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Assessing theory with practice: an evaluation of two aspectual-semantic classification models of gerundive nominalizations

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Abstract: This study presents a corpus-based comparison of two aspectual-semantic classification models proposed in theoretical literature (unidimensional vs. bidimensional) by applying them to a set of nominal and verbal gerunds from the Modern English period. It (i) summarises the differences between unidimensional and bidimensional classification models and (ii) the potential problems associated with them. Despite the difficulties of studying semantic aspect in Present-day as well as historical data, this study will argue that, (iii) at least for deverbal nominalization patterns, it is possible to take a bidimensional approach and maintain a clear distinction between, on the one hand, ASPECT features of the nominalized situation (stativity/dynamicity, durativity/punctuality, and telicity/atelicity), and TEMPORAL BOUNDEDNESS of that situation. The question of which semantic classification model to use, then, is not so much one of which one is practically feasible in a corpus analysis, but rather which one is best suited to describe the attested variation. In order to determine the best model (in terms of parsimony and descriptive accuracy), (iv) the models were compared by means of ‘akaike weights’. To describe the variation between nominal and verbal gerunds in Early and Late Modern English, the bidimensional model outperformed the unidimensional one, showing that (v) the aspectual-semantic distinctions between Modern English nominal and verbal gerunds are a matter of both ASPECT and TEMPORAL BOUNDEDNESS.

Keywords: gerund, aspect, Modern English, model selection, akaike weights

1 Introduction

In (and beyond) linguistics, the concept of aspect has played the lead in a multitude of monographs, book chapters, and journal articles, resulting, as Sasse (2002: 199) puts it, “in an impenetrable thicket of definitions, theories, and models”. Not surprisingly, then, the analyst interested in studying the semantics of aspect will

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soon find that there is a choice of semantic classification models, each based on their own theory about the conceptual properties of the semantics of time, and many of them employing terms that are “not actually synonymous in different aspectual theories” (Croft 2012: 33). In this paper, I will show that at least some of this aspectual thicket of theories and models can become penetrable by using corpus methodology and rigorous empirical treatment of data. The case at hand is the study of the aspectual properties of deverbal nominalization patterns (in English).

In studies that discuss the specific semantic properties of deverbal nominalization patterns, “it has become natural to ask to what extent the aspectual properties of different verbs are shared by the nouns that derive from those verbs” (Fábregas et al. 2012: 162; see, among many others, studies such as Brinton 1991; Brinton 1995; Brinton 1998; Siegel 1998; Sleeman and Brito 2010). A great deal of discussion has, for instance, been devoted to cross-categorical analogies between the notion of aspect – which is associated with the verbal class – and the notion of “countability” – which is associated with the nominal class (Bartsch 1981: 4; Bromser 1985: 71; Brinton 1991; 1995: 37–8; Ehrich 1991: 452). As pointed out by a range of scholars, there appears to be a structural analogy between events and things: mass nouns and bare plurals, which are uncountable, show similarities to events that *lack* boundaries, whereas count nouns and proper names are similar to events *with* boundaries (Allen 1966: 192; Lakoff and Johnson 1980: 25; Carlson 1981; Mourelatos 1978; Hoepelman and Rohrer 1980; Bach 1986; Smith 1997: 31–32; Declerck 1991: 263–4; Jackendoff 1990: 28–31; Leech 1969: 134–148; Talmy 1988; Taylor 1977; Andersen 2007). The analogy is illustrated as follows: bare plurals or mass nouns, such as *water*, are cumulative (or “suffusive”, see Allen 1966: 193). This means that if an entity *a* is water and an entity *b* is water, then *a* and *b* taken together are water. At the same time, mass nouns are also considered “like-parted” (Mourelatos 1978: 430). This means that, if one takes any part of water, it is still water. These properties do not hold for count nouns, because it cannot be said that if entity *a* is a horse and entity *b* is a horse then *a* and *b* taken together are a horse (rather the combination of *a* and *b* would yield two horses), and a part of a horse is not a horse. Certain events, then, are also cumulative, as a part of the event of walking is an event of walking in itself, and hence *John was walking* entails that *John walked* (Smith 1997: 32). This is not true for other situations like *walk to school*: a part of *John walked to school* is not the same as the whole event, and we cannot conclude from *John was walking to school* that *John walked to school*.¹

¹ For a more elaborate comparison between countability and telicity, see Krifka (1987).

An interesting case in this respect is the variation in the English system of gerunds. In English, there are roughly two types of nominalizations in *-ing* that have event-reference: the nominal gerund, illustrated in (1), and the verbal gerund, as illustrated in (2).

- (1) a. *Meanwhile, the public is not only horrified but also mystified by **the killing of a two-year-old in Merseyside**, last seen with two older boys.* (BNC)
 b. *In a country where murders are common place [sic.] **the senseless killings of Julie Godwin and her friend Elizabeth Over** have shocked the local community.* (BNC)
- (2) *Lizards remain sacred to these tribesmen, and death is said to result from **accidentally killing one**.* (BNC)

While both nominal and verbal gerunds distributionally pattern like other noun phrases (serving as subjects, direct objects, prepositional complements, etc.), they differ in terms of their internal structure. In a study of the aspectual-semantic properties of nominal and verbal gerunds (in historical and Present-day English), Alexiadou (2013: 135) uses the structural properties of both forms to argue that there is a semantic distinction between the two forms, explaining that

the nominal one inherits the inner aspect [i.e. ‘lexicalized aspect’] of the verb. Inner aspect also correlates with the availability of pluralization: if the verb is [+bounded], the plural is available; if the verb is [-bounded], the plural is unavailable

In other words, it is suggested that, since nominal gerunds allow for pluralization, they do not exhibit any “aspectual restrictions” and can thus express situations that are either [-bounded] or [+bounded]. Verbal gerunds, on the other hand, are said to resemble the progressive with regards to their aspectual properties (Alexiadou 2013: 135),² because they never allow pluralization and hence the situation they express is always [-bounded].

² Note that Alexiadou (2013) argues that the English verbal gerund historically developed from the progressive construction, but see the counterarguments listed in, for instance, Jack (1988). Alternative accounts of the verbalization of the English gerund have been suggested by Fanego (2004) and De Smet (2008). For an elaborate overview of the morphosyntactic changes that affected the English gerund between Old and Present-day English, see, among others, Mustanoja (1960), Tajima (1985), Donner (1986), Jack (1988), Houston (1989), van der Wurff (1993), Fanego (2004), Miller (2002), Kranich (2006), De Smet (2008, 2013), and Fonteyn (2016).

As straightforward as such explanations might seem, there is, however, much discussion on what exactly is meant by “boundaries” and “boundedness”. The conceptual aspectual primitive of “bounding” or “boundedness” and how to treat it in semantic classification models is one of the major points that causes dividedness in the vast body of theoretical literature on aspect. There are, broadly speaking, two approaches to the description of these conceptual primitives of aspect, namely unidimensional and bidimensional approaches (Sasse 2002: 202–203; see also Michaelis 2004: 9–10; Binnick 2012: 34–38). In unidimensional approaches, the basic idea is that aspectual phenomena can be analyzed and described in terms of a single conceptual dimension. Put differently, unidimensional approaches to aspect assume one (and only one) set of aspect-relevant semantic primitives by means of which all kinds of interactions can be categorized. While theories and models vary (extensively) in their categorizations, these characteristics are most commonly defined in terms of three dichotomies, i.e. *stative/dynamic*, *durative/punctual* and *telic/atelic*. The distinctions are illustrated in examples (3)–(6):

- (3) *She is French.*
- (4) *The window shattered.*
- (5) *The girls chanted.*
- (6) *I ate an apple pancake.*

Example (3) is different from (4) to (6) in that it is stative: it is conceived of as existing rather than as being done or taking place (Declerck 2006: 51). Situations as the one presented in (3) are traditionally called *states*. The examples in (4)–(6), then, are non-static or dynamic. Dynamic situations can be punctual, as the example in (4). Punctuality means that the described situation only takes up a very brief moment in time. Situations like the one presented in (4) are traditionally called *achievements*, and are generally held to represent “instantaneous changes of state” (Smith 1997: 28; see also Declerck 2006: 70).³ The situations in (5) and (6), on the other hand, are not punctual or instantaneous, but durative. The difference between examples (5) and (6) consists in the fact that, while the situation described in (5) in principle can go on forever, the eating of an apple pancake is necessarily finished once the entire pancake is consumed. Thus, it has

³ For a more elaborate discussion of the relation between telicity, punctuality, change and states, see Demonte and McNally (2012: 2–6).

been said that the situation in (5) is atelic, while the situation in (6) is telic, i.e. the situation includes a boundary or endpoint (sometimes also called “telos”, see Janda 2008; Declerck 2006). Situations like the one presented in (5) are called *activities*, and situations like the one in (6) are called *accomplishments*.⁴

The aspectual types described here are usually grouped together as different types of “lexical aspect”, sometimes also referred to as *aktionsart*. The different categories were originally proposed by Vendler (1967), but have repeatedly been specified and modified since. It is important to note here that the term “lexical aspect” is somewhat confusing, as more recent aspectual studies no longer regard it as something that is exclusively confined to verb lexemes; the semantic distinctions of stativity/dynamicity, (a)telicity and durativity/punctuality are ascribed to a wide variety of (complex) expressions, ranging from lexical verbs to verb phrases and even full sentences (cf. e.g. Verkuyl 1972; Nordenfelt 1977: 34–36; Mittwoch 1980: 206–211; Mourelatos 1981: 196–197; Moens 1987: 150–151; Mommer 1986: 61–62; Brinton 1988: 26, 45–50; Shi 1990: 48–50; Binnick 1991: 191; Smith 1997; Depraetere 1995: 4; Croft 2012: 31, 69). For instance, the lexical aspect of *write* depends on whether it combines with a single count noun object (making it telic, and hence an accomplishment, e.g. *I wrote a postcard*) or a bare plural or abstract/mass object noun (resulting in an *atelic* activity, e.g. *I wrote postcards/poetry*). Similarly, the progressive or adverbials indicating duration can disambiguate whether a situation is punctual or durative (compare *The mouse squeaked (once/for hours)* vs. *The mouse was squeaking*). As such, the aspectual meaning “is carried by the interaction of various linguistic features” (Freed 1979: 12–14) and is not confined to verb lexemes. To avoid further confusion, I will refrain from using the term “lexical aspect” as a cover term for the semantic distinctions of stative/dynamic, durative/punctual, telic/atelic, and propose to use the term ASPECT instead.

In bidimensional approaches, on the other hand, it is assumed that the set of semantic primitives to characterize a situation needs to have at least two *cross-cutting* dimensions. A distinction is made between a set of meanings associated with ASPECT and a set of meanings associated with so-called “grammatical aspect” or “viewpoint aspect” (Comrie 1976; Dahl 1985; Brinton 1988: 3; Depraetere 1995: 4; De Swart 2012; Friedrich 1974: 37; Declerck 2006: 37). There are broadly two ways in which a denoted situation can be viewed: it can either be presented as an ongoing, unfinished or partial situation (sometimes called “imperfective” aspect) or as a holistic, complete one (Michaelis 2004: 9), which presents the situation as a single unanalyzable whole (sometimes called

4 A more elaborate description of these categories is provided in Sections 2 and 3.

“perfective” viewpoint aspect).⁵ In more recent bidimensional approaches, viewpoint aspect is regarded as a semantic notion that is relevant even to languages that do not have overt grammatical devices to distinguish perfective and imperfective aspect (Declerck 2006: 37), making way for a definition of grammatical aspect that relies on the presence or absence of non-inherent or imposed “boundaries” (Sasse 2002: 205). In other words, viewpoint aspect has to do with whether or not a situation is construed in its context as being ongoing (“unbounded”) or with boundaries (“bounded”).⁶

The problem with such bidimensional models is that the semantic approaches to grammatical aspect (i.e., where there is no grammatical marker of “imperfectivity”) introduce a notion of situational “boundaries” that is closely related to, and in some cases even coincides with the “telicity” feature of ASPECT (cf. Depraetere 1995: 6). Due to this (full or partial) convergence between the two assumed distinct aspectual levels some scholars have suggested that it does not make sense to maintain the distinction between the conceptual primitives of ASPECT and context-induced grammatical aspect (cf. Croft 2012: 31–33). Any researcher interested in studying the aspectual-semantic features of a particular construction – such as, for instance, English deverbal nominalizations like nominal and verbal gerunds – will have to dig into the theory and subsequently evaluate which classification model (unidimensional or bidimensional) should be employed to describe the data.

The corpus study presented in this paper is an illustration of how the researcher can go about the evaluation of semantic classification models. It will be argued that, despite the difficulties of studying semantic aspect in Present-day as well as historical data, it is possible to assume a bidimensional approach to aspectual-semantics. In the present case, then, the question of which semantic classification model to use is not one of feasibility, but rather which one is best suited to describe the attested variation without becoming unnecessarily complex. Thus, to determine the best model (in terms of parsimony and descriptive accuracy), the models will be applied to a set of nominal

5 Note that, while it is most commonly the case that a binary distinction of perfective and imperfective (with, in some cases, the addition of a neutral category) is posited in approaches to grammatical aspect, some scholars have suggested additional categories on this dimension, such as ‘habitual’, ‘generic’ and ‘progressive’ aspect. These distinctions will not be made here.

6 Another way of explaining the different grammatical aspects (or viewpoints) is to say that perfectly construed situations are viewed externally, without focusing on the inner composition of the situation, whereas imperfectly construed situations are viewed from an internal point, which is either the beginning, middle or end. This somewhat ‘psychological’ definition of grammatical aspect in terms of internal or external viewpoint has been abandoned in recent years (Sasse 2002: 205).

and verbal gerunds (from the Modern English period, 1570–1920) and subsequently their accuracy will be compared by means of “akaike weights” (Akaike 1983; Wagenmakers and Farrell 2004). The results of the model comparison again argue in favor of taking bidimensional approach, which suggests that the aspectual-semantic distinctions between Modern English nominal and verbal gerunds are a matter of two cross-cutting dimensions.

2 Boundedness and the difference between unidimensional and bidimensional models

In his analysis, Croft (2012) considers aspect as the description of how events are construed as unfolding over time (also see Jackendoff 1996). In essence, this can be captured in two dimensions. The first dimension required for the description of aspectual phases is the temporal dimension (t-axis). The second dimension involves the capturing of how the event “unfolds”. Croft (2012: 53) explains that “the unfolding of events is the sequence of qualitative states that characterize a particular event type”, which is captured on the qualitative state dimension (q-axis). The combination of the t-axis and q-axis, then, can be used to capture the aspectual properties used to define for instance the Vendler aspect classes. For instance, situations are punctual when they only profile one point on the time axis, while durative events take up an interval (i.e. consist of more than one point). The state/process contrast, on the other hand, is defined as “profiling one point vs. an interval on the qualitative state dimension” (Croft 2012: 56), or, in other words, it is based on whether the situation comprises just one qualitative state, or is dynamic in the sense that it involves many (Figure 1).

The classification can be presented as follows: states are distinct from the other aspectual types because they only profile one point on the q-axis, while

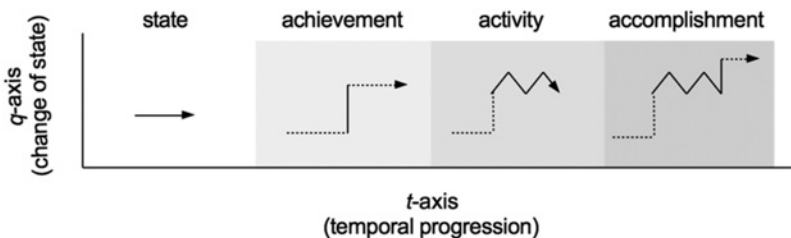


Figure 1: Examples of state, activity, accomplishment and achievement based on Croft (2012).

achievements, accomplishments and activities all consist of a set of qualitative states rather than just one. Achievements can be distinguished from activities and accomplishments because they only profile a single point on the t-axis, that is, unlike accomplishments and activities, they are punctual and not durative. Finally, achievements and accomplishments are different from states and activities because the event they profile includes a completion phase, which results in a rest state that is different from the initial state (following Croft 2012, this is schematically represented by a solid vertical line that ends in an unprofiled result state (dashed horizontal line) that is higher up on the q-axis). Thus, not only are accomplishments (e.g. *I repaired the computer*) and achievements (e.g. *I reached the summit*) temporally bounded (including a profiled completion phase, e.g. *The computer is repaired/the summit is reached by me*), the state resulting from that completion phase is different from the initial phase (e.g. *I have a broken computer/not reached the summit yet*).

The difference between unidimensional and bidimensional classification models can best be explained by considering an example such as the one in Figure 2, *I am repairing the computer*.

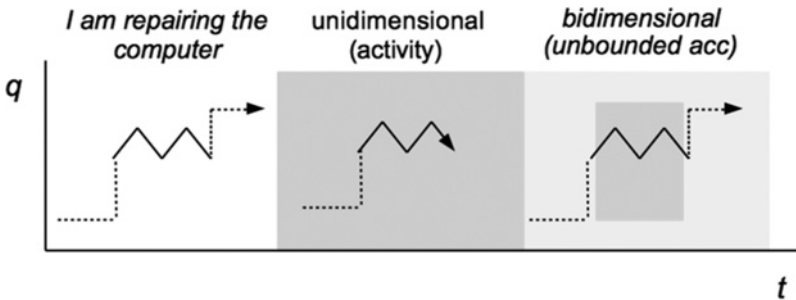


Figure 2: Schematic representation of how unidimensional and bidimensional models categorize the profiling imposed by unbounded “repairing the computer”.

Both unidimensional and bidimensional models more or less agree that the progressive *I am repairing the computer* does not profile the boundary transition or end phase towards the result state or telos (i.e. *a repaired computer*). They differ substantially, however, in terms of what this means for classification of data. In a unidimensional approach this would mean that *I am repairing the computer* is essentially just an activity, while in bidimensional approaches it would be considered an accomplishment (with an inherent, potential telos) but the construction in which it is used is unbounded on the t-axis, so it becomes an unbounded accomplishment. The question that arises now is which classification model best

captures all kinds of interactions and the aspectual-semantic distinctions between constructions (which might be a problem for the unidimensional model) without needlessly multiplying the number of factors to be distinguished (which might be problematic for the bidimensional one, as it multiplies the number of categories by 2 at least).

With regards to successfully capturing and distinguishing all kinds of different situations, a good case can be made for distinguishing two levels of analysis. As Sasse (2002: 206, 222) points out, the practice of lumping together the semantic distinctions associated with grammatical aspect and ASPECT is problematic in the case of “intrinsically durative predicates known as activities”. Activities can be understood as an ongoing activity with no boundaries implied (e.g. *I am working*) and a delimited version that is “temporally terminated” (e.g. *I worked (for a while and then ...)*). For these predicates, it seems to be the case that, even though no telos is involved, factors like the English past tense and other contextual elements can still impose temporal termination boundaries (Croft (2012: 77); cf. Sasse’s (2002: 206) “secondary boundaries”). Depraetere (1995: 3) makes a similar point, stating that a situation “is bounded if it represents a situation as having reached a temporal boundary, irrespective of whether the situation has an intended or inherent endpoint or not”.⁷ This is the case, for instance, in examples such as (7)-(8):

(7) *John lived in London for a year.* (Depraetere 1995: 5)

(8) A: *Her eyes are red.*

B: *She’s been crying.* (Depraetere 1995: 5)

The notion of temporal boundaries is also particularly relevant in the analysis of deverbal nominalization. In a comparative study of various nominalization strategies in English, Brinton (1995: 34) argues that “whether or not the situation denoted by the nominalization is complete(d) depends upon the grammatical aspect of the sentence, not upon the nominalization”. For example, while a progressive main predication with an activity nominalization denotes an ongoing activity (e.g. *The rubbing of the strap is causing irritation*), the simple past tense form has the effect of

⁷ For Depraetere (1995: 5), these arbitrary temporal boundaries are not the same as the perfectiveness/imperfectiveness distinction, as “perfectiveness/imperfectiveness applied to a language such as English corresponds to the non-progressive/progressive distinction (...) [and] (un)boundedness should not be equated with the progressive/non-progressive distinction”. This paper will discuss temporal boundedness as set out by Depraetere (1995). For more on boundedness see also Declerck (1989).

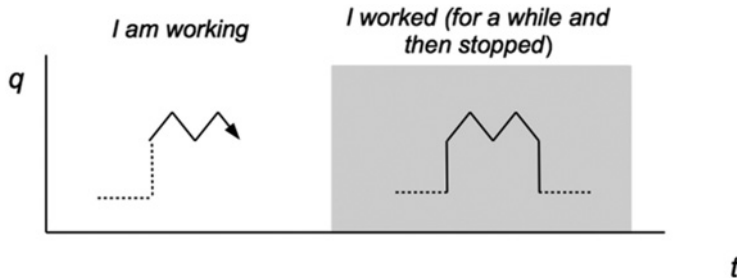


Figure 3: Schematic representation of temporally bounded activity.

imposing (arbitrary) temporal boundaries on the situation, yielding a “terminated” activity (e.g. *The wiggling of the child annoyed me*). The termination of activities can be schematically represented as illustrated in Figure 3.

What is important to recognize here is that, while the absence of the termination phase with accomplishments and achievements like *writing a novel* or *reaching the summit* is said to render activities (Croft 2012: 80), the reverse does not hold: bounded activities such as *I worked* are still activities “because there is no result state defined on the q dimension” (Croft 2012: 80). Thus, it indeed appears that, in theory, certain aspectual-semantic distinctions could be obscured if temporal boundedness is not included as a second level of analysis. In the sections to follow, I will show that recognizing the distinction between these two levels of analysis is possible – and relevant – in practice. I will do so by applying a unidimensional and a bidimensional semantic classification model to a set of authentic corpus data (henceforth *model 1* and *model 2*) and subsequently assessing and comparing those models.

3 Methodology: applying the aspectual classifications to a set of English gerunds

Before turning to the assessment of the classification models in Section 4, I will first show that it is indeed possible to distinguish two levels of analysis when looking at authentic corpus data, on the condition that the analyst clearly defines the subcategories associated with ASPECT (i.e. stative/dynamic, punctual/durative, and telic/atelic) and then separately sets out which cues establish or remove *temporal* boundaries on a (nominalized) situation (henceforth TEMPORAL BOUNDEDNESS). The analysis presented here will focus on the aspectual properties of two historically related nominalization strategies (i.e. nominal

and verbal gerunds) as they occur in Early Modern English (between 1570 and 1710) and Late Modern English (between 1780 and 1920), but the methodology can of course be applied to set out and compare the aspectual-semantic behavior of other types of deverbal nominalization (in historical and Present-day English) as well.

For Early Modern English (EModE), a random sample of gerunds was extracted from the Penn Parsed Corpus of Early Modern English (PPCEME; Kroch et al. 2004), comprising 293 nominal gerunds and 488 verbal gerunds that occurred between 1570 and 1710. For Late Modern English (LModE), 276 nominal gerunds and 2,317 verbal gerunds that occurred between 1780 and 1914 were taken from the Penn Parsed Corpus of Modern British English (PPCMBE; Kroch et al. 2010). Note that the large difference in token frequency between nominal and verbal gerunds in the Late Modern period is due to the fact that verbal gerunds at this point had become much more frequent than their nominal predecessor. As the data were subjected to a logistic regression analysis (cf. Section 4), the absolute frequency of the most infrequent outcome variable is of considerable importance. To acquire a sufficiently large number of nominal gerunds, the entire set of nominal and verbal gerunds found in the PPCMBE between 1780 and 1914 was therefore used.

3.1 ASPECT classification

The ASPECT classification adopted here largely follows the aspectual types set out in Croft (2012), which depends on four aspectual types which can most easily be grouped according to the original categories proposed by Vendler (1967): state, achievement, activity, and accomplishment. Each main category is further divided into subtypes, which are meant to capture the additions and adjustments suggested to Vendler's aspectual classes in more recent literature (e.g. Smith 1997). Croft's suggested (sub-)categorization (and its geometrical representation) is summarized in Figure 4.

The first aspectual category consists of states. Croft's (2012) geometrical representation of aspect types is illustrated in Figure 4. Stative events are distinct from all other aspectual categories in that "their profiled phase is only a single point on the *q* dimension" (Croft 2012: 59), i.e. they only profile one qualitative state rather than a set of changing qualitative states. While some states are punctual (e.g. *It is exactly 2 o'clock*), the vast majority is durative. Durative states can be transitory or permanent: a stative situation like *the door is open* lasts until it is closed again, but other qualitative states "true of the entity for its entire lifetime" (Croft 2012: 58), like the situations expressed by *She is*

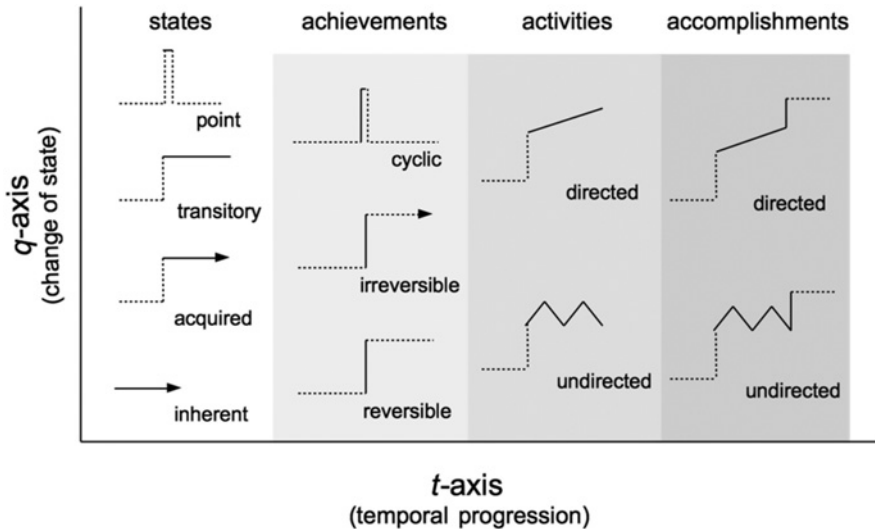


Figure 4: Summary ASPECT types as presented in Croft (2012).

French or the window is shattered. As illustrated in the following examples, verbal (9) as well as nominal (10) gerunds can refer to states in EModE and LModE. The stative gerunds in the present sample are all of the durative kind (qualitative or permanent); no punctual states were found.

- (9) a. *The fault lies not in **haveing desires suitable to the apprehensions and appetites of these severall ages*** (1685, PPCEME)
 b. *He (...) **tired me with apologies for being tiresome*** (1773, PPCMBE)
- (10) a. *If this then be prov'd true, That you still prosecuted the Marriage, without **liking of her Person**, without Estimation of her Possessions, (...): All these Matters consider'd, the seeking of this Marriage in this Form, must needs be High-Treason.* (1571, PPCEME)
 b. *for **the knowing of the letters** (...) they may be furthered thus;* (1627, PPCEME)
 c. *What improvements might also be made are only here proposed to further trial, in order to **the having of roses**.* (1780, PPCMBE)

The second category is that of achievements. Achievements are defined as events taking up an interval on the q dimension but only a single point on the temporal dimension. Croft (2012) distinguishes three types of achievements:

reversible directed, irreversible directed and cyclic achievements. Both reversible and irreversible achievements are directed, which means that the result state phase “is a state at a different point on the q dimension from the presupposed (unprofiled) initial rest state phase” (Croft 2012: 59). The difference between the two subtypes is that reversible achievements end in a transitory and hence reversible result state (e.g. *The door opened (and was closed again)*), while the result state of an irreversible achievement is permanent (e.g. *The window shattered*). By contrast, cyclic achievements “result in point states, which then revert to the rest state” (Croft 2012: 60). Croft (2012) uses the example *the mouse squeaked* to illustrate these cyclic achievements, pointing out that the profiled event is the transition from silence to squeak, and once the squeak has finished, the situation returns to its rest state.

Thus, the term “cyclic achievement” is a synonym for the more widespread term “semelfactive”. Again, both nominal and verbal gerunds can designate achievements.⁸ These can be reversible (11), irreversible (12), or cyclic (13):

- (11) a. (...) *the Captain advanced up to one of the ladies and saluted her, by **putting his nose to her’s*** (1776, PPCMBE)
 b. *To this Mr Weller replied with **an easy and unstudied closing of one eye***. (1837, PPCMBE)
- (12) a. (...) *and they were in mighty hopes of **finding Gold** there* (1719, PPCMBE)
 b. (...) *and then it was, at **the finishing of that war**, which had continued for two years, that the prince came to court* (c1668, PPCEME)
- (13) a. *I (...) could not at this moment put up with such a laceration of feeling as to be roused from contemplation by **the slamming of a box door*** (1808, PPCMBE)
 b. (...) *dip it in the spawn of Frogs, beaten as you would the whites of eggs, several times letting it dry on pewter, or earthen plates, between each time of **dipping it**, and keep it in a box close stopt from air, and apply it when you have occasion*. (1736, PPCMBE)

⁸ Contrary to what is claimed for Present-day English by for instance Brinton (1995) and Borer (2013), who argue that nominal gerunds cannot profile telic situations, or Alexiadou et al. (2010), who argue that nominal gerunds are only telic when no other nominal suffix is available (e.g. ‘killing’). While this study only focused on Modern English gerunds, a recent study by Heyvaert, Maekelberghe and Buyle (forthc.) makes similar observations as the one presented here for Present-day English, i.e. that nominal gerunds are aspectually neutral and are able to profile activities as well as states, achievements and accomplishments (also see Bauer et al. 2013).

Activities differ from achievements in that they are durative, i.e. instead of representing a point on the t-axis, they take up a time interval, as shown in Figure 6. Activities can be either undirected or cyclic, as in (14), or directed, depending on whether or not they involve an incremental transition from one point to another on the q-axis (17). Croft (2012: 61) represents undirected or cyclic activities as zigzag lines on the q-dimension because “undirected activities are typically construed as a succession of cyclic (undirected) achievements”.⁹ For example, *speaking Latin* (14a) and *preaching* (14c) are repeated emissions of certain types of words; *walking* (14b) and *exercising* (14d) are a repeated taking of steps or actions of a certain type.

- (14) a. (...) *it is intended as an introduction of Grammar, to guide children in a way of **reading; writing, and speaking Latine*** (1660, PPCEME)
 b. *In **walking the Streets**, I can please myself, by looking this way and that;* (174X, PPCMBE)
 c. (...) *men that shall vse religion as a cloake to put off, and on, as the weather serveth; such as shall with Herod heare **the preaching of Iohn Baptist** to day, and to morrow condescende to haue him beheaded* (1614, PPCEME)
 d. *On the contrary, he saw, in the active pursuit of such things as these, the fulfilment of one end of our being, **the exercising of ourselves** in that sore labour, which God has appointed as the task of fallen man.* (1830, PPCMBE)

Cyclic activities can also form an iterative interpretation, for instance when the gerund combines with an adverb expressing continuity/durativity (15), or a bare plural object (16):

- (15) (...) *which you must further by **rubbing him continually with drie clothes*** (1615, PPCEME)

- (16) *my Limbs were made for **leaping of Ditches*** (1707, PPCMBE)

In the case of directed activities, the activity does consist of a continuous (or at least incremental) change along the q-dimension from one point to another. However, the profiled event does not entail a transition to a result state representing a completed action. For instance, *heating the pieces* (17a) means that

⁹ See also Rappaport Hovav and Levin (2010) for pointing out that these directed activities (or, in their terminology, “degree achievements” Rappaport Hovav and Levin 2010: 27) are not inherently telic.

there is a continuous change in state (becoming hotter), but there is no natural endpoint (i.e. maximum state of hotness) implied. Similarly, in (17b), *drying* and *hardening* are incremental changes, but no end state of complete dryness or hardness is entailed in the situation:

- (17) a. *This he did by **heating the Pieces first in the Fire**, and afterwards working them on the Stones* (1744, PPCMBE)
 b. (...) *only, because the season of the yeere denyeth **a kindly drying or hardning thereof** [‘summer cheese’], it differeth much in taste.* (1615, PPCEME)

In that sense, directed activities are different from accomplishments, which do entail the completion phase as well as the phase leading up to it. Again, like activities, accomplishments can be directed or undirected (Croft 2012: 63), depending on whether their “middle phase” is a directed activity (a gradual incremental progression toward the end transition phase) or an undirected activity. In other words, when I eat an apple pancake, there is an intermediate stage in which the pancake is half-eaten, but when I repair a computer, there is no such intermediate stage of being “half-repaired”. Accomplishments (incremental as well as nonincremental) occur both as verbal and nominal gerunds, as illustrated in (18) and (19)

- (18) a. *Between **eating my Dinner**, and washing my Mauth, Ladies I spend my time, till I go to the Play* (1696, PPCEME)
 b. *I know (...) where you will go immediately after **reading this*** (1776, PPCMBE)
- (19) a. ***The reading of the Indictment** hath driven me to other Occasions* (1571, PPCEME)
 b. *What made **the Restoring of the Reformation** the easier was this, that tho’ the Kingdom appear’d wholly Popish, it was not really so.* (1747, PPCMBE)

In a few cases, the context did not provide enough information to categorize the gerund as being part of one of the four main aspectual types. For instance, in example (20), it is unclear whether the gerund designates a punctual instance of shooting or stabbing, in case the king would be dead by a single shot or stab, or a durative (iterative) activity, comprising multiple shots and stabs; the context does not provide any indication of its duration. In such cases, the instances were placed in a separate “ambiguous” category:

- (20) *The issue of the consultation was, that they came to a resolution to kill the king by **shooting, stabbing, or poisoning him**.* (1683, PPCEME)

3.2 Temporal bounding classification

As explained in Section 2, the classification of ASPECT types is roughly the same in a unidimensional model (*Model 1*) and a bidimensional model (*Model 2*), except for one substantial difference in how *boundedness* is dealt with. This has an effect on how the analyst should classify examples such as the one in (21):

- (21) *This very Man's Hand of yours must be employ'd in **writing a Letter from my Unkle Richlove in London to me here at York**.* (1716, PPCMBE)

The example here is comparable to the progressive discussed in Section 2. Because the verb *writing* combines with a singular count noun, the situation expressed by *writing a letter* has a potential telos (i.e., the finished letter). However, the transitional change of state toward this endpoint remains potential as the verbal gerund is used in combination with the verbal phrase *be employ'd in*, which entails ongoingness. Such phrases can be considered as explicit textual cues for unbounded readings. The way in which the two models differ, then, is that the unidimensional model (*Model 1*) does not consider the “potential telos” as part of the profiled situation (because the expressed situation does not entail that the letter was finished successfully), which renders the situation “unbounded”. Because the unidimensional model only distinguishes one kind of boundedness, *Model 1* classifies (21) as an activity (Croft 2012: 80). Examples such as (22), in which explicit cues occur that establish an unbounded reading (e.g. adverbials such as *at present*, temporal prepositions such as *in* and *on*, and matrix clause predicates such as *to be employed in*, *enter into*) are quite common. They can be used to present a situation as ongoing at the time of speaking (22a) or simultaneous with the situation expressed in the matrix clause (22b–e):

- (22) a. *At present she **is employed in buying up all the nose-gays in Covent Garden**.* (174X, PPCMBE)
 b. *The hearing of this Indictment giveth me occasion **to enter into the making of a Suit**.* (1571, PPCEME)
 c. (...) *you place your Churn in a paile of cold water as deep as your Creame riseth in the Churne; and **in the churning thereof** let your stroakes goe slow*

- d. *I know what you will suffer in **being absent*** (1777, PPCMBE)
- e. *The Bedouins offered us for purchase some small articles of antiques; and **on taking our leave**, a dispute arose between them respecting baksheesh* (1836, PPCMBE)

In the bidimensional model (*Model 2*), such instances will be categorized as a *temporally unbounded* instance of an activity, accomplishment, achievement or state.

In the discussion in Section 2, it was also pointed out that distinguishing two kinds of boundedness has an effect on how the different models categorize activities. In the present data set, a large number of examples also exhibit explicit contextual cues that help construe the event designated by the nominal or verbal gerund as having been terminated by imposing temporal boundaries. Consider the following examples:

- (23) a. *Not many dayes after **this firing of images and church ornaments in London**, a mightie tempest did rise.* (1612, PPCMBE)
- b. (...) *thus worshipping him, he ceaseth from **hurting their bodies*** (1593, PPCEME)
- c. *I remember **being at the Old Bailey**, and being examined.* (1817, PPCMBE)

The examples in (23) all express durative and atelic events, being either activities (23a)–(23b) or states (23c). However, they are presented as temporally terminated (using temporal prepositions such as *after*, matrix clause predicates such as *cease from*, or reporting verbs such as *remember*), i.e. they have terminated before another expressed event (cf. Declerck 2006: 30). In Model 2, a distinction would be made between the temporally bounded states and activities in (23), and the temporally unbounded ones in (22c) and (22d), while in Model 1 this would not be the case (cf. Section 2).

Finally, I wish to point out that, if one wishes to take a bidimensional approach to a set of authentic corpus data – especially when it comes to historical variants of a language (of which no native speaker intuitions can be assumed) – the analyst should be aware that there are also contexts that should be considered “neutral”. This is the case in absence of explicit cues imposing or removing temporal boundaries, as illustrated in the examples in (24):

- (24) a. *They were found guilty of a design of **killing the King and destroying the government**.* (1683–1713, PPCMBE)
- b. *They must not be hindred from **being children** and from playing and doeing as children, but from doeing ill.* (1685, PPCEME)

Neutral contexts mainly comprise future (24a) and hypothetical (24b) references. This is because, in unrealized events, it is impossible to determine whether the event boundaries are profiled as well (cf. Croft 2012: 139).

Figure 5 schematically represents the difference between the unidimensional classification model (Model 1) and the bidimensional classification model (Model 2). In a nutshell, Model 1 recognizes four aspectual categories (state, achievement, activity, and accomplishment – and, because we are working with historical corpus data, a set of indeterminate or ambiguous cases). Model 2 recognizes the same categories, but additionally considers the examples on a second dimension, i.e. whether they are contextually marked as being temporally bounded or unbounded, or whether no such marking is present. Besides the fact that more levels are recognized in the second model, it should be noted that what would be considered t-unbounded achievements and accomplishments in Model 2 are considered to be activities in Model 1.

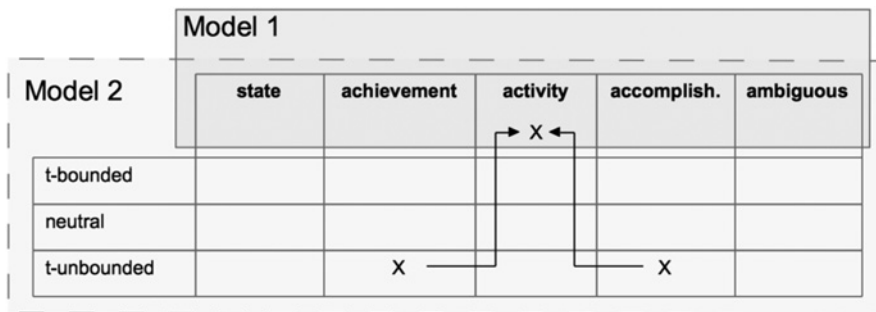


Figure 5: Semantic categories as understood in Model 1 vs. Model 2.

4 The aspectual differences between nominal and verbal gerunds: comparing the models

To determine the role of aspectual properties in explaining the variation between nominal and verbal gerunds, the set of 2,805 verbal gerunds and 569 nominal gerunds was subjected to a mixed effect logistic regression. In the first model, the unidimensional classification system was used (i.e. one predictor with four variables: *state*, *activity*, *achievement* and *accomplishment*; disregarding the more fine-grained distinctions made within those categories

set out in Section 3.1). In the second model, the bidimensional classification system is used (i.e. two predictors, one called *ASPECT* with four variables (*state*, *activity*, *achievement* and *accomplishment*) and one called *T-BOUNDEDNESS* with three variables (*t-bounded*, *neutral*, and *t-unbounded*). The distribution of *ASPECT* in EModE and LModE according to the unidimensional model is illustrated in Figure 6, and the distribution of *ASPECT* and *T-BOUNDEDNESS* following the bidimensional model is illustrated in Figure 7.

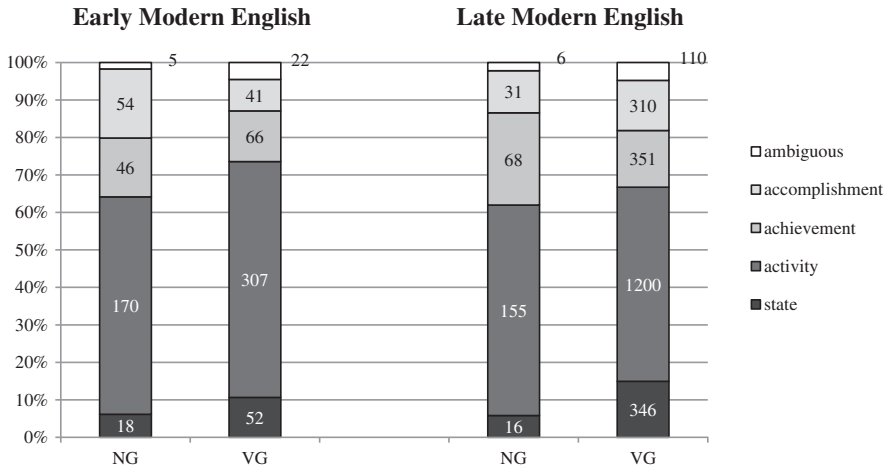


Figure 6: Relative frequency of ASPECT types in Early and Late Modern English according to Model 1 (Labels show the raw token frequencies).

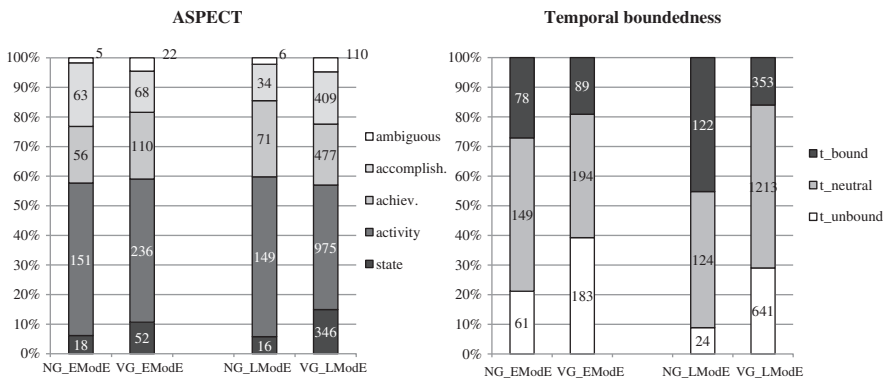


Figure 7: Relative frequency of ASPECT types and TEMPORAL BOUNDEDNESS in Early and Late Modern English according to Model 2 (Labels show the raw token frequencies).

In both models, the variable *period* was used as a predictor with two variables, namely nominal and verbal gerunds found in the Early Modern data set (EModE, 1570–1710) and Late Modern data set (LModE, 1710–1850). These variables are included to create interaction effects with the other variables to see how the influence of the other predictors has shifted over time (as is, for example, done with regard to dative and genitive variability in Wolk et al. 2013). The results of the two models are summarized in Table 1 (Model 1) and Table 2 (Model 2).^{10,11}

Table 1: Unidimensional model (Significance codes: 0 ‘***’/0.001 ‘**’/0.01 ‘*’/0.05 ‘.’).

Model 1 – ASPECT_TYPE only (unidimensional)

- C-value: 0.8345904		- Observations: 3374				
- AIC: 2530.5		NG: 569				
		VG: 2805				
Predictors	Levels of categorical predictors	Coef.	Standard error	Z value	p-value	
	(Intercept)	0.6752	0.1481	4.558	5.16e-06	***
Aspect type	Activity	Reference level				
	Accomplishment	-1.0065	0.2802	-3.592	0.00033	***
	Achievement	-0.1546	0.2635	-0.587	0.55736	
	State	0.6254	0.3405	1.837	0.06626	
Period	EModE	Reference level				
	LModE	1.7544	0.2245	7.815	5.49e-15	***
Interaction : Period	Activity:LModE	Reference level				
	Accomplish:LModE	1.2486	0.3539	3.528	0.00042	***
	Achievement:LModE	-0.1992	0.3116	-0.639	0.52263	
	State:LModE	0.2714	0.4367	0.622	0.53419	

The question we are confronted with now is how to evaluate the two candidate models. At first glance, it appears that both models have strong explanatory quality (cf. Speelman 2014; Gries 2015), but the more complex bidimensional model exhibits a slightly better c-statistic (Model 1: C = 0.83; Model 2: C = 0.87).

¹⁰ All data sets and R-code can be retrieved on <https://github.com/LFonteyn/Aspect>.

¹¹ As to be expected, Model 1 and Model 2 yield a difference in predictive strength of the accomplishment category. This is due to the high number of verbal gerunds referring to accomplishments in temporally unbounded contexts, which are categorised as activities in Model 1 (cf. Section 3.2).

Table 2: Bidimensional model (Significance codes: 0 ‘***’/0.001 ‘**’/0.01 ‘*’/0.05 ‘.’).

Model 2 – ASPECT & T-BOUND (bidimensional)						
- C-value: 0.8690546			- Observations: 3374			
- AIC: 2382.8			NG: 569			
			VG: 2805			
Predictors	Levels of categorical predictors	Coef.	Standard Error	Z value	p-value	
	(Intercept)	1.14327	0.21490	5.320	1.04e-07	***
Aspect type	Activity	Reference level				
	Accomplishment	-0.44336	0.25447	-1.742	0.081450	
	Achievement	0.30816	0.23962	1.286	0.198438	*
	State	0.72816	0.35077	2.076	0.037906	
T-bounded	Unbounded	Reference level				
	Bounded	-0.90546	0.25700	-3.523	0.000426	***
	Neutral	-0.90644	0.21868	-4.145	3.40e-05	***
Period	EModE	Reference level				
	LModE	2.23117	0.33707	6.619	3.61e-11	***
Interaction : Period	Activity:LModE	Reference level				
	Accomplish:LModE	1.33163	0.33809	3.939	8.19e-05	***
	Achievement:LModE	-0.02726	0.29618	-0.092	0.926672	
	State:LModE	0.32318	0.45411	0.712	0.476662	
	Unbounded:LModE	Reference level				
	Bounded:LModE	-1.52710	0.35514	-4.300	1.71e-05	***
	Neutral:LModE	0.05349	0.32015	0.167	0.86730	

Of course, this is to be expected because Model 2 has more variables, and hence is more flexible than Model 1. The problem is that more complex models should not be deemed better by default, as there is a consensus that “the best model is the one that provides an adequate account of the data while using a minimum number of parameters” (Wagenmakers and Farrell 2004: 192; in reference to Myung *et al.* 2000; Myung and Pitt 1997).

To evaluate the models, then, we need to assess them with a measure that takes both descriptive quality and parsimony into account. To do so, one can consider the Akaike information criterion (AIC; see, e.g., Akaike 1983), which rewards descriptive accuracy via the maximum likelihood, and penalizes lack of parsimony according to the number of variables. As a rule, it is generally suggested that a smaller AIC is to be preferred (e.g. Levshina 2015: 194), but, as pointed out by Wagenmakers and Farrell (2004: 192), it is

“difficult to intuit how much statistical importance we should attach to a difference in the AIC values” between multiple candidate models. In other words, while we can confidently say that the AIC of Model 1 is bigger than the AIC of Model 2, it still does not tell us anything about the weight of evidence in favor of *Model 2*. To remedy this problem, Wagenmakers and Farrell (2004) suggest using a transformation called “akaike weights”. This transformation yields a value between 0 and 1 for each model, indicating their conditional probability.

What the figures in Table 3 indicate is that the weight of evidence that Model 1 is the most accurate model is only very small. Model 2, on the other hand, has a conditional probability of 1.0, meaning that the probability that it is the better model approximates 100%.

Table 3: Akaike weights Model 1 vs. Model 2.

Akaike.weights	Model 1	Model 2
Akaike information criterion	2530.5	2382.8
Weight	8.406112e-33	1.0

Having established that Model 2 is the most accurate, we can have a look at what it tells us about the aspectual-semantic distinctions between nominal and verbal gerunds in EModE and LModE. The coefficients in the first column of Table 2 quantify the strength of the effect and the direction in which it deviates from the reference level, with positive values signifying preference for the verbal gerund construction and negative values indicating preference for nominal form. The *p*-values in the final column show which of the effects are significant. In addition to the fixed main effects, the model also contains interaction effects between the predictor “period” and lexical aspect and temporal boundedness to see which of the effects have shifted over time.

Let us first consider the results for the ASPECT type. The figures in Table 2 suggest that the only significant variable appears to be *state* (0.726, $p = 0.038$) but the effect should be treated with caution (cf. overlapping confidence intervals in EModE but not in LModE; see Figure 6). The likelihood of accomplishments occurring in verbal form also increases between EModE and LModE (1.331, $p < 0.001$). Overall, what emerges from the model appears to be that in this data set we find no evidence that there are aspectual restrictions associated with either gerund type, and only very little indication lexical aspect plays an important role in explaining the variation between nominal and verbal gerunds. Returning to previous claims made regarding the aspectual-semantic properties of nominal and verbal gerunds,

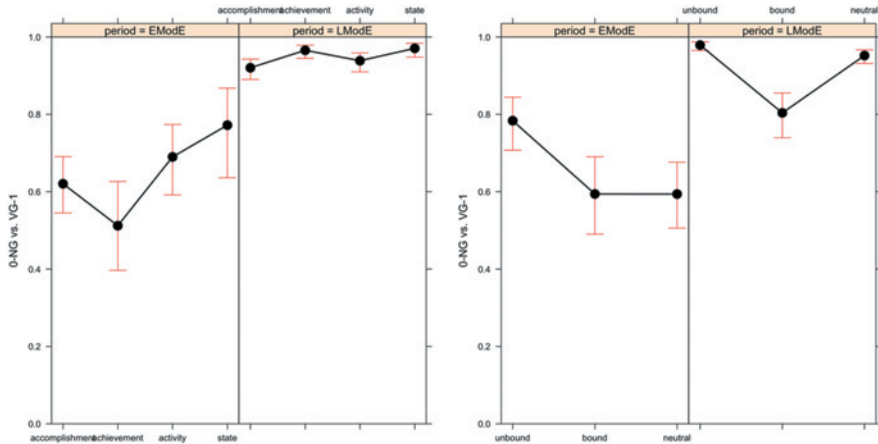


Figure 8: Effect plots Model 2 showing the interaction between period and ASPECT (left) and period and TEMPORAL BOUNDEDNESS (right).

this indicates that it would be inaccurate to posit that English gerunds are (or have become) restricted in terms of the ASPECT categories they can express (as has been suggested for Present-day English nominal gerunds, for instance, by Brinton (1995, 1998), who argues that they all profile activities, and Borer (2013), who argues that nominal gerunds cannot profile telic situations). There are, moreover, no indications that such absolute restrictions have started to emerge in the investigated period (as suggested, for instance, by Iordachoaia and Werner (2015) for Modern English; for more discussion see Fonteyn (forthc.)), except for the observation that stative situations (in LModE) are slightly less likely to occur as nominal gerunds than other types of situations.

The predicting effect of temporal bounding (illustrated in Figure 8), on the other hand, yields a more interesting picture (all effects being significant with $p < 0.001$). First, both contexts in which the gerund is construed as temporally bounded, as well as the neutral contexts, have a negative coefficient (-0.865 and -0.893 respectively). This indicates that, in these contexts, it is somewhat more likely to encounter a nominal gerund than in unbounded contexts. In the case of bounded construal, the effect is enhanced significantly in the Late Modern period (-1.594, $p < 0.001$).¹² Again, it should be noted that neither

¹² To make sure that the predictor ASPECT still made a significant contribution to the model, I compared Model2 to a third model, in which T-BOUNDEDNESS served as the only predictor (Model 3, c-statistic = 0.86, AIC = 2408.7). First, ANOVA indicated that the contribution of ASPECT in Model 2 was significant ($p < 0.0001$). Second, the akaike weights indicated that Model 3 had a small

nominal nor verbal gerunds are restricted to temporally unbounded contexts, which challenges a wide range of accounts that largely consider *-ing* as a progressive suffix in *all* its uses (e.g. Langacker 1991; Smith and Escobedo 2002; Egan 2008), and goes against the claim that verbal gerunds are always [-bounded] (cf. Alexiadou 2013). However, what we *do* see is that there is a more tentative, weakened version of that claim, in that there is a higher likelihood that we will find a verbal gerund in temporally unbounded contexts than in temporally bounded ones. Conversely, in LModE, the likelihood that we will find a nominal gerund is highest in temporally bounded contexts.¹³

5 Conclusion

In this paper, I addressed the knotty concept of “boundedness” in theories of aspectual semantics, focusing on two types of deverbal nominalization in English. First, I set out (i) how two different classification models (unidimensional and bidimensional) would classify the same examples and (ii) briefly touched upon the potential issues that could be associated with each model. On the one hand, studies that apply a unidimensional model might fall short in descriptive quality. On the other hand, it has been argued that *in practice* it is almost impossible to distinguish two levels of analysis, which would mean bidimensional classification models cannot be upheld. Furthermore, it is generally accepted that simpler models should be favored over more complex ones if the additional complexity does not significantly contribute to the descriptive accuracy of the model.

By means of a set of nominal and verbal gerunds, it was shown that (iii) for deverbal nominalization it is indeed possible to distinguish a situation’s ASPECT type from temporal boundedness, on the condition that the analyst defines these semantic concepts as explicit contextual cues or usage contexts. The question of which semantic classification model to use, then, is not so much one of which one is practically feasible in a corpus analysis, but rather which one is best suited to describe the attested variation. As such, (iv) this paper also presented a means of model comparison, i.e. akaike weights. This model comparison method comes in handy if the analyst wishes to compare the descriptive quality and accuracy of two candidate models (with different degrees of complexity) and subsequently determine the statistical importance or weight of this observed difference. The

conditional probability of 2.32e-06, which is bigger than that of Model 1 (AIC=2530.5; weight = 8.41e-33) but again much smaller than that of Model 2 (AIC = 2382.8; weight = 0.99).

¹³ For reflections on *why* the gerundive system has thus been diachronically restructured, see Fonteyn (forthc.: Chapter 6).

results of the model comparison indicated that to describe the variation between nominal and verbal gerund in EModE and LModE the bidimensional model outperformed the unidimensional one. (v) From the results of the bidimensional analysis, it indeed appears that the aspectual-semantic distinctions between Modern English nominal and verbal gerunds are a matter of both ASPECT and TEMPORAL BOUNDEDNESS, which in turn suggests that it might be worth revisiting and re-evaluating some of the existing accounts of the (changes in) aspectual-semantic in and “boundedness” of English nominal and verbal gerunds.

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