THE SEMANTIC MAP OF *AKTIONSART* AND LEXICAL ENTAILMENT OF OLD ENGLISH STRONG VERBS

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ABSTRACT. The aim of this article is to analyse the semantic relations that hold between Old English primitive and derived verbs in terms of lexical entailment and *Aktionsart*. The results of this analysis are presented in a semantic map, while emphasis is made on the points of contact between these phenomena. The main conclusion is that semantic maps represent a more flexible and applicable methodology than previous work suggests since they have been used to deal with one language, to explain historical languages and to refer to specific lexical items. Likewise, this analysis shows evidence of an inherent relationship between both phenomena: lexical entailment and *Aktionsart*.

Keywords: Old English, semantic map, *Aktionsart*, lexical entailment, lexical paradigm, verb.

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MAPA SEMÁNTICO DEL *AKTIONSART* Y LA IMPLICACIÓN LÉXICA DE LOS VERBOS FUERTES DEL INGLÉS ANTIGUO

RESUMEN. El propósito de este artículo es analizar las relaciones semánticas que se establecen entre el primitivo del inglés antiguo y sus derivados en términos de vinculación semántica y *Aktionsart*. Los resultados de este análisis se presentan en un mapa semántico en el que se enfatizan los puntos de contacto entre ambos fenómenos. La conclusión principal es que los mapas semánticos representan una metodología más flexible y aplicable de lo que trabajos previos sugieren, ya que han sido empleados para tratar con un único idioma, para explicar idiomas históricos y para hacer referencia a términos léxicos concretos. Del mismo modo, el análisis demuestra una relación inherente entre ambos fenómenos: implicación léxica y *Aktionsart*.

Palabras clave: inglés antiguo, mapa semántico, *Aktionsart*, implicación léxica, paradigma léxico, verbo.

1. INTRODUCTION

This article deals with the semantics of the Old English verb. It aims at analysing the semantic relations that hold between primitive and derived verbs in terms of lexical entailment and *Aktionsart*. Fellbaum (1990: 283) describes verbal lexical entailment as "the relation between two verbs V_1 and V_2 that holds when the sentence Someone V_1 logically entails the sentence Someone V_2". In this regard, the study explores these relations according to the taxonomy of the On-line Lexical Database WordNet (Miller, G.A, Beckwith, Fellbaum, Gross and Miller, K. 1993). In consequence; troponymy, -troponymy, backward presupposition and cause are considered. Nevertheless, since the relations of synonymy and opposition are also salient in the Old English paradigms, these are also included into the analysis. Concerning the *Aktionsart* or internal aspect, it shows the inherent temporal properties of the verb, and combines its pure semantics and associations in the syntax of the sentence. Regarding the typology of Aktionsart, this work follows Van Valin and LaPolla (1997) and Van Valin (2014). The focus of the research is on verbs derived from verbs, so that the derivatives from all the 328 Old English lexical paradigms based on strong verbs are analysed. The results are presented in a semantic map, while, throughout the analysis, emphasis is made on the points of convergence between lexical entailment and *Aktionsart*.

A review of the available bibliography of Old English semantics turns out three main types of works. In the first place, a significant number of publications deal with specific areas of the vocabulary of the language, such as plants (Sauer and Kubaschewski 2018). Secondly, some works present and organise certain semantic fields of the language like the semantic field of theft (Schwyter 1996). Thirdly, some studies engage in the syntax and semantics of verbal classes, such as verbs of motion

(Ogura 2002), verbs of tasting (Ogura 2008), verbs of inaction (Ojanguren López fc.-a), End verbs (Ojanguren López fc.-b), and verbs of rejoice (Martín Arista 2020a, 2020b).

A limited number of works have hitherto engaged in the semantic of Old English. Moreover, the category of the verb as such as well as the organisation of the verbal category have not been a priority of the linguistic research of Old English. While it is clear that the semantics of the Old English verb in general requires more attention, it is not obvious what the starting point of a study in Old English verbal semantics should be. In this respect, it is necessary to look at the border between grammar and semantics so as to describe the state of the art of scholarly research in this area more clearly and to define the aims of this research with respect to the state of the art in the field.

The article is organised as follows. After a review of previous literature on the semantics of Old English (Section 2) and semantic maps (Section 3), the methodology of this research is described in Sections 4 and 5. The results of the analysis are presented in Section 6. The semantic map based on this analysis is given in Section 7. To finish up, Section 8 summarises the main conclusions of this article.

2. REVIEW

Kastovsky (1992a) pointed out that an exhaustive study of the Old English lexicon in general and word-formation in particular was still pending and acknowledged the difficulty of carrying out such a study. After all, the data combine synchronic and diachronic facts (the outcome of word-formation processes remain for a long time in the lexicon even though the word-formation that created them is no longer operative). The study of Old English morphology and semantics carried out by Kastovsky (1992b) has been continued in four directions: morphological analysis (García García 2019); the semantic analysis of semantic primes (Mateo Mendaza 2013, 2016); the analysis of lexical functions (Vea Escarza 2016, 2018); and paradigmatic morphology (Martín Arista 2013, 2017, 2018, 2019; Novo Urraca 2015, 2016a, 2016b).

Both the analysis of lexical functions proposed by Vea Escarza (2016, 2018) and the study in paradigmatic morphology conducted by the authors cited above are based on the model of morphology adopted in the work by Trips (2009), which gathers together all the derivatives that share a lexeme and accounts for the relations that hold in the lexical paradigm by means of rules and operations. For example, the lexical paradigm of the adjective *glēaw* 'penetrating' (Novo Urraca 2015: 61) includes nouns such as *gereordglēawnes* 'skill in singing', adjectives like *æglēaw* 'learned in the law', as well as adverbs such as *foreglēawlīce* 'providently, prudently'. Such a set of lexical items or lemmas is called a "derivational paradigm" and its base of derivation is the "primary adjective".

The analysis of the derivation within the paradigm is gradual (Martín Arista 2011, 2012a, 2012b). This means that a maximum of one affix is attached by a given

process. For instance, the noun *unglēawscipe* 'folly' is the result of the stepwise attachment of the prefix un- and the suffix -scipe. Therefore, whereas some derivatives like *glēaw > glēawlīce* can be directly related to the base of derivation, thus representing instances of non-recursive derivation, others, like *unglēawscipe* 'folly', call for intermediate derivational steps from the base of derivation of the paradigm and involve recursive derivation (Novo Urraca 2015: 62). The analysis of derivation within the paradigm is also panchronic (Martín Arista 2012b). The term panchronic must be understood as the inclusion into the paradigm not only of the processes that are formally transparent on the synchronic axis but also of the processes that are no longer transparent on the synchronic axis and have to be explained with reference to the diachronic axis. For example, the noun *byrst* 'loss, calamity, injury, damage, defect', the verb *tōberstan* 'to burst apart' and the adjective *byrstig* 'broken, rugged' belong to the derivational paradigm of the strong verb *berstan* 'to break, burst, fail, fall; escape; break to pieces', although the formation of the strong verb is formally transparent, the noun and the adjective are opaquer from the point of view of lexical derivation.

3. SEMANTIC MAPS IN LINGUISTIC ANALYSIS

According to Levshina (2015) "a semantic map is a graphical representation of functions of linguistic constructions, unto which linguistic forms from one or different languages can be mapped". For de Haan (2004) semantic maps are used to avoid terminological multiplication and for a better representation of linguistic data. Since the first work on semantic maps (Anderson 1982, 1986), no agreement has been reached on the architecture of this kind of graphical representation. In de Haan's (2004) words, semantic maps help linguists "to come to grips with the complex interactions of semantic meanings in the world's languages and constitute a representation that is the sum total of the semantic possibilities of the category under investigation". Before going into the details of the model, the foundations of semantic maps can be found in the studies by Croft (2003) and Haspelmath (2003). The basic idea is that similarity is expressed by closeness in representational space. Closeness is also represented by means of a straight connecting line. The simplest semantic maps are monodimensional, but bidimensional semantic maps are also used. In general, the length of the connecting lines is not significant, nor the spatial orientation. Semantic maps comprise categories and relations. The semantic map of the instrumental and related functions proposed by Haspelmath (2003: 229) illustrates what has just been said.
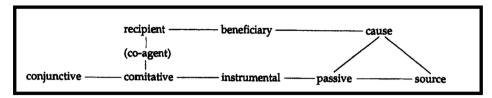
Figure 1 The semantic map of the instrumental and related functions (Haspelmath 2003: 229).

Haspelmath (2003) finds several advantages of the semantic map model. Semantic maps ensure cross-linguistic comparison, describe grammatical meanings in a very concrete way, do not presuppose that the correct semantic analysis has been found, avoid homonymy claims, do not require the identification of a prototype and, above all, "not only provide an easy way to formulating and visualizing differences and similarities between individual languages, but they can also be seen as a powerful tool of discovering universal semantic structures" (Haspelmath 2003: 232).

Although hybrid approaches occur, there are two fundamental classes of semantic maps (Levshina 2015). Firstly, a 'classical map' (van der Auwera 2013), 'first generation map' (Sansò 2009), or 'connectivity map' (van der Auwera 2013) is a semantic map that consists of a network of nodes connected between links. These nodes denote the functions and serve as points of cross-linguistic comparison among words, constructions or grammatical categories. To draw a classical semantic map, functions are identified and presented as nodes. Then, a spatial outline is configured in such a way that Croft's (2001) Semantic Map Connectivity Hypothesis is satisfied. This hypothesis is also known as the Adjacency or Contiguity Principle and stipulates that if two functions are conveyed by one form in one or more languages, the consequent nodes must be connected. Figure 2 (from Haspelmath 2003) illustrates the concept of connectivity map.
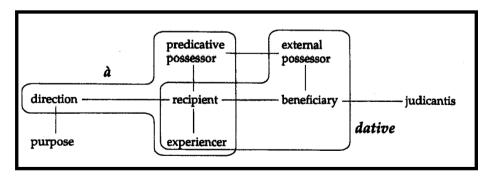

Figure 2. A map of dative functions from Haspelmath (2003: 219).

As Levshina (2015) remarks, most classical semantic maps are usually non-hierarchical because they do not display hyponymy relations. There are exceptions, like the semantic map of causation shown in Figure 3.
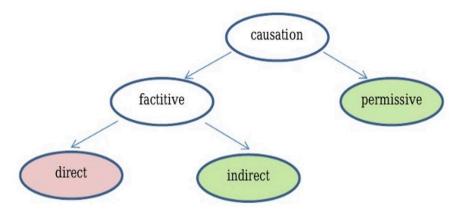

Figure 3. A hierarchical semantic map of causation (from Levshina).

Barðdal (2007) draws on Croft (2001) and Haspelmath (2003) for the idea that items with the same grammatical behaviour are adjacent to each other in conceptual space and items with different behaviour are distant from each other. Since Barðdal (2007) discusses the ditransitive construction and all the items share the same grammatical behaviour, they cannot be arranged on the basis of this criterion. Barðdal (2007) arranges the lexical items according to the semantic similarities found across these items, as can be seen in Figure 4.

transfer along a path		
giving lending sending instrument of sending paying	future transfer bringing obtaining	
	creation	
	communicated message	mental activity

constraining	enabling	owning	
	hindrance	utilizing	

Figure 4. The semantic map of the ditransitive dative-accusative construction in Icelandic (from Barðdal 2007: 14).

François (2008) also draws lexical semantic maps in order to represent polysemy, so that the diagram shows all the attested meanings as well as the most likely connections between them. This is shown in Figure 5:
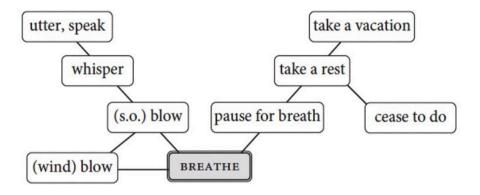

Figure 5. A semantic map for BREATHE (François 2008: 185).

Gaume, Duvignau and Vanhove (2008) incorporate graph theory to the methodology of the semantic maps. Graphs are mathematical structures that represent relations between objects. A graph consists of nodes (vertices or points) which are connected by edges (arcs or lines). Graphs may be undirected, if there is no difference made by the direction of the edge, or directed, when the direction of the edge draws a difference between the two nodes. A graph may be binary, if a maximum of two edges stem from a node, or non-binary, if more than two edges can stem from a node. In Gaume, Duvignau and Vanhove (2008), the vertices represent the lexical units of a language and the edges depend on the different relations, which fall under three types: syntagmatic relations of cooccurrence (an edge is created between two words if they are found near each other in a large corpus); paradigmatic relations, notably synonymy, as in WordNet (a graph is drawn in which two vertices are linked by an edge if there is synonymy between the two words); and semantic proximity relations, which may apply both on the syntagmatic and the paradigmatic axis (an edge is created between two words when one is found in the definition of the other in a dictionary). For instance, Figure 6 shows the graph for the French verb ÉCORCER 'to bark'.
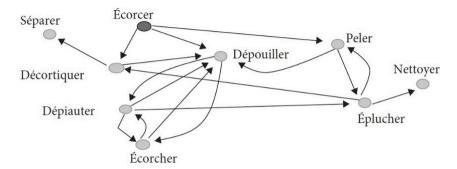
Figure 6. The graph for the verb ÉCORCER 'to bark' (Gaume, Duvignau and Vanhove 2008: 241).

Of the two main types of semantic maps mentioned above, all the types discussed so far belong to the first type, the classical semantic map. As for the 'proximity map' (van der Auwera 2013) or 'second generation map' (Sansò 2009), it is a map that shows data points, especially instances from an experimental stimulus or a corpus and denotes a specific situation. The distance or proximity between the data points represents the different relationships. These maps are also known as probabilistic or statistical semantic maps and are generated at the hand of multivariate statistical methods. An illustration of this type of map is provided in Figure 7.
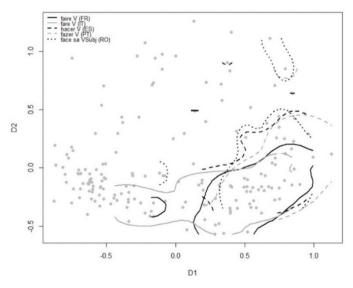

Figure 7. A probabilistic semantic map of analytic causatives in Romance (Levshina 2015).

To finish up this review of semantic maps, it must be noted that different views have been held as regards the relationship between semantic maps and cognitive-semantic analyses. In Croft's (2001: 287) words, "semantic maps depict the geography of the human mind, which can be read in the facts of the world's languages in a way that the most advanced brain scanning techniques cannot ever offer us". Croft (2001) argues that semantic maps depict the universal conceptual space that belongs to the speakers' mental representation. In this line, Haspelmath (2003: 233) holds that semantic maps "can indeed be taken as a direct representation of the relationships between meanings in the speakers' mind". However, other linguists, such as Cristofaro (2010), claim that instead of individual knowledge at the synchronic level, semantic maps represent diachronic evolution.

4. METHODOLOGY

328 lexical paradigms of Old English strong verbs have been analysed. This amounts to a total of 1,509 verbs (328 lexical primes and 1,181 derived verbs). The data of analysis have been retrieved from the lexical database of Old English *Nerthus* (Martín Arista, García Fernández, Lacalle Palacios, Ojanguren López and Ruiz Narbona 2016) and represent all strong verb primes and about 1/5 of the verbal lexicon. The remaining 4/5 of the verbs in the lexicon of Old English are not morphologically related to the paradigms under analysis and have been disregarded. In practice, most of the verbs selected for the analysis are strong verbs derived from other strong verbs, such as *bedrīfan* 'to beat', *eftādrīfan* 'to reject', *eftfordrīfan* 'to drive away', which belong to the derivational paradigm of *drīfan* 'to drive'. The reason why there are more strong than weak verbs is that weak verbs are derived from nouns (as in *cuss* 'kiss' > *cyssan* 'to kiss') and adjectives (*eald* 'old' > *ieldan* 'to delay') and, therefore, they belong in the lexical paradigms of these categories.

In this study, as in WordNet, the analysis is organised by means of synsets, or unordered sets of cognitive synonyms (Cruse 1986), which work as building blocks and that, by means of conceptual-semantic relations, allow us to build a network hierarchy where the semantic and syntactic characteristics of each verbal paradigm are explicit and presented visually in a principled way. Nevertheless, unlike WordNet, this work focuses on verbal paradigms. Therefore, this investigation concentrates on verbs and conceptual relations link words belonging to this part of speech. Synsets are associated via the conceptual relationships of synonymy, antonymy or opposition, troponymy, -troponymy, backward presupposition and cause (Miller G.A, Beckwith, Fellbaum, Gross and Miller K. 1993).

In this sense, troponymy represents a particular lexical entailment in which a troponym V_1 of a more general verb V_2 represents a particular manner of V_2 as in the pair *walk* (V_1) - *move* (V_2). Whereas troponymy relates pairs which are temporally co-extensive, -troponymy connects pairs that show proper temporal inclusion such as *dream - sleep*. In respect of backward presupposition, it associates pairs in which a verb V_1 is a previous requirement of another verb V_2 as in the pair *paticipate* (V_1) - *win* (V_2). Finally, in a causal relation a causative verb V_1 entails a

verb V_2 in which the subject is necessarily an object of V_1 as in the pair *give* (V_1) - *have* (V_2) (Fellbaum 1990). The four lexical entailment relations distinguished are shown in figure 8.
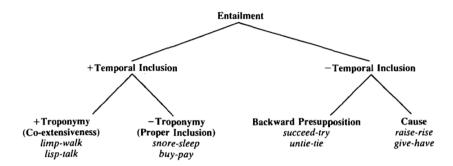

Figure 8. Four kinds of entailment relations among verbs (Fellbaum: 33).

With respect to the specific principles governing the application of *Aktionsart* to this analytical framework, each synset displays a predicative mode according to the typology of *Aktionsart* types of Role and Reference Grammar (Van Valin and LaPolla 1997; Van Valin 2014). The application of the *Aktionsart* types of Role and Reference Grammar to this analysis can be described as follows.

As regards the spontaneous classes, the class of states is defined by the features [+static], [-dynamic], [-telic], [-punctual]. Representative examples include states or conditions such as *be broken, be shattered, be dead, be dirty, be angry* and *be afraid;* existence verbs such as *exist, be* and *live;* pure location verbs like *be at home, be under the table* and *be in the box;* perception verbs such as *see, hear, smell* and *taste;* cognition verbs like *know, believe* and *ignore;* desire verbs like *want, desire, wish* and *need;* propositional attitude verbs such as *consider, estimate* and *hold an opinion;* possession verbs like *have, own* and *possess;* internal experience verbs like *feel, sense* and *fear;* emotion verbs like *love, hate, dislike* and *envy;* attributive and identificational expressions like *be short, be tall, be fat, be a policeman* and *be a doctor;* and specificational and equational verbs and expressions like *be the president* and *equate.*

The class of activities is defined by the features [-static], [+dynamic], [-telic], [-punctal]. Some examples of this category include motion verbs such as *walk, march, run* and *orbite;* verbs for static motion such as *spin, shiver* and *shake;* light and sound emission verbs like *shine, cry* and *squeak;* performance verbs such as *sing, dance, swim* and *bounce a ball;* consumption verbs such as *eat, drink* and *partake;* creation verbs like *write, paint, compose, cook, knit* and *sew;* directed perception verbs like *hear* (intentionally), *watch, listen to* and *look at;* use verbs like *use, employ* and *enjoy;* and the verb *do* denoting the unspecified action. Furthermore, the verbs of saying such as *speak say, talk, discuss* are considered an important activity verb subclass.

Because of the analogy with the verbs of saying, verbs denoting the sounds emitted by animals, such as *meow*, *roar* and *crow* are also considered activities. Verbs representing bodily noises such as *cough* and *sneeze* are also considered activities.

The class of achievements represents punctual changes of state or onsets of activity with the following features: [-static], [-dynamic], [+telic], [+punctual]. Some examples of achievements include *pop*, *explode*, *shatter* and *burst* (intransitive versions). On its side, the class of accomplishments comprises non-punctual changes of state or onsets of activity with the following features: [-static], [-dynamic], [+telic], [-punctual]. Nevertheless, the distinction between achievements and accomplishment is not perfectly clear-cut. Whereas certain verbs are always punctual or always durative, many verbs encode state of affairs that may be almost instantaneous but need not to be. Some other verbs are even neutral as this feature is concerned and the classification under achievement or accomplishment may be dependent on the context of the verb. Some examples of accomplishment include *melt*, *freeze*, *dry*, *recover*, *break*, *open*, *close, redden* (intransitive versions), *get sick*, *get cold*, *learn*, *master*, *die*, *arrive* and *begin*.

The class of semelfactives depicts non-static, punctual events which often imply repetition, are not temporally bounded and do not present a result state. The following features characterise them: [-static], [+ -dynamic], [-telic], [+punctual]. Some examples of semelfactive verbs include *flash*, *tap*, *clap*, *glimpse* and *catch sight*.

The class of active accomplishments describes accomplishment uses of activity verbs. They comprise an activity predicate of motion, consumption or creation plus a change of state, which turns it telic. In this manner, the terminal point is reached when the distance is covered, or the entity is created or consumed. The features presented by this class are: [-static], [+dynamic], [+telic], [-punctual]. Most active accomplishments are activities to which a goal is added, a path or distance is covered, an entity is created or some specific quantity of something is consumed. Some examples include *run to the park*, *walk to the shore*, *paint a picture*, *write a poem*, *eat a sandwich* or *drink a glass of beer*. However, some verbs are lexically active accomplishments in their own such as *go*, *come* and *devour*.

All things considered, the six spontaneous *Aktionsart* classes described are summarised in figure 9.

1. State: [+static], [-dynamic], [-telic], [-punctual]

2. Activity: [-static], [+dynamic], [-telic], [-punctual]

3. Achievement: [-static], [-dynamic], [+telic], [+punctual]

4. Semelfactive: [-static], [+ -dynamic], [-telic], [+punctual]

5. Accomplishment: [-static], [-dynamic], [+telic], [-punctual]

6. Active accomplishment: [-static], [+dynamic], [+telic], [-punctual]

Figure 9. *Aktionsart* typology of spontaneous classes (Van Valin 2005: 33).

Despite the richness and applicability of the *Aktionsart* classes of Role and Reference Grammar, some of the verbs under analysis do not correspond to any of the classes presented above. The reason may be that the amount and diversity of verbs under analysis raise more questions than *ad hoc* examples. To fill this gap, a new *Aktionsart* class is proposed, namely the class of unbounded processes. The class of unbounded processes is defined by the features [-static], [-dynamic], [-telic], [- punctual]. Verbs such as *grow*, *flourish*, *diminish*, *decrease*, *increase*, *swell*, *deteriorate*, *whither* and *pine* (all intransitive) exhibit processes of change which are not delimited by a discrete beginning or end, in such a way that the process goes on for a very long time or indefinitely (trees can grow for hundreds of years, civilisations flourish for centuries, rocks get eroded throughout millennia, etc.). The verbs classified under this category are similar to accomplishments in that they represent non-punctual processes; nevertheless, this category includes the feature [-telic].

As noted in Van Valin and LaPolla (1997), causative classes present causative paraphrases displaying the same number of NPs as the original sentence, as in *The passing of time causes the cathedral to deteriorate* (causative unbounded process, like *The passing of time deteriorates the cathedral*) and *The sergeant caused the soldiers to march to the park* (causative active accomplishment, like *The sergeant marched the soldiers to the park*).

Special attention is given in this analysis to causative accomplishments. This class shows a specific result state that involves a process prior to attaining the result state. Some examples are *tell, show*, *give, donate*, *close* (transitive), *break* (transitive), *murder* and *kill*. In general, this analysis follows Van Valin (2014) as regards the characteristics of every class in the taxonomy. Nevertheless, there is an important point of disagreement regarding the nature of the causative states and causative accomplishments. In Van Valin (2014), as in previous works by this author, causative states include examples such as *scare*, *frighten* or *upset*. Nevertheless, all these causative verbs involve a process in the subject affected by these emotions that has been disregarded until now. The point is that if someone or something upsets a person, this person undergoes an inner process prior to the change of state, the process of becoming upset. Therefore, since accomplishments involve processes which give way to a new state, these verbs must be considered as causative accomplishments and not as mere causative states.

5. DRAWING THE SEMANTIC MAP OF INDIVIDUAL PARADIGMS

The main methodological decision made with respect to the semantic map has to do with the steps of the analysis. In the first step, the analytical model is applied to each of the lexical paradigms of Old English strong verbs. In the second step, a generalisation is made concerning troponymy and Aktionsart in the 328 lexical paradigms under analysis, in such a way that a semantic map is drawn for these phenomena.

Before drawing the semantic maps of individual paradigms, it is necessary to explain the differences between the mainstream methodology of semantic maps and the way in which this type of visual representation is used in this work.

Normally, as de Haan (2004) explains, in the methodology of semantic maps, an exponent of a linguistic category in a given language is compared to the same category in other languages. However, in this study, the semantic map model is applied to the analysis of one language.

Likewise, although they can also predict change on the diachronic axis, semantic maps have been mainly used to represent linguistic phenomena on the synchronic axis. In the same manner, they have been applied to living languages more often than to historical languages (de Haan 2004).

A further difference between this application of the semantic map and other works is that semantic maps frequently display categories rather than tokens of the categories in question and relations. In this investigation, the semantic map of troponymy and *Aktionsart* is a generalisation of the semantic maps of all the lexical paradigms based on strong verbs, in such a way that the maps of individual paradigms present tokens and relations and the semantic map of troponymy and *Aktionsart* comprises categories and relations between these categories.

Finally, as Levshina (2015) remarks, most classical semantic maps are usually non-hierarchical because they do not display hyponymy relations. The map that is aimed in this study is hierarchical from two perspectives: from the point of view of troponymy, more general meanings are more central in the representation than less general meanings; from the point of view of *Aktionsart*, basic *Aktionsart* types are more central in the representation than derived *Aktionsart* types. In this sense, this approach goes, to a certain extent, in the line of Barðdal (2007), who deals with items that share the same grammatical behaviour and arranges them according to their semantic similarities. This approach follows François (2008) more closely, because this author draws lexical semantic maps with the connections between the attested meanings. In this analysis, the study of such connections is restricted to troponymy and *Aktionsart*. Therefore, of the three types of relations that hold in a lexical network according to Gaume, Duvignau and Vanhove (2008), syntagmatic relations of coocurrence, paradigmatic relations, notably synonymy, and semantic proximity relations, this analysis focuses above all on the third type, since if verbal troponymy holds between two verbs, one should expect that one verb is found in the definition of the other.

The first step of the analysis requires the identification of the lexical paradigms and the selection of the verbs within such paradigms. A total of 328 lexical paradigms of strong verbs have been retrieved from the lexical database of Old English *Nerthus* (Martín Arista, García Fernández, Lacalle Palacios, Ojanguren López and Ruiz Narbona 2016). It has been necessary to revise and update some paradigms as well as to check all the meanings provided by *Nerthus*. This task has been accomplished with the help of the revised meaning definitions of the Old English lexicon provided

by Martín Arista and Mateo Mendaza (2013) and the studies in homonymy by Vea Escarza and Tío Sáenz (2014) and Tío Sáenz and Vea Escarza (2015).

As in the lexical database of Old English *Nerthus*, numbered predicates are used to indicate different morphological classes, or different variants, for predicates otherwise equal. For instance, *ābūtan* 1 'on, about, around, on the outside, round about' is an adposition and *ābūtan* 2 'about, nearly', an adverb.

This said, the lexical paradigm BELGAN, for example, consists of the primitive verb (strong, class IIIb) itself, *(ge)belgan* 'to be or become angry; to provoke, offend, irritate, anger, make angry, incense' and its derivatives. The primitive thus defined subsumes the underived *belgan* as well as the derived *gebelgan*, between which it is difficult to draw a distinction as to their meanings, so that dictionaries often include both the derived and the underived within the same headword entry. This paradigm includes the masculine nouns *ǣbylga* 'anger', *gebelg* 'anger, offence; arrogance' and *ǣbylgð* 'indignation, anger, wrath; offence, wrong, fault, injury, scandal'; the feminine nouns *ābolgennes* 'irritation, exasperation', *ǣbylgnes* 'anger, offence, indignation, wrath, scandal' and *belgnes* 'injustice, injury'; as well as the neuter noun *ǣbylg* 'anger'. Once the nouns (and the members of other non-verbal classes in other lexical paradigms) have been put aside, the data of analysis for the lexical paradigm of BELGAN comprise, along with the primitive verb, the derived strong verbs *ābelgan* 1 'to anger, make angry, irritate; to incense; to offend, vex, distress, hurt; to be angry with' and *forbelgan* 'to get angry; to be enraged'; and the derived weak verbs *ābilgian* 'to offend, make angry, exasperate' *gebylgan* 'to provoke, anger, make angry; to cause to swell' and *ābylgan* 'to irritate, provoke, offend, anger, vex'.

Then, the lexical paradigms of the Old English strong verb primitives are represented in semantic maps, or independent diagrams in the form of semantic-syntactic networks. In the semantic map of each paradigm, meanings have been assembled into synsets, unordered sets of cognitive synonyms. The primitive is placed in the centre of the diagram, and the synsets resulting from the different meanings of the primitive verb have been associated to it by means of a simple line. Next, the synsets obtained from the meanings of the derivatives have been connected to the synsets of the primitive and among them by means of the six conceptual- semantic relations of synonymy, opposition, troponymy, -troponymy, backward presupposition and cause. The semantic map of the lexical paradigm of BELGAN has the form shown in Figure 10.
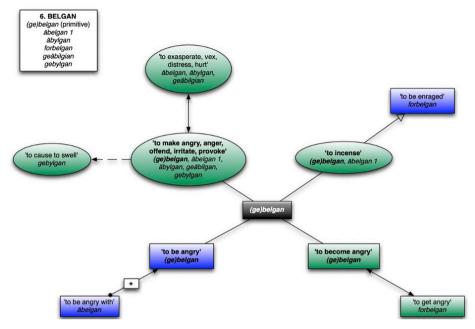
Figure 10. The semantic map of the lexical paradigm of BELGAN.

As can be seen in Figure 10, the different meanings of the primitive are represented in bold typeface. Then, the synsets derived from the meanings of the derivatives of *(ge)belgan* are connected with the synsets of the primitive via the corresponding conceptual-semantic relation. Together with the Present-Day English meaning, each synset shows the Old English verb or verbs of the Old English paradigm that convey those meanings. The Old English verbs are written in italics. If it is the case that any of the derivatives of the primitive also includes one or more of the meanings of the primitive verb, the Old English derivative is incorporated into the corresponding synset or synsets of the primitive. In this example, *ābelgan* 1, *ābylgan, geābilgan* and *gebylgan,* among their meanings, include 'to make angry, anger, offend, irritate' and 'provoke' and therefore belong in this synset. Similarly, the Old English derivative *ābelgan* 1 presents the meaning 'to incense' and this is the reason why it is included into this synset of the primitive *(ge)belgan*.

The synsets of the primitive draw on the translation of the predicates provided by *Nerthus*. If it is the case that a derivative conveys a meaning that is synonymous to one of the primitive synsets, this is not included into the synset of the primitive but related to it via the conceptual-semantic relation of synonymy. This can be illustrated by means of the synsets 'to become angry' (belonging to the primitive) and 'to get angry' (belonging to one of the derivatives) in the example above.

In the semantic map, the direction of the arrow marks the direction of the entailment, while the various conceptual relations are depicted by means of different types of figures, lines and arrows in the following way.

As synonymy is symmetrical, it is represented by a double headed arrow, as can be seen in Figure 11.

Figure 11. The representation of synonymy in the semantic map.

It is sometimes the case that although the relationship established is one of synonymy, some meaning specification is conveyed by one of the synsets. Then, the basic synset is understood as the origin and, consequently, the arrow goes in this direction. Furthermore, a symbol '+' stands for the meaning specification, which is usually marked by a preposition, an object, a circumstance or a force. This is illustrated in Figure 12.

Figure 12. The representation of meaning specifications in the semantic map.

As is the case with synonymy, opposition is symmetrical or mutually entailing. It is represented as can be seen in Figure 13.

Figure 13. The representation of opposition in the semantic map.

As in synonymy, one of the opposite synsets can add a meaning specification. It is also represented by the symbol '+'. The basic synset is equally understood as the origin, in such a way that an arrow substitutes one of the 'x' in order to indicate the direction of the entailment.

Troponymy is represented as can be seen in Figure 14, with a broken line and an arrow that indicates that the relationship is not symmetrical.
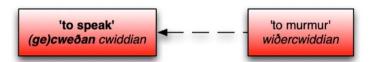

Figure 14. The representation of troponymy in the semantic map.

As in synonymy and opposition, if it is the case that some meaning specification is conveyed by the entailed synset, the symbol '+' is included in the representation.

The same holds for –troponymy, in Figure 15, although a dotted line is used.

Figure 15. The representation of –troponymy in the semantic map.

Backward presupposition is represented as in Figure 16. Again, the relation is not symmetrical.

Figure 16. The representation of backward presupposition in the semantic map.

Finally, cause is represented as shown in Figure 17. The arrow, as in the previous relations, marks the lack of symmetry of the relationship.
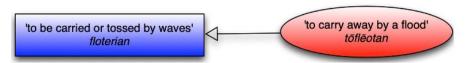
Figure 17. The representation of cause in the semantic map.

As regards the syntactic analysis, spontaneous synsets are framed in a rectangular figure, whereas induced or causative synsets are framed in an oval or circular one. If the oval or circle is surrounded by a broken line, this means that the synset shows a permissive kind of causality, some examples include 'to let go by default', 'to allow to come, not to exclude' and 'to permit'. When no spontaneous or induced sense is found in the synset, an octagon frames it. The octagon figure encloses those synsets of the primitive verb that adopt diverse senses, including spontaneous and induced, in order to establish different relationships with other synsets. When the synset adopts different senses, but all of them are spontaneous or all of them are induced, the octagon figure is not used, and the synset is framed by the corresponding figure.

The colour of the figures represents the different kinds of spontaneous or induced *Aktionsart* types of every synset: states are coloured in blue, activities in red, accomplishments in green, achievements in yellow, unbounded processes are coloured in purple, semelfactives in pink and active accomplishments, since they are comprised of an activity plus and accomplishment, are coloured both in red and green. The absence of colour in the synset indicates that none of these categories is attributed to the predicate either because it is a synset of the primitive that establishes different relations adopting diverse senses characterised by different *Aktionsart* types; or because no specific *Aktionsart* type can be attributed to it, as in synsets such as 'to allure, entice, attract' which are causative; but the nature of the causativity cannot be predicted; 'to permit' which depicts a permissive causality but, once again, the nature of the permissive causality cannot be determined; or 'order, command, decree' which are causative, but since the order is not specified the colour cannot be ascribed to it. A verb predicate such as *order to run* stands for a causative activity, whereas *order to stop* represents a causative accomplishment, for instance.

Apart from all the *Aktionsart* types considered, throughout this analysis I have also come across counterfactual verbs such as *misfōn* 'to fail to take', *foregān* 1 'to abstain from, not to do' or *mishealdan* 'not to keep'. Although these verbs do not represent any of the types of the *Aktionsart* taxonomy, they are analysed together with their paradigms and represented in grey colour in the diagrams. It is important to note that the verb 'to happen' and its semantic derivatives such as *oferbecuman* 'to supervene', or *tōfaran* 'to pass off' do not correspond to any *Aktionsart* type considered in the taxonomy either and are represented in orange colour.

The methodology described above is illustrated with the paradigm of ÐĪNAN, which is presented with its semantic map in Figure 18.
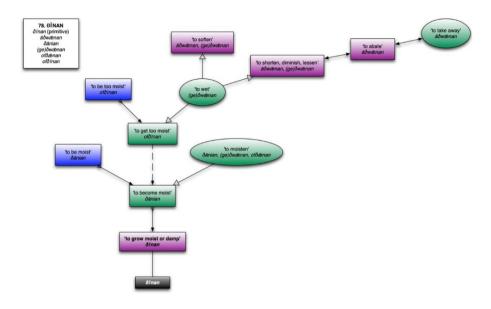
Figure 18. The semantic map of ÐĪNAN.

As it can be seen in Figure 18, it is sometimes the case that a polysemous verb or verb phrase establishes two or more relationships with different meanings. This happens to 'to abate' in the example above. In *āðwǣnan* 'to abate' stands for (a) 'to grow gradually less' and (b) 'to take away (a quantity) from another quantity'. Then, the synset shows the verb predicate that is related to the more central meaning, in this case, 'to grow gradually less'. However, the semantic relation that it establishes with the synset 'to take away' is considered from the perspective of the meaning in (b).

6. RESULTS OF THE ANALYSIS

The analysis of the relations of troponymy, -troponymy, synonymy, backward presupposition, cause and opposition, as well as *Aktionsart*, represented by means of the semantic maps allows us to take a step forward with respect to the observation of semantic relatedness in the lexical paradigms. That is to say, morphologically related words that belong to the same lexical paradigm, thus sharing the form and meaning of the base of derivation, are also semantically related. It is necessary, however, to determine what kind of semantic relations hold in the lexical paradigm. The whole set of semantic relations holding in the lexical paradigm constitute a network of semantic inheritance, in which it is possible to distinguish, on the one hand, how new meanings diverge from the original meaning and, on the other, what the nature of the divergence is in terms of meaning specification with respect to more basic verbs.

It must be pointed out, to begin with, that the most frequent semantic relation found in the paradigms is synonymy, followed by troponymy and cause. The least frequent relations are backward presupposition, -troponymy and opposition, as is represented in Figure 19.
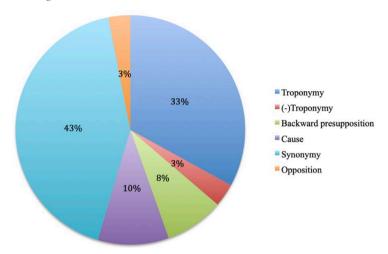

Figure 19. Semantic relations in the lexical paradigms.

Secondly, and regarding the association between *Aktionsart* and semantic relations, synonymy, troponymy and opposition hold between synsets with the same *Aktionsart* in the vast majority of the cases, whereas cause, backward presupposition and -troponymy tend to change the *Aktionsart* type between the two related synsets. This is represented in Figure 20.
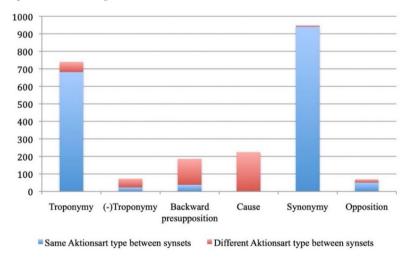

Figure 20. Semantic relations and *Aktionsart*.

In synonymy, the existence of different *Aktionsarts* can be the result of meaning specification (far more frequently) or of syntactic structure and meaning interpretation (far less frequently), as is shown in Figure 21.
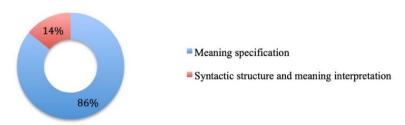

Figure 21. *Aktionsart* in synonymy.

When two synsets related to each other by a relation of troponymy show different *Aktionsarts*, this can be due to meaning specification (most frequent cause), complex verbal structures, semantic proximity between both active accomplishments of consumption and causative accomplishments of destruction and active accomplishments of creation and causative accomplishments of formation or configuration, and figurative associations (least frequent cause). This can be seen in Figure 22.
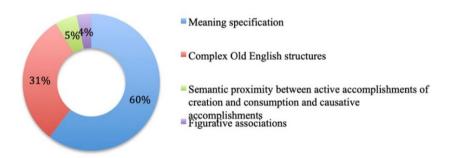

Figure 22. Different *Aktionsart* in troponymy.

In general, spontaneous synsets are more frequent than causative synsets. As regards entailing synsets, however, the total number of spontaneous synsets is 1,110 and the total number of causative synsets is 1,129. On the other hand, the total number of spontaneous entailed synsets is 1,387, whereas the number of causative synsets is 852, as can be seen in Figure 23.
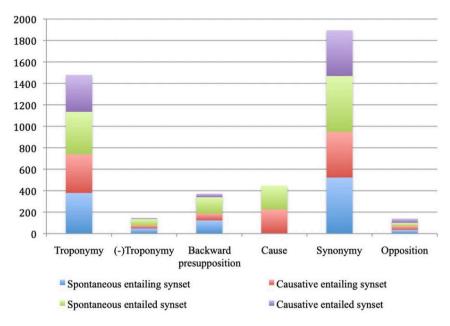
Figure 23. Spontaneous and causative synsets.

Finally, the presence of state or change of state *Aktionsart* types in synsets related by the relation of opposition is remarkable, as can be seen in Figure 24.
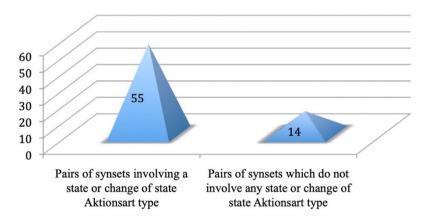

Figure 24. State and change of state *Aktionsart* types with respect to opposition.

At the same time, the presence of, at least, an activity *Aktionsart* type in pairs of synsets related by the relation of -troponymy is also worth taking into consideration. This is represented in Figure 25.
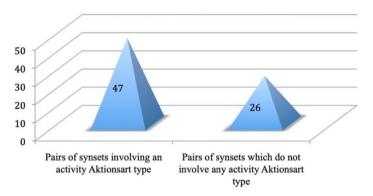

Figure 25. Activity *Aktionsart* type with respect to -troponymy.

7. DRAWING THE SEMANTIC MAP

Of the available models of semantic map, this research has opted for the connectivity map, with the important difference that a hierarchical map has been preferred. The incorporation of measures on frequency to the generally accepted judgements of co-occurrence (whereby related notions appear close to each other while unrelated notions are far away from each other in the representation) has contributed to the hierarchical organisation of the map.

In the semantic map of verbal troponymy and *Aktionsart* of the verbal lexicon that belongs to the Old English lexical paradigms based on strong verbs, the frequency of the semantic relations that have been analysed throughout this study (troponymy, -troponymy, backward presupposition, cause, synonymy and opposition) is directly proportional to the surface occupied by the relation in question. The area corresponding to each relation has been divided on the vertical dimension to separate, also proportionally, the frequency of pairs of synsets sharing the *Aktionsart* type (dotted area) from the pairs of synsets which do not share the *Aktionsart* type (solid area). The semantic relations have been arranged in such a way that those which display temporal inclusion (troponymy and –troponymy) are placed together to the left of the map. Then, placed in the centre of the map, come those relations which do not involve temporal inclusion, backward presupposition and cause. Finally, those relations which are mutually entailing, synonymy and opposition, have been placed at the right of the map. Inside each section, the most and the least frequent type of *Aktionsart* association is exhibited, in such a manner that the bigger font size stands for the most frequent type of *Aktionsart* association, and the smaller font size represents the least frequent type of *Aktionsart* association.

Finally, a hyphen separates the entailing synset (at the left of the hyphen) from the entailed synset (at the right).

The main descriptive result of this work is the semantic map of troponymy and *Aktionsart* in the verbal lexicon of the strong verb paradigms of Old English, which represents a generalisation over the semantic maps of the individual derivational paradigms of Old English strong verbs. It is given in Figure 26. [1]
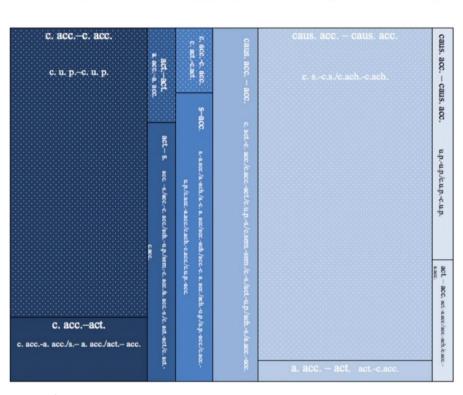

Figure 26. The semantic map of troponymy and *Aktionsart* in the verbal lexicon of the strong verb paradigms of Old English.

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[1] The following abbreviations are used in Figure 26. Semantic relations: B.P.: Backward presupposition; C: Cause; O.: Opposition; S.: Synonymy; T.: Troponymy; -T.: -Troponymy; *Aktionsart:* Acc.: Accomplishment; Ach.: Achievement; Act.: Activity; A acc.: Active accomplishment; C.: Causative; S.: State; Sem.: Semelfactive; U.p.: Unbounded process.

8. CONCLUDING REMARKS

This article has offered a dual analysis of the 328 lexical paradigms based on Old English primitive strong verbs. In the first place, the semantic relationships underlying the configuration of these lexical paradigms have been determined. Secondly, the *Aktionsart* types of the different meanings inside each paradigm have been identified. The adoption of the semantic map methodology in this investigation has allowed us to exhaustively combine both analyses into a single network from the core to the periphery of each paradigm.

Apart from the contents of the semantic map, the main conclusion of this article has to do with the design of the semantic map. This work has drawn a semantic map in a way that diverges from most works that use this type of visual representation. It has been shown that semantic maps can be used to deal with one language (rather than for cross-linguistic comparison), to explain historical languages (rather than natural languages) and specific lexical items (rather than classes). The conclusion can be drawn, therefore, that semantic maps represent a more flexible and applicable methodology than previous work suggests and that it is worth exploring these possibilities by means of studies like the one conducted in this investigation.

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