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# Productivity and schematicity in constructional change

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In Diachronic Construction Grammar, many instances of language change can be captured in terms of variation in the schematicity and productivity of constructions. These two notions are often thought to be interrelated, which suggests that they might be collapsed and treated as essentially the same property. By contrast, this paper argues that schematicity and productivity, while related, should be kept separate and considered in their own right. Cases are reported from the literature showing that the relation between schematicity and productivity is at best indirect. It is argued that a distinction should be made between the schematicity of lexical slots inside a particular construction and the schematicity of the constructional meaning itself. Only the former is directly related to productivity. The latter may or may not be, and if so, only in very specific ways that can be assessed not by looking merely at the lexical items attested in the slots of the construction, but only by examining the semantics of earlier uses in their entirety. To illustrate this idea, a case study of recent change in the abstract uses of the *way*-construction is reported on, in which the increasing range of abstract verbs can be related to an increase in the variety of abstract situations conceptualized as motion in uses of the construction. This will be interpreted as an increase in the schematicity of the motion component of the constructional meaning. Keywords: schematicity, productivity, constructional meaning, *way*-construction

## 1. Introduction

In Diachronic Construction Grammar, many instances of language change are described to affect two properties of constructions: schematicity, referring to the level of abstraction at which a construction is represented, and productivity, referring to the ability/property of a construction to recruit a wide range of lexical items as slot fillers. This article critically examines these two properties and the relation between them, drawing on the network model of Construction Grammar. As such, it seeks to clarify when it is warranted to postulate a new separate node in the network (question 2 of this volume), especially in the case of expanding constructions, and how schematization may affect the structure of the constructional network (question 6).

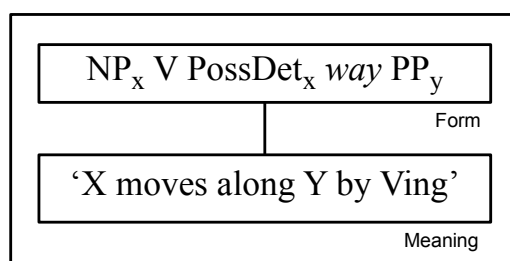
Section 2 provides some general background on Construction Grammar and the network model. Section 3 discusses the concepts of schematicity and productivity in detail and defines them with regards to the network model introduced in section 2. Section 4 focuses on the relation between productivity and schematicity. While it is acknowledged that the two properties are related, it is argued that this relation is not always as direct as

is often assumed, and that it depends on the amount and type of meaning contributed by the construction itself, in particular as it pertains to how the new lexical items combine with it. It is argued that a difference must be made between two kinds of schematicity: that of the lexical slots of the construction, and that of the constructional meaning as a whole. Only the former is directly related to productivity, while the latter requires an examination of individual instances to be characterized and potentially related to productivity. To illustrate this idea, section 5 reports on a case study of the recent history of abstract uses of the *way*-construction. It is shown that there has been a sharp rise over the past 180 years in the diversity of the types of abstract situations conceptualised as motion in uses of the construction, which can be linked to an increase in the schematicity of the constructional meaning.

## 2. Diachronic Construction Grammar and constructional networks

Diachronic Construction Grammar aims to describe and explain language change by drawing on the idea that the grammar of a language consists of an inventory of form-meaning pairs, called constructions. Construction Grammar rejects the notion of a sharp distinction between lexicon and syntax, and therefore allows constructions of any complexity to be defined and to contain fully specific lexical material as well as syntactic slots with various degrees of openness (Fillmore et al., 1988; Croft & Cruse, 2004; Bybee, 2010). A textbook example of a construction, the *way*-construction, is exemplified by (1) and (2) below and represented diagrammatically in Figure 1.

- (1) *They hacked their way through the jungle.*  
 (2) *We pushed our way into the pub.*

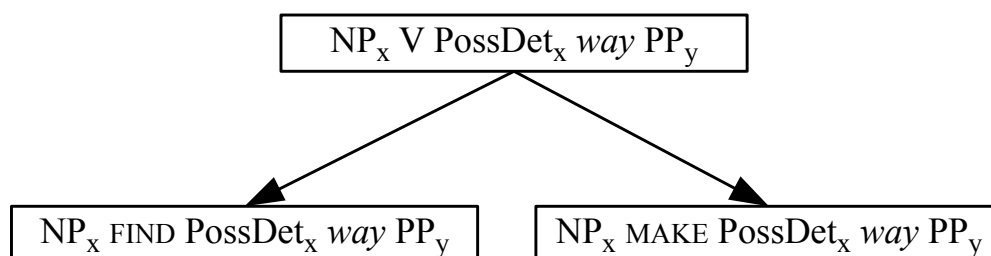


**Figure 1: The *way*-construction**

As shown in Figure 1, the construction formally consists of a subject noun phrase, a verb, a possessive determiner co-referential with the subject, and a prepositional phrase. In one of the uses of this construction (called the “means interpretation” by Goldberg 1995: 207), this form is paired with the notion that the subject referent performs the action described by the verb, and

as a result moves along the trajectory described by the prepositional phrase (cf. Goldberg, 1995; Israel, 1996; Jackendoff, 1990; Perek, 2018).

Importantly, constructions do not exist in a vacuum: they are linked to each other in a network that can comprise various kinds of relations. In particular, inheritance relations relate more general constructions to their more specific instantiations, forming a kind of taxonomic hierarchy (Croft & Cruse, 2004; Goldberg, 1995). For example, when the *way*-construction mentioned above is combined with a particular verb, this forms a more specific construction that inherits from the general *way*-construction. This is illustrated in Figure 2 below with the verbs *find* and *make*; for the sake of simplicity, only the formal side of the relevant constructions is represented. Inheritance relations are marked by arrows pointing from the more general construction to the more specific ones that inherit from it.



**Figure 2: The *way*-construction and two of its lexically-specific constructions**

As soon as a lexical item is attested in a construction, a lexically-specific subconstruction containing this item may in principle be added to the network. Hence, constructions of different levels of generality can co-exist in the grammar. Frequent and highly conventionalised lexically-specific constructions, as is the case for instance for *find one's way* and *make one's way*, are particularly likely to receive their own constructional node in the network.

In Diachronic Construction Grammar, language change is described in terms of change in constructions: either the creation of new constructions, change in the properties of particular constructions, change in the structure of the constructional network, or any combination of these (Hilpert, 2013; Traugott & Trousdale, 2013). Two properties of constructions are often discussed in Diachronic Construction Grammar studies: productivity and schematicity. These two notions are discussed in the next section with reference to the constructional network model outlined above.

### 3. Productivity and schematicity

In a Diachronic Construction Grammar approach, many instances of language change can be captured in terms of variation in two properties of

constructions: schematicity and productivity. These two concepts will be described in turn.

### 3.1 Schematicity

Schematicity commonly refers to the level of detail that is stored in the representation of a construction; in the context of this paper, the term is applied to the semantic side of constructions.<sup>1</sup> In a usage-based Diachronic Construction Grammar approach such as that of Hilpert (2013) and Traugott & Trousdale (2013), grammatically complex constructions of some degree of abstractness are conceived of as schemas generalising over a range of instances of language use. If certain aspects of form and meaning recur across different uses, the commonalities between these uses are stored in a schematic form-meaning pair. The more semantically diverse these uses are, the more schematic the constructional meaning will be. Conversely, a construction with a more schematic meaning is available for sanctioning a wider range of new uses, and applies to the description of a wider range of situations than a construction with a less schematic meaning. In diachrony, it is common for constructions to increase in schematicity, as they are creatively exploited by speakers to fulfill expanding communicative needs. Increases in schematicity are typically involved during and after grammaticalization, as lexical items come to be associated with grammatical meanings that are related to, yet more general than, their original lexical meaning, and newly grammaticalized meanings tend to be extended to an increasingly wider range of contexts (Bybee & Pagliuca, 1985; Himmelmann, 2004; Gisborne & Patten, 2011; Patten, 2012).

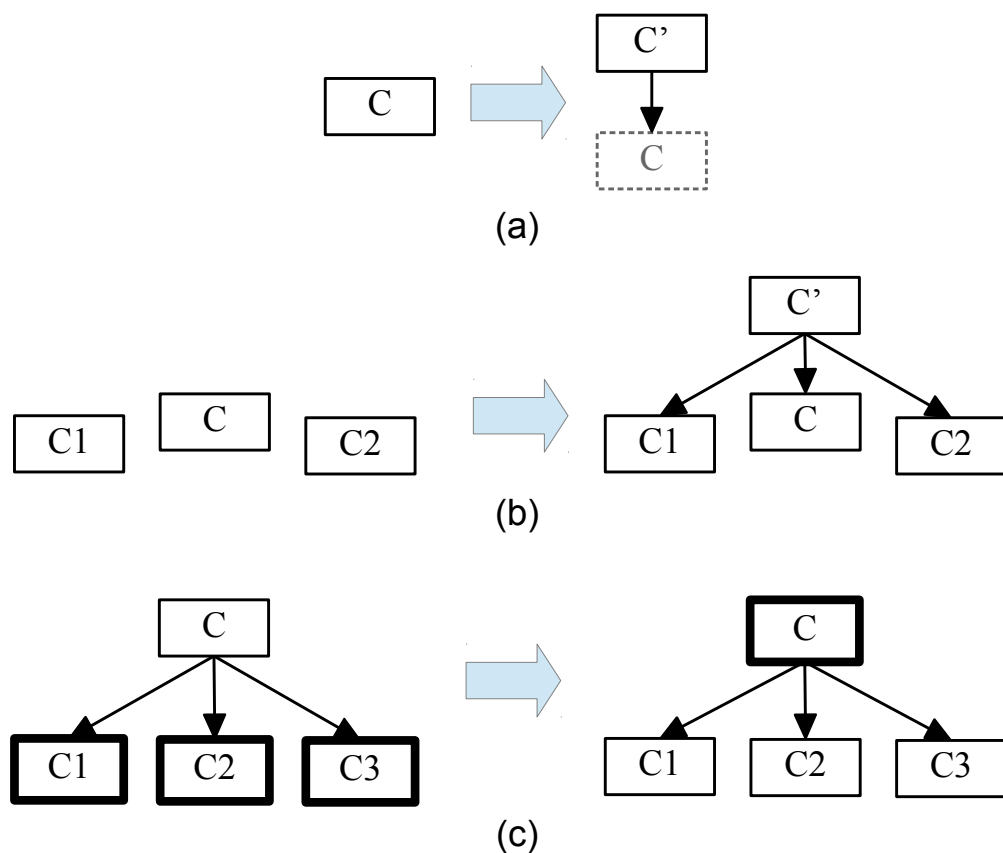
In sum, an increase in schematicity of the meaning of a construction means that the same form becomes associated with a wider range of possible meanings. An example of this can be found in the “*be going to V*” construction, which originally used to have a more restricted meaning than the Present-day English meaning of futurity. Studies of this construction generally report that *be going to* followed by a verb initially grammaticalized into a marker of intentionality (cf. Disney, 2009; Traugott & Trousdale, 2013); for instance, *I am going to be an architect* became an acceptable way of saying “I intend to be an architect”, without any implication of motion originally found in the lexical source of the construction (i.e., the verb *go*). Over time the construction came to be associated with the more general meaning of futurity, which covers the original meaning (since intentionality

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<sup>1</sup> The term can also be applied to the form of constructions. In that context, an increase in formal schematicity means that a construction is allowed more variability in form to express the same meaning. For example, the ability of different grammatical categories to occur in the slots of constructions (e.g., prepositional phrases and subordinate clauses in the focus position of *it*-clefts, initially restricted to noun phrases, cf. Patten, 2012), can be described as an increase in formal schematicity.

entails futurity) in addition to other meanings such as prediction (e.g., *It's going to rain tomorrow*).

As is clear from this example, schematicity relates to the position of a construction within the taxonomic network mentioned previously. In terms of the network metaphor, an increase in schematicity can be defined as follows: a certain form is said to become a more schematic construction if a superordinate node in the constructional network is created that pairs the same form with a more general meaning and thus subsumes the earlier construction. This is diagrammed in Figure 3a, where C refers to the original construction, and C' refers to the new, more schematic construction that subsumes C. Such a change is especially likely to happen if the more schematic construction subsumes other uses as well (which may themselves have been generalized into sub-constructions); this is illustrated in Figure 3b, where C1 and C2 are "sister" constructions of C, and the more schematic C' is abstracted from C, C1, and C2. Over time, the superordinate node can be reinforced and become more available for the categorization of matching expressions, over the more specific constructions, as shown in Figure 3c, with bolder lines representing relative degrees of entrenchment or cognitive accessibility between a construction and its subordinate nodes. This too can be said to correspond to an increase in schematicity.



**Figure 3: Different representations of an increase in schematicity of a construction C**

### 3.2 Productivity

Productivity is a more familiar notion to many linguists, as the term has a long history in the domain of morphology (Bauer, 2001; Plag, 1999). The productivity of a construction has to do with how open it is to different lexical items. This is often interpreted in two ways. Productivity can refer to the range of different lexical items that are attested in a particular slot of a construction, as can be observed in a corpus; this corresponds to what Baayen (2009) more specifically calls “realized productivity”. In a related interpretation, productivity can also refer to the property of a construction to be extended to new lexical items that were not attested in it; this is called “extensibility” by Barðdal (2008). For instance, if some construction is observed to occur with the verbs *say*, *whisper*, and *mutter*, its realized productivity corresponds to these three verbs, while its extensibility relates to what other verbs could be acceptable (though not attested) in this construction according to speakers of the language; in this particular case, the construction might be extensible in particular to other manner of speaking verbs.

These two definitions of productivity are of course related, especially in diachrony: over time, a construction with high extensibility is likely to increase its realized productivity. However, extensibility can only be assessed by asking speakers about their intuitions of what lexical items might be acceptable in a given construction; therefore, it is not measurable in diachronic times.<sup>2</sup> The only kind of productivity that can be investigated in diachrony is realized productivity at different points in time, as measured by looking at the range of lexical items attested in the slot of a construction in different time sections of a diachronic corpus. The comparison of realized productivity at different points in time, does, however, retrospectively give an indication of extensibility: a construction that is found to be extended between two different periods (i.e., attested with new types) can be claimed to be extensible from the earlier period on.

In the network model, productivity relates to nodes that are subordinate to a construction and correspond to more specific instantiations of the construction with one of the slots filled by a particular lexical item. Realized productivity is captured by the subordinate nodes themselves; extensibility is the likelihood for new subordinate nodes to be created. An increase in realized productivity means that new subordinate nodes to that construction are created in the network, as diagrammed in Figure 4, where C1 to C5 are

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<sup>2</sup> As pointed out by an anonymous reviewer, in the literature on morphological productivity, the number of hapax legomena observed in different time periods, i.e., types with a corpus frequency of one, is sometimes used as a proxy to measuring extensibility. It is, however, merely a crude measure, since not all new types are first attested as hapaxes, and conversely not all hapaxes might be equally novel, among other issues.

lexically-specific constructions of C. Retrospectively, this is evidence for extensibility of the construction.

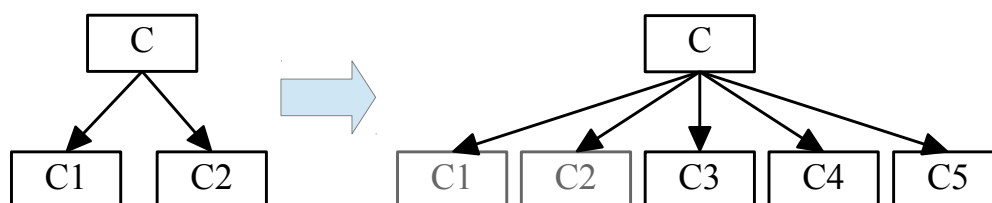


Figure 4: Increase in productivity of a construction C

### 3.3 The relation between productivity and schematicity

Productivity and schematicity are commonly thought to be interrelated, in that one is seen to impact the other and vice versa (Barðdal, 2008; Traugott & Trousdale, 2013). Quite trivially, an increase in schematicity is likely to cause an increase in productivity: a more schematic meaning can be applied to the description of a wider range of situations, and consequently, a wider range of lexical items are compatible with the schema. As Trousdale (2008, p. 170-171) puts it, “[t]he more schematic the construction, the more productive it will be [...]; the more substantive the construction, the less productive it will be”. The converse can also be seen to hold, in that the occurrence of new types may contribute to schema extension. Constructions are not fully categorical grammatical representations: they allow for the occurrence of lexical items that are not fully in line with the established schema, a phenomenon that is commonly referred to as coercion in the Construction Grammar literature (Michaelis, 2005; Lauwers & Willems, 2011). This captures the notion that speakers occasionally push the boundaries of conventional usage, to achieve particular communicative goals. If the use of a new lexical item in a construction is not covered by the construction’s schematic meaning, the latter has to be adjusted in order to make it compatible with the lexical meaning. If similar instances of coercion recur, the adjusted schema can itself become a conventional unit, paving the way to an extended schema covering both the original schema and the adjusted one, corresponding to an increase in schematicity (cf. Langacker, 2008, ch. 6). This view is also articulated by Traugott & Trousdale (2013, p. 16), who comment that “partially sanctioned extensions of an existing conventionalized construction may over time become fully sanctioned instances of a more general, schematic construction, which has changed as a result of the speaker/hearer’s experience with language”.

The perceived interdependency between productivity and schematicity makes it tempting to conclude that these two notions can be collapsed into one and treated as essentially the same property of a construction. Under this view, the lexical distribution of a construction could be used to make claims



about its schematicity, in that an increase in the range of lexical items attested in a construction is taken to mean that the constructional meaning has become more schematic. Yet, it is clear that the two notions involve different aspects of the constructional network, hence they are indeed distinct properties.

Besides, while productivity and schematicity do work in tandem in many cases, this is not necessarily the case. This is especially true when the construction contributes substantial meaning of its own that does not directly correspond to the meaning of its typical lexical items. In such cases, it is possible for the constructional meaning to live a life of its own and undergo changes in schematicity independently of its lexical distribution. Conversely, the productivity of the construction is not necessarily commensurate with its degree of schematicity. Hence, while the relation between productivity and schematicity cannot be denied, it is in many instances a very indirect one.

First, it is important to clarify that the productivity of a construction attested in diachrony is only indirectly dependent on the representation of the construction and its degree of openness. Since productivity is essentially a fact about usage, it is subject not only to grammatical constraints on possible tokens but also to whether these tokens are useful to speakers to fulfill their communicative needs. While a pattern may be available for creative uses, such uses will not be attested until the need for them arises. This can be illustrated by the use of the verb *spend* in the *way*-construction. The first instances of this verb in the construction in the 400 million word Corpus of Historical American English (COHA; Davies, 2012), spanning from 1810 to 2009, date back to the 1930s:

(3) *Is it true that we can spend our way to prosperity?* (1935)<sup>3</sup>

(4) *There is no recorded instance of any nation having spent its way out of a depression.* (1935)

(5) *[S]uch a statement stands in clear opposition to the Administration's philosophy of spending our way into recovery.* (1939)

These examples, all from newspapers or magazines, clearly refer to the New Deal: a policy of public spending started in 1933 by Franklin D. Roosevelt as a way of pulling the United States out of the Great Depression by injecting funds into the American economy, notably through major publicly-funded construction projects. As the idea was fairly new at the time, these journalists relied on this creative use of the *way*-construction to describe it. Importantly, however, there is no evidence that anything prevented the construction from being used in this way before these first corpus attestations. Uses of the construction to express transition to a state (or out of one) were attested for about a century (and probably earlier), as shown by the following examples:

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<sup>3</sup> From (3) on, all the examples used in this paper are from the COHA.

- (6) *[H]e had at last fought his way into some degree of notoriety at home. (1829)*
- (7) *Smith, however, was poor, and was obliged to carve his way to fame without the aid of chroniclers. (1838)*
- (8) *[T]o make his difficulties more perplexing, I have secured his purse, so that he can not bribe his way out of them. (1846)*

Moreover, the construction is also attested with semantically related verbs, like *pay* or *buy*, long before it was first used with *spend* in the corpus:

- (9) *Kershaw & Co. will not be able to pay their way out of their present difficulties. (1887)*
- (10) *They confront privilege buying its way to power. (1904)*

This suggests that *spend* could have been used in the *way*-construction earlier than it is actually found to be, in that the construction showed all signs of being open to uses like (3) to (5) above before the 1930s, should such a use have been useful to speakers of earlier times. It is, however, the specific socio-historical context that called for this particular idea to be expressed by speakers, who as a result coined this novel combination of *spend* with the *way*-construction (or at least strongly supported its use).

This example illustrates that just because a particular usage is grammatically possible does not necessarily mean that it will be attested right away: this is dependent on the communicative needs of speakers. This predicts that a direct relation from schematicity to productivity does not always hold. At best, schematicity defines the productivity domain, i.e., the set of items that *may* in principle be used in the construction, but not those that will actually be used. In line with this view, the literature on grammaticalization and constructionalization is replete with examples of emerging constructions that gradually expand their distribution over time, instead of immediately being used with all types that are presumably compatible with the constructional meaning. For instance, Traugott & Trousdale (2013) discuss the case of the quantifiers *a lot of / lots of*, which emerged in the late 18<sup>th</sup> century from binominal constructions with *lot/lots* as their head and meaning ‘a group of’, as illustrated by (11) below (see also Brems 2011, 2012; Traugott, 2008).

- (11) [ (a) *lot(s)*<sub>head</sub> [ *of* N ] ] ‘group of N’ → [ [ (a) *lot(s) of* ] N<sub>head</sub> ] ‘many N’

Traugott & Trousdale (2013, p. 115) report that after its creation, the construction was initially used mostly with concrete nouns that were typically countable and plural, such as *people* and *goods*. This is in line with the original meaning of the partitive use of *lot* from which the construction originated, meaning ‘group’. Mass nouns, such as *room* and *time* only started

occurring in the construction in the 19<sup>th</sup> century, and abstract nouns like *ideas* and *power* only became common from the mid-19<sup>th</sup> century onwards.

It would be spurious to assume that these gradual changes in productivity are due to corresponding changes in the schematic meaning of the construction, or vice versa that these new types joining the distribution of the construction cause its meaning to become more abstract (if different at all). According to Brems (2011, 2012), the quantifier meaning of the construction is in evidence since at least the 1780s. This meaning arguably stays the same throughout the various productivity phases described above; it does not become more abstract. What does become more abstract, however, is the generalisation over the kind of entities that can be quantified using that construction. In other words, changes in the lexical distribution of a slot can be said to cause changes in the schematicity of that slot in the representation of the construction, which in this case becomes gradually more open until the construction can be combined with virtually any noun. To the extent that lexical slots can be seen as part of the constructional meaning (since they do refer to an aspect of the situation that the construction describes), it can be claimed that there is indeed an increase in the schematicity of that particular part of the constructional meaning, but it does not entail that the rest of the constructional meaning is affected in any way.

In light of these observations, it seems that an adequate description of change in the schematicity and productivity of a construction, and the relation between them, requires to make a distinction between two aspects of the schematic meaning of a construction: (i) schemas representing the lexical slots of the construction, i.e., generalizations over the meaning of the lexical items occurring in it, and (ii) the schema representing the construction's own semantic contribution above and beyond the meaning of the individual lexical items occurring in it. For example, the *way*-construction discussed in section 2 conveys the idea that the subject referent moves along a certain trajectory. It combines with verbs that do not convey motion on their own, but refer to the means that enable motion. Hence, the motion component is part of the schematic meaning of the construction.

The productivity of a construction is only directly related to the schematicity of the lexical slots, but not necessarily to that of the rest of the construction. A more schematic slot entails that a wider range of types can be used in the construction; conversely, when new types enter the distribution of a construction, the corresponding lexical slot may increase in schematicity if the types are not covered by the existing schema. Under this view, it is perfectly legitimate to use the lexical distribution of a construction to make claims about the schematicity of the corresponding lexical slots: an increase in the range of attested types corresponds to an increase in the schematicity of the slot.

However, claims about the schematicity of the entire constructional meaning are often less straightforward to make on the basis of the lexical

distribution alone. In the case of constructions that do not contribute much, if anything, beyond the words that they combine, the constructional meaning is essentially described by the lexical slots, hence the relation between schematicity and productivity (and in turn, the lexical distribution) is rather direct; a good example of such constructions are the case argument structure constructions in Icelandic studied by Barðdal (2008). But if the construction makes a semantic contribution of its own, the relation between schematicity and productivity is less straightforward, and claims about changes in schematicity depend on how new types relate to the constructional meaning. Some types might not be fully compatible with the construction meaning and require a semantic extension, or even instantiate a different constructional meaning altogether. These types of change can only be directly observed at the level of individual instances, and while lexical distributions can sometimes give an indication of a trend, the observations they provide merely afford tentative conclusions until they have been examined in context. This is illustrated in the next section by a case study on the recent history of the *way*-construction.

#### **4. Case study: abstract uses of the *way*-construction**

The history of the *way*-construction is a typical example of constructionalization (Israel, 1996; Trousdale & Traugott, 2013; Perek, 2018; Fanego, 2018). According to various studies, one of the main uses of the *way*-construction originates from sentences combining a transitive verb with the noun *way* to express the actual creation of a physical path through some obstacle. The notion that the subject referent undergoes motion as a result of the verbal event likely started as a mere implicature and gradually became part of the conventional meaning of the construction (Israel, 1996; Trousdale & Traugott, 2013).

A constant trend noted by several studies in the history of the construction is its sustained productivity, with many new verb types regularly joining the construction over time. In line with its diachronic origin, the construction was initially centered on verbs referring to physical action that can be typical ways to create a physical path. For instance, from OED data, Israel (1996) reports *pave*, *smooth*, and *cut* in the 17th century, and *bridge*, *hew*, *sheer*, *plough*, *dig*, and *clear* in the 18th century. In more recent times, the construction is used with an increasing number of verbs referring to abstract actions, especially from the 19th century onwards: for instance, *smirk*, *spell*, *write* (Israel, 1996), *joke*, *laugh*, *talk*, and *bully* (Perek, 2018).

Following the approach to productivity and schematicity outlined in the previous section, this latter development corresponds to an increase in the schematicity of the verb slot of the construction, which, in particular, becomes more open to different kinds of abstract verbs. However, this change in productivity could also be seen to be tied to a change in schematicity. The semantic contribution of the construction mostly consists of a motion

component, and historically, the verbs used in the *way*-construction tend to refer to typical ways in which the motion of the subject referent can be enabled. However, many of the new verb classes attested in later periods correspond to implausible ways to cause or enable physical motion: interaction, commerce, cognition, etc. These verbs are more likely to involve abstract motion, i.e., when a different kind of event is metaphorically construed in terms of motion, as illustrated by the following examples:

(12) *[T]hey talk about Uncle Paul having bought his way into the Senate!*

(13) *[She] managed to talk her way out of the ticket.*

(14) *For a short unmemorable time, he'd bluffed his way in the trainer's position at a small farm in Florida.*

If the *way*-construction is taken to convey concrete motion as its central meaning, these examples can be analysed as involving a metaphorical mapping from the source domain of motion coded in the constructional meaning to various, more abstract target domains, following the terminology of conceptual metaphor theory (Lakoff & Johnson, 1980). Motion in these abstract domains can be enabled by a different and probably wider range of actions than physical motion, especially by abstract ones. A likely interpretation of the productivity of the construction in terms of schematicity is therefore that the motion component of the construction becomes more open to metaphorical instantiations: this is an increase in the schematicity of the constructional meaning. However, as argued in the previous section, as likely as this interpretation might be, it is merely a hypothesis, especially since there is evidence that metaphorical construals are not always needed for verbs like those exemplified in (12) to (14) above to occur in the *way*-construction. This is shown by examples (15) to (17) below, in which the construction conveys physical motion of the subject and no metaphorical extension is involved; in other words, abstract means of enabling motion does not necessarily entail abstract motion.

(15) *The Kremlin announced that Russians could buy their way out of the country by paying a passport fee.*

(16) *[I]t took Beau more than an hour to talk his way into the Fort Morgan brig.*

(17) *He was guiding just one refugee, a Guatemalan woman who seemed too harrowed by past ordeals to try bluffing her way past uniformed men at a port of entry.*

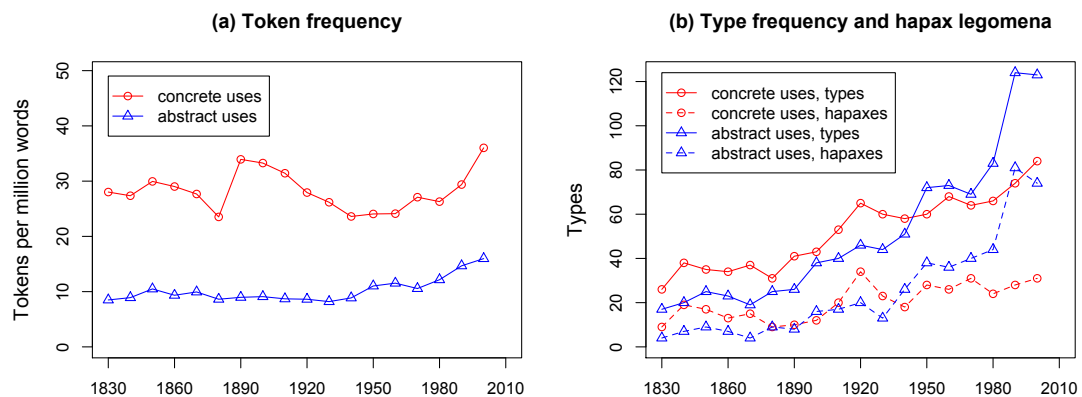
It may thus be the case that the construction only becomes more productive in these verb classes, yet does not vary in schematicity, in the sense that metaphorical uses do not become more prominent. To investigate this question, I examined data from the Corpus of Historical American English. All instances of a verb followed by a possessive determiner, the word

way, and a preposition between 1830 and 2009<sup>4</sup> were extracted from the corpus (20,197 tokens). These corpus hits were manually filtered for instances of the *way*-construction, yielding 17,972 instances of the construction. For this study, only instances of the path-creation sense of the construction were considered (Traugott & Trousdale, 2013; Perek, 2018), in which the verb describes the means whereby the motion of the subject referent is caused or enabled. This ruled out cases where the verb describes the manner of motion (as opposed to its means), or some action performed simultaneously with motion but unrelated to it, as exemplified by (18) and (19) below respectively.

(18) *The horse was plodding its way through the snow-drifts.*

(19) *She heard him whistling his way up the stairs and into the bathroom.*

The 15,446 tokens of the path-creation sense thus obtained were further annotated as to whether they refer to concrete or abstract motion. If the sentence described motion of the subject in a concrete sense in physical space, it was labelled concrete motion; if not, it was labelled abstract motion. Figure 5 below shows diachronic variation of a range of quantitative measures, comparing abstract vs. concrete uses of the construction.



**Figure 5: Token frequency, type frequency and hapax legomena of concrete vs. abstract uses of the *way*-construction**

Figure 5a shows variation in token frequency per decade, normalized by the corpus size of each decade. Token frequency is relatively stable for both kinds of uses. Abstract uses tend to increase in frequency in the latest decades, but so do the concrete uses (and even more sharply at that). In sum, abstract uses do not seem to become significantly more common, and their frequency seems to follow the general trends of the construction. Figure 5b

<sup>4</sup> The corpus also contains data from the 1810s and the 1820s, but these two decades were removed from consideration because they are markedly smaller than later ones and are less well balanced in genre.

shows variation in the number of different verb types found in concrete vs. abstract uses, and in their hapax legomena, i.e., of the verb types attested only once in each decade, how many exemplify a concrete vs. an abstract use of the construction. While both uses are on the rise in all measures, the increase is stronger for abstract uses, to the extent that they overtake concrete uses in later decades. In other words, abstract uses end up instantiating more verb types than concrete uses, and most productive uses of the construction (as measured by the number of hapax legomena) tend to be abstract in later decades. This gives quantitative support for the idea that the recent productivity of the construction primarily lies in uses instantiating abstract motion.

As argued earlier, an increase in productivity does not always correspond to an increase in schematicity of the constructional meaning. In the case of the *way*-construction, it may be the case that new verb types are attested in the construction in large part because speakers use the construction to express new kinds of abstract events in terms of the motion component coded by the construction; in these new types of abstract motion, the action that enables motion might be one that was previously unattested in the construction. In other words, it could be hypothesized that this increase in productivity is tied to an increase in the schematicity of the constructional meaning, in particular its motion component, which becomes more open to more diverse types of metaphorical motion.

To confirm this intuition and gain a better understanding of change in abstract uses of the *way*-construction, the remainder of this case study focuses on characterizing the different types of abstract uses and whether they increase in diversity. A subset of the abstract uses of the *way*-construction was examined: namely, those with the preposition *into*. The choice of this sample was motivated by two facts. First, *into* is the most frequent preposition found with abstract uses of the construction (31% of uses), and one of the most frequent overall; this resulted in a smaller yet sizeable sample. Second, focusing on a particular preposition keeps the spatial path relation between the subject of the sentence and the complement of the preposition stable, providing a more restricted set of metaphors than the whole sample. Given the semantics of the preposition, it was also expected that most of the metaphors would be container metaphors, conceptualizing some abstract entity in terms of a container, and the abstract event expressed by the construction as entering that container. This expectation was borne out to a limited extent.

This dataset was annotated according to the kind of abstract motion use exemplified by each token. Identifying metaphors in naturally occurring text is a notoriously difficult task; sorting many diverse metaphorical uses into a discrete number of categories is an even more challenging one. Contrary to grammatical or even some semantic categories, there is no pre-existing list of motion metaphors that could be relied on to annotate the data. Such a list

would probably be open-ended anyway: with motion being such a basic domain of human experience, the range of target domains that can be conceptualised in terms of motion is virtually endless. Moreover, it can be difficult to decide whether two different examples exemplify two different metaphors, or the same metaphor in different ways, in particular by drawing on different mappings between source and target domain.

It is not within the province of this case study to provide definite answers to these thorny methodological issues. The main question is whether the abstract uses of the *way*-construction have increased in diversity over time; hence, it does not matter what classification scheme is used, as long as it is applied consistently in all time periods. The following method was used to annotate the abstract uses of the *way*-construction. First, a subset of the corpus was selected in order to obtain reliable counts for the metaphor categories over time. This is because decades in the COHA vary quite substantially in size, from 13 million words in the 1830s, to 29 million words in the 2000s. However, it is well-known that types and type counts do not vary linearly with sample size (Zipf, 1935; Baayen, 1992, 2009), hence there is no straightforward way to normalize these measures across samples; instead, equal sample sizes are required. Random samples were compiled for each decade of the corpus by randomly selecting texts until the target sample size (i.e., the smallest available sample size: 13 million words) was reached. Second, the early periods (1830s, 1840s and 1850s) in this subset were considered separately (120 tokens); in this dataset, abstract uses were sorted into categories according to the general kind of abstract event that the construction described. Then, the resulting set of categories was used to annotate the later periods (1860s onwards); any token that could not be matched to one of the categories derived from the earlier periods was annotated as “other”. The growth of the “other” categories is our main measure of the increase in diversity of abstract uses. Essentially, what this method captures is how the distribution of abstract uses in later periods differs from that found in earlier periods, or in other words, how well the categories needed to capture the earlier periods cover the later periods. Twelve categories of abstract uses were posited to sort out the 1830-1859 data; they are summarized in Table 1. The left-most column provides a short description of the conceptual metaphor underlying the abstract motion use, in the manner of Lakoff & Johnson (1980). A short identifier is also provided (“mind”, “heart”, etc.) that is used to refer to the category in Table 2 and Figure 6 below. The right-most column contains two to three examples of each type from the corpus.



Type of abstract use	Examples
The Mind is a Container for Thoughts (mind)	<i>The truth of many of these reflections made their way into the mind of Margaret Cooper.</i> <i>Indeed, there is no notion too improbable to find its way into the head of a political hypochondriac.</i>
The Heart is a Container for Feelings, Emotions, etc. (heart)	<i>But a silent sorrow had made its way into her bosom.</i> <i>[N]o human feelings found their way into his long-hardened heart.</i>
Texts are Containers for Ideas, Stories, Words, etc. (text)	<i>The anecdote has found its way into the newspapers.</i> <i>[T]heir prejudices and feelings found their way into the account of the voyage of Lord Byron in the Blonde.</i>
A Group of People is a Container for its Members (group)	<i>He has forced his way into good society.</i> <i>[O]ne could always cut his way into the patrician ranks by the sword.</i> <i>The learned pressed their way into the field of metaphysics.</i>
States are Containers (state)	<i>He fought his way into notice by a duel with one of the Rutledges.</i> <i>The Antiquary [...] was more slow in making its way into favor.</i>
Change of Possession is Change of Location (possession)	<i>I'm glad the money finds its way into the pockets of the like of him.</i> <i>[M]any a comfortable donation [...] found its way into the parish treasury.</i> <i>Some of them [...] found their way into the hands of persons, who did not scruple to claim and publish, as their own, the discoveries and inventions which they contained.</i>
A Whole is a Container for Parts (part-whole)	<i>The black currant should always find its way into every garden.</i> <i>The leading doctrines of Political Economy [...] have been finding their way into the systems of education.</i>

Type of abstract use	Examples
Ideas are Moving Entities (idea)	<i>[T]his accursed superstition [...] is working its way into the empire.</i> <i>In 1811 this new branch of Industry made its way into France.</i>
Sound is a Moving Entity (sound)	<i>[L]ittle belligerent sounds, such as screaming and kicking, occasionally find their way into church.</i> <i>It was not long before a strange voice made its way into the darkness.</i>
Light is a Moving Entity (light)	<i>... the brightest sunlight that ever found its way into a kitchen</i> <i>Thus, the cheerful sun [...] never found its way into the close, cellar-like apartment where the Widow Hope sold needles, tape, and various other articles of trifling value.</i>
Sickness is a Moving Entity (sickness)	<i>I found the cholera had made its way into these fastnesses of nature.</i> <i>[Y]et [the plague] found its way into our little family.</i>

**Table 1: Categories of metaphorical uses of the way-construction with the preposition *into* in the early decades of the corpus (1830-1859)**

The main focus in positing these categories was on the general kind of situation that is being expressed, since it is presumably what is metaphorically encoded by the constructional meaning. Some of these categories correspond to classic examples of conceptual metaphors identified in the literature, such as “The Mind is a Container” (148), “Texts are Containers for Ideas, Stories, Words, etc.” related to the Conduit metaphor (Reddy, 1979; Lakoff & Johnson, 1980, ch. 3), and “The Heart is a Container for Emotions” (Kövecses, 2000), among others. As can be noticed from some of the examples in Table 1, these categories are meant to allow some variation in terms of the vehicles that are used to refer to the target domain. For instance, the “The Mind is a Container” metaphor can be used not only with the word *mind* as container but also the related words *head* and *brain*. Different vehicles are often related by metonymy; this is the case in particular in the “Change of Possession is Change of Location” metaphor, where words such as *hands*, *pocket*, and *treasury* (among others) metonymically refer to someone’s possession.

A category was only posited if there were a least two examples exemplifying it in the 1830-1859 data. This left the following eight orphan tokens, which each exemplify a different kind of abstract use that could not

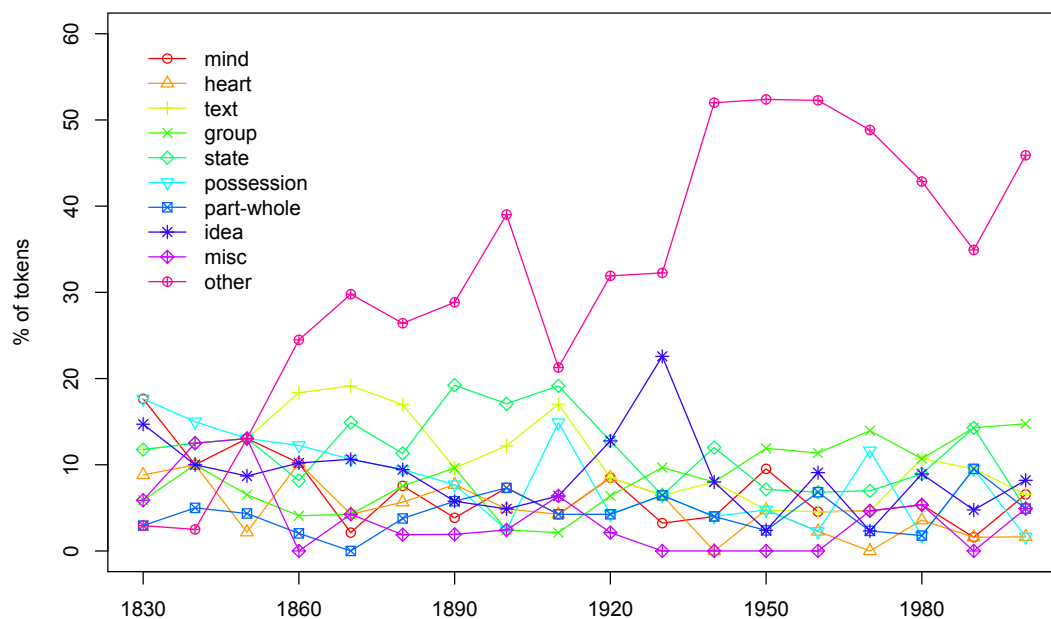
be matched to any of the other categories. Some of them really strike as creative, nonce metaphors, such as examples (24) and (25), while others might well stem from conventional metaphors that are nonetheless not especially prominently used in the *way*-construction.

- (20) *The people are slowly working their way into some sort of empirical knowledge.*
- (21) *[S]omething new and extraordinary had found its way into the market.*
- (22) *[H]e with difficulty engineered his way into [his nether garments].*
- (23) *I hev the power to feel my way into Rafe's head, and when I gits thar, I jest handles his pocket like my own.*
- (24) *The vitality and force, which are abundantly displayed in every department of active life, would soon find their way into a higher channel, to meet the new and clamorous necessity for mental food.*
- (25) *And hence this book presents its author to our mind, as one who has traveled out of the beaten track of human experience and inquiry, has peeped over those precipices along the pathway of life, which most travelers think it prudent to avoid, and has groped his way into the dark caverns that open, upon the earthly pilgrim's course, generally keeping himself either out of sight, or else in exposed situations, and yet seldom so far off as not to hear the repeated expression from the great body of his fellow pilgrims.*
- (26) *It gropes its way into caves and dungeons where the secret agents of know nothingism practice their incantations, to invoke them to its aid.*
- (27) *It seemed to be mingled throughout with the recollections of father, mother, brother, and all the trials and preventions through which he had made his way into life.*

The categories in Table 1 were used to annotate the rest of the data. As indicated earlier, any token that did not match any of these categories was sorted into a thirteenth category, "other" (including the ten examples listed above). The frequency counts of each category across the 180 years of the corpus thus obtained are summarized in Table 2, tallied in 30-year time periods. Change in the relative importance of each category as a percentage of the total number of abstract uses is represented in Figure 6. Since the categories 'sound', 'light', and 'sickness' are very low-frequency, they were collapsed into a single "miscellaneous" category ('misc') in Figure 6.

Period	1830-1859	1860-1889	1890-1919	1920-1949	1950-1979	1980-2009
mind	16	10	7	6	8	8
heart	8	10	8	6	3	4
text	15	27	18	8	6	16
group	11	9	8	8	19	24
state	18	17	27	12	9	20
possession	18	16	12	5	8	8
part-whole	5	3	8	5	5	10
idea	13	15	8	15	6	13
sound	2	1	1	0	0	0
light	3	1	1	0	0	1
sickness	3	0	1	0	0	2
other	8	40	41	38	66	74
Total	120	149	140	103	129	180

**Table 2: Frequency variation of types of abstract uses of the *way*-construction with the preposition *into* across six 30-year time periods**



**Figure 6: Diachronic change in the distribution of the abstract uses of the *way*-construction with the preposition *into***

As can be seen in Table 2 and Figure 6, the initial categories of abstract uses are relatively stable in frequency. Some of them, such as “state” and “text”, even decrease slightly, and only “group” seems to somewhat gain in popularity. The less frequent ones (such as “part-whole”, and the categories subsumed under “misc”), which could have been seen as innovations on the rise, actually do not become more common. At any rate, none of the initial categories seem to become particularly more prominent in later decades. Interestingly for our purposes, the only major development lies in a rapid though unsteady increase of the “other” category, which grows almost

twenty-fold: from 3% in the 1830s, up to 52.4% in the 1950s of all tokens of abstract uses of the construction do not match any of the categories attested in the first decades of the period of interest. This is evidence that there is indeed a sharp increase in the range of situations conceptualised as motion in uses of the *way*-construction over the last 180 years.

While many of these new uses could well be creative, one-shot metaphors, some of them can be seen to belong to new categories that recur over time. The examples below illustrate some of these new categories:

- (28) a. *[T]he word has not yet pushed its way into classic usage. (1865)*  
b. *When German Walz made its way into English, the unfamiliar initial sound of the German was displaced by English v or w. (1921)*  
c. *Overnight a fearful new word has bullied its way into our language. (1957)*
- (29) a. *You have bullied your way into the dictatorship. (1928)*  
b. *Houde had bribed his way into office. (1945)*  
c. *[H]e'd bluffed his way into the trainer's position at a small farm in Florida. (1993)*
- (30) a. *He had bought his way into the Illinois Central which Stuyvesant Fish controlled. (1926)*  
b. *Newcomers are fighting their way into the industry. (1994)*  
c. *[T]he Justice Department suspected the Mob was working its way into the Indian gaming industry. (2008)*

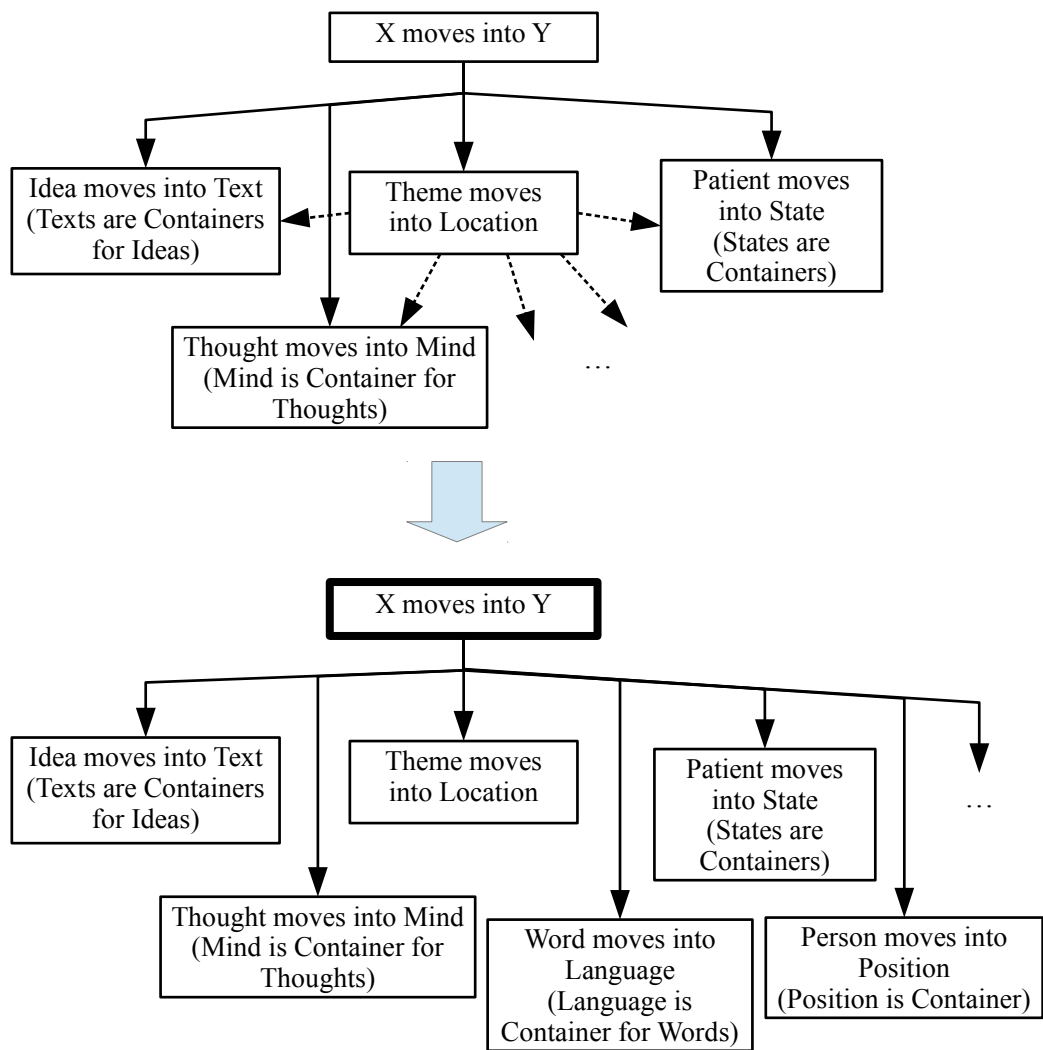
Examples (28a-c) involve construing a language as a container for words and expressions. In examples (29a-c), a position, job or role is seen as a container for the person holding it. Finally, in examples (30a-c), investing in a company or market is construed as motion. To some extent, these new categories can be seen to be somewhat related to the existing ones, which motivates their occurrence in the construction, but they are sufficiently different to be considered distinct, and none of these uses are attested in earlier decades, which points to their status as innovative uses of the construction. Importantly, many of these new ways to use the *way*-construction extend the productivity domain of the verb slot of the construction by allowing types of verbs that were not attested so far. For instance, there can be many ways whereby someone manages to assume a position, as in examples (29a-c) above. Hence, this use brings new verb types into the distribution of the construction, such as *murder* and *steal*, which are only attested in this use in the sample under study. Another good illustration is provided by examples (31a-c) below, which involve a metaphorical construal of gaining unauthorized access to a computer system in terms of

breaking into it. This relatively recent use of the construction adds IT-related words to the distribution, such as *dial*, *click*, and the computer sense of *hack*.

- (31) a. *Nobody just dials his way into the war games subsystem. Even if he managed to get on line, there are five levels of passwords. (1983)*  
b. *No more clever than hacking your way into records at the coroner's office and police department. (1995)*  
c. *She clicked her way into the Veterans' Administration computer in Chicago. (2003)*

Many of these new uses are quite plausibly motivated by socio-cultural and technological change, not unlike the case of *spend* examined in the previous section. This is obviously the case for the computer hacking uses in (31a-c), and can also be said of the “Investment is Motion” uses in examples (30a-c). At any rate, there is an increase in the diversity of abstract uses of the *way*-construction over time, which can be interpreted as an increase in schematicity. Figure 7 outlines a description of this change in terms of the network model. The top diagram in Figure 7 is a possible description of the constructional network of the *way*-construction at the beginning of the period of interest; for the sake of simplicity, only the motion component of the constructional meaning is represented, since it is change in this aspect of the construction that is being considered here. The box labelled “Theme moves into Location” represents concrete uses. At the beginning of the period of interest, abstract uses are already well established in the construction; we can thus hypothesize that some of the types of abstract uses, especially the most frequent ones, are also stored as conventional subconstructions, each conveying a metaphorical variant of the motion component. These are represented in Figure 7 as boxes linked to the concrete use by a dashed arrow, symbolizing a relation of metaphorical extension; the ellipsis suggests that there might be more of these subconstructions than the four pictured in Figure 7. Although this is not the chief concern of this article, these extension relations can be seen to correspond to horizontal links between the abstract uses of the *way*-construction and the central, concrete use they derive from.

In the abstract uses, the motion component relates different kinds of entities from Theme and Location that cannot be understood in terms of concrete motion, and a metaphorical mapping, indicated in brackets, is involved in the interpretation of the motion component. The presence of these metaphorical extensions allows to posit a more general representation of the construction that abstracts over the variants of the motion component. This higher level of representation retains only a general motion schema but not the ontological type of the elements involved in the schema, and by extension that of the motion component itself. This is represented by the top box in Figure 7, with plain arrows depicting relations of inheritance from this generalization to the concrete use and the abstract uses.



**Figure 7: Change in schematicity of the motion component of the *way*-construction with the preposition *into***

The change occurring in the uses of the *way*-construction with the preposition *into* over the past 180 years, as identified in this case study, is pictured in the bottom diagram of Figure 7. There is an increase in the range of situations conceptualised as motion in uses of the construction; for example, new abstract uses have appeared, such as “Word moves into Language” and “Person moves into Position” in Figure 7.<sup>5</sup> Presumably, this leads to speakers’ awareness that the construction has become more open to more diverse abstract uses than it used to be, which in turn allows new kinds

<sup>5</sup> The horizontal links mentioned above between the metaphorical uses and the concrete use are not reproduced in this diagram, mostly for reasons of space and visibility. Also, while there is no reason why these relations would not be kept in the latter stage, it is also possible that these relations become less salient as the abstract uses become more established, and thus perceived as independent from the concrete use they originally stem from. I will leave this question for future research.

of abstract uses to occur in the construction. In terms of the network model, this can be taken to mean that the most schematic node becomes more salient in the network representation of the construction; this is marked by bolder lines in Figure 7. As discussed in section 3, this corresponds to an increase in the schematicity of the construction. There is less of a tendency for speakers to treat abstract uses as extensions of the concrete meaning, but rather as direct instantiations of the more abstract construction.

To summarize, the examination of metaphorical uses of the *way*-construction with the preposition *into* shows an increase in the diversity of abstract motion uses, which can be linked to an increase in schematicity. As revealed by previous studies (Israel, 1996; Perek, 2018; Fanego, 2018), there is at the same time an increase in the productivity of the verb slot of the construction. These two changes are probably not fully independent from each other, since the verbs joining the distribution of the construction mostly refer to an abstract action, and hence are more likely to cause abstract, metaphorical motion rather than concrete, physical motion. It seems reasonable to assume that it is the change in schematicity, or more specifically the appearance of new abstract uses, that caused the increase in productivity; however likely, this is still mere speculation, since as argued in section 4, the causal link between schematicity and productivity can be seen to work both ways, and the purpose of this study is not to identify this causal link in the case of the *way*-construction. The point of this case study concerning the relation between productivity and schematicity is that we cannot in principle use one to identify the other; any attempt to do so is merely speculative, since they are manifested differently in the data.

## 5. Conclusion

Studies in Diachronic Construction Grammar are often concerned with change in two properties of constructions: schematicity and productivity. Schematicity refers to the level of abstraction at which a construction is represented (and its constructional meaning in particular), and productivity refers to the property of a construction to be used with a wide range of lexical items. In terms of the network model, an increase in schematicity can be defined as the creation or reinforcement of a node superordinate to a construction, and an increase of productivity as the creation of lexically-specific nodes subordinate to a construction.

These two properties are often assumed to be so interdependent that change in one should automatically affect the other. However, as argued in this paper, the schematicity and productivity of constructions are not always as directly related as is commonly thought. An increase in schematicity makes a construction applicable to the description of a wider range of situations, which in turns should allow a wider range of lexical items to be combined with it. However, as shown by many studies of grammaticalization and constructionalization, this does not mean that a construction will always be



used with the whole range of items compatible with it, as this depends on whether speakers have a communicative need for it. Conversely, an increase in productivity can mean that the construction is used with lexical items that are not fully compatible with its schematic meaning, which in time can lead to an increase in schematicity; this is, however, dependent on how the new lexical meanings relate to the constructional meaning.

To address this discrepancy, a distinction must be made between two kinds of schematicity: that of the lexical slots of a construction, i.e., generalizations over the meaning of a construction's lexical fillers, and that of the constructional meaning as a whole. Only the former is, by definition, directly related to productivity. For constructions with little to no semantic contribution of their own (such as for instance many abstract argument structure constructions), the schematicity of slots is essentially all that the semantic representation of the construction consists of; hence, it is possible to use a construction's productivity to make claims about its schematicity, and vice-versa. If, however, the construction contributes meaning above and beyond that of the lexical items, changes in this constructional meaning must be examined on its own, by looking at individual instances of the construction, but claims about the schematicity of the construction should not be made on the basis of the lexical distribution alone.

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