001; Richardson, Cilliers and Lissack 2007: 26–8; Schlindwein and Ison 2007: 237; Cilliers 2007: 82–3, 88; Diéguez Lucena 2010: 66, 75; Allen, Strathern and Varga 2010; Cilliers et al. 2013: 3–4).

There is no rule of thumb which could determine how models of complex systems should be developed. There is no minimal threshold of complexity compulsory to such models. Usually, a model is beneficial when it is the least reductionist and simplistic as possible and the most accurate in its preservation of typical properties of complex systems—being still treatable and transparent enough to be comprehended. Accordingly, there may be a large number of models of a given complex system. Some of them can be more resultant, isolated, coarse-grained (namely, less precise), more settled for equilibrium, with either fixed boundaries or with the external world being relegated to exogenous parameters, and with endogenous variables externalized or regarded as given and fixed. Others can be more emergent, open, relational, fine-grained (more precise), endogenous and dynamic. In each case where a model is designed, its exact shape is driven by generalizations to be discovered and by the precision that the scientist and/or the experiment require. By resorting to multiple approximations and

distinct scales, diverse models discover different macro-truths and their relations to micro-states. A single unique model of a realistic complex system does not exist. Rather, any real-world complex system can be mapped onto various models, if not onto an infinite number of them. Although, in the end, the shape and choice of such models are pragmatically conditioned, it is assumed that the more a representation approximates reality in the way explained above, the better it is. This assumption stems from the fact that these "better" models are able to discover and represent a larger number of realistic "truths." Since models of complex systems intend to preserve as much of these systems' complexity as possible, simplicity (especially the kind of simplicity that annihilates the complex nature of a real-world system) is nowadays perceived as the model's drawback rather than its advantage. The model should not be simple but manageable. Fortunately, advances in modern information sciences and digital technologies in the past century have greatly increased the level of such manageability. This leaves little or no space for (artificial and/or forced) simplicity in scientific representations (Auyang 1998: 11, 15, 67–70, 342–4; Prigogine 2009: 177; Diéguez Lucena 2010: 66, 75; Hooker 2011a, 2011b; Cilliers et al. 2013; Andrason 2014a; 2016).

Complexity is not limited to the purely tangible universe, that can be understood by physics, chemistry and biology. It is also typical of social, economic and cultural organizations (Cilliers 1998 and 2005; Schlindwein and Ison 2007: 232; Wagensberg 2007: 12, 27, 56–62; Hooker 2011b: 20–1, 40; Bishop 2011: 112; Cilliers et al. 2013: 2–4). Language—a system where physical and non-physical components constantly intervene and mix—is viewed as an exemplary complex body, offering all the properties listed above. As a result, its more accurate representation is required to be based upon a model that preserves the properties characteristic of complex systems in a transparent and manageable manner (Andrason 2012b; 2014a; 2016; Massip-Bonet 2013; Munné 2013; Mufwene 2013; Massip-Bonet and Bastardas-Boada 2013a and 2013b; Kretzschmar 2015).

2.1. MODEL OF VERBAL MEANING

2.2.1 QUALITATIVE MAPS

In accordance with usage-based approaches to language—such as cognitive and grammaticalization theories—any grammatical formation regularly offers various senses. Practically, their exact number depends only on how fine-grained the intended description is. At the most microscopic perspective, there are as many senses as there are cases of usage.[8] At a description level characterized by an

[8] This agrees with the fact, acknowledged by modern science, that no two phenomena are completely identical. At the ultimately fine-grained analysis, they always differ somehow (Auyang 1998: 344; Smith 1998: 51–

average or intermediate granularity,[9] grammatical constructions display a considerable, but yet finite and manageable variety of values (Evans and Green 2006: 352–3, 368; Nikiforidou 2009: 17, 26; Bybee 2010: 183, 186–7).

Semantic polyvalence of a grammatical form—known under the concept of polysemy—is a norm in languages. It necessarily arises due to language evolution and to broadly understood grammaticalization. Senses offered by a construction are activated in specific contexts that call upon slightly different semantic, even contradictory, properties of the formation. It is this ability to be constantly reused in new contexts that allows constructions to evolve. As each sense is prompted in and produced by a specific context, all of them depend on environmental factors. This holds true not only for senses that are divergent, irregular or exceptional, but also for senses that are fully stabilized, being viewed as "normal" values of the form. In language, there are no senses that are context-free, because any sentence or text (be it written or uttered) is produced in a concrete environment. Supposedly context-free meanings are as contextual as any other senses. They are merely restricted to their own milieu, for instance to general quotations or dictionary entries (Evans and Green 2006: 352–3, 368; Nikiforidou 2009: 17, 26; Bybee 2010: 183, 186–7).

All the senses that a form can express are somehow related. Nothing is random in reusing a form in new contexts and in adopting it to new values. The cognitive relation between the senses conveyed by a construction—labeled as the "relatedness principle"—is both conceptual and chronological. First, as far as the conceptual link is concerned, one sense constitutes a semantic foundation of another. To be exact, by applying universal human cognitive mechanisms (for example, metaphor, image-scheme process, metonymy, etc.), the formation can be extended to a new environment, where a new value is activated. Second, as far as the chronological relation between two adjacent senses is concerned, the value that represents the conceptual foundation of another usage historically precedes the sense which has been derived from it. Accordingly, the form's meaning is understood as its entire and interrelated polysemy or as a semantic potential organized into a cognitively and historically coherent structure—a map (a web or a network). In these maps, components (i.e., senses) are connected by links that arrange them in a chain. As already explained, this linkage is both conceptual (it reflects universal cognitive procedures which allows certain meaning extensions) and historical (it reflects the historical expansion of the polysemy; Lakoff 1987: 12–3; Gibbs 1994: 157; Heine, Claudi and Hünnemeyer 1991: 224–5, 259–60; Taylor 2002: 98, 138–9; Tuggy, 2003: 323–4, 348–50; Janssen 2003:

67, 90–115; Wagensberg 2007: 56–7, 60; Schneider and Sagan 2009: 55).

[9] Such intermediate granularity levels are adopted in most scientific models.

96; Haspelmath 2003; Evans and Green 2006: 36, 169, 328, 331–52; Lewandowska-Tomaszczyk 2007: 140, 147–8; Nikiforidou 2009: 17, 26; Bybee 2010; De Haan 2010 and Van der Auwera and Gast 2011: 186–8).

To represent this cognitive coherence, a map can be linked in two manners, i.e., by using either psychological or typological explanations. The psychological mapping, which constitutes an intuitive linkage of the various components of the semantic grid of a form, can be viewed as being, largely subjective, arbitrary and unverifiable or unfalsifiable. By contrast, the mapping based on typological diachronic universals can be regarded as more scientifically secure. It is empirical, testable and easily accessible or repeatable, and thus objective. Typological studies have discovered that languages are governed by evolutionary laws (or under a less strong assumption, tendencies) known as grammaticalization paths. Paths constitute idealized models of evolution of grams belonging to a certain type. They indicate how certain types of polysemies evolve. They determine the exact order of senses that are gradually acquired by a class of grammatical forms and incorporated into these forms' semantic potential as new components of their maps. Although abstract and idealized, they have been derived from empirical observations and tested on a great number of languages (Heine Claudi and Hünnemeyer 1991: 221–2, 225–8, 260–1; Bybee, Perkins and Pagliuca 1994; Bybee 2010; Haspelmath 2003; Dahl 2000b).

Since grammaticalization paths represent and predict the most likely meaning extensions typical of certain grammatical types, and since the chaining of a polysemous map must not only be conceptual but also diachronic, grammaticalization clines are extensively used as templates for the linking of synchronic (and hence conceptual) semantic potentials. They constitute the most plausible matrixes for the chaining of polysemous webs. As a result, a grammatical entity is represented as a portion of a path or as a collection of related paths, where each distinct sense offered synchronically by a concrete gram corresponds to a stage on the abstract grammaticalization cline with which that gram is modeled. It is assumed that the proposed mapping is not only typologically plausible (as it is based on a universal template) but also realistic—it represents how the components of the map of this specific form have actually arisen through a process of expanding from one another (Heine, Claudi and Hünnemeyer 1991: 221–8, 260–1; Bybee, Perkins and Pagliuca 1994: 15–9; Heine 1997: 10; Haspelmath 2003; Tyler and Evans 2003: 344–6; Sadler 2007: 33; Ariel 2008; Bybee 2010: 198–9; De Haan 2010 and van der Auwera and Gast 2011: 186–8).

This approach enables linguists to coherently represent the meaning of a gram despite the fact that this construction may otherwise resist any consistent classification, in particular, lacking a straightforward definition by means of available taxonomical labels. The model tolerates the situation whereby a gram provides various,

even disparate and contradictory, senses and/or is used in contexts that are typical of more than one taxonomical class. Additionally, the model provides solutions both for micro- and macro-levels of analysis. On the one hand, as it builds on synchronic variability, it preserves the empirical richness of a form, enabling one to recover, relate and explain even the most fine-grained nuances in the meaning of a form. On the other hand, it delivers coherent definitions of grammatical constructions as such, represented as kinetic vectors or dynamic surfaces. Such definitions make reference to the process-like nature and evolutionary capacity of grammatical forms by specifying not only what the form is, but also where it comes from and where it is heading to (cf. Heine, Claudi and Hünnemeyer 1991: 225, 248, 251, 259; Nichols and Timberlake 1991; Heine 1997; Dahl 2000a: 15–7; Bybee 2010, van der Auwera and Gast 2011: 186–8, 281; for details of the qualitative mapping, see Haspelmath 2003 and Andrason 2012a; 2012b; 2013a; 2013b; 2016; compare also section 4.1.1 below).[10]

The approach discussed above has been extensively used in studies on the BH verbal system, being designated as the "second generation" grammaticalization model (Andrason 2011a). This representation constitutes a more consistent and more sophisticated application of the grammaticalization framework to the description of verbal semantics of Biblical Hebrew than the first grammaticalization models proposed by Andersen (2000) and Cook (2002, 2012; on criticism of Cook's deeply structuralist perspective, see Andrason 2011a and 2011b).

2.2.2 Quantitative maps

Frequency and prototypicality

Although the modeling presented in the previous section is nowadays extensively used in linguistics and has been employed in analyses of the BH verbal system, it has one important weakness or inconsistency. Contradicting its own theoretical foundations, the approach ignores quantitative information, which is a necessary and crucial factor both in complex systems (especially in thermodynamic ones) and in grammaticalization and usage-based frameworks. Consequently, the introduction of the ideas of frequency—and related concepts such as prototypicality and fuzziness—constitutes the next necessary step for the adjustment of the "second-generation model" to complexity theory as well as to grammaticalization and usage-based linguistic approaches.

The qualitative model can be enriched by quantitative data, particularly the specification of the frequency of the elements of the map: each sense is accompanied by a number that specifies its weight in the semantic potential of the formation. The necessity of

[10] Additionally, some properties offered at macro-levels of this model are emergent, for instance path dependency, directionality and chaos.

including this type of information stems from the following well-known fact: although a gram can convey a great variety of values, the frequency of these values and their relevance for the macroscopic classification and/or analysis—as well as for the perception of the meaning of this form by the speakers—are not identical. Sences play a more or less significant role in the total meaning of a gram according to their regularity or scarcity. The most frequent senses are viewed as conceptual nuclei (although not necessarily historical centers) of the map. They are statistically the most probable and, therefore, the most prototypical in a corpus. They are also stabilized and correspond to the users' representation of the meaning of this form. As a result, high frequency or statistically driven prototypicality is correlated with cognitive prototypicality understood as "the first-come-to-mind manifestations of abstract thoughts" (Gilquin 2006: 180). In other words, the prototypical value is cognitively the most salient one; and this saliency can be observed in the high frequency with which a particular sense occurs within a given corpus. In contrast, less common behaviors are non-prototypical and non-stabilized. They are scarce and, therefore, do not enter into the users' representation of a form (for details, see Gries and Stefanowitsch 2006; Gries 2006; and Gilquin 2006).[11]

This frequency-based prototypicality implies that the classification of an entity as a member of a taxonomical class—and the degree of this inclusion—depends not only on the extent of the qualitative conditions fulfilled by this item, but also on how frequently the conditions are fulfilled. To be a prototypical member of a taxonomical type—for example, to be classified as a perfect, a perfective or a past—the individual's prototypical behavior must frequently coincide with the prototype posited for this class (cf. Geeraerts 1988: 221–2; Stubb 2004; as well as Gilquin 2006: 159). For instance, a gram is an ideal present perfect if it is always used as a present perfect. It is an exemplary perfective aspect if it is found

[11] Frequency and its relation to prototypicality is a complex matter. A global frequency of senses that compose the semantic potential of a form only corresponds to one type of it. Another major type concerns the frequency of forms that are compatible with a semantic domain (cf. section 5.3). Frequency can also give distinct results depending on the corpus chosen for a given analysis. It varies in relation to genres, types of text, authorship and geographical areas. Moreover, other properties such as productivity of senses make an important contribution to the concept of prototypicality. Therefore, although the degree of prototypicality can be inferred from frequency, crude frequency is far too simplistic. However, even though scholars have not proposed a manner of combining different types of frequency into a unified picture or digit, frequency remains the most objective and tangible indication of prototypicality. In order to avoid a simplistic treatment of frequency, various measures of frequency will be discussed in this paper (regarding frequency, corpus studies and cognitive semantics, see Glynn 2010; Stefanowitsch 2010; Schmidt 2010 and Gris and Divjak 2010).

at all times to perform the function of a perfective aspect. The same holds for its definition as a past tense or any other grammatical category. The problem is that reality is much less strict than the ideal, as already obviates from the commonness of polysemy of grams; the fulfillment of the ideal condition of 100% of the cases is therefore an unworkable and naïve postulate. The description of realistic phenomena, including grammatical ones, in terms of binary completion [+/-] is inadequate. The universe—physical and linguistic—does not practically allow for such dichotomies. Intermediate stages and mixed properties are more frequent than phases of absolute taxonomical distinctiveness and uniformity (cf. Andrason 2016). Reality and language are fuzzy.

Fuzziness

In nature, cases of total compliance with a prototype are exceptional. Intermediate stages, in which properties characteristic of more than one prototype intermingle and amalgamate, are significantly more common. Fuzziness is an exemplary aspect of real-world complex systems and stems from the fact that all the subsystems of the realistic universe are infinitely open and fail to be comprised within sharp discrete boundaries. Fuzziness means that any discrete categorization should be replaced by the idea of prototypicality and its degree. It is virtually impossible to determine a precise and non-arbitrary line that would distinguish objects belonging to a certain class *a* from those belonging to a class *b* because the transition is smooth and gradual. This borderline depends on the subjective assessment of the person seeking to explain the distinction and his or her model (Zadeh 1973; Dimitrov 2002: 10–2, 15, 18–9; Dimitrov and Hodge 2002: 37; Munné 2013: 181; Mufwene 2013; Massip-Bonet 2013).

In order to explain the relevance of fuzziness in grammar, I will return to the process of grammaticalization. Grammaticalization clines link stages in such a way that each stage reflects a distinct taxonomical type, giving the impression that (a) grams jump from one stage to another or that (b) once they have acquired certain stages on the path, constructions convey the senses corresponding to these phases with equal intensity. The real state of affairs is different. First, paths do not imply a sudden and total transformation from one stage to another in the sense that when the posterior stage is acquired, the previous one is necessarily abandoned. Grams typically accumulate values that reflect subsequent stages of grammaticalization so that they can span a large section of the path. Second and most important, the acquisition of new developmental stages, and therefore new senses, is always gradual; the entire process corresponds to a progressive modification of the prototypicality of an item. Grammaticalization involves a continuum of intermediate stages where various senses intervene with different prototypicality and frequency: some are common, some are uncommon and some are extremely rare (cf. Bybee, Per-

kins and Pagliuca 1994: 8, 17–9; Andrason 2011a: 50; 2011b: 18, 49–50; 2012a: 52; 2013: 256–355).

The importance of frequency in language evolution cannot be overestimated. Frequency is regarded as an indicator of the modification in the prototypicality of a form. A change in the statistical distribution of a feature triggers the reinterpretation of an entity as a member of a new category because users associate it with more frequent senses. Grammaticalization, which works through automatization, is strongly correlated with frequency. That is, less grammaticalized senses are less common, while fully grammaticalized values are frequent. However, one should also note that values that have previously been grammaticalized and/or were originally common may later become uncommon and lost. Once more, this reflects the grammaticalization process, which goes not only from non-grammaticalized (peripheral) to grammaticalized (central), but also from grammaticalized (central) to a loss (peripheral; Bybee, Perkins and Pagliuca 1994: 8–23; Dahl 2000; Hopper and Traugott 2003: 126, 129, 172–4; Ariel 2008: 142; Bybee 2010: 171–2, 193).

Given that the increase in frequency can range from 0% to 100%, grammaticalization is infinitively gradual and the modification of the categorial status of a form inevitably fuzzy. The idea of an absolute fulfilment (or [+/-] classification) is clearly deficient, as these possibilities (i.e., an impeccable match with a category) constitute only two variants among the infinitum of other options. In other words, since the degree of prototypicality is related to the quantitative extent of resemblance to the prototype, the array of this compatibility can theoretically range from a total match (100% of resemblance) to a total mismatch (0% of resemblance) with the absolute match to a prototypical stage constituting only one possibility among many. Although grammatical prototypes, i.e. states that correspond to two poles of a continuum or to ideal categories are important for determining clines and indeed may actually be encountered, intermediate phases are much more common. Therefore, taxonomical classes cannot be defined in linguistics with rigid boundaries in Boolean bivalent terms of belonging or non-belonging. Such categorization is an abstract and unrealistic theoretical invention. To represent realistic cases, they must be reformulated in fuzzy terms where the relation of belonging to a class is viewed as gradually approaching the prototype (Wittgenstein 1972; Labov 1973; Jackendoff 1983; Lakoff 1987; Rosch and Mervis 1975: 575; Taylor 1989; Heine, Claudi and Hünnemeyer 1991: 227; Langacker 1987, 1991: 266 and 2008: 8; Cruse 2004: 130–2).

Complexity model of verbal meaning

The dynamic qualitative model based on grammaticalization paths—where the semantics of a form is defined as a kinetic vector comparable with a portion of a cline—is highly suitable for the incorporation of quantitative data and for the fuzzification of the definition of meaning.

In this model, the meaning of a grammatical construction approached in its totality can be portrayed as a directional, bi-dimensional phenomenon—a kinetic topology. Its shape is determined by two clines: a horizontal one (the *x*-axis) and a vertical one (the *y*-axis). The horizontal cline or a cluster of clines links the components of the semantic potential of the gram. These clines reflect grammaticalization paths and correspond to the qualitative mapping. As the parameter of frequency is introduced, each path can be vertically "lifted" at the stages that correspond to the more frequent values.[12] Since such a bi-dimensional typology is dynamic, the model of a gram's meaning can be understood and represented elegantly as a wave.

To illustrate this, I will use the example of a gram whose semantic potential consists of the senses of a perfect and a past, which match two consecutive stages on the anterior path. These two values can be represented on the *x*-axis as two consecutive stages and their frequency values allocated on the *y*-axis. The two values must sum 100% or 1 in probabilistic terminology, since each one determines the frequency of one sense out of the two senses that are possible. The more lifted a given portion of the path is, the more prototypical the sense related to this stage becomes and the more easily speakers can associate it with the form. Less common values will remain less vertically risen and will be perceived by speakers as exceptions that are restricted to special contexts;[13] hence they will not be easily associated with the form.

The model presented above accounts for the entire semantic variability and diversity of the gram on the one hand, and its fuzziness on the other. It represents any distribution of frequency of the senses and, thus, any type of a semantic map. It accounts for all possible fuzzy transition phases or objects that can be viewed as conceptually located between two ideal poles of a total belonging (all the conditions are always fulfilled) and non-belonging (no condition is ever fulfilled). Moreover, the definition in the form of a wave is concise and scientifically manageable as one formulates classifications that are coherent, explanatory and predictive. They are far from mere taxonomies or collections of micro-data. On the contrary, they depict the form at the global level as a dynamic geometrical—at least bi-dimensional—object with topological properties that enable us to relate it to other formations. This is a clear advantage in comparison with rigid, dichotomist, static and minimally intricate classifications proposed by structuralism.

Additionally, within this model, the meaning of a form preserves most of the properties of complexity. A dynamic molecule that represents the semantics of a form is complex (it incorporates an infinite number of specific senses available on concrete occa-

[12] Alternatively, it is possible to represent more frequent senses as stages that are more densely populated.

[13] It should, however, be remembered that *all* senses are contextual.

sions at the micro-level), dynamic (the meaning is represented as a kinetic vector, modeled by means of a processual template that reflects both typological and concrete evolution), metastable (it is viewed as an individual or a holistic global map), organizationally intricate with access to the micro and macro-levels of analysis (it accounts for individual micro-senses and for the global all-encompassing macro-meaning) and emergent (the model develops new exotic properties at higher levels that cannot be perceived in the micro-analysis: vector of time, path organization, etc.). By maintaining most properties typical of real-world complex systems, this model represents linguistic reality with a lesser degree of approximation. It is therefore regarded as more adequate (Andrason 2014a; 2016).[14]

Comparing two forms—different maps and statistical distribution

In structuralism, the comparison between two forms is methodologically a simple task: it is reduced to the formulation of a binary opposition and/or complementary distribution of these two forms. By contrast, in the realistic universe and in the complexity approach that mirrors that universe, this interaction between any two components of the system is extremely intricate and the nature of their mutual similarities and dissimilarities sophisticated. The reduction of such an opposition to the idea of dichotomy and/or qualitative complementarity is unacceptable.

The relation between any two grams is intricate because their meaning is itself a complex phenomenon—a topology. As explained above, this topology involves at least two different axes or dimensions, i.e. the *x* path-axis and the *y* frequency-axis. Each (but especially the latter) is characterized by an infinite degree of granularity. Additionally, each path consists of a set of more specific clines, each stage may be deconstructed into more fragmentary sub-stages and each cline can be located in three temporal frames (viz. past, present and future). Meanings yield topologies with different horizontal and vertical coordinates and the commensurability between them necessarily involves a great number of features and parameters. This renders any attempt to use the method of binary oppositions in order to portray a relationship between any two grams entirely inadequate and the idea of complementary distribution unrealistic. The relevance of quantitative information further challenges the structuralist dogmas of binary oppositions and complementary distribution. Rather than being complementary with respect to function or meaning, grammatical entities overlap functionally, semantically and pragmatically. The difference between them does not concern their qualities, but rather the prototypicality with which these qualities materialize. As a result, it is the

[14] For a further discussion of the advantages of the wave model, see section 6.2. For a more comprehensive analysis consult Andrason 2016.

quantitative (statistical) and not the complementary distribution that plays the central role in molding grammar (for similar views, see Langacker 1987; Hopper and Traugott 2003: 35, 130; Cruse 2004: 150; Ariel 2008: 114–5, 142, 148; Bybee 2010).

Despite their complexities, maps can be successfully compared. But contrary to structuralism that compares unrealistic and drastically oversimplified ideas of grams, in the complexity model one compares grams' topologies. As explained above, topologies may be disparate and apparently incomparable because they are driven by different qualitative and quantitative properties. So far, one method that makes the comparison of such complex topologies manageable has been developed (Andrason 2016). It is applicable to constructions that belong to a similar evolutionary taxon and necessitates the use of a coarse-grained perspective. Namely, if a relatively coarse-grained view is adopted, in which the grammaticalization cline that is the most relevant for a gram is only envisaged (i.e., in which a map or web appears as a line), certain constructions seem to be organized along highly similar linear grammaticalization templates. They travel along an analogous path and share the *x*-axis. This is true even though such grams have been derived from different inputs and emerged at different times and/or do not share any semantic components. Such constructions—or rather their topological representations—can be placed on an axis which represents a grammaticalization channel recursively activated in a language. This axis (that frames the gram's specific development within a more general and abstract evolutionary template) will be referred to as a stream. Once placed on the common stream, grams will differ quantitatively in responding to the values codified by the *y*-axis. These quantitative differences that relate to the grams' maps will cause the grams to occupy distinct locations on the stream.[15] One topology will be more advanced (its wave having travelled the stream more efficiently) while the other will be less advanced (its wave having travelled the stream to a lesser extent). The former corresponds to an older gram (chronologically, more remote) whereas the latter to a younger one (chronologically more recent).[16] To conclude, the stream is a conceptual medium where (at least certain) grams can be easily compared and their mutual relationship estimated.[17]

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[15] These differences can be understood as uniquely quantitative even though they intuitively seem to be qualitative. That is, the fact that a "gram a" does not express a certain sense available on the *x*-axis while a "gram b" conveys that sense, reflects a quantitative difference between 0% versus any positive value greater than 0%.

[16] Although waves of grams can partially overlap, they can also be entirely disjunctive.

[17] For an illustration of this type of comparison of grams, see section 5.2; for a detailed discussion of the concept of a stream and its systemic consequences, see Andrason (2016).

3. EVIDENCE

The qualitative and quantitative data that will be presented in this section are extracted from an extensive database that includes all the occurrences of the five BH verbal grams (*qatal*, long *yiqtol*, short *yiqtol*, *wayyiqtol* and H-*yiqtol* [the so called-cohortative]) in the book of Genesis.[18] The aim of this study was to compile a review of all the senses conveyed by the said formations in this corpus and to estimate their frequency. The main principles driving this research were empiricism and objectivity.[19]

The procedure adopted by the author was the following: each case where a gram appears was classified as a sense "measured" within the categories (or semantic domains) established for the study. The selection of these specific categories was dictated by three major principles: (i) the categorization was aimed to respect the grammatical tradition (the chosen categories have been commonly used in traditional BH grammars and/or in studies developed within linguistic typology, grammaticalization theory and cognitive linguistics); (ii) the categories are grammaticalized as grammatical forms in some languages (this means that they typologically exist); and (iii) a given category is used to determine the exact extent of similarity or dissimilarity between semantically-akin forms in two or more languages (to put it another way, by using these categories, forms whose properties are otherwise similar are differentiated).[20]

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[18] The main justification for the choice of Genesis as my corpus relates to a relative straightforwardness of semantic values that can be ascribed to verbal forms in this book of the Hebrew Bible. Since my study builds on semantic values of verbal forms as recorded in specific places of a text, and since, contrary to syntactic or morphological features, semantic traits are more elusive (we do not have tools to "measure" them), the fact that the interpretation of a text is *grosso modo* unproblematic is highly important. Genesis is such an uncomplicated text. This stems from the nature of this book as being principally comprised of stories either in narrative (narrative proper) or discursive passages (narrative discourse or embedded narrative). Of course, I am aware of limitations of my approach that principally concern the issue of represenativity of the chosen corpus (cf. section 6.3). I am also fully aware that the corpus of Genesis is not particularly stable in antiquity, which may be deduced from the Qumran manuscripts, the Samaritan tradition, and even the LXX. This means that the variations recorded by other ancient versions may sometimes have a bearing on *qatal* and *wayyiqtol*. This may in turn alter the analysis of frequency. However, given the statistical rule of big numbers, the extent of the analyzed text and the number of considered tokens seem to counteract these shortcomings. In fact, a contrastive study of 2 Samuel 1–2 showed that the qualitative and quantitative maps of verbal grams (and hence their waves and streams) are fully comparable with those proposed in this paper (cf. Andrason forthcoming).

[19] Of course, I am aware of the fact that the ideal objectivity is a naïve postulation. Therefore, by objective, I mean scientifically objective.

[20] For a discussion of other solutions to the issue of categorization, see

This "measured" value was understood as information expressed by a formation on a concrete occasion (it occupies an empirically defined place in the corpus) and conditioned by contextual factors. The context was not only understood as shaping the exact sense of a verbal form but also as an overt indicator of the registered value. A sense was viewed as "tangible" or objectively demonstrable because of the presence of explicit contextual signs: an accompanying lexeme, clause, sentence or the entire passage.[21] For each unambiguous occurrence, the value of a given domain was increased by one point in the semantic potential of the gram. For example, if the gram conveyed the value of a past, the past sense received one point. Due to a particular nature of the biblical corpus in certain cases, a single verbal construction could be interpreted in more than one manner and categorized as harmonizing within two domains. Such uncertainty, which derives from our imperfect understanding of Biblical Hebrew and/or the ambiguity inherent to the language, was reflected in the database by ascribing the value of 0.5 to two alternative senses that were possible on that specific occasion.[22]

3.1. LOCAL FREQUENCIES

3.1.1 Qatal

The results of the empirical study show that the broad domain of taxis, itself consisting of the senses of a present perfect[23] (1.a),

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Taylor (2003: 144–69) and Tyler and Evans (2003: 42–5).

[21] This demonstrates that the senses determined in the study were not based on and derived from translations, be they in English or any other language.

[22] Apart from semantic values, the database distinguishes types of text (discourse, narrative, narrative discourse and narrative comment), morpho-syntactic variants of a given gram (for instance, *0-qatal* or *x-qatal* and *0-yiqtol* and *x-yiqtol*), and syntactic environments (for instance, in the case of the *x-qatal*, this *x* is specified as **לֹא**, **אֲשֶׁר**, **לוֹ**, subject, object, etc.). For a more detailed description of the procedure of compilation of the database see Andrason and Van der Merwe (2015).

[23] The descriptions of semantic domains in footnote 23–28 draws from several of my previous papers (Andrason 2012a; 2012c; as well as Andrason and van der Merwe 2015). The category of a perfect is a complex group of even more specific senses, such as inclusive (an action or state holds without interruption from a determined point in the past to the present moment: *I have known Max since 1960*; Jónsson 1992: 129–45), resultative (dynamic events have occurred and since then the results remain unchanged for the present state of affairs: *I cannot come to your party—I have caught the flu*; McCawley 1971), experiential (the subject has an experience of having performed a given action: *I have read "Principia Mathematica*"; Jónsson 1992: 129–45), frequentative (the current or recent repetition of activities is focused; for example in the Portuguese perfect *Ultimamente o João tem lido muitos romances* "Recently John has read many novels"; Squartini and Bertinetto 2000: 409) and, according to some anal-

indefinite perfect[24] (1.b), pluperfect (1.c) and future perfect (1.d), has the biggest weight in the semantic potential of *qatal*. If all the types of texts are considered and all the subtypes of taxis counted jointly, this sense ascends to 55.5% (468 cases). The aspectual value of a perfective[25] past (1.e) is also common, being found in 26.7% (225 cases). The sense of a present (be it resultative,[26] stative[27] or

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yses, indefinite (see the next footnote, below). What unifies them is the ability to express anterior events, actions or situations that are relevant to the present (De Haan 2011: 456). It is either the situation itself that continues into the present or its results that do so (Comrie 1976: 52; cf. also Nurse 2008: 154). In its exemplary function, a perfect belongs to the temporal or cognitive sphere of the present. This current relevance is what distinguishes present perfects from definite past tenses (Comrie 1976: 52–4; Bybee, Perkins and Pagliuca 1994: 61; Nurse 2008: 154–5; De Haan 2011: 456–7). It is important to note that in the present perfect use, a formation cannot be employed with lexemes or expressions that explicitly locate the activity in the past time frame (Bybee, Perkins and Pagliuca 1994: 61–2). The perfect usually emphasizes the dynamic event or activity while the relevance of the component related to the resulting state—although certainly available—is reduced.

[24] From a typological (both diachronic and synchronic) perspective, the indefinite perfect is an intermediate stage between the present perfect and a past tense. It indicates clearly anterior or past events (anterior to the reference frame time and to the enunciator), without, however, specifying its temporal location. As for the former property, the gram approximates a past tense: it indicates already-accomplished events, since "the situation referred to stops before the moment of speaking" (Depraetere and Reed 2000: 97). However, given the latter characteristic, whereby it does not tolerate the past time adverbials, the formation behaves as a typical present perfect. Accordingly, in the indefinite perfect sense, a gram can be used to introduce events—even sequential ones—which occurred previously (cf. Lindstedt 2000: 369, 379). The "journalistic perfect of hot news" is a subtype of such an indefinite perfect. Sometimes the sense of an indefinite perfect is considered jointly with other perfectal values as one of the sub-types of the category of perfect.

[25] In typological studies, the categories of perfect (taxis or order) and perfective (aspect) are clearly distinguished from each other (Bybee, Perkins and Pagliuca 1994: 54–5; Nurse 2008: 154; De Haan 2011: 450–2, 456–7). As for the perfective aspect, it is usually restricted to the past time frame, portrays events as complete and bounded with no internal event structure and in its prototypical usage introduces single and punctual events (Dahl 1985: 78, 84–6; Bybee, Perkins and Pagliuca 1994: 54, 82–7; Nurse 2008: 134–5; De Haan 2011: 450–1). On the contrary, the perfect typically offers the nuance of current relevance (which is insignificant for perfectives), has a complex internal structure (an anterior event that continues to the present or its results do so) and can express durative continuing states or sequences of activities (cf. inclusive and frequentative perfects).

[26] In this sense, the construction indicates that the current state—which is in focus (contrary to the perfect which emphasizes the dynamic prior and causing activity)—derives from a previous action. The formation expresses an ensuing state that is simultaneous to the reference

simple)[28] appears in 5.7% (48.5 cases; see example 1.f). In 8.2% (69 cases) *qatal* is used as a durative past (1.g). The remaining values are highly uncommon: performative (1.h)—1.9% (16.5 cases), future (1.i)—1.1% (9.5), modal counterfactual (1.j)—0.9% (7.5 cases) and gnomic (1.k)—0.1% (1 case).

(1)

a. Gen 4:10

וַיֹּאמֶר מֶה עָשִׂיתָ קוֹל דְּמֵי אָחִיךָ צֹעֲקִים אֵלַי מִן־הָאֲדָמָה

Then he said: What **have you done**? Your brother's blood is crying out to me from the ground

b. Gen 8:21

וְלֹא־אֹסִף עוֹד לְהַכּוֹת אֶת־כָּל־חַי כַּאֲשֶׁר עָשִׂיתִי

I will never again destroy every living creature as I **have done**

c. Gen 1:31

וַיַּרְא אֱלֹהִים אֶת־כָּל־אֲשֶׁר עָשָׂה

And God saw everything that he **had made**

d. Gen 24:33

לֹא אֹכַל עַד אִם־דִּבַּרְתִּי דְּבָרָי

I will not eat until I **have told** my errand

e. Gen 1:5

וַיִּקְרָא אֱלֹהִים׀ לָאוֹר יוֹם וְלַחֹשֶׁךְ קָרָא לָיְלָה

God called the light "day." The darkness he **called** "night"

f. Gen 4:9

וַיֹּאמֶר יְהוָה אֶל־קַיִן אֵי הֶבֶל אָחִיךָ וַיֹּאמֶר לֹא יָדַעְתִּי

And the Lord said to Cain: "Where is your brother, Abel?" And he said: "I do not **know**"

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time and is an outcome of a previous activity (Andrason 2014b).

[27] From an evolutionary perspective, statives are grams in which the (original) relation between cause/action and effect/state is absent, since any connotation of the prior action that has triggered this current situation is lost. The only recoverable meaning corresponds to an acquired state such that the gram introduces present states with no adjacent resultative connotations. The information concerning the prior actions which has triggered a given state is unavailable and the construction expresses present conditions or properties of a person or thing.

[28] In this usage, a form fails to denote qualities but rather expresses present activities or events that may be either temporary-momentary or general-persistent. Semantically, it approximates the category of a general present tense of Indo-European languages.

g. Gen 37:3

וְיִשְׂרָאֵל אָהַב אֶת־יוֹסֵף מִכָּל־בָּנָיו

And Israel **loved** Joseph more than any other of his children

h. Gen 15:18

לְזַרְעֲךָ נָתַתִּי אֶת־הָאָרֶץ הַזֹּאת

To your descendants I **give** this land

i. Gen 17:16

וּבֵרַכְתִּי אֹתָהּ וְגַם נָתַתִּי מִמֶּנָּה לְךָ בֵּן

I will bless her and moreover I **will give** you a son by her

j. Gen 43:10

כִּי לוּלֵא הִתְמַהְמָהְנוּ כִּי־עַתָּה שַׁבְנוּ זֶה פַּעֲמָיִם

If we **had not delayed**, we would now have returned twice

k. Gen 1:21

וַיִּבְרָא אֱלֹהִים אֶת־הַתַּנִּינִם הַגְּדֹלִים וְאֵת כָּל־נֶפֶשׁ הַחַיָּה | הָרֹמֶשֶׂת אֲשֶׁר שָׁרְצוּ הַמַּיִם לְמִינֵהֶם

God created the great sea monsters and every living creature that moves of every kind with which the waters **swarm**[29]

All the evidence can be tabulated in the following manner:[30]

[29] This is the only example in the book of Genesis that could possibly be interpreted as expressing the sense of universal truth even though it is not fully canonical.

[30] For an extensive discussion and interpretation of the data concerning *qatal*, see Andrason and van der Merwe (2015).

Table 1: The frequency of the senses of qatal

X = number of occurrences
% = percentage

		Discourse		Narrative		Nar. discourse / Nar. comment		Total	
		X	%	X	%	X	%	X	%
Present perfect		204.5 (179+25.5)	50.6	-	0	-	0	204.5 (179+25.5)	24.3
Indefinite perfect		91 (74+17)	22.5	-	0	8 (6+2)	21.6	99 (80+19)	11.7
Pluperfect		8 (7+1)	1.9	143.5 (130+13.5)	35.9	8 (8+0)	21.6	159.5 (145+14.5)	18.9
Perfective past		15 (14+1)	3.7	193 (177+16)	48.3	17 (16+1)	45.9	225 (207+18)	26.7
Present		48.5 (40+8.5)	12	-	0	-	0	48.5 (40+8.5)	5.7
	Resul-tative	14 (8+6)	3.5	-	0	-	0	14 (8+6)	1.6
	Stative	5 (3+2)	1.2	-	0	-	0	5 (3+2)	0.6
	Simple	29.5 (27+2.5)	7.3	-	0	-	0	29.5 (27+2.5)	3.5
Performative		16.5 (16+0.5)	4	-	0	-	0	16.5 (16+0.5)	1.9
Future		9.5 (8+1.5)	2.3	-	0	-	0	9.5 (8+1.5)	1.1
	Perfect	5 (5+0)	1.2	-	0	-	0	5 (5+0)	0.6
	Simple	4 .5 (3+1.5)	1.1	-	0	-	0	4.5 (3+1.5)	0.5
Modal counter-factual		7 (6+1)	1.7	-	0	0.5 (0+0.5)	1.3	7.5 (6+1.5)	0.9
Durative past		4 (3+1)	0.9	61.5 (47+14.5)	15.4	3.5 (3+0.5)	9.4	69 (53+16)	8.2
Gnomic		-	0	1 (1+0)	0.2	-	0	1 (1+0)	0.1
Total		404	48	399	47.5	37	4.4	840	100

The global frequencies of the senses can be presented more graphically. This representation gives a more intuitive access to the quantitative weight of the senses conveyed by *qatal*.

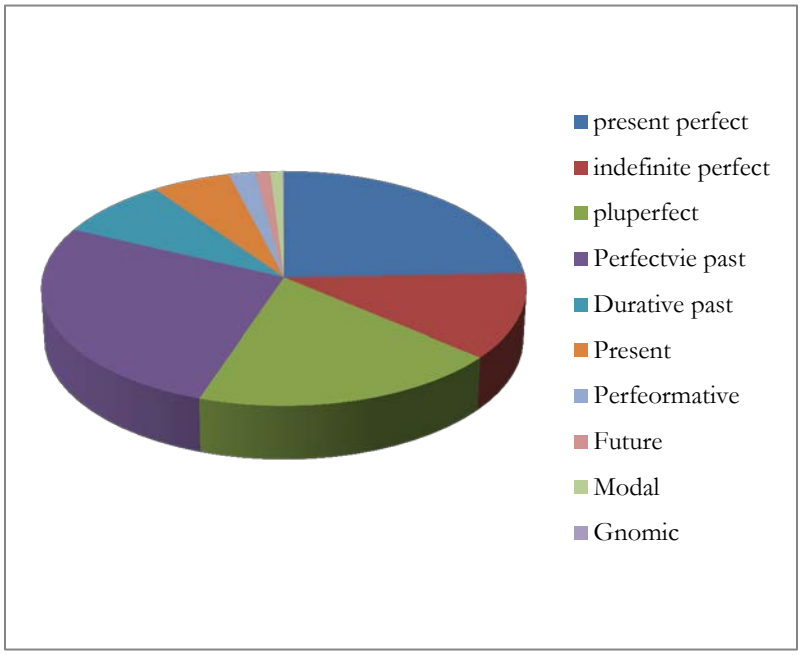

Figure 1: Semantics of qatal

As is evident from the data included in Table 1, the frequency of the senses is distinct if the types of text are studied separately. This is especially true of discourse and narrative. In general, the global incidence of *qatal* in discourse and narrative is almost identical. Namely, the discursive examples amount to 48% (404 cases) while the narrative ones constitute 47.5% (399 cases). On the contrary, the frequency of examples found in narrative discourse and narrative comment are scarce and will not receive dedicated treatment.[31]

In discourse, the sense of a present perfect constitutes more than 50% (204.5 cases), while in narrative, no examples of this usage are found. Furthermore, still in discourse, the anterior or non-past taxis senses (i.e., the values of a present perfect and an indefinite perfect counted jointly) amount to 73.1% (295.5 cases). Once again, they are entirely absent in narrative. In narrative, it is the value of a perfective past that predominates, being identified in almost the half of the examples (48.3% or 193 cases). In discourse, the incidence of this sense is minimal (3.7% or 15 cases). Consequently, the discursive type of *qatal* is heavily impregnated by the senses of taxis, while its narrative variant is a prototypical past form, usually perfective (48.3% – 193 cases), but also pluperfect (35.9% – 143.5 cases) and, less commonly, durative (15.4% – 61.5 cases). The semantic dissimilarity between the two types of *qatal* is evident.

[31] This also holds true for *wayyiqtol*. In general, discourse and narrative constitute jointly 96.5% of all the cases where *qatal* and *wayyiqtol* are used.

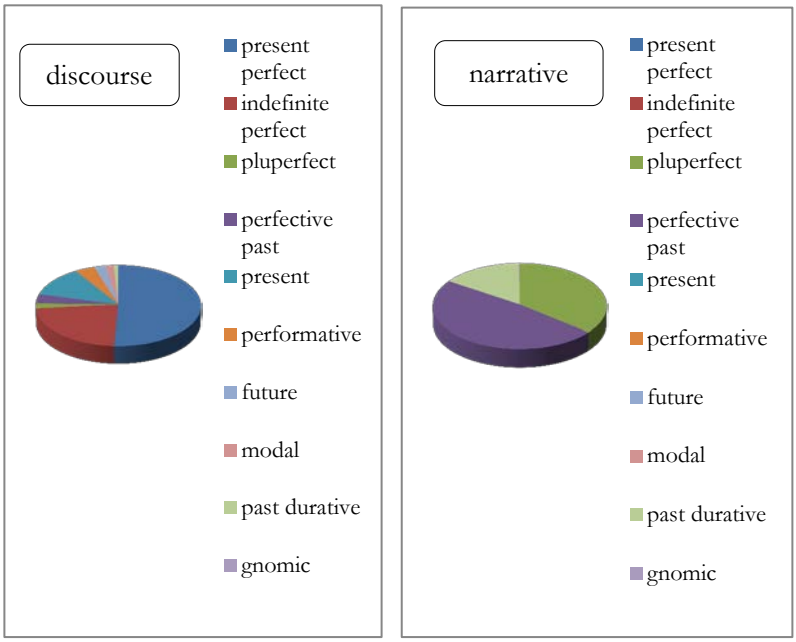

Figure 2: Semantics of qatal in discourse and narrative

3.1.2 Wayyiqtol

The empirical research reveals that, if the instances of *wayyiqtol* are counted globally, the sense of a perfective past (2.a) clearly predominates in the semantic potential of this gram. It is found in 89.7% (1831 cases). The various values of taxis—the senses of a present perfect (2.b), an indefinite perfect (2.c) and a pluperfect (2.d)—constitute, in total, only 4% (81.5 cases). In 6% (123.5 cases), *wayyiqtol* appears in the function of a durative past (2.e). The remaining senses are extremely rare: present (2.f)—0.15% (3 cases), performative (2.g)—0.05% (1 case) and modal cohortative (2.h)—0.05% (1 case).

(2)

a. Gen 1:21

וַיַּפֶּל֩ יְהוָ֨ה אֱלֹהִ֜ים | תַּרְדֵּמָ֗ה עַל־הָאָדָם֙ וַיִּישָׁ֔ן וַיִּקַּ֕ח אַחַ֖ת מִצַּלְעֹתָ֑יו
וַיִּסְגֹּ֥ר בָּשָׂ֖ר תַּחְתֶּֽנָּה

And the Lord God **caused** a deep sleep to **fall** upon the man, and he **fell** asleep; then he **took** one of his ribs and **closed** up the place with flesh

b. Gen 3:17

וּלְאָדָ֣ם אָמַ֔ר כִּֽי־שָׁמַעְתָּ֖ לְקֹ֣ול אִשְׁתֶּ֑ךָ . . . אֲרוּרָ֤ה הָֽאֲדָמָה֙ בַּֽעֲבוּרֶ֔ךָ
וַתֹּאכַ֖ל מִן־הָעֵ֑ץ

Because you **have listened** to the your wife and **have eaten** of the tree [. . .] cursed be the ground because of you

c. Gen 16:5

אָנֹכִי נָתַתִּי שִׁפְחָתִי בְּחֵיקֵךְ וַתֵּרֶא כִּי הָרָתָה וָאֵקַל בְּעֵינֶיהָ יִשְׁפֹּט יְהוָה בֵּינִי וּבֵינֶיךְ

I gave my slave-girl to your embrace, and when she **saw** that she had conceived, she looked on me with contempt

d. Gen 26:18

וַיָּשָׁב יִצְחָק וַיִּחְפֹּר | אֶת־בְּאֵרֹת הַמַּיִם אֲשֶׁר חָפְרוּ בִּימֵי אַבְרָהָם אָבִיו וַיְסַתְּמוּם פְּלִשְׁתִּים אַחֲרֵי מוֹת אַבְרָהָם

And Isaac dug again the wells that had been dug in the days of his father Abraham, which the Philistines **had stopped** up after the death of Abraham

e. Gen 25:28

וַיֶּאֱהַב יִצְחָק אֶת־עֵשָׂו כִּי־צַיִד בְּפִיו וְרִבְקָה אֹהֶבֶת אֶת־יַעֲקֹב

Isaac **loved** Esau, as he was fond of game, and Rebekah loved Jacob

f. Gen 32:6

וַיְהִי־לִי שׁוֹר וַחֲמוֹר צֹאן וְעֶבֶד וְשִׁפְחָה

I **have** oxen, donkeys, flocks, male and female slaves

g. Gen 32:6

וָאֶשְׁלְחָה לְהַגִּיד לֵאדֹנִי לִמְצֹא־חֵן בְּעֵינֶיךָ

I **send** to tell my Lord so that I may find favor in your sight

h. Gen 4:8

וַיְהִי בִּהְיוֹתָם בַּשָּׂדֶה

Let us go out to the field

The detailed distribution of all the senses conveyed by *way-yiqtol* is summarized below:

Table 2: The frequencies of the senses of wayyiqtol

X = number of occurrences
% = percentage

		Discourse		Narrative		Nar. discourse /Nar. comment		Total	
		X	%	X	%	X	%	X	%
Present perfect		23 (19+4)	44	-	0	1 (0+1)	1.5	24 (19+5)	1.2
Indefinite perfect		20 (15+5)	38	-	0	29.5 (27+2.5)	44.5	49.5 (32+7.5)	2.4
PQP		-	0	8 (6+2)	0.5	-	0	8 (6+2)	0.4
Perfective past		3 (2+1)	6	1794.5 (1780+14.5)	93.5	33.5 (30+3.5)	51	1831 (1812+19)	89.7
Present		3 (3+0)	6	-	0	-	0	3	0.15
	Resultative	1 (1+0)	2	-	0	-	0	1	0.05
	Simple	2 (2+0)	4	-	0	-	0	2	0.1
Performative		1 (1+0)	2	-	0	-	0	1	0.05
Modal Cohortative		1 (1+0)	2	-	0	-	0	1	0.05
Durative past		1 (1+0)	2	120.5 (107+13.5)	6	2 (2+0)	3	123.5 (110+13.5)	6
Total		52	2.5	1923	94.2	66	3.2	2041	100

The graphical representation makes it easier to apprehend the distribution of the quantitative weight of the senses and demonstrates the predominance of the value of a perfective past:

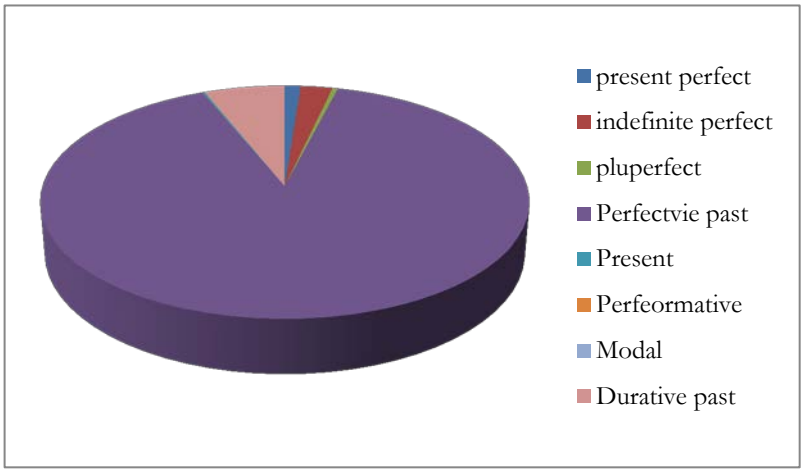

Figure 3: Semantics of wayyiqtol

As was the case with *qatal*, the distribution of the senses is distinct in different types of texts, especially if narrative and discourse are contrasted. However, unlike *qatal*, discursive instances of *wayyiqtol* are significantly less numerous than the narrative ones. The former constitute only 2.5% (52 cases) whereas the latter amount to 94.2% (1923 cases).

In discourse, the domain of taxis predominates constituting 82% (43 cases). It may itself be deconstructed into two more specific senses, namely the present perfect (44% – 23 cases) and the indefinite perfect (38% – 20 cases). In narrative, it is the sense of a perfective past that appears most frequently (93.5% – 1794.5 cases). This difference in the quantitative distribution of the senses is represented visually in Figure 4, below. Nevertheless, given the huge disproportion of the discursive uses (2.5%) in comparison with the narrative examples (94.2%), the weight of the sense of a present perfect and/or of the domain of taxis for the totality of the semantic potential of *wayyiqtol* is minimal.

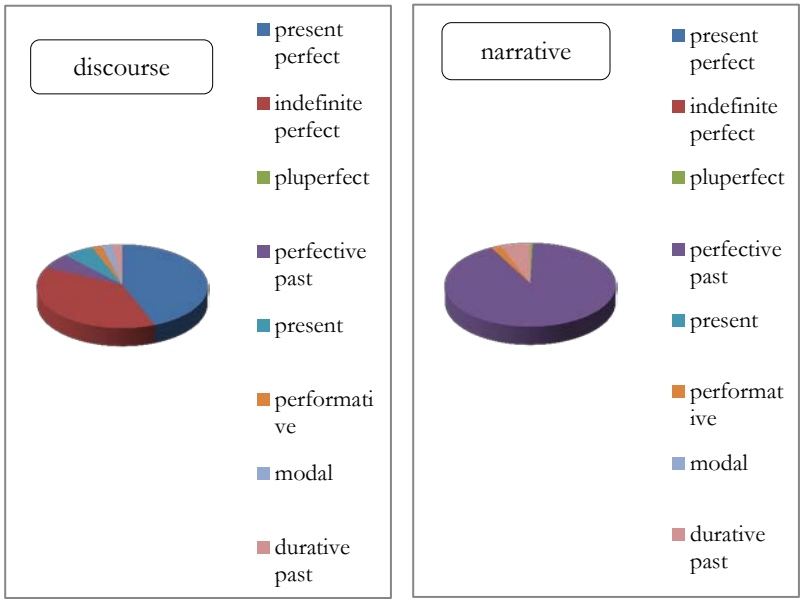

Figure 4: Semantics of qatal in discourse and narrative

3.2. COMPARATIVE FREQUENCIES

Having presented the information concerning the weight of different senses in the semantic potential of *qatal* and *wayyiqtol* separately, I will now offer a comparative study of the relative frequencies of the two grams. First, the distribution of *qatal* over different semantic domains will be contrasted with a distributional pattern presented by *wayyiqtol* (section 3.2.1). Next, the distribution of certain semantic domains over *qatal* and *wayyiqtol* (as well as over some other grams) will be analyzed (section 3.2.2).

3.2.1 Qatal versus wayyiqtol

In this section, the frequencies of senses offered by *qatal* and *wayyiqtol* will be compared. First, the frequencies of the two grams without distinguishing particular types of text will be contrasted (cf. *GLOBAL GRAMS*). Subsequently, the comparison of the quantitative information extracted separately from narrative and discourse will be developed (*TEXT-SENSITIVE GRAMS*).

GLOBAL GRAMS

Several phenomena can be observed when the global frequencies are compared. The meta-domain of taxis, which predominates in the map of *qatal* (55.5%) is poorly represented in the map of *wayyiqtol* (4%). The difference ascends to 51.5 points. The importance of the sense of taxis in the semantic potential of *qatal* is also evident if this domain is deconstructed into more specific values: a present perfect, an indefinite perfect and a pluperfect. To be precise, the value of a present perfect is almost 23 points greater in the seman-

tics of *qatal* (24.3%) than in *wayyiqtol* (1.2%). The difference concerning the sense of an indefinite perfect ascends to more than 9 points (compare 11.7% in *qatal* with 2.4% in *wayyiqtol*). The frequency of a pluperfect sense is likewise higher in *qatal* (18.9%) than it is in *wayyiqtol* (0.4%) by 18.5 points.

Table 3: Quantitative distribution of the domain of taxis in qatal and wayyiqtol

Form / Domain		Qatal		Wayyiqtol	
		Cases	Frequency	Cases	Frequency
Taxis	Total	468	55.5	81	4%
	Present perfect	204.5	24.3%	24	1.2%
	Indefinite perfect	99	11.7%	49.5	2.4%
	Pluperfect	159.5	18.9%	8	0.4%
	Future perfect	5	0.6%	0	0%

The following figure visualizes the data included in Table 3 demonstrating the statistical significance of the senses of taxis in the semantic potential of *qatal* and an almost total lack of such relevance in the case of *wayyiqtol*:

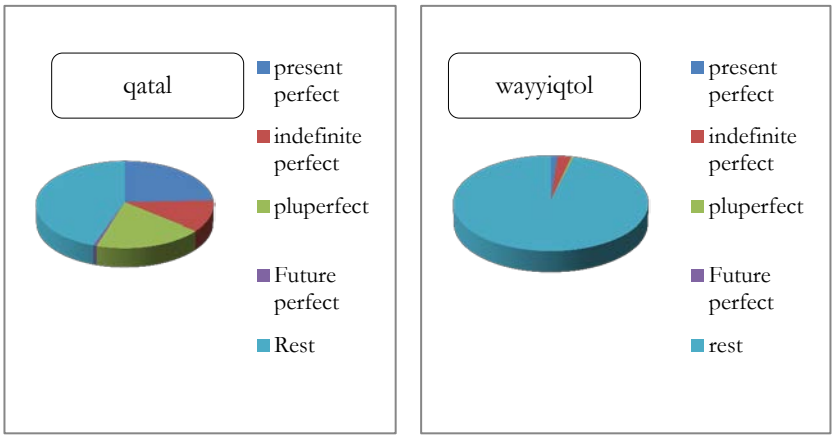

Figure 5: Weight of the domain of taxis in qatal and wayyiqtol

The domain of a perfective past is well represented in the semantic potential of the two grams. However, the frequency of this sense in *wayyiqtol* (89.7%) surpasses the frequency offered by *qatal* (26.7%) by more than 60 points. Thus, the value of a perfective past is considerably more relevant in the meaning of *wayyiqtol* than in the semantics of *qatal*.

The domain of a durative past plays a role of similar importance in the two constructions. That is, the durative past

value constitutes 8.2% in the semantic potential of *qatal* and 6% in that of *wayyiqtol*. If all the past senses are summed up, the value of a definite past—either perfective or durative (but excluding the taxis sense, viz. a pluperfect)—is more relevant in the semantic potential of *wayyiqtol* than in the meaning of *qatal*. In the case of *wayyiqtol*, the value of a definite past appears in 95.7%, while in *qatal*, it equals—still important—34.5%. If the pluperfect sense is included, the idea of a past time frame is found in 96.1% of the cases of *wayyiqtol* and in 53.8% as far as *qatal* is concerned.

Table 4: Quantitative distribution of the domain of past (perfective and durative) in qatal and wayyiqtol

Form / Domain		Qatal		Wayyiqtol	
		Cases	Frequency	Cases	Frequency
Past	Total	294	34.9	1954.5	95.7%
	Perfective past	225	26.7%	1831	89.7%
	Durative past	69	8.2%	123.5	6%

Figure 6 below graphically shows the importance of the domain of a past and, in particular, of its aspectual perfective type, in the semantic potential of *wayyiqtol*. The relevance of this past domain significantly decreases in the case of *qatal*. On the whole, the most prototypical domain of *qatal* (in quantitative terms) is taxis (i.e., a present perfect, an indefinite perfect and a pluperfect), while the nucleus of the prototypicality of *wayyiqtol* is occupied by a temporal-aspectual value, viz. the perfective past. Therefore, it is possible that speakers could have associated *qatal* with the category of taxis and *wayyiqtol* with the category of a perfective past.

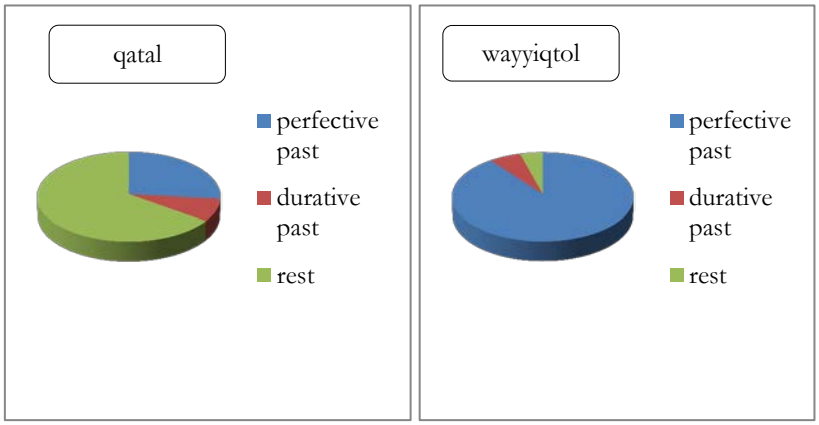

Figure 6: Weight of the domain of past (perfective and durative) in qatal and wayyiqtol

The domain of a present (be it a resultative present, a stative present or a simple present) is less relevant than the values of taxis and perfective past. The role of such present values is greater in the semantic potential of *qatal* than in *wayyiqtol*. In *qatal*, present senses constitute a relatively well-marked portion, viz. 5.7%. In *wayyiqtol*, the same values are found in a negligible 0.15%. If the sense of a present perfect—a value that temporarily belongs to a present time sphere—is counted together with the sense of a present, the conceptual and cognitive link between *qatal* and a present time frame is more evident. Namely, the idea of relevance to the present situation is recoverable in at least 30% of all the cases of *qatal*. *Wayyiqtol* is sensitive to the idea of present relevance only in a scarce 1.35%.

Table 5: Quantitative distribution of the domain of a present and the concept of present relevance in qatal and wayyiqtol

Form / Domain		Qatal		Wayyiqtol	
		Cases	Frequency	Cases	Frequency
Present	Total	48.5	5.7%	3	0.15%
	Resultative present	14	1.6%	1	0.05%
	Stative present	5	0.6%	0	0%
	Simple present	29.5	3.5%	2	0.1%
Present sphere/relevance (present perfect included)		253	30%	84	1.35%

The same data can be presented graphically in order to visualize the important discrepancy in the relation to the present time frame between *qatal* (this relation is common, amounting in total to 30%)

and *wayyiqtol* (the relation is virtually negligible as it appears in circa 1%). These results are consistent with the previously mentioned connection of *qatal* with the domain of taxis and the relation of *wayyiqtol* to the temporal-aspectual domain of a perfective past.

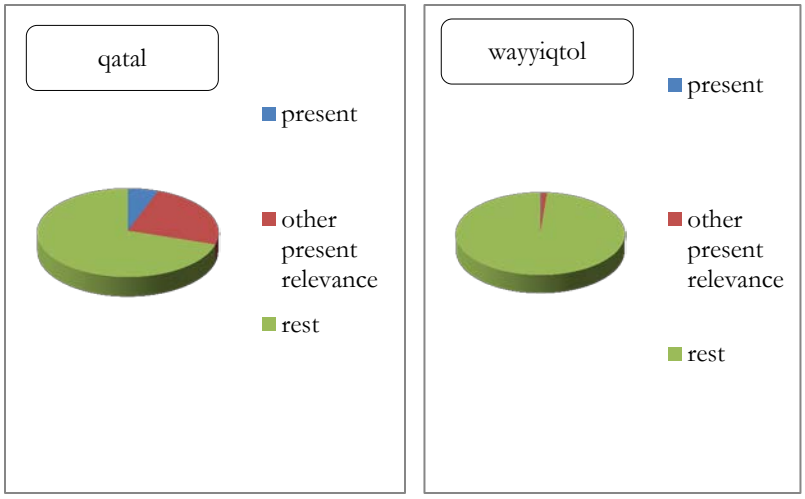

Figure 7: Weight of the domain of present and the idea of present relevance in qatal and wayyiqtol

The relevance of the remaining senses, such as performative, future, gnomic and modality, is marginal. Yet, these values play a more prominent role in the semantics of *qatal* than in the meaning of *wayyiqtol*. In the former, they ascend to 4% (2%, 1.1%, 0.1% and 0.9%, respectively) while in the latter they do not surpass the limit of 0.01% (the performative and modal values constitute 0.05% each, while the gnomic and future senses are entirely missing).

Table 6: Quantitative distribution of the marginal senses of qatal and wayyiqtol

Form / Domain		Qatal		Wayyiqtol	
		Cases	Frequency	Cases	Frequency
Others	Total	34.5	3.7	2	0.1%
	Performative	16.5	1.9%	1	0.05%
	Future	9.5	1.1%	0	0%
	Modal	7.5	0.6%	1	0.05%
	Gnomic	1	0.1%	0	0%

The data tabulated above indicate that, from a semantic perspective, *wayyiqtol* is a more homogenous formation (it exhibits a minor extent of semantic variability), while *qatal* seems to be a more heterogeneous gram (it exhibits a higher degree of variability; cf. Figure 8, below). In total, senses that are not classifiable with the domains of a present, taxis and/or past (i.e. the senses that do not

correspond to the categories of a present perfect, an indefinite perfect, a pluperfect, a future perfect, a perfective past and a durative past) are infrequent in *qatal* (3.4%),[32] In *wayyiqtol* such values are not only uncommon, but extremely marginal (0.1%).

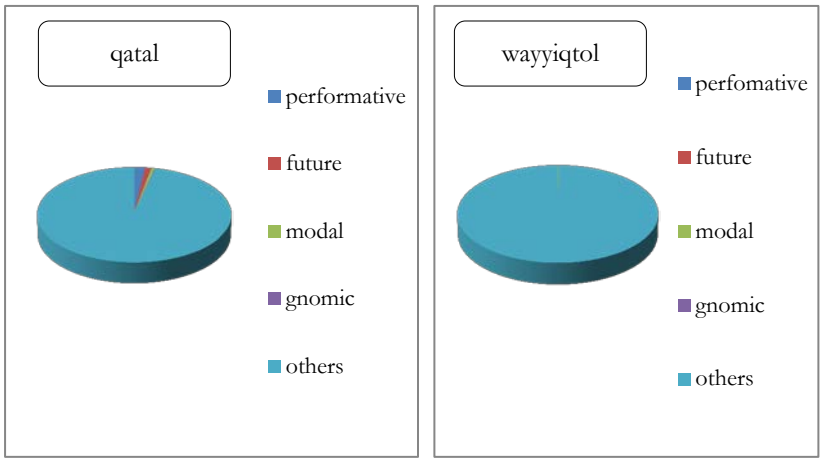

Figure 8: Weight of the marginal senses of qatal and wayyiqtol

Lastly, it must be recalled that *qatal* shows a similar frequency of occurrences in discourse and narrative (48% and 47.5%, respectively). By contrast, *wayyiqtol* is typically found in the narrative parts of the Hebrew Bible (94.2%), the discursive cases appearing only in 2.5%. The instances of narrative comment or narrative discourse are both infrequent and constitute 4.4% of the examples of *qatal* and 3.2% of the cases of *wayyiqtol*.

Table 7: Quantitative distribution of the types of text in qatal and wayyiqtol

Form / Domain	Qatal		Wayyiqtol	
	Cases	Frequency	Cases	Frequency
Discourse	404	48%	52	2.5%
Narrative	399	47.5%	1923	94.2%
Narrative discourse /comment	37	4.4%	66	3.2%

This dissimilar behavior of the two grams with reference to a type of text summed up in Table 7 above becomes more evident if a

[32] This includes the future (but not future perfect), performative, gnomic and modal. The performative and gnomic uses could be synchronically counted as present, while evolutionarily they correspond to the extensions arising from the present perfect (Andrason 2012a; 2012c; 2013b).

graphic representation is used. Figure 9 demonstrates that the narrative uses clearly predominate in the case of *wayyiqtol*, whereas the significance of the narrative and discursive types is comparable in the case of *qatal*.

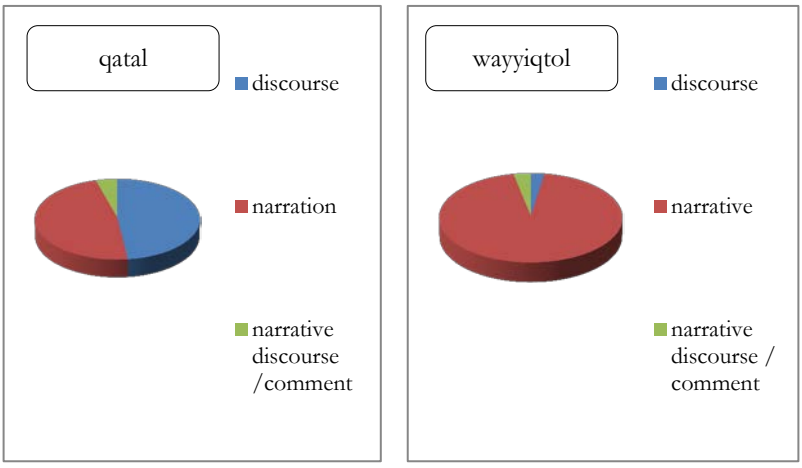

Figure 9: Weight of the types of text in qatal and wayyiqtol

TEXT-SENSITIVE GRAMS

The tendencies in the quantitative distribution introduced above, although less marked, are still maintained if the two grams are compared separately in discourse and narrative.

The narrative type of *qatal* offers the distribution of senses that diverges from the frequency counted globally. If the sense of a perfective past is taken into consideration, the semantics of the narrative variant of *qatal* seem to be closer to those exhibited by *wayyiqtol*. However, *wayyiqtol* continues to offer a significantly higher frequency of the value of a perfective past (93.5%) than *qatal* (48.3%). In a similar vein, the narrative variant of *qatal* still provides a more archetypal taxis behavior than its *wayyiqtol* counterpart. Namely, the pluperfect value appears in 35.9% of *qatal* in narrative while in the case of *wayyiqtol* it is found only in a marginal 0.5%. Additionally, the sense of a durative past is twice as frequent in the narrative type of *qatal* (15.4%) than in *wayyiqtol* (6%).

Table 8: Comparison of the quantitative distribution of the senses in narrative

Form / Domain	Qatal		Wayyiqtol	
	Cases	Frequency	Cases	Frequency
Perfective past	193	48.3%	1794.5	93.5%
Pluperfect	143.5	35.9%	8	0.5%
Durative past	61.5	15.4%	120.5	6%

It is clear that even though the compatibility of *qatal* with the domain of a perfective aspect increases in narrative (compare 48.3% in narrative with 26.7% in the global frequencies), the role of past senses that are not perfective (i.e. a durative past and a pluperfect) is still highly relevant, and *de facto* dominant as they constitute 51.3%. The narrative variant of *wayyiqtol* also gives more prominence to the perfective sense than its counterpart when calculated globally (compare 93.5% in narrative with 89.7% in the global statistics). This suggests that the mere fact that *wayyiqtol* is typically found in narrative, while *qatal* appears in narrative and discursive fragments more or less equally, by itself does not explain the difference in the semantics of the two forms. Even in narrative, the two constructions exhibit quite different quantitative profiles: a more perfective-past profile in the case of *wayyiqtol*, and a less perfective-past profile (i.e., with a significant role of the values of a pluperfect and a durative past) in the case of *qatal*. This can be illustrated by the following figure:

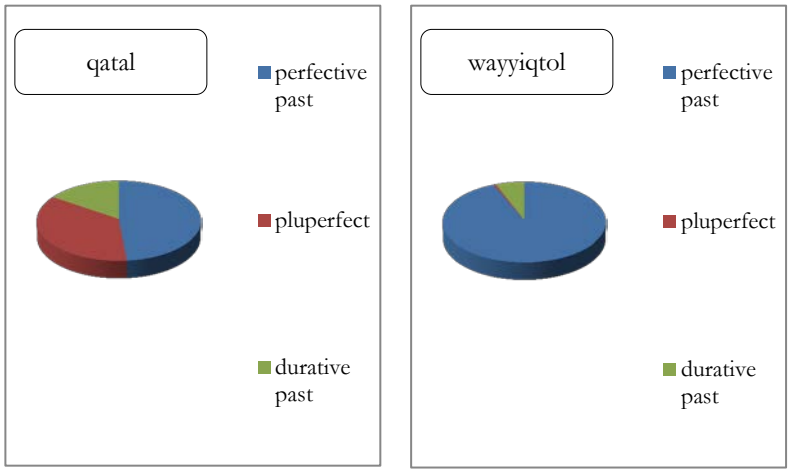

Figure 10: Comparison of the weight of senses in narrative

The comparison between *qatal* and *wayyiqtol* in discourse reveals other remarkable phenomena. As far as their qualitative semantic potentials are concerned, the two grams offer a similar range of main senses: a present perfect, an indefinite perfect, a perfective past and a present. However, while the senses of a present perfect and a present play a greater role in *qatal* than in *wayyiqtol* (consider 50.6% versus 44% and 12% versus 6%, respectively), the values of an indefinite perfect and a perfective past acquire more relevance in the meaning of *wayyiqtol* than in *qatal* (compare 38% versus 22.5% and 6% versus 3.7%, respectively).

Table 9: Quantitative distribution of the senses in discourse

Form / Domain	Qatal		Wayyiqtol	
	Cases	Frequency	Cases	Frequency
Present perfect	204.5	50.6%	23	44%
Indefinite perfect	91	22.5%	20	38%
Perfective past	15	3.7%	3	6%
Present	48.5	12%	3	6%
Others	37	10.8%	3	6%

The data summed up in table 9 above indicate that the component of present relevance is more visible in the discursive type of *qatal* (in total, with the performative sense included, it ascends to 68.6%) than in an analogous variant of *wayyiqtol* (52%). Inversely, the domain of "not-currently-relevant" anteriority (i.e., indefinite perfect, perfective past, pluperfect and durative past) is more prominent in the discursive type of *wayyiqtol* (46%) than in a comparable variant of *qatal* (29%). Once more, the quantitative profiles of the two grams are not identical. As a result, the sole fact that *qatal* exhibits a more discursive profile than *wayyiqtol* does not explain distinct semantic properties provided by the two constructions.

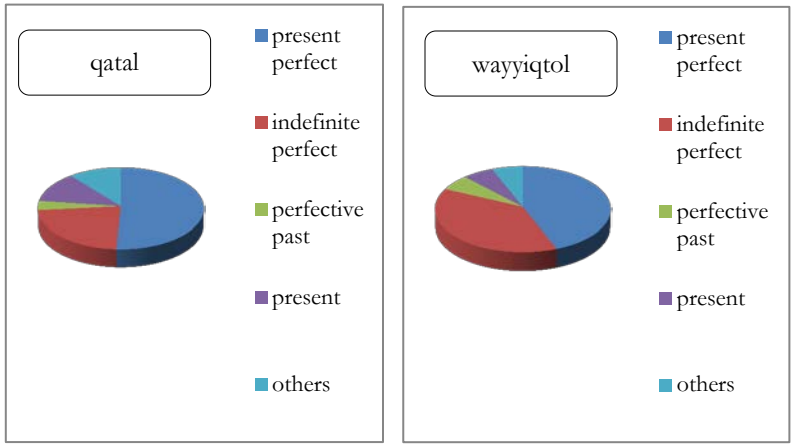

Figure 11: Comparison of the weight of the senses in discourse

3.2.2 Domains versus qatal and wayyiqtol

Although the comparison of the individual frequencies of *qatal* and *wayyiqtol* gives important insights into the grams' relationships, it does not exhaust the information that can be extracted from the empirical study. Alternative phenomena can be observed if the evidence provided by the empirical research is arranged differently. This time, the frequencies show not how prototypical a given sense (domain) is in the semantic potential of *qatal* or *wayyiqtol*, but rather which BH verbal gram is the most prototypical means of conveying

a given sense. Thus, this procedure concerns the qualitative distribution of a sense over the grams with which this value can be encoded. It specifies how a domain is expressed grammatically.

As far as the domain of taxis is concerned,[33] the following may be observed. The taxis senses appear on 547 occasions in the book of Genesis. In 463 cases, this domain is expressed by *qatal* (84.6%) while in only 81.5 cases it is expressed by *wayyiqtol* (15%; the remaining 2.5 cases or 0.4% are conveyed by *weqatal*). This demonstrates the importance of the relation between the concept of taxis and the *qatal* form in a more obvious way.

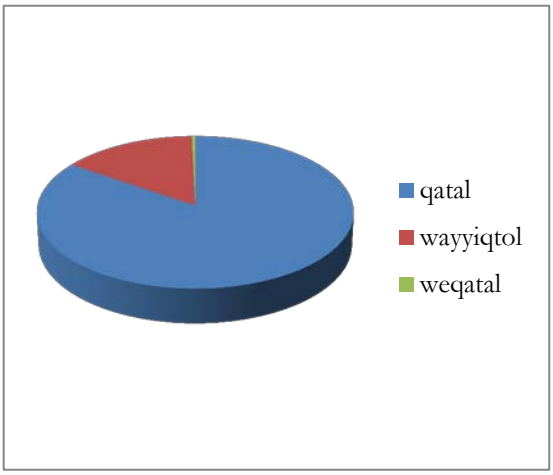

Figure 12: Quantitative distribution of the sense of taxis over the BH forms

The close relationship between the domain of taxis and *qatal* is even more recognizable if the analysis is narrowed to discourse. The taxis sense in discourse is conveyed 347.5 times in the book of Genesis. The *qatal* gram is used in 87.3% (303.5 cases), *wayyiqtol* in 12.3% (43 cases) and *weqatal* 0.2% (1 example).

[33] This analysis includes the senses of a present perfect, an indefinite perfect and a pluperfect, but excludes the sense of a future perfect.

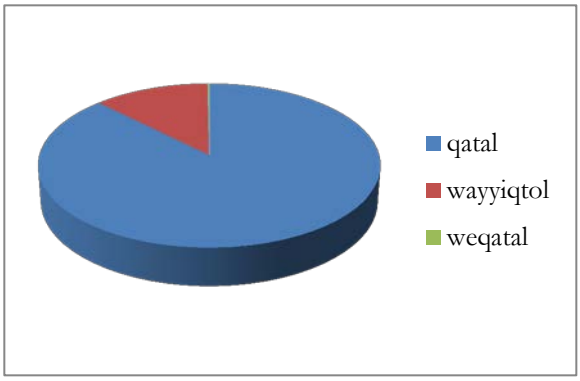

Figure 13: Quantitative distribution of the sense of taxis in discourse over the BH forms

Similar proportions can be observed if more specific components of the taxis domain are studied. First, the value of a present perfect is encoded in 89.1% (204.5 cases) by *qatal*, while only in 10.5% (24 cases) by *wayyiqtol* (one instance of *weqatal* constitutes 0.4%). Second, the domain of an indefinite perfect is expressed by the *qatal* form in 66.6% (99 cases) and *wayyiqtol* in 33.3% (49.5 cases). Third, the sense of a pluperfect is conveyed in 94.3% (159.5 cases) by *qatal* and uniquely in 4% (8 cases) by *wayyiqtol* (1.5 cases of *weqatal* equal 0.9%).

Table 10: Quantitative distribution of sub-senses of taxis over the BH forms

Semantic domain		Grammatical form			
		Qatal		Wayyiqtol	
	All cases	Cases	Frequency	Cases	Frequency
Present perfect	229.5	204.5	89.1%	24	10.5%
Indefinite perfect	148.5	99	66.6%	49.5	33.3%
Pluperfect	169	159.5	94.4%	8	4.7%

The close connection between *qatal* and the three main subtypes of the domain of taxis is graphically illustrated by Figure 14. This figure clearly shows that among all the grammatical manners of encoding the value of taxis, *qatal* is the most frequent one. This especially holds true for the senses of a present perfect and a plu-perfect.

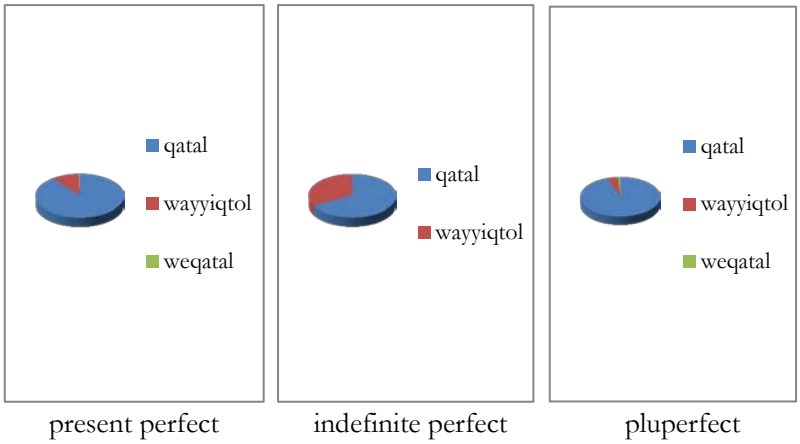

Figure14: Quantitative distribution of sub-senses of taxis over the BH forms

The study of the relation between a given semantic domain and its grammatical expression also demonstrates that *wayyiqtol* is the principal means of conveying the sense of a perfective past. Among 2058 cases where this sense is grammatically expressed, 1831 times it is encoded by means of *wayyiqtol*. This constitutes 89% of all the cases. The *qatal* form is used only in 225 instances, which equals 10.9% (there are 2 possible cases of *weqatal*, which constitute an almost ignorable 0.1%). In narrative, the digits are even more favorable for *wayyiqtol*, as this form encodes the value of a perfective past in 90.2%. In contrast, *qatal* holds only 9.7% of the cases where this sense is to be expressed.

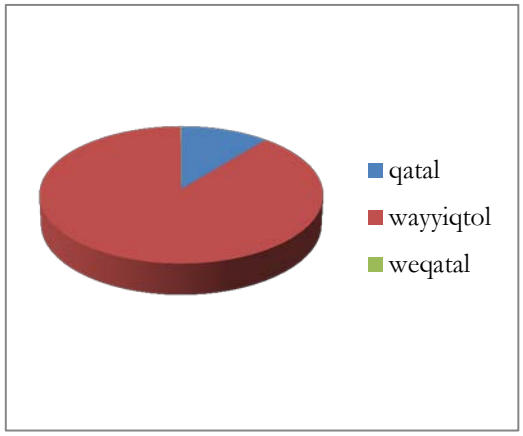

Figure 15: Quantitative distribution the sense of a perfective past over the BH forms

The data introduced in this section suggest a strong drift of *qatal* towards the prototypicality pole that corresponds to the domain of taxis (and, in particular, of a present perfect and a pluperfect), and a similar drift of *wayyiqtol* towards the prototypicality pole of a per-

fective past. The mutual relation of the two forms in both cases equals approximately 90% versus 10%. Namely, while the values of taxis are conveyed by *qatal* in approx. 85% of the examples where this sense is to be encoded, *wayyiqtol* is used in approx. 10% (the pluperfect sense is expressed by *wayyiqtol* even less commonly, viz. in 4%). Inversely, while *wayyiqtol* is employed in circa 90% of the cases where the sense of a perfective past is to be communicated, *qatal* is used in circa 10%. Once more, this suggests that native speakers could have associated *qatal* with the meaning of taxis, whereas *wayyiqtol* would have instead been associated with the domain of a perfective past. As these sets of domains (i.e. the taxis and the perfective past) are almost uniquely expressed by *qatal* and *wayyiqtol* (the instances of *weqatal* are so scarce that they can almost be ignored from a systemic perspective), the association of the two formations by the users with the categories of taxis and perfective past respectively could be relatively clear-cut.

The link between the taxis/perfect and *qatal* on the one hand, and between the perfective past and *wayyiqtol* on the other, is related to another fact, namely to the encoding of the domains of present and past time frames. In order to express senses belonging to a present temporal sphere or characterized by the nuance of present relevance (this includes the values of a resultative, stative and simple present and a present perfect), *qatal* is employed in 90.3% (282 times), *wayyiqtol* in 1% (3 times), *yiqtol* in 8% (25.5 times) and *weqatal* in 0.3% (one example).[34]

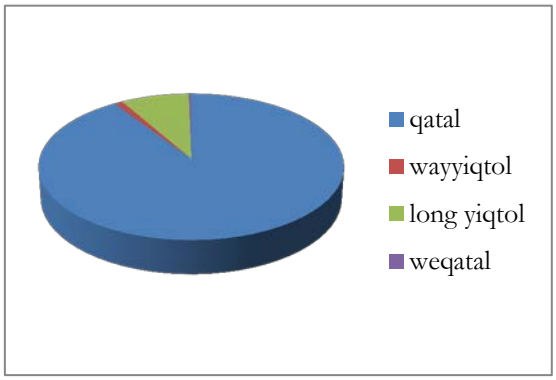

Figure 16: Quantitative distribution of the domain of a present relevance over the BH forms

Contrary to the situation discussed above, the domain of a definite past (especially if the taxis sense of a pluperfect is put aside) is typically expressed by *wayyiqtol*. The past sense that is non-taxis appears in the book of Genesis on 2280.5 occasions. In 85.7% of those occasions, *wayyiqtol* is used to encode it and *qatal* in 12.9%. The

[34] The data do not include the *qotel* gram that also appears within a present time frame.

quantitative weight of long *yiqtol* and *weqatal* is extremely weak, equaling 0.65% and 0.75% respectively.

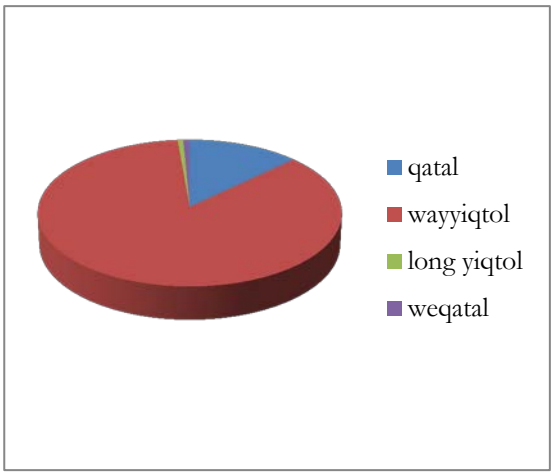

Figure 17: Quantitative distribution of the sense of a definite past over the BH forms

The remaining domains that are expressed by *qatal* and *wayyiqtol* are commonly conveyed by other BH grams too. Thus, they probably contributed less to the cognitive association of the *qatal* and *wayyiqtol* forms with a given meaning. This is especially evident as far as the sense of a present is concerned. The idea of a present (except for the present perfect) of any sort (stative, simple, habitual, progressive etc.) is to be conveyed on 77 occasions in the book of Genesis. In 48.5 cases, *qatal* is used (63%), while *wayyiqtol* is employed 3 times (4%). In 25.5 instances (33%), the sense of a present is encoded by long *yiqtol*.[35] These data—graphically represented in Figure 18—once more suggest a strong relationship between the present-time frame and the *qatal* form:

[35] The data do not include the *qotel* gram, which is also employed to express present values.

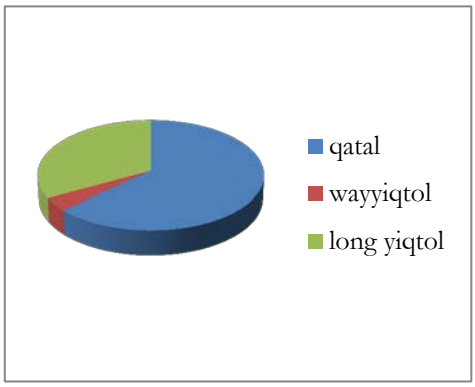

Figure 18: Quantitative distribution of the sense of a present over the BH forms

As far as the domain of an imperfective (or non-perfective) past is concerned—i.e., the values of a durative, habitual and progressive past—a remarkable fact can be noted: imperfective past senses of various types appear 222.5 times in the book of Genesis. Interestingly, it is *wayyiqtol* that is chosen to encode this domain most commonly, i.e. in 55.5% (123.5 times). *Qatal* is employed in 31% (69 times) and long *yiqtol* and *weqatal* in 6.75% respectively (15 times each).[36] This indicates that the two quantitative arrangements can yield distinct results. On the one hand, the distribution of the senses in a given gram ("a gram over senses") shows that the durative domain (and, hence, the imperfective domain) is more relevant in the semantic potential of *qatal* than in the meaning of *wayyiqtol*. In the former, it constitutes 8.2%, while in the latter, 6%. On the other hand, the distribution of grammatical forms used to convey a given sense ("a sense over grams") demonstrates that it is *wayyiqtol*—not *qatal*—that appears as a more common means of encoding the value of an imperfective past.

[36] The data do not include *qotel*.

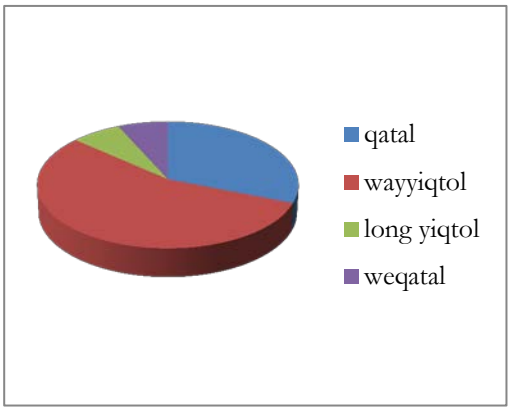

Figure 19: Quantitative distribution of the sense of an imperfective past over the BH forms

To conclude, the statistical information provided here shows, by itself, how complex and multifaceted the relationship between *qatal* and *wayyiqtol* is. This connection changes if the grams are analyzed globally or separately in different types of text. It also depends on how fine-grained the categorization is. Moreover, it is conditioned by the way in which more atomic senses are grouped into larger domains (e.g. into the categories of taxis, definite past, present, present relevance, non-present, non-present relevance, etc.). Finally, it may be modified if the gram-over-senses frequencies are replaced by the sense-over-grams frequencies. Each perspective is important because each one reveals distinct characteristics that underlie and condition the relationship between the two constructions.

4. MAPS OF QATAL AND WAYYIQTOL

Even when enriched by the quantitative information, the semantic potentials of *qatal* and *wayyiqtol* are by themselves nothing more than taxonomies. Although such taxonomies can be representative, detailed, and exhaustive, they are not explanatory.[37] They are merely resultant combinations of the underlying microscopic cases. That is, if the total meaning of a gram is classified by means of its qualitative-quantitative semantic potential, the definition constitutes nothing more than a list of micro-states. As a result, the grammatical object is not portrayed as a coherent phenomenon, but seems to be a group of randomly assembled, individual values. Even more importantly, such taxonomical representations do not preserve properties typical of complex systems. Above all, they are static, additive, and isolating. They also modularize the system.

As explained in section 2, a more cohesive definition of a gram that also harmonizes with the principles governing complex systems can be achieved by mapping according to grammaticaliza-

[37] However, it can be understood as predictive.

tion paths. This procedure coordinates all the senses offered by a form, illustrating how they relate to each other. It also imposes an internal sequential order among the elements of the semantic potential and enables one to determine new emergent properties of the gram. That is, the semantic potential is mapped dynamically as a vector of change that directs the senses from an input (both conceptual and historical) to further extensions.

4.1. QUALITATIVE MAPS

4.1.1 Qatal

The semantic potential of the *qatal* form has been given internal cohesion by means of a set of kinetic vectors or a cluster of grammaticalization trajectories. To be precise, all the senses of *qatal* have been shown to be cognitively connected—both conceptually and diachronically—by employing one principal path (the resultative path) with its two principal sub-clines (the anterior and simultaneous clines) as well as by using certain extensions departing from stages acquired along the resultative path (e.g. the evidential path, the gnomic branches and the future perfect cline). Additionally, modal values have been mapped by means of a modal contamination path, along which the evolving resultative-path gram has been travelling.

Most indicative senses of *qatal* may be grasped in their integrity and viewed as a harmonious whole if one applies the chaining procedure based upon the resultative path and its two main formative sub-clines: the anterior cline and the simultaneous cline. The senses of a present perfect (be it an inclusive, a resultative or an experiential perfect), an indefinite perfect and a definite past, as well as the values of a perfective past and a durative past, cover the stages located along the anterior path.[38] Accordingly, the part of the semantic potential that consists of the above-mentioned values has been classified as a portion of the anterior path, spanning from the phase of an inclusive perfect to the phase of a durative past tense (Andrason 2013a: 111–20, 305–7, 159–60; see also 2012a: 38–41).

[38] The anterior path is a trajectory that determines the grammatical life of original resultative constructions. It specifies the order in which a given value (perfect, perfective, past etc.) is incorporated into the semantic potential of a formation that originated as resultative proper locution. In general terms this cline states that resultative grams first develop into perfects (in the beginning, inclusive and resultative present perfects, later experiential and indefinite varieties) and then into past tenses (initially, recent and discursive, subsequently general, remote and narrative). Additionally, during the transformation from a present perfect into a definite past tense, the gram may sometimes acquire an explicit aspectual perfective sense (cf. Bybee, Perkins and Pagliuca 1994; Dahl 2000; and Cook 2002; for a far more detailed treatment of the anterior path and its relation to the resultative trajectory with all its sub-tracks, see Andrason 2011b: 10–6; 2012b: 40–3; 2013a: 50–5).

The value of a pluperfect has been chained using the same template, but located in a past time frame.[39] Future uses—either perfect or simple—have been chained by means of the anterior path, located in a future time frame.[40] Additionally, the senses of future certainty, inevitability and imminence have been mapped by using the future-perfect path:[41] a trajectory that derives from the anterior cline located in a future time frame (Andrason 2013b). The values of a resultative stative, a stative present and a simple present have been networked by means of another formative development within the resultative path: the simultaneous cline (Andrason 2013a: 115–20).[42] The exceptional cases where *qatal* provides an evidential sense have been shown to be expressions of the evidential path, a minor sub-track within the resultative path (Andrason 2010b: 623–4).[43]

In an explicitly modal environment, temporal and aspectual readings of the *qatal* formation—which otherwise follows the resultative path, acquiring consecutive stages on the anterior, the simultaneous and the evidential cline—have been re-analyzed differently, in agreement with the modal context and the develop-

[39] If resultative grams are located in a past time frame, they regularly develop into past perfects (pluperfects).

[40] Besides being employed with a present and past temporal reference—thus giving rise to present perfect and pluperfect senses—original resultative formations can also be positioned in a future time frame. Typically, such formations develop first into future perfects and next, if they survive, into simple future grams (this development is referred to as an anterior path in a future context).

[41] According to this cline, future perfects quite commonly acquire modal values related to the concept of certainty, inevitability, imminence, temporal nearness and/or "present-ness" of a prospective event (for details of the argumentation, see Andrason 2013b).

[42] The simultaneous path, another sub-cline in the resultative track, shows the manner in which resultative proper grams develop into present tenses (cf. Maslov 1988: 70–1; Bybee, Perkins and Pagliuca 1994: 74–8; and Drinka 1998: 120; Andrason 2011a; 2011b; as well as, especially, Andrason 2014b). To be exact, the cline predicts that certain resultative proper grams evolve into simultaneous resultative presents (the main emphasis is put on the resulting state while the prior action is merely suggested), subsequently into stative presents (resultative undertones become unavailable and the only remaining sense corresponds to a static quality or situation) and finally into simple present tenses (for a more detailed discussion of the simultaneous path, see Andrason 2011a: 40–5; 2011b: 13–5; as well as, Andrason 2014b).

[43] In accordance with this path (the third sub-cline within the resultative track), certain resultative proper forms evolve into evidential grams following the following subsequent stages: a) inferential, based upon resulting visible traces; b) inferential, based upon general assumption and hearsay; and c) broad non-first hand evidential (cf. Lindstedt 2000; Johanson 2000 and 2003; Aikhenvald 2004: 112–7, 279–81; as well as Andrason 2010b).

ment(s) specific to it. To be exact, modal counterfactual senses of *qatal*[44] have been networked by means two typologically plausible processes: a modal contamination path (i.e., as the modalization of a resultative-path gram imposed by modal particles) and, departing from it, an optative path (i.e., the development from optative contexts to conditional periods).[45] The modal contamination path has also been used in order to elucidate and map the precative sense of *qatal*.[46]

The gnomic sense provided by certain dynamic roots in the *qatal* form has been explained as a manifestation of so-called gnomic braches spreading from initial stages of the anterior cline (Andrason 2012c).[47] The same sense conveyed by static roots has been chained by means of the regular simultaneous-path template. Lastly, the performative function offered by *qatal* has been understood as a stage of the anterior cline (Andrason 2012a).[48] The entire kinetic semantic map of *qatal* can be schematized in the following simplified manner:[49]

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[44] This group of values includes six basic senses: counterfactual real optative, counterfactual unreal optative, counterfactual real conditional, counterfactual unreal conditional, counterfactual real hypothetical and counterfactual unreal hypothetical (Andrason 2012).

[45] Modal contamination codifies a process during which indicative formations (because of their consistent use in clearly modal contexts) gradually assume the modal meaning of their environment as their own and are finally converted into genuine moods (Dahl 1985: 11; Hopper and Traugott 2003: 82; and Bybee, Perkins and Pagliuca 1994: 25–6; Andrason 2011b: 33; 2013a: 62–4; 2013c; 2013d).

[46] The precative *qatal* corresponds to the second stage of this evolutionary scenario, where an original indicative (or, in this case, resultative) gram is fully modalized in an overtly modal context.

[47] The gnomic branch is a cluster of trajectories that traces the extension of post-resultative values located on the anterior path into gnomic functions (cf. Andrason 2012c). Thus, inclusive perfects, frequentative perfects, experiential perfects, iterative perfects and anti-perfects are ripe to develop habitual, generic and characteristic—and hence gnomic—uses. Consequently, the gnomic sense constitutes a typical extension of the inclusive, frequentative, iterative and experiential perfect (as far as its inferences are concerned) as well as anti-perfect, which corresponds to negative perfect uses. This means that at earlier stages of the anterior path, non-advanced post-resultative formations (so-called young anteriors) quite regularly express general truths, habitual states or permanent—potentially universal—situations, thus overlapping with gnomic imperfectives and broad presents that are cross-linguistically typical means of expression of the semantic domain of gnomicity.

[48] The performative value has been viewed as one of the initial stages on the anterior cline, located after the resultative proper stage and before the resultative perfect phase, in a vicinity close to the phase of an inclusive perfect (Andrason 2012a).

[49] As can be deduced from the above posited specific chaining-mecha-

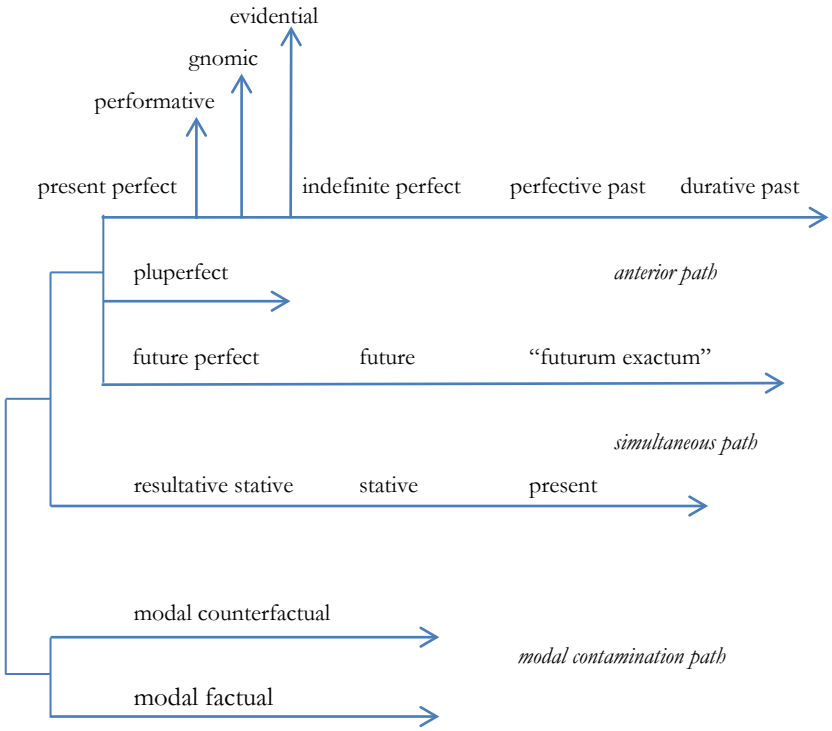

Figure 20: Qualitative map of qatal

To conclude, the *qatal* form has been dynamically defined as a developing resultative-path gram in an intermediate stage of its evolution. It conveys senses typical of the anterior and simultaneous clines, spanning almost their entire lengths. Furthermore, it offers values located along sub-developments that are crosslinguistically related to the resultative path, especially the evidential path and the future-perfect path, as well as gnomic extensions. Additionally, a close relation of static roots with stativity and thus the importance of the simultaneous cline, the use in a performative function and compatibility with a future time frame (as well as be-

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nisms, all the values that are conveyed by the BH *qatal* derive—both conceptually and diachronically—from a resultative proper input. This means that all senses may be explained as having arisen following the resultative path (and in particular, its three formative sub-trajectories: anterior, simultaneous and evidential clines, as well as a cluster of gnomic branches) and the modal contamination path of an originally non-modal resultative construction. This conclusion—derived from synchronically measured semantic potential of the gram and from typological rules—is consistent with a standard reconstruction of the historical origin of the BH formation and with certain diachronic and comparative facts. On the detailed diachronic argumentation confirming the mapping posited here, see Andrason 2013a: 120–71; and also Andrason 2012a; 2012b; 2013b; as well as 2013d).

ing extensively found in discourse, besides being found in narrative) are all consistent with the dynamic classification as a "middle-age" resultative-path gram (for details, see Andrason 2012a; 2012c; 2013a; 2013b; 2012c; 2013d).

4.1.2 Wayyiqtol

A similar mapping has been posited for *wayyiqtol*. The semantic potential of this gram receives an internal cohesion by means of the resultative path, with its two main sub-developments (the anterior and the simultaneous cline), located in two (rather than three) time spheres (present and past). Modal senses are further networked by the use of a modal contamination path.

To be exact, the senses of a present perfect (be it an inclusive, a resultative or an experiential perfect), an indefinite perfect, a perfective past and a durative past have been arranged into a series that corresponds to the development codified by the anterior cline. The uses as a resultative stative, a present stative and a simple present have been ordered and represented as matching the simultaneous track. The value of a pluperfect is harmonized with the previously-ordered meanings and explained as a stage of the anterior cline that is traveled within a past temporal frame. The performative sense likewise belongs to the anterior path, corresponding to one of the initial extensions available along this trajectory. In contrast with *qatal*, the *wayyiqtol* gram fails to indicate broadly understood evidential nuances. Consequently, the gram does not provide uses that could be arranged in terms of the third formative development characteristic of resultative constructions—the evidential cline. It also fails to be used in a gnomic function and the sense of futurity[50] is uncertain (Andrason 2011b).

The modal variant of *wayyiqtol* typically appears in explicitly modal contexts (especially in conditional protases and apodoses), where, in clear opposition to *qatal*, it does not differ from its indicative equivalent, at least insofar as the tense-taxis-aspect values are concerned. Thus, this range of uses has been understood as an initial stage of the modal contamination of a resultative-path gram.[51] The entire map can be posited in the following—schematized and simplified—manner:[52]

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[50] The sense of a future tense, the existence of which is debatable or at least extremely scarce, can be mapped by the means of an anterior cline located in a future time frame (cf. Andrason 2011b: 41–9; 2013a: 181–6).

[51] The modal cohortative value—documented in our database but not discussed in the previously posited maps of *wayyiqtol* (cf. Andrason 2011b and 2013a; see also Cook 2002 and 2012)—has not yet been chained. However, given the diachronic origin of *wayyiqtol* as a resultative construction (of a still debatable source), this modal sense must correspond to a type of modal contamination.

[52] On the diachronic grounding of the map, see Andrason (2011a: 35–43 and 2013a: 188–206). Additionally, the sense of consecution, frequently

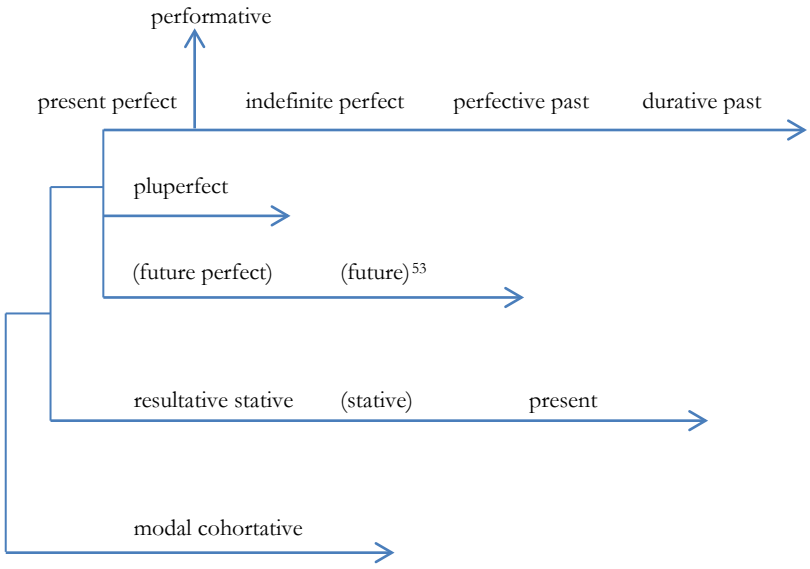

Figure 21: Qualitative map of qatal

To conclude, *wayyiqtol* has been defined as a highly advanced resultative-path gram, with a minimal extent of modal contamination. In conformity with this classification, the construction has no evidential values (having arisen along the evidential cline) and no gnomic senses (having arisen along gnomic branches), typical to younger resultative-path forms. Moreover, performative uses—which are characteristic of less advanced resultative-path constructions—are almost entirely missing. The relation between static roots and the idea of stativity is also less visible. In general, the simultaneous cline is given little prominence in the semantic potential of *wayyiqtol*. The sense of a future is debatable and, at least as far as my database is concerned, unrecorded. These facts are again typical of formations that are advanced along the resultative path. Lastly, discourse pragmatic properties and the fact that *wayyiqtol* is principally used in narrative and narrative discourse to introduce events that belong to the backbone of the story (foreground)—but not in discourse—further confirms its dynamic definition in terms of an advanced resultative-path gram (for details, consult Andrason 2011b and 2013a).

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patent in *wayyiqtol*, has been explained as a meaning extension that arose due to the incorporation of an originally independent morpheme. Namely, the lexeme **wa*, which, in Biblical Hebrew, acquired a consecutive value typical to the conjunction **pa* lost in the BH language, added this value to *wayyiqtol*, as it has first been agglutinated to the form and, then, fused under the indissoluble element *wa-* (for a detailed explanation see Andrason 2011b and 2013a).

[53] The senses put in parentheses have not been found in the book of Genesis but are documented in other places in the Hebrew Bible.

Although maps chained dynamically in terms of kinetic vectors are explanatory and preserve typical traits of complex systems (in contrast with the static taxonomies of semantic potentials), they have one important weakness. All the senses are treated equally, giving false information concerning the prototypicality of the form, its cognitive perception and possible interpretation by native speakers. This can be clearly seen in the highly similar nature of the qualitative maps of *qatal* and *wayyiqtol*, almost identical, as the two formations are compatible with the same paths and those paths' sections. However, as was shown in the empirical study, the quantitative weight of senses composing the map is distinct in the two grams. The frequency study shows that although the qualitative maps of *qatal* and *wayyiqtol* are comparable, the two forms are differentiable. To account for such dissimilarities in the semantics of the grams and to avoid the essential shortcoming of the maps designed above, qualitative maps must be converted into the quantitative ones.

4.2. QUANTITATIVE MAPS

In general terms, quantitative maps[54] are combinations of qualitative dynamic maps (as presented in section 4.1 above) and quantitative information that is included in the static semantic potentials (as described in section 3).

4.2.1 Qatal

For the sake of simplicity, certain approximations have been made. The modal senses—which in total constitute a scarce 0.9%—will be ignored and the study will be narrowed to the resultative-path values. The sub-clines of the resultative path will also be simplified. The granularity of the anterior cline will be reduced to four stages (instead of more than fifteen phases, which are sometimes distinguished; cf. Andrason 2012a; 2013a) and the simultaneous cline will be presented as one stage only, encompassing three stages that are usually posited.[55] Moreover, the evidential sense of a "guessing-perfect" will be included in the same stage as a present perfect.[56]

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[54] Quantitative maps are in fact both quantitative (frequency) and qualitative (ranges of senses). I will use the term "quantitative maps" since a map already implies the presence of qualitative properties as well as references to them.

[55] This more coarse-grained granularity is necessary because it would be extremely difficult to clearly differentiate between all the specific senses in the biblical text.

[56] As explained previously, the extensions of the values of a future perfect and a simple future towards the ideas of certitude and inevitability will be omitted since they have not been distinguished in the empirical study. All of them have been classified either as future perfects or simple futures.

By combining the quantitative data presented in section 3.1.1 and the dynamic representation of the senses offered by *qatal* proposed in section 4.1.1, the following qualitative-quantitative model of this form could be designed:

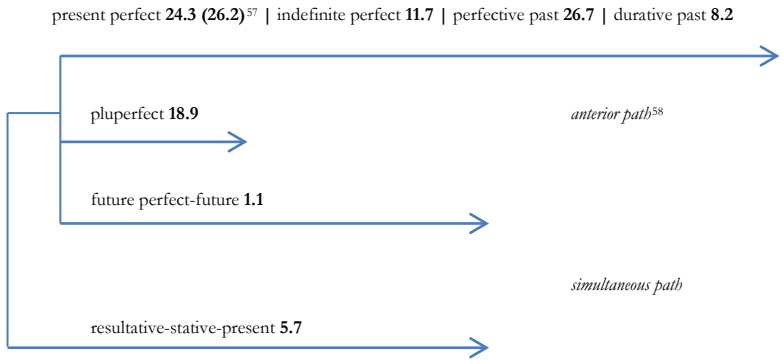

Figure 22: Quantitative map of the resultative-path qatal

If the taxis values available along the anterior cline (when this path is located within a present time frame) are grouped under the label of an "anterior" and counted together (this includes the senses of a present perfect and an indefinite perfect, but excludes the senses of a pluperfect and a future perfect), the semantic map of *qatal* can be networked as follows:

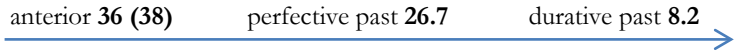

Figure 23: Quantitative map of qatal (the anterior-path in a present time frame)

This enables us to design the following curve of the semantic potential of *qatal*. This dynamic curve represents the variety of senses of *qatal* located on the anterior cline (the *x*-axis) and their frequency (the *y*-axis).

[57] The second digit includes the performative and gnomic senses. In this Figure, all the digits indicate the percentage. However, the symbol % has been omitted.

[58] These three subtypes of the anterior cline make reference to the three possible temporal frames where this cline develops: present (present resultative > present perfect > perfective past > durative past); past (past resultative > pluperfect > remote past); future (future resultative > future perfect > simple future; cf. Andrason 2011b: 12–3; 2013b; 2013a: 55).

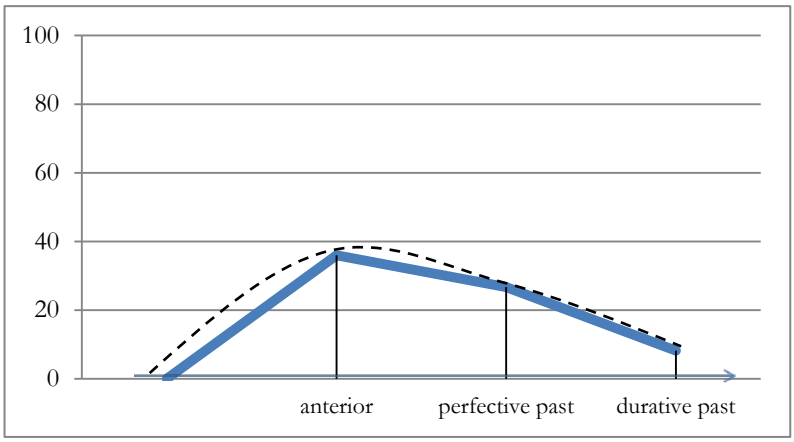

Figure 24: Curve of qatal (the anterior path in a present time frame)[59]

If all the perfectal values (i.e., a present perfect, an indefinite perfect, a past perfect and a future perfect) are grouped together under the broad concept of "taxis," the dynamic quantitative map of the semantics of *qatal* receives the following shape:

taxis **55.5 (57.5)** perfective past **26.7** durative past **8.2**

Figure 25: Quantitative map of qatal (the anterior-path in the three-time frames)[60]

This can again be presented in the form of a kinetic curve that shows the semantic variability (the *x*-axis), its quantitative distribution (the *y*-axis) and the direction of chaining (the *x*-axis):

[59] The starting point of the curve corresponds to the typological input of the anterior and resultative clines, viz. the sense of a resultative proper. This sense, which constituted the origin of *qatal* (cf. Andrason 2012a; 2013a: 120–8), seems to be unavailable in the book of Genesis.

[60] This cline (taxis > perfective [past] > durative [past]) is a theoretical construct of a higher degree of generalization than the usual anterior path. Here, the time frame is ignored, especially in the first stage of the trajectory, and the taxis and aspectual (perfective and durative) values are given prominence.

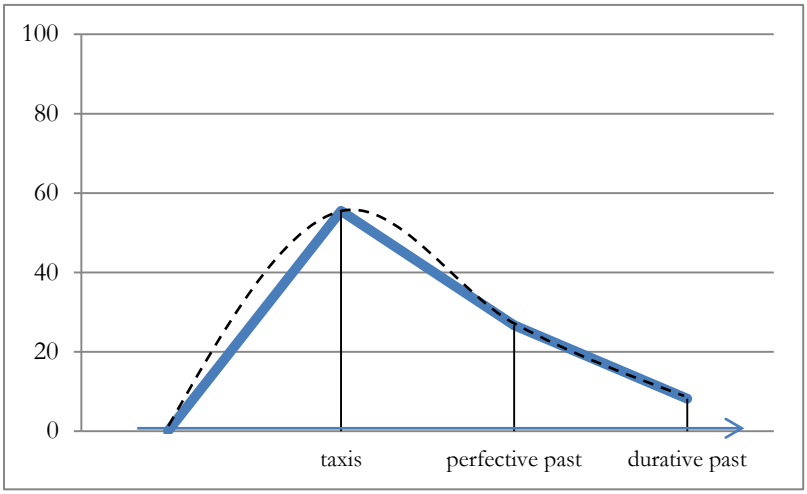

Figure 26: Curve of qatal (the anterior-path in the three time frames)

The above-proposed representation of the anterior-path senses can be combined with the information concerning the values located on the simultaneous cline, which is another major trajectory of the resultative path:

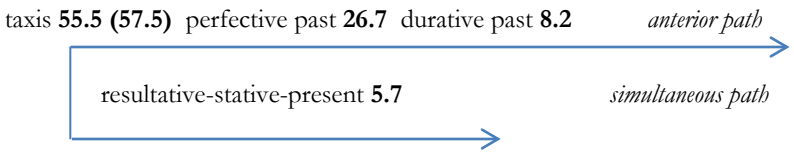

Figure 27: Quantitative map of qatal (anterior and simultaneous paths)

This enables us to design the following curved model of *qatal*.

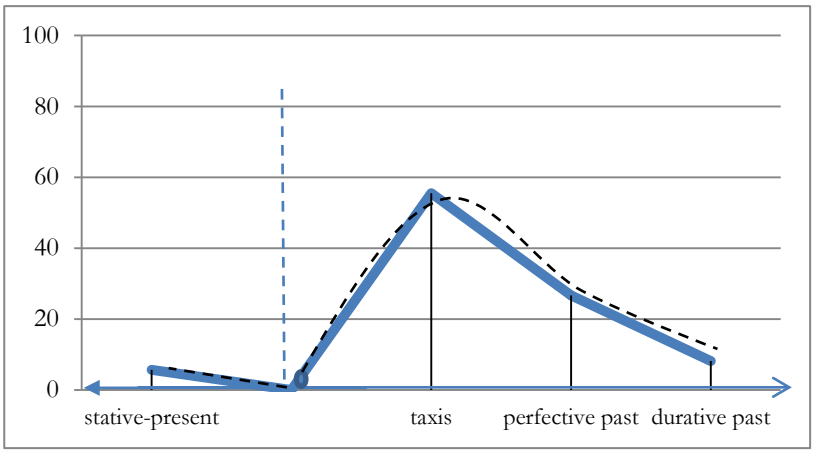

Figure 28: Curve of qatal (anterior and simultaneous paths)

This model can be viewed as the most macroscopic topological definition of *qatal*. The *qatal* form is a resultative-path gram with the predominance of the anterior cline over the simultaneous cline and with the prototypicality peak in the domain of taxis. Prototypicality gradually decreases at the other stages, although the section of a perfective past can be viewed as a secondary peak. This can be condensed to the following formula: $QATAL = \{AP_1^4\ (0, 57.5, 26.7, 8.2) + SP_1^2\ (0, 5.7)\}$.[61] This definition shows that one is dealing with a resultative-path gram that has advanced to an intermediate stage. That is, *qatal* spans all the sections of the resultative path—both the anterior and the simultaneous cline—and locates its primary peak of prototypicality (perfect/taxis) in the intermediate phase of the former path. The secondary peak (perfective past) occupies a more advanced section of the anterior cline.

4.2.2 Wayyiqtol

A similar approach—whereby the data are narrowed to the indicative senses and the granularity of the anterior and simultaneous clines is simplified—yields the following dynamic qualitative-quantitative model of *wayyiqtol*:

[61] The abbreviations AP and SP stand for "anterior path" and "simultaneous path," respectively. The digits 1 and 4 on the right of AP and SP indicate the number of distinguished stages up to 4 for the AP and from 1 to 2 for SP). Each one of these stages is given a frequency weight (cf. the digits in the brackets). Observe that this global model can be deconstructed into more microscopic and fine-grained representations such as those presented previously in this section.

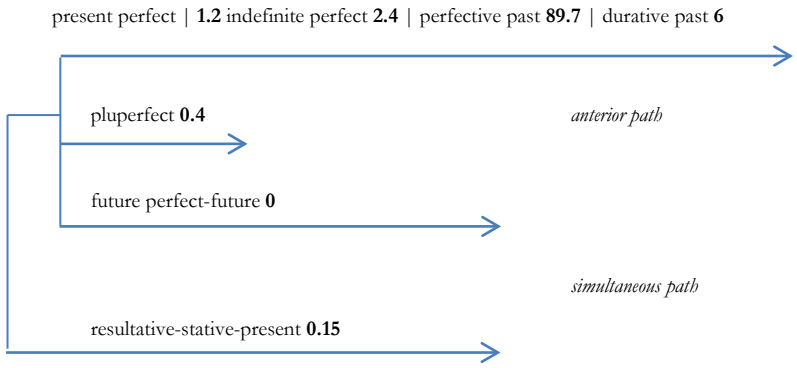

Figure 29: Quantitative map of wayyiqtol

The grouping of the anterior values developed within a present time frame delivers the following shape of the quantitative map:

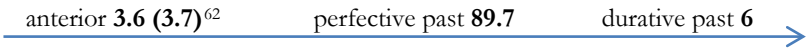

Figure 30: Quantitative map of wayyiqtol (the anterior path in a present time frame)

This can be converted into the following curved model:

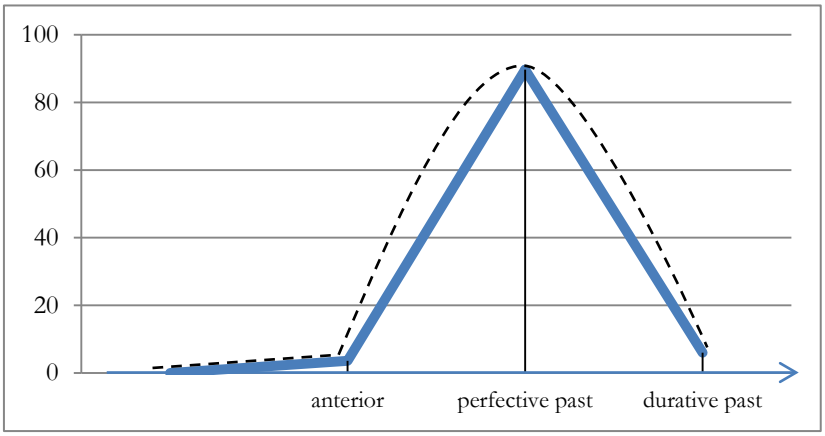

Figure 31: Curve of wayyiqtol (the anterior path in a present time frame)

If all the perfectal values belonging to the present, past and future time frames of the anterior cline are combined under a broad concept of "taxis," the map can be represented as follows:

62 The second digit reflects the situation whereby the gnomic sense is also counted.

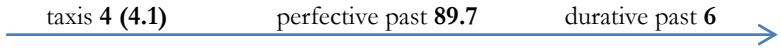

Figure 32: Quantitative map of qatal (the anterior path in the three time frames)

This can be interpreted graphically in the form of the following kinetic curve:

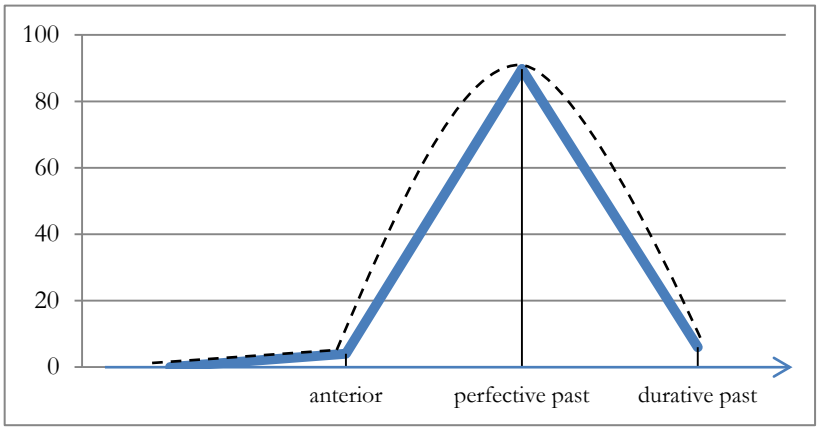

Figure 33: Quantitative map of the anterior-path wayyiqtol—curve model

If the dynamic map of the anterior-path senses also includes the information concerning the values acquired along the simultaneous cline, the following representation emerges:

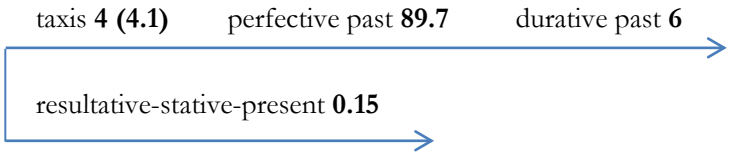

Figure 14: Quantitative map of the anterior- and simultaneous-path wayyiqtol

This can be represented as a dynamic curve according to the following figure:

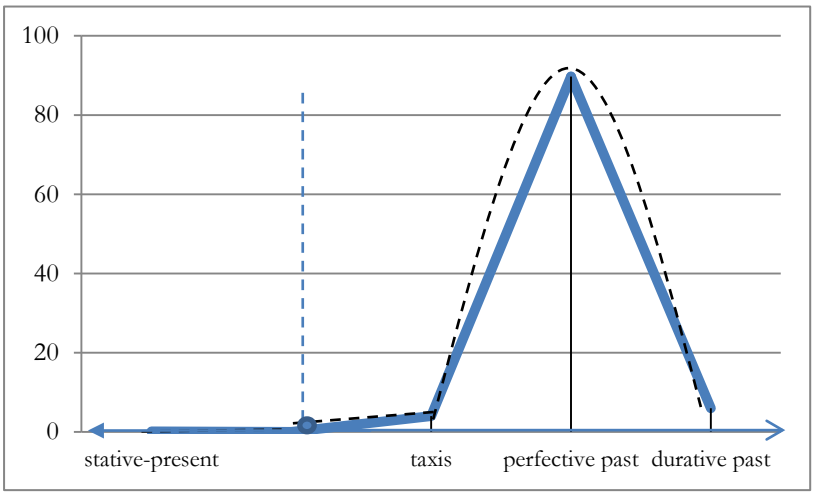

Figure 35: Quantitative map of the anterior- and simultaneous-path wayyiqtol

This macroscopic geometrical representation defines *wayyiqtol* as an advanced resultative-path gram. The construction is almost exclusively restricted to the anterior cline and locates its prototypicality peak at the advanced segments of the cline, i.e. in the stage of a perfective past. The degree of prototypicality descends radically in the preceding and posterior stages, i.e. in the phases related to taxis and durative past.[63] This can be encapsulated with the following formula: *WAYYIQTOL* = {AP_1^4 (0, 4.1, 89.7, 6) + SP_1^2 (0, 0.15)}.[64]

5. INTERACTION OF MAPS

5.1. COMPARISON OF THE QUANTITATIVE MAPS OF QATAL AND WAYYIQTOL

The comparison between the quantitative maps of *qatal* and *wayyiqtol* designed in the previous section enables us to detect new types of interactions existing between the two grams.

If the qualitative maps of *qatal* and *wayyiqtol*, narrowed to the anterior path of a present time frame, are contrasted, the following can be observed. First of all, the fluctuations between the prototypicalities of the three formative stages on the anterior cline (i.e.

[63] In accordance with the typical behavior of old resultative-path grams, *wayyiqtol* is found almost exclusively in narrative (94.2%) and personal narrative. In discourse, it appears only sporadically (2.5%).

[64] As was the case with *qatal*, this macro-level model can be deconstructed into more fine-grained descriptive planes such as those previously discussed in this section and in section 3.

the senses of an anterior/perfect, a perfective past and a durative past) are less prominent in the case of *qatal* than they are in the case of *wayyiqtol*. For *qatal*, the maximum oscillation equals 29.8 points (cf. 38% of the sense of an anterior *versus* 8.2% of the sense of a durative past), while for *wayyiqtol*, it ascends to 86.1 points (cf. 3.6% of the sense of an anterior *versus* 89.7% of the sense of a perfective past). Thus, the semantic diversity of *qatal* is quantitatively more uniform than the diversity of *wayyiqtol*, which is highly disproportionate.

Furthermore, the peaks of prototypicality of the two grams are clearly distinct. Even though *qatal* is qualitatively balanced, it exhibits its zenith of prototypicality in the stage of an anterior, while *wayyiqtol* reaches its highpoint in the stage of a perfective past. On the whole, *qatal* lifts its curve in more initial sections of the path, whereas *wayyiqtol* does so—and to a much greater degree if compared with the adjacent sections—in more advanced fragments of it:

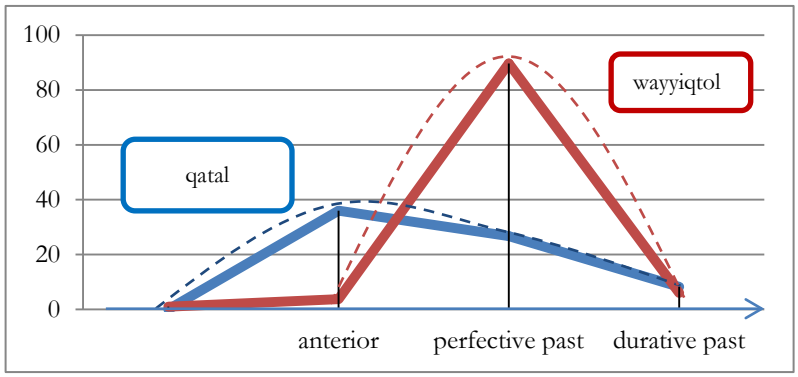

Figure 36: Comparison of the curves of the qatal and wayyiqtol (the anterior path in a present time frame)

A similar contrast between the two grams can be observed if all the perfect values are grouped under a single stage and/or label "taxis." Within this categorization, the fluctuation between the peak of *qatal*, which is located in the stage of taxis, and the stages of a perfective past and a durative past ascends to 30.8 and 49.3 points respectively. For *wayyiqtol*, the oscillation between its peak and other stages is almost identical to that discussed in the previous paragraph. As the prototypicality of the domain of taxis in the meaning of *qatal* is more prominent, the quantitative dissimilarity between the curves of *qatal* and *wayyiqtol* becomes clearer. The two constructions locate their peaks of prototypicality in the two consecutive stages of the anterior cline: *qatal* in the zone of taxis, while *wayyiqtol* in the sphere of a perfective past.

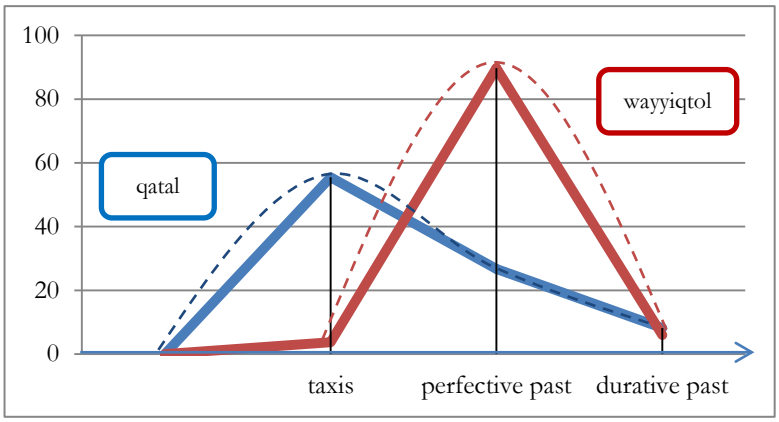

Figure 37: Comparison of the quantitative maps (curved models) of the anterior-path qatal and wayyiqtol

Contrasts between *qatal* and *wayyiqtol* can also related to the simultaneous cline. For *qatal*, the oscillation between the peak of the anterior cline and the values available along the simultaneous cline equals 51.8 points (compare 57.5% of the sense of taxis versus 5.7% of the values of the simultaneous cline). If the two clines are compared in their totality, their respective weights are separated by 86.7 points (compare 92.4% of all the senses located along the anterior cline versus 5.7% of the senses available on the simultaneous cline). For *wayyiqtol*, the oscillation between the anterior cline's peak (89.7% of the sense of perfective past) and the values of the simultaneous cline (0.15% present) equals 89.55 points. If the two clines are compared globally, the difference increases to 99.25 points (compare 99.4% of the senses related to the anterior cline *versus* 0.15% of senses located on the simultaneous cline). To conclude, the simultaneous cline is more prominent in the curve of *qatal*, which is quantitatively more uniform than the curve of *wayyiqtol*.

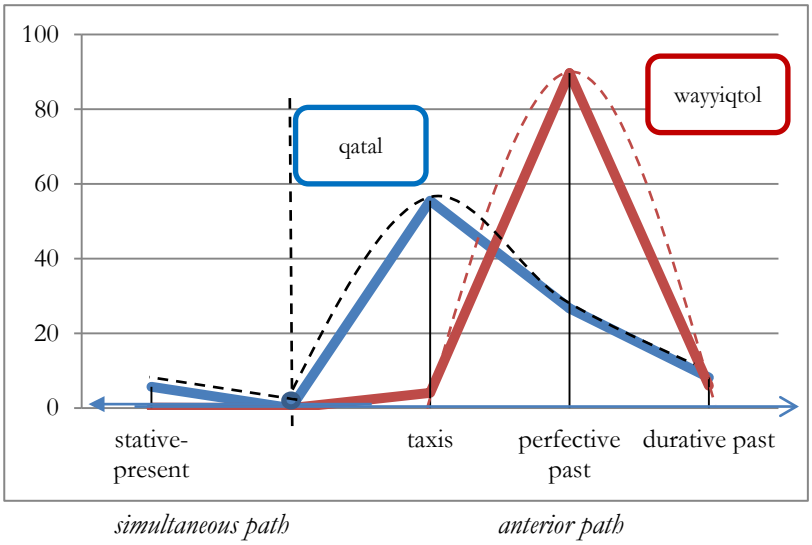

Figure 38: Comparison of the quantitative maps (curved models) of the anterior- and simultaneous-path qatal and wayyiqtol

The comparison of the curves of *qatal* and *wayyiqtol* indicates that the two grams interact topologically: this includes different peaks of prototypicality and different shapes of the curves (e.g. their uniformity or disparity).[65] On the whole, the curve model corroborates that *qatal* is a less advanced resultative-path gram, while *wayyiqtol* is a more advanced form of the same type. Qualitatively, the two constructions span the entire resultative path with its two main sub-trajectories, the anterior and simultaneous clines. Quantitatively, *qatal* and *wayyiqtol* relate to these clines in an entirely different manner. Being a less advanced form, the prototypicality zones of *qatal* are located in more initial sections of the anterior path, and the simultaneous cline is relatively important in the semantics of this gram. By contrast, as a more advanced form, *wayyiqtol*'s prototypicality occupies further sections of the anterior cline and the relevance of the simultaneous cline for the gram's total meaning is almost negligible. The curve of *qatal* is more uniformly spread along the path, while *wayyiqtol* gives clear prominence to the perfective past stage, as is characteristic of young and old resultative-path grams respectively.

[65] Additionally, if the evidential cline is included and the gnomic extensions counted, a more fine-grained description would trigger slightly different shapes of the maps. Moreover, in reference to their topology, the two grams differ in that *wayyiqtol* lacks the anterior-path cline in the future time frame.

5.2. WAVES ON A STREAM

As explained in section 2, a qualitative kinetic model of the semantic potentials explicitly refers to the dynamic essence of grammatical entities. That is, the synchronic semantic state of a verbal construction is portrayed as an evolutionary process. In an analogous manner, the qualitative-quantitative representation of meaning as curves provides important insight into the grams' dynamics.

The dynamics and time dependency of meaning are even more evident if forms, whose semantic potentials are organized along the same path, are compared and represented as waves propagating along a common medium—the stream (cf. section 2.2.2). As propagating waves, they can be located on different sections of the stream. Some curves or maps can span more advanced sections of the stream whereas others are limited to less advanced sections of it. The difference merely stems from their respective grammatical age. The overall topologies and prototypicality peaks of older grams cover more advanced fragments of the stream. In contrast, younger grams cover less advanced segments of the stream and locate their prototypicality peaks in its more initial zones.

If we imagine the anterior path as a stream where grams of a perfect, a perfective and/or a past type are recursively formed, *wayyiqtol* constitutes the initial, older wave. That wave was set in motion first, before *qatal*, and has travelled the stream for a longer duration than the latter gram. Therefore, its peak is located in posterior sections of the stream, i.e. in the zone of a perfective past. At earlier historical period, it was certainly confined to less advanced sections of the stream, probably exhibiting its peak not only in the sphere of a perfective past, but also in that of a perfect or taxis.[66] With time, the peak of the *wayyiqtol* wave passed through these more initial fragments of the cline and reached further zones. Nevertheless, traces of the wave in less advanced sections of the stream—although to a minimal extent—can still be identified in Biblical Hebrew.

Qatal is a younger wave, historically posterior to *wayyiqtol*. It was shaped and set in motion after *wayyiqtol* and travelled the stream for a shorter duration. Hence, in Biblical Hebrew, it reached less advanced zones of the stream and located its peak in the more initial sections. However, the *qatal* wave has advanced towards the zone of a perfective past since it exhibits a secondary peak in this section of the stream. As is documented by post-biblical texts, the *qatal* wave will reach—and entirely "inundate"—this zone in the Rabbinic Hebrew period. At the same time, the wave of *wayyiqtol* will disperse, having travelled the entire length of the stream: The form will be lost.

The following figure shows how the waves of two grams chase and/or escape each other on the resultative stream, exhibit-

[66] This can be illustrated by the data offered by the Akkadian *iprus* (cf. Andrason 2010c; 2011b; 2012c: 192–8).

ing distinct topologies and peaks (compare 38 points of *qatal* in the stage of anterior *versus* 89.7 points of *wayyiqtol* in the stage of a perfective past).

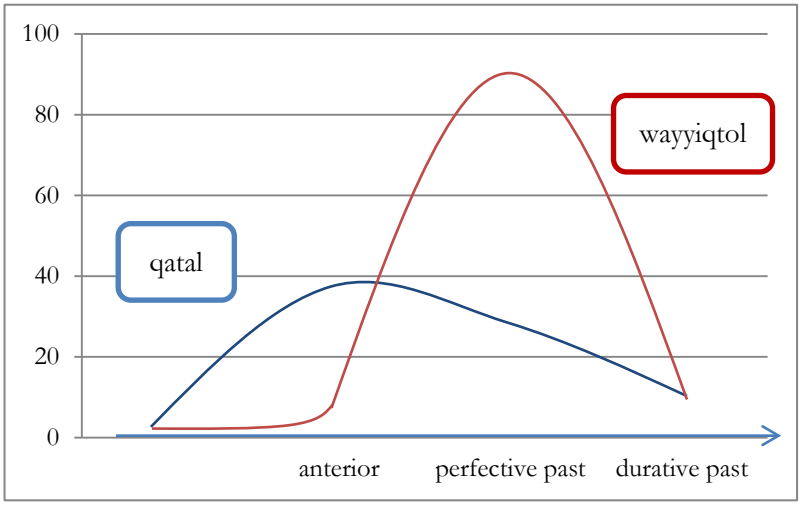

Figure 39: Waves of qatal and wayyiqtol (anterior stream in a present time frame)

The complementary distribution of the peaks of *qatal* and *wayyiqtol* is more evident if the perfectal values are envisaged in their totality under the label of "taxis." In this approximation, the peaks of the two grams are more evenly raised (compare 57.5 points of *qatal* and 89.7 points of *wayyiqtol*). Nevertheless, the *qatal* wave remains more uniform.

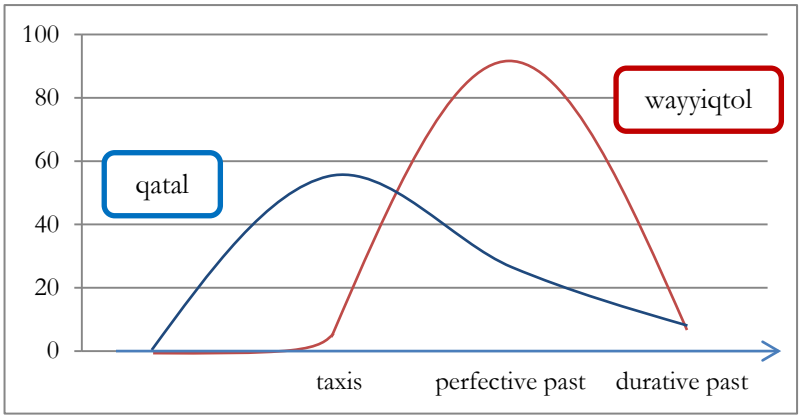

Figure 40: Waves of qatal and wayyiqtol (anterior stream in the three time frames)

The relation of the *qatal* wave with the *wayyiqtol* wave on the stream is as one of the hunted and the hunter, or the chased and the chaser. It is impossible to determine the direction of causality or

which form progresses because of the other. The two movements appear as though they existed in the state of an inseparable entanglement or a relation of pressing ahead (*qatal* exerts the pressure on *wayyiqtol* and therefore *wayyiqtol* moves ahead) and of escaping (*wayyiqtol* develops, leaving room for *qatal* to progress). The intricacy of such a mutual relationship, where something interacts with its immediate environment, is overwhelming, resulting in a non-linear equation (cf. Andrason 2014a: 83; 2016).

The stream as a medium of the relationship coupling *qatal* and *wayyiqtol* is also responsible for certain emergent properties of these grams. In particular, as the *wayyiqtol* wave entirely covers the *qatal* wave in stages where the latter exhibits a secondary peak (cf. the stage of a perfective past), the relevance of this secondary peak for the semantics of the former diminishes. This further increases the predominance of the domain of taxis in the global meaning of *qatal*. Consequently, some important traits of *qatal* do not only stem from the wave's internal properties (i.e., from its own topology) or constitute products of bottom-up causation. On the contrary, they derive from the topology of the entire stream to which *wayyiqtol* contributes, and constitute an example of top-down causation.

5.3. DOMAINS MODEL

The waves of *qatal* and *wayyiqtol* can also be analyzed from a domain-based perspective, which studies how a given sense is distributed over different grams (cf. section 3.2.2).

If one analyzes how the semantic domains of an anterior (a present perfect and an indefinite perfect), a perfective past, and a durative past are quantitatively distributed among the BH grams, the following dynamic waves of *qatal* and *wayyiqtol* emerge. First to be discussed is the sense of anteriority. The sense of anteriority is conveyed by *qatal* in 80.3% of all the instances where this value is to be encoded in the book of Genesis. The second sense (a perfective past) is conveyed by *qatal* in 10.9%, and the third (a durative past) in 36%. The wave formed by *wayyiqtol* is more advanced but, as far as its peak is considered, equally raised. Namely, the section of an anterior is expressed by *wayyiqtol* in 19.4%, a perfective past in 89%, and a durative past in 64%.[67]

[67] As far as the value of a durative past is concerned, only the instances of *qatal* and *wayyiqtol* are counted in this approximation, as these are the only two categories that could have acquired the sense of a durative past following the resultative and/or anterior cline. Long *yiqtol* and *weqatal* reached this value through meaning extensions that arose due to entirely different evolutionary scenarios (cf. Andrason 2010a and 2012d). If all the grams that can convey the value of a durative past are included in the model, the digits for *qatal* and *wayyiqtol* decrease to 31% and 55% respectively.

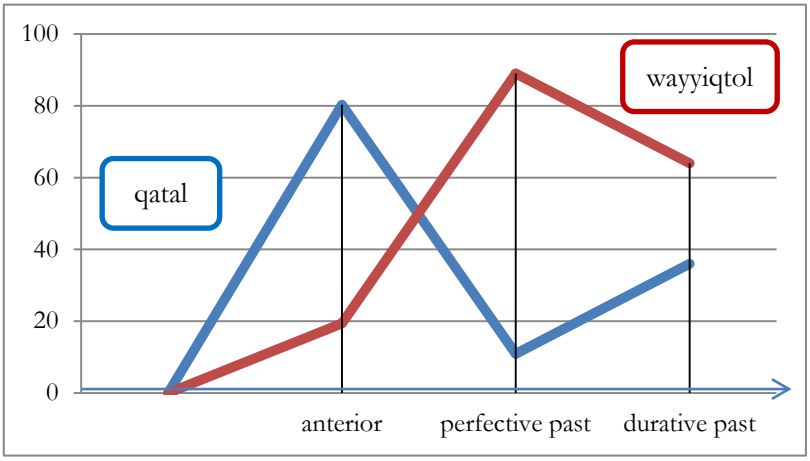

Figure 41: Curves of qatal and wayyiqtol—the domain-based model (anterior path in a present time frame)

The shape of two consecutive waves, lifted almost equally at their respective peaks of prototypicality, can be recovered in the following smoothed representation, which is more apt to capture the dynamic character of waves:

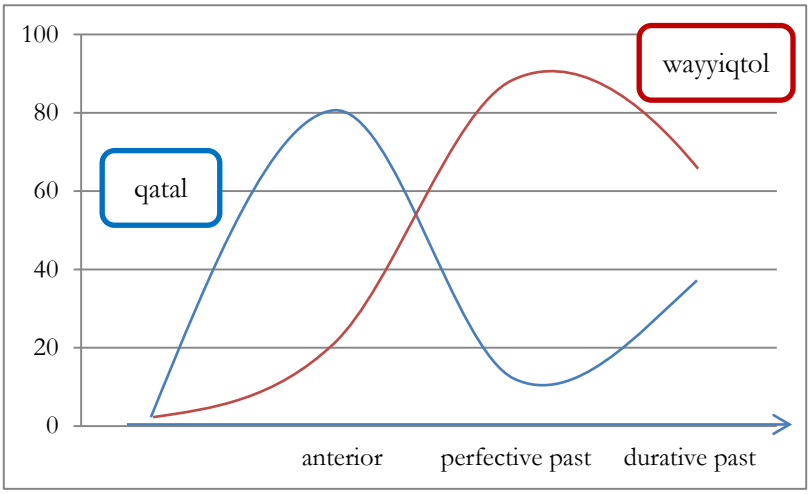

Figure 42: Waves of qatal and wayyiqtol—the domain-based model (anterior path in present time frame)

If one substitutes the domain of an anterior by a broader domain of taxis, the symmetry of the consecutive waves (or the quantitative equivalence of their peaks) is even clearer. As explained above, the more advanced wave of *wayyiqtol* exhibits its peak in the section of a perfective past. *Wayyiqtol* appears in 89% of all the cases where this sense is to be encoded. In order to express values located in the zone of taxis, *wayyiqtol* is only employed in 15% of cases. In contrast, the wave constituted by *qatal* reaches its peak at the stage of

taxis. The *qatal* form is used in 84.6% of all the cases where this sense is to be conveyed. As mentioned in the previous paragraph, the sense of a perfective past is encoded by *qatal* in only 10.9% of cases.[68]

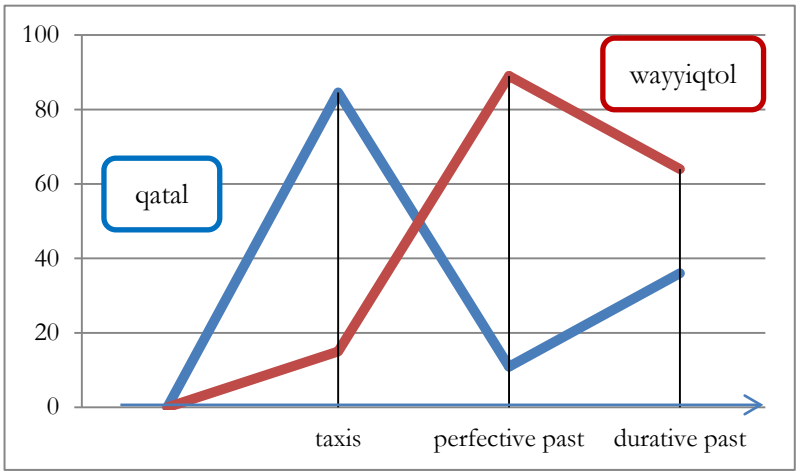

Figure 43: Curves of qatal and wayyiqtol – the domain-based model (the anterior path in the three time frames)

This can be depicted in a smoothed manner, more suitable to representing waves:

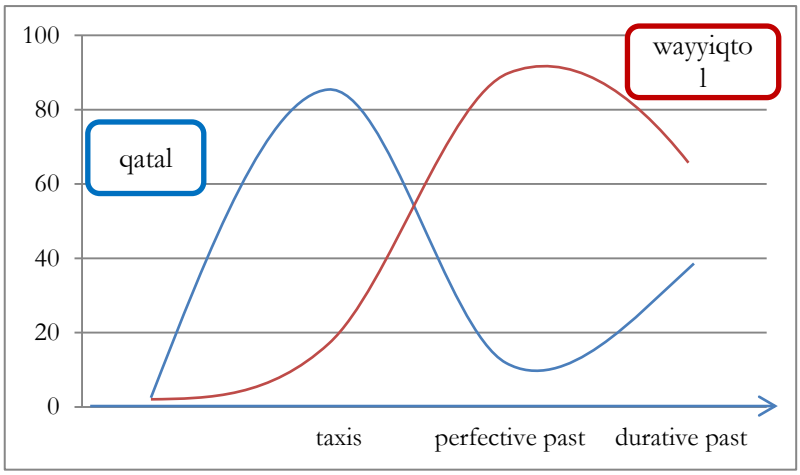

Figure 44: Waves of qatal and wayyiqtol—the domain-based model (the anterior path in the three time frames)

On the whole, the domain-based model shows that the correspondence of the two waves is almost symmetrical in respect to

[68] The digits concerning the durative past are comparable to those mentioned in the previous paragraph.

the two first sections of the anterior cline. This holds true both for the more specific domain of an anterior and for the broader domain of taxis. The peak of the *qatal* wave occupies the more initial stage rising to circa 80–85%.[69] At the same stage, the visibility of the *wayyiqtol* peak is significantly reduced as its wave ascends to less than 15–20%.[70] In contrast, the peak of *wayyiqtol* is located in the stage of a perfective past reaching almost 90% whereas the *qatal* wave ascends to circa 10%.

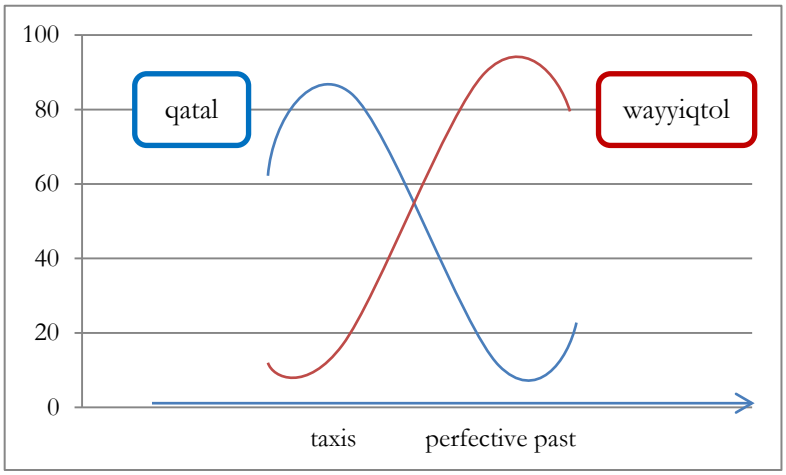

Figure 45: The comparison of the waves traced by qatal and wayyiqtol in the domain-based statistical analysis (first two stages of the anterior path)

6. CONCLUSION

6.1. MAIN RESULTS OF THE STUDY

The objective of the present study was to determine the relationship that exists between *qatal* and *wayyiqtol*. The provided evidence demonstrates that, as hypothesized, this relationship is complex in the sense of complex-system theory. In this section, the main causes of such extreme relational intricacy coupling *qatal* with *wayyiqtol* will be recapitulated.

The first contrast between the two forms includes their static qualitative and quantitative semantic potentials. In section 3.1, I determined the exact range of senses conveyed by *qatal* and *wayyiqtol* in all the places where these constructions appear in the book of Genesis and specified their quantitative distribution. This study enabled me to design detailed static taxonomical descriptions of the meanings of the two forms. At this stage, the frequencies of the

[69] The exact values are 80.3% and 84.6% depending on categorization, i.e. whether the anterior or the taxis sense is considered.

[70] The exact values are 19.4% (anterior) and 15% (taxis).

senses conveyed by the two grams were compared both globally (irrespective of type of text) and locally (the narrative and discursive types were analyzed separately). In general, the comparison could be more macroscopic (broad domains were compared) or more microscopic (more specific senses were contrasted). Additionally, microscopic senses could be grouped differently in distinct larger categories and the quantitative study conducted from a gram-oriented perspective or a domain-oriented perspective. Thus, the modification of scopes and manners of analysis and their precision had important bearings on the relationship between *qatal* and *wayyiqtol*. As the exact range of senses and their statistic weight are different when viewed from different perspectives and granularities, the interactions coupling the two formations are likewise different. To put it simply, by epistemologically "manipulating" one's qualitative and quantitative approach, different types of interactions between the two ontological categories can be discovered and/or proposed. It is evident that even at this level of description, instead of a single relationship between *qatal* and *wayyiqtol*, one deals with a great number of micro- and macro-connections that depend not only on the empirical evidence but also on the interpretation of that evidence, and, hence, on the explainer and/or observer. As in typical complex systems, the complexity is both ontological and epistemological.

Subsequently, in section 4.1, the qualitative semantic potentials of *qatal* and *wayyiqtol* were made coherent and unified in kinetic maps. The kinetic nature of each map stems from the fact that all its components are related by linking mechanisms based upon grammaticalization paths. I have shown that the maps of the two grams interact topologically as they both overlap and differ. The kinetic map of *qatal* is more extended, while the kinetic map of *wayyiqtol*, although very similar, is topologically more restricted. The map of *qatal* includes the three sub-clines of the resultative path (the anterior, the simultaneous and the evidential clines) with the anterior and simultaneous trajectories located in the three time frames. It also contains performative and gnomic extensions, as well as a cline which is specific to future prefects. Lastly, it exhibits an important extension towards modality through various types of modal contamination paths. The map of *wayyiqtol* is less elaborate. It consists of two clines, i.e., the anterior and the simultaneous tracks. The evidential track is missing. Moreover, the anterior and simultaneous paths are almost entirely restricted to a present and past time frame. Additionally, the gnomic extensions are unavailable and the modal contamination path is highly reduced. As a result, the kinetic maps of the two grams were shown to be organized along the same evolutionary scenario (the resultative path) and to span comparable sections of it. Even though topologically similar, *wayyiqtol* has reached more advanced sections of the resultative cline, while *qatal* has progressed to a lesser extent.

In section 4.2, the kinetic maps were enriched by frequency and transformed into quantitative ones. This enabled me to determine the zones of prototypicality in the semantic networks of the two constructions. Again, the model could be more macroscopic (coarse-grained) or microscopic (fine-grained), depending on the adopted perspective. The modeling of the two grams as quantitative kinetic maps revealed further aspects of their interaction (section 5.1). Even though *qatal* and *wayyiqtol* are organized along the same type of paths, there are numerous differences that distinguish them. These differences especially concern the exact topologies of the curves (e.g. their amplitudes) and the location and predominance of their peaks. As for the former trait, the curve of *qatal* is generally more uniform while that of *wayyiqtol* is less uniform. This applies not only to the anterior cline but also to the simultaneous cline. As for the latter issue, *qatal* locates its prototypicality peak in the section of an anterior and/or taxis, while *wayyiqtol* does so in the sphere of a perfective past. The peak of *wayyiqtol* is also more disproportionate in relation to the other parts of the curve. It is more prominent than the peak of *qatal*.

In section 5.2, the kinetic quantitative maps of *qatal* and *wayyiqtol* that follow an analogical developmental template (in particular, the anterior cline) were correlated and classified as successive waves on the same grammaticalization stream. The relation between *qatal* and *wayyiqtol* was explained as an interaction of two consecutive waves on this stream. *Wayyiqtol* is the first, and older wave. It has reached more advanced sections of the stream, having passed its more initial fragments, especially as far as the peak is concerned. However, the "remainders" of the wave are still perceivable at more initial sections of the stream. By contrast, *qatal* is a posterior wave and, hence, a younger one. It proliferates in less advanced sections of the stream, although it has also conquered, to a relatively important degree, its more advanced zones. *Qatal* follows the *wayyiqtol* wave by taking up the sections previously occupied by *wayyiqtol*. Their causal relation is intricate, the two grams existing in a state of an inseparable entanglement. The stream is also responsible for certain emergent properties of the two grams. That is, some traits of each gram do not stem from the wave's internal properties (its own topology), but derive from the topology of the environment in which the gram's wave is embedded.

In section 5.3, a domain-based model has demonstrated that the relationship between the kinetic waves of *qatal* and *wayyiqtol* is almost symmetrical (90% *versus* 10%). In this way, the two grams constitute an example of entanglement where the state of one gram depends on and can be predicted from the state of the other. *Qatal* is the most prototypical means of conveying the senses of a perfect (anterior) or taxis (which constitute initial stages on the resultative path) while *wayyiqtol* is the most prototypical means of encoding the value of a perfective past (which is a more advanced stage on the cline).

To conclude, at the most macroscopic level, where all the noises and disturbances are ignored, *qatal* appears to be most typically associated with the idea of taxis. First, the taxis value has the heaviest weight in the static semantic potential of *qatal* and it constitutes the peak of the wave of this gram. Second, the domain of taxis is most commonly conveyed by *qatal*. On the contrary, at the ultimately global perspective, *wayyiqtol* seems to be associated with the domain of a perfective past. Primarily, the sense of a perfective past has the heaviest weight in its static semantic potential, so that it also constitutes the peak of the wave of this formation. Secondarily, the domain of the perfective past is most commonly conveyed by *wayyiqtol*. At this macro-level, the qualitative-kinetic complementarity and the entanglement of the two grams is unmistakable. This entanglement stems from the sequential nature of the two waves. The *wayyiqtol* is more advanced because it is older or anterior to *qatal*. In contrast, the *qatal* wave is less advanced because it is younger or posterior to *wayyiqtol*.

It is from this global dynamic interaction that all the micro-relations can be recovered as one descends to more fine-grained levels of analysis. However, as complex systems cannot be fully modularized and deconstructed into autonomous parts, the global property determined by the wave nature of the grams must always accompany the micro-states. The deconstruction into parts and descent to more elementary levels make sense, as long as the macro-situation, in which all the micro-states are embedded, is acknowledged. In this manner, an individual sense is not only the information offered by a gram in a specific place and time, but rather this very information accompanied by the adjacent possibility of the gram to appear in this and any other context, i.e. by its wave.[71] To put it differently, the wave of the gram always accompanies the specific use of this form. I expressed this figuratively in the following way: "in a particular context, one of the possible, previously integrated [into the semantic potential], values is activated and emphasized; metaphorically, it is taken out from the multicolored sphere. However, as we choose such an exact meaning, imposed by a given environment, and, thus, tug a piece of the gum, other values-colors follow because they are strongly tied to the selected fragment (i.e., the one which we are pulling)" (Andrason 2010a: 56).

6.2. THIS STUDY AND THE GRAMMATICAL TRADITION

The model presented in this paper offers various benefits. Its main advantages are that it preserves valuable aspects of traditional BH

[71] For instance, a performative use of *wayyiqtol* (a concrete *wayyiqtol* form that appears once in the book of Genesis) is a unit consisting of the performative sense, prompted by the context in which the form is employed, and of the global *wayyiqtol* gram with all its macro-properties recoverable from its curve model.

scholarship, corrects their main deficiencies and incorporates the most advanced propositions formulated by contemporary linguistics and modern science.

The model respects the grammatical tradition of studies on the BH verbal system:

1) **Scholarly continuity**: The wave model incorporates various insights of previously formulated theories that have investigated the relation coupling *qatal* with *wayyiqtol*. As these theories usually focus on a given perspective, granularity level or frame of explanation (cf. section 1.1), they remain relevant if viewed from the wider perspective provided by the wave model. From this perspective, the traditional theories continue be valid, because they reveal an important fragment of the truth. That is, the interaction between *qatal* and *wayyiqtol* certainly concerns a) the taxis: *qatal* approaches to the taxis attractor, while *wayyiqtol* is much less sensitive to this domain; b) the aspect: *qatal* is less tied to the concept of a perfective past (it also links better to the domain of durativity), whereas *wayyiqtol* is strongly related to the sense of a perfective past; c) the time: *qatal* is closely related to the idea of present and/or current relevance, while *wayyiqtol* is almost entirely tied to a past temporal frame; d) the text type and text function: as a category *qatal* is as discursive as it is narrative, whereas *wayyiqtol* predominates in a narrative function.

2) **Compatibility with pre-modernistic theories**: The dynamic model of waves is particularly compatible with approaches developed before the time of structuralism and the modernistic over-rational apogee. Rather than discovering binary dichotomies or designing unrealistically neat systems, these approaches focused on the semantic variability or polysemy of grams (e.g. Driver 1892; Gesenius 1910; and Jouön 1923; as well as Waltke and O'Connor 1990). The wave model introduces coherence to the values identified in such approaches, specifies their exact quantitative status in relation to each other, and proposes how the grams in their totality might have been perceived by native speakers. Those familiar with these traditional grammars will find the wave model accessible, since this representation builds on the senses identified in the classical works.

The model avoids problems typical of structuralist or modernistic approaches:

3) **Empiricism**: The wave model has a strong empirical orientation seeking its ideal in natural sciences, in contrast with an over-rational, "arm-chair" linguistic attitude characteristic to structuralism and modernism. It primarily builds on observation and accounts for the entire semantic variability and diversity of *qatal* and *wayyiqtol*. As the model seems to tolerate any array of empirical data, there is no need for "cleaning" the evidence, e.g. for ignoring rare senses and uses or treating them as exceptions.

4) **Objectivity**: The wave model builds from a lesser degree of presupposition. It starts with empirically measuring senses as they appear, i.e. without assuming any specific meaning being attached to the form. This stands in contrast with "one form—one meaning" approaches, which are significantly more tautological and circular.[72]

5) **Taxonomical flexibility**: As the definitions in the form of waves are able to accommodate any sense (from the regular ones, to the rarest ones, and superficially unrelated) and recover any type of relationship underlying grams, they work for grammatical objects that are not easily classified according to traditional categories. Being based on the idea of fuzziness, the model affords the possibility to define grams without introducing arbitrary dichotomies and rigid unnatural boundaries as is usually done in structuralism. Instead of inflexible classifications, one formulates fuzzy definitions that are apt for any degree of qualitative and quantitative variation.

6) **Lesser sensitivity to categorization**. The model and the definitions that it yields tolerate any type and of categorization and any level of granularity. It "works" for more fine-grained categories as well as for more coarse-grained ones.[73] Thus, this representation is less sensitive to the issue of categorization than other models, being arguably compatible with categorizations that will be developed in the future.

The wave model also avoids problems associated with taxonomical (usually pre-modernistic) approaches:

7) **Definability**: The model yields definitions, which are explanatory, predictive and scientifically manageable. Such classifications expand beyond mere taxonomies or collections of micro-data. They provide solutions for global grams. They depict the form as a bi-dimensional dynamic object with specific topological properties that enable us to relate it to other formations. The definitions yield

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[72] The model is objective because it is empirical. The evidence explicitly shows where a gram behaves as a certain type and how often this occurs. The experiments (uses in precise contexts) and the numerical data (frequencies) significantly reduce the subjectivity of the analysis. (Of course it partially persists, as we do not have machines to measure senses.) It is, therefore, not the linguist himself (because of his or her intuition or personal conviction) but the objective data that determine that *qatal* and *wayyiqtol* exhibit such-and-such behavioral profile.

[73] Probably, the only exception is an extremely macroscopic level of granularity where only one sense would be distinguished. This perspective is, however, impractical. In order to include all the cases of the gram, the one-sense definition would necessarily include objects other than this gram, and would also fail to encapsulate the semantic essence of the gram being defined.

various synchronic and diachronic hypotheses, which can subsequently be tested.

8) **Systemic view**. Contrary to taxonomical approaches, the wave model recovers systemic positions of forms and the systemic interactions that couple them. The model does not fragment grams into independent objects but develops a holistic view of how the system works.[74]

The wave model incorporates the human actor to the linguistic analysis:

9) **Competence**: Although the model is corpus-driven and oriented towards performance, it also gives insight into the potential competence of native speakers. That is, the peaks of prototypicality of a gram and its relation to the prototypicality peaks of the other form traveling the stream jointly suggest the domain(s) with which the two constructions may have been associated. In other words, the systemic fuzziness does not mean that, in their minds, native speakers of Biblical Hebrew could not have identified *qatal* and *wayyiqtol* as expressions of clearly distinct categories. The quantitative distribution of the two grams suggests such a sharp association, *qatal* being viewed as a perfect (and, to a lesser degree, a perfective past) and *wayyiqtol* as a perfective past (and, maybe, a definite past).[75]

The wave model complies with contemporary understanding of real world systems and with its modelling within complexity theory.

10) **Properties of real-world complexity**: The model preserves the properties typical of realistic complex systems, which contradict the orthodox, structuralist ideal of stability, simplicity, neatness, qualitative complementarity and modularity. In particular, it demonstrates that the interaction between *qatal* and *wayyiqtol* is

[74] However, from the system's perspective, the complementarity of two or more forms—if it is to be posited—is qualitative and not quantitative. In this study, this more holistic analysis has only reached the level of a stream. For a more global perspective of the BH verbal system and the manner of modeling an entire verbal system, see Andrason (2015) and (2016) respectively.

[75] The distinction between the etic perspective (language is treated as a physical, objective, objectively accessible, autonomous system and as an acting agent for which humans are the medium of propagation) and the emic perspective (speakers are the acting agents who by using their cognitive faculties can manipulate the language, giving it a more psychological and subjective status) is highly relevant. The two perspectives interact and influence each other. On the one hand, speakers' subjective perception of language influences the "running" of language as an objective system. On the other hand, this objective language system influences the speakers' subjective perception of it.

complex, not in a trivial sense of this word, but in the precise sense formulated by complex-system theory. Namely, this relationship is:

- Dynamic. The grams interact kinetically. Instead of static pictures of the grams and a static view of their relationship, the model offers dynamic equations governing the behavior of the forms and underlying their connections.[76]
- Highly cardinal. The interaction between the grams involves multiple types of specific relations and a great number of components of different kinds.
- Multilevel. The interaction consists of hierarchical levels of organizational depth ranging from those that are more microscopic to those that are more macroscopic. The model is both atomic/analytical and holistic/synthetic.
- Emergent. Qualitatively novel types of interactions and properties emerge as a higher level of analysis is ascended to.
- Fuzzy. Although *qatal* and *wayyiqtol* drift towards determined attractors of prototypicality poles, they are located

[76] This is one of the most important complex properties exhibited by the wave model, which is entirely missing in the other synchronic approaches. Even though the model presented here is synchronic, it is also dynamic. It is fully evolutionary in spirit, precisely because it is dynamic at the level of synchrony. It shows that language evolves over time because it is evolving constantly, in every second. In comparison, the view exposed by Cook (2002, 2012), which also draws from grammaticalization theory, is as static as any other structuralist, modernistic representation. This gives rise to the portrayal of the diachrony of a language as instances of teleportation rather than evolution. Of course, like the various species in the history of Earth, languages gradually evolve and do not teleport from one state to another state. In order to evolve, they must be dynamic at the synchronic level. Static systems simply do not change. The basis of this dynamicity is variability. The wave model, which is inherently dynamic and explicitly builds on variability, is compatible with the understanding of evolution as defended by natural sciences. *Homo Sapiens* did not evolve by teleporting from the state present in a common human-ape ancestor. This evolution happened gradually through a great number of intermediate branching species and variations. If we imagine a gram as a species of individuals (i.e. a collection of the gram's uses), each use (like each individual of a species) exhibits slightly distinct properties. The synchronic variation of a species typically shows certain dynamic tendencies. Over time the quantitative distribution of certain traits in the individuals changes, and the species as such develops into a new taxon (or variation). The wave model postulates exactly the same for grams. Synchronic variation is dynamic. It reflects and drives the evolution of the global form. Diachronically, the distribution of uses is modified so that the global status of the gram changes.

in transition zones. As holistic objects, the grams do not match any prototype.[77]

- Characterized by two types of causation. The explanation draws from both the bottom-up causation and the top-down causation, showing how atomic properties build up the system and how the system simultaneously contributes to atomic states of the components in a loopback manner.

11) **Properties of complexity models**: By being intentionally pluralistic, the wave model complies with a property typical of scientific representation of real-world complexity. The model offers a number of perspectives, granularity and explanatory frames, demonstrating how the properties of grams change in response to modification of the parameters of analysis. The wave model can be viewed as an overarching representation within which other, non-complexity approaches can also be accommodated and viewed as emphasizing a specific type of analysis or specific manner of data collection. In accordance with the complexity of reality, the optimal model is one that can account and allow for many possible perspectives with their local truths. It would enable scholars to reach and explain different propositions, showing how they can all coexist. In fact, any single-facet model with one inflexible position (as most traditional models of the BH verbal system are) is insufficient. The model must be flexible with multiple facets, depending on the modification of parameters, be they different contexts (e.g. text type, syntactic environment, etc.), categorization manners and granularity levels, as well as objectives of the analysis. The wave model avails for different results by modifying parameters, still providing their explanation and connection.[78]

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[77] The fuzziness of the grams and their definitions is another highly relevant trait of the wave model that is missing in any other theory. Once more, this stands in agreement with modern evolutionary theory. For example, as stated by Futuyma (2005: 78) "because the evolution of mammals from synapsids [. . .] has been gradual, there is no cutoff point for recognizing mammals: the definition of "Mammalia" is arbitrary." Accordingly, "[h]igher taxa arise not in single steps, by macromutational jumps (saltation), but by multiple changes in genetically independent characters (mosaic evolution). Most such characters evolve gradually, through intermediate stages" (ibid. 519).

[78] In the wave model, a gram may be imagined as a color. Color is defined as a wave of light or density of field of photons. For an observer, a given wave with the same physical properties can appear as different colors given the background light or the surface of the object on which it is being observed. The perceived color may therefore change drastically depending on the "perspectives." If the observer changes and it is not the human eye but a different receptor, the perception of the color will also be distinct. The model presented in this paper—as the definition of the color in terms of a specific type of a wave of light—preserves the essence of the grams, but also allows for its multiple perceptions.

6.3. LIMITATIONS AND A PLAN FOR IMPROVEMENT

Although this article has responded to various questions concerning the relationship of *qatal* and *wayyiqtol*, it has not exhausted the entire depth of the problem. Such a complete answer to all problems can never be reached in a singular study. As I explained in the introductory section, science is a collaborative enterprise and truths (or rather *our* truths) are discovered through joint and/or accumulative work of many individuals.

It is possible to discern three types of limitations in the model formulated in this article. First, certain aspects of the semantics of *qatal* or *wayyiqtol* have deliberately been omitted. Most importantly, I have not included the value of sequentiality in the analysis. The motivation for this is that the place of this sense has never been precisely positioned on the anterior or resultative cline, but stems from the incorporation of the lexeme **wa*-x- into the short *yiqtol* gram (cf. Andrason 2011b and 2013a). However, I am fully aware that the interaction between *qatal* and *wayyiqtol* also involves the parameter of sequentiality, both in the static semantic potentials of the two grams and as far as their qualitative kinetic maps are concerned.

Second, another contrast existing between *qatal* and *wayyiqtol* has been ignored in this paper. This contrast has emerged as a by-product of the empirical research. Namely, my database suggests that as far as the sense of a perfective past is involved, the syntactic parameter of fronting (surfacing in the pragmatic functions of focus and/or topicalization) seems to play a crucial role in differentiating between the two forms and in selecting one of them. In cases where the verb-first word order fails to be found and non-verbal entities are fronted in the sentence, *qatal* is employed. In situations where the verb-first order is preserved and fronting does not take place, *wayyiqtol* is used. This means that although the two grams can express the same senses—within a given categorization—they are not fully interchangeable. Their use can be different because the selection between them may depend on other factors ignored in the categorization and considered as noise. This again shows the extreme complexity of the language and the enormous intricacy of relationships that underlie any two forms.

Third, and in close connection to the previous point, the study omitted all information concerning contextual features (be they semantic, morphological, syntactic or pragmatic) that, in probabilistic terms, condition the activation of certain senses of *qatal* and *wayyiqtol*. For instance, the pluperfect value of *qatal* usually appears if the form is used in subordinate clauses introduced by כִּי or אֲשֶׁר. As explained, this information is included in the database. Although this has been ignored in this article given the semantic focus of the study, it can easily be extracted from the database and elegantly incorporated in the wave model.

Lastly, the relation between *qatal* and *wayyiqtol* was treated in total isolation from the remaining elements of the system. I have

analyzed the two formations as if only they existed in the BH verbal organization. Almost no relation to other grams has been posited. This is, of course, an oversimplification. The kinetic maps or waves of *qatal* and *wayyiqtol* exist and develop in the company of and in response to other maps and waves. The interaction with these remaining components of the system certainly has important bearings on the two grams and on their mutual connection.

The incorporation of the parameters ignored thus far, as well as the inclusion of the other grams present in the BH verbal system in the analysis of *qatal* and *wayyiqtol* shall constitute one of the future research activities of the present author.

6.4. TOWARD A NEW HORIZON

The results of this research and, in particular, the classification of a gram as a wave may have further consequences for the modeling of verbal forms, verbal systems and languages in general.

As demonstrated by contemporary physics, everything in the realistic universe—be it physical or non-physical—is a wave. Every particle, such as electrons and protons, constitutes a wave or, in more technical terminology, a(n) (a)periodic disturbance in the density of the field. Every particle—usually viewed as a static object—is in fact a pulsating process of density fluctuation in the field. Not only electrons, but also human beings, planets, galaxies—everything is a wave. What is interesting about waves, including the wave of an electron or a human, is that they never end, but propagate infinitively. Although they apparently exhibit field disturbances and are confined to some limits, they expand over the entire universe. An electron wave never terminates, just like a human wave never does so. What happens is that the peaks of such waves decrease exponentially to the limits close to zero so that under most (if not all) estimations they can be ignored. This shows that, as posited by complexity theory, all objects interact with all the others. Every electron in each atom interacts with every electron in all the remaining atoms in the entire universe. As the wave decreases exponentially, distant interactions are interminably weak.

Since the universality of laws of physics is indisputable—they apply to everything in the known universe—the wave interpretation of the meaning of verbal grams can be viewed as complying with the wave paradigm defended by modern physics. The meaning of a gram is defined as a wave or a density disturbance of the semantic field traced by the grammaticalization cline(s). As an exemplary wave, it fills the entire available field—every gram spans the entire field traced by its grammaticalization cline. Already at the very beginning of its grammatical life, it reaches to the limits of its grammatical universe and spans to the end of the semantic field established by the cline(s). What occurs is that the density fluctuation at these regions is extremely low, approximating zero. The only dense field is the initial zone of the grammaticalization cline. With time, the wave propagates along the available field so that

other regions become dense and the wave is more uniformly distributed along the entire field available.

The wave model constitutes a new manner of describing, analyzing and representing verbal semantics, in which dynamics, fuzziness and connectivity are in focus. In this representation, the wave becomes the central concept: an individual gram is a wave, sets of grams are consecutive waves on the stream, and the whole system is a complex ocean of interfering streams of waves. Furthermore, a wave not only functions as a global definition of a gram and a systemic concept. It also enables us to discover or recuperate all the remaining properties by stepping downwards to more microscopic levels of analysis.

This is an entirely new way of approaching grammar. It is novel not only in the area of Semitic languages but also in general linguistics. In this way, studies of Biblical Hebrew can contribute to the advancement of modern linguistic theories, postulating a more accurate manner of comprehending and representing meaning and grammar of languages. There is no doubt that the further development of the wave model will constitute the central activity of the author of the present article.

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