

A frame-based approach to evaluative morphology

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Abstract

Although the intuitive effects of evaluative morphology are clear, the semantic details are certainly not. In the present study, we seek to explicitly model the semantics of evaluative morphology. We challenge the idea that evaluation can be modeled as the addition of a component of meaning to the base lexeme and we motivate an analysis under which evaluative morphology is relational in nature. Evaluative morphology expresses a relation between the derived lexeme and a comparison class, of which the derived lexeme is a member, with respect to a pertinent scale. To this end, we invoke a frame-based approach and propose a treatment of English diminutive and augmentative affixation in terms of lexical rules in the form of attribute-value matrices. A formal treatment and modeling of evaluative morphology allows us to tackle the issue of modification in word formation and gain a better understanding of the interaction between the semantics of the base and the semantics of the affix. An explicit modeling of evaluative morphology also gives us a clear-cut classification of English affixed formations into diminutive and augmentative. Our formal analysis of evaluation has ramifications for the way we classify the prefix *midi-*, which cannot be easily classified as diminutive or augmentative.

Keywords: evaluative morphology, lexical semantics, frames, affixation

1 Introduction

Following the seminal work of Scalise (1984: 132-133) on evaluative affixes, a number of approaches on the formal and pragmatic aspects of evaluation have been developed (for a recent handbook on evaluative morphology see Grandi and Körtvélyessy 2015a).

With respect to the formal aspect of evaluative morphology, scholars raise issues that pertain to the formal properties of evaluative morphology, its status and place within morphology (Scalise 1984; Stump 1993; Beard 1995; Štekauer 2015). In particular, much attention has been directed towards the status of evaluative morphology as an independent “third morphology” in between derivational morphology and inflectional morphology (Scalise 1984). Consider, for example, that evaluative affixes exhibit properties that are characteristic of either derivational morphology (i.e. they affect the semantics of the base) or inflectional morphology (i.e. they do not affect the categorial properties of the base). In a recent study on the place of evaluation within morphology, Grandi (2015) concludes that the nature of evaluative morphology as either derivational or inflectional is not a “yes/no question” since the

application of pertinent criteria to various languages leads to different results. Thus, although there might be properties that are shared cross-linguistically (e.g. high degree of redundancy of evaluative morphology), the status and place of evaluative morphology within the morphological component is rather language-specific.

Studies on the pragmatic and semantic aspect of evaluative morphology are primarily concerned with the descriptive and qualitative functions of evaluative morphology. Studies on morphopragmatics (Dressler and Merlini-Barbaresi 1994; Schneider 2003; Merlini-Barbaresi 2015) have contributed to our understanding of functions of evaluative morphology that emerge in discourse, as for example, *tenderness*, *irony*, *euphemism*, *modesty*, *anger*, *pleasure*, *request*, *pleading*, *contempt*, and *sarcasm*. Studies on semantics have analyzed evaluative morphology in terms of semantic primitives (Wierzbicka 1996; Lieber 2007), as a radial category (Jurafsky 1996), and from a cognitive perspective (Prieto 2005, 2015).

Although evaluation has been the focus of much literature (for a recent handbook see Grandi and Körtvélyessy 2015a), a satisfactory formal modeling of the semantics of evaluative morphology, and thus, modification in word formation, is still a desideratum. Although the intuitive effects of evaluative morphology are clear, the semantic details are certainly not. In addition, a clear-cut classification of English formations into diminutive and augmentative is still an open issue as evident in the analysis of *midi-* in Bauer et al. (2013: 406).

The aim of the present study is threefold. First, to explicitly model the semantics of evaluative morphology. Second, to inform the discussion on the way modification works at the interface between morphology and lexical semantics. Third, to offer a clear-cut classification of English evaluative formations into diminutive and augmentative. To this end, we invoke a frame-based approach¹ that has been developed in Petersen (2007), Kallmeyer and Osswald (2013), and Löbner (2014). We draw on corpus-extracted data from English diminutive and augmentative affixes, and motivate a treatment of evaluative morphology in terms of lexical rules using the formalism of attribute-value matrices.

An explicit formal treatment and modeling of evaluative morphology will allow us to gain a better understanding of an issue that figures prominently in lexical-semantic studies, namely, the interaction between the semantics of the base and the semantics of the affix. In particular, it will allow us to be very specific with respect to the way evaluative affixes modify the semantic structure of the base. Some pertinent questions to be addressed are the following:

- *Can modification be considered as the addition of a semantic component to the base lexeme?*
- *What is the nature of this semantic component? Is it a semantic primitive?*

¹Frames have been used by several scholars to model linguistic phenomena (for an overview see Lehrer and Kittay 1992). Frames, for example, figure in works on Lexical Functional Grammar (Bresnan 2001) and Head-Driven Phrase Structure Grammar (Pollard and Sag 1994). More recently, Sag (2012) uses a version of Frame Semantics and Minimal Recursion Semantics (Copestake et al. 2005). Fillmore's frames (Fillmore 1982) are used in the FrameNet project (Fillmore and Baker 2010). For an overview of the main similarities and differences between frame-based approaches, the interested reader is referred to Osswald and Van Valin (2014). For evidence for frames in human language see Löbner (2014).

- *By which mechanism is this component added to the base?*

By answering these questions, the present study aims to fill a gap with respect to the study of evaluation in morphology and other fields. As we will show, the semantics of evaluative morphology should not be treated in isolation from advancements in the study of the semantics of scales and comparison classes in other fields (Kennedy 2007; Barner and Snedeker 2008; Bale 2011; Tessler et al. 2017).

An explicit modeling of the semantics of evaluative morphology will also allow us to touch upon the issue of the classification of English affixes into augmentatives and diminutives. In particular, as Bauer et al. (2013) in their treatment of evaluative morphology have shown, this is a non-trivial task. As we will see in Section 5, it is not clear how one should classify *midi*-lexemes such as *midibus* and *midi-skirt*.

The rest of the paper is structured as follows: Section 2 presents the way the semantics of evaluative morphology has been treated in previous literature. It also introduces the notion of comparison class. Section 3 gives a brief overview of the way a frame-based approach can be used to capture the semantics of word formation. In Section 4, we offer an analysis of the semantics of evaluative morphology and in Section 5, we tackle the issue of classification of affixes into diminutive and augmentative. Section 6 concludes the paper.

2 Size, primitives, and modification

In this section we present the way evaluative morphology has been treated in previous literature and introduce the notion of comparison class. We focus on two aspects. First, the central role of the category of size in evaluation. Second, the way modification works in evaluative morphology.

2.1 The central role of size

As argued for by Prieto (2015: 22), the meaning of evaluative affixes “is grounded in the fundamental bodily function of perception, and visual perception of size, particularly”. Thus, the starting point for the meaning of evaluatives is the category of size (Jurafsky 1996; Prieto 2005, 2015). This means that the qualitative function of evaluative affixes (i.e. the expression of subjective feelings and opinions) is secondary, in that it derives from the descriptive one (i.e. the descriptive characteristics of an item) via figurative extensions (Wierzbicka 1984; Jurafsky 1996; Prieto 2005, 2015).

The link between size and other notions such as endearment is shown in the studies of Jurafsky (1996) and Prieto (2005) that build on the model of radial categories of Lakoff (1987). Under these approaches, there is a core primitive from which other senses emerge. Consider Figure 1:

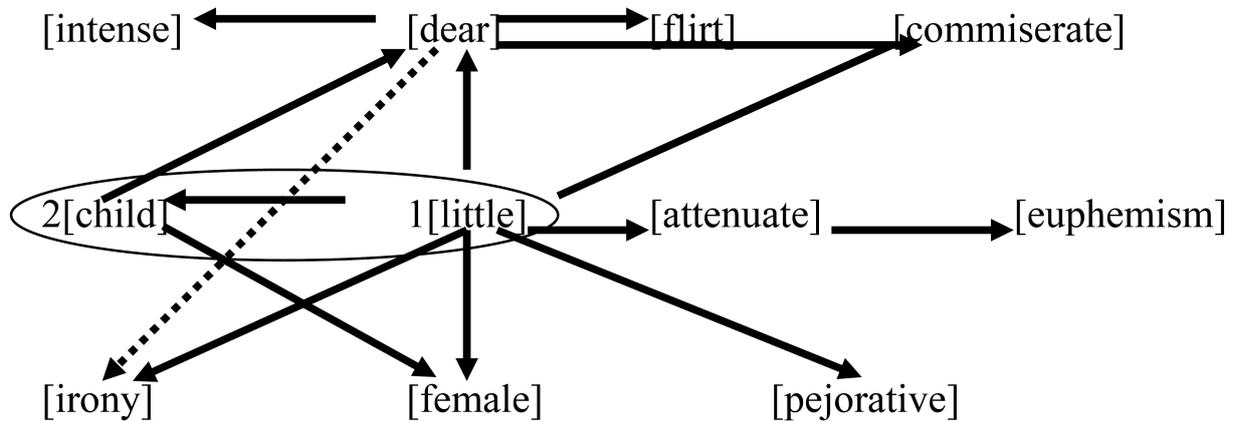


Figure 1: Radial models of diminutives (Prieto 2005: 86)

As shown in Figure 1, the polysemy of evaluative affixes can be considered as structured polysemy, in that there is a core from which other senses emerge. The core in Prieto’s analysis of diminutives is “littleness”. We will return to the issue of polysemy in Section 4.

In addition to polysemy, any treatment of the interface between morphology and lexical semantics needs to account for the way the semantics of the base and the semantics of the affix interact. That is, the way the affix modifies the base. Below we present the traditional view with respect to the semantics of evaluative morphology.

The traditional view, which we will call the “additive” view, is nicely captured in the following excerpt from Schneider (2013): “the suffix does not change the word class of the base, nor does it crucially change the meaning of the base. The meaning of the base is merely modified by adding the semantic component *SMALL*” (Schneider 2013: 138). As is clear from this passage, under the traditional approach, the contribution of the affix is characterized as the addition of a component to the base. A formalization of this view can be sketched as in (1).

$$(1) \text{ base} + \text{affix}[\text{SEM: } \textit{small}] \rightarrow \text{base}[\text{SEM: } \textit{small}]$$

In (1), there is a base, e.g. *bomb*, we add to it a suffix, e.g. *-let*, which comes with the semantic specification *small*, and we get a derived lexeme with the meaning “small base”, e.g. *bomblet*: “a small bomb”. Thus, under the additive view, we have modification by addition of a component. This component is *SMALL* in the case of diminution and *BIG* in augmentation.

Although the approach sketched in (1) seems to be intuitively on the right track, it leaves much to be desired on a lexical-semantic level. In fact, although the intuitive effects of evaluative morphology are clear, the semantic details are certainly not. In what follows, we show that neither the ontological status of this assumed component is clear nor the mechanism by which it is added to the base is spelled out in any detail in the relevant literature.

Let us begin with the examination of the ontological status of the *SMALL*, *BIG* components. Wierzbicka (1989, 1996) proposes to capture the distinction between the descriptive func-

tion and the qualitative function of evaluation in terms of the semantic primitives SMALL, BIG, GOOD, and BAD. The primitives SMALL and BIG, which Wierzbicka (1996: 36) calls “descriptors”, relate to the evaluation of the physical properties of an item. The primitives GOOD and BAD, which Wierzbicka (1996: 36) labels “evaluators”, relate to the expression of subjective feelings such as endearment, appraisal, contempt, and attenuation.

Lieber (2004, 2007, 2016a) also proposes an approach that is based on semantic features that are primitives of meaning. The feature that is relevant to evaluative morphology is the feature [scalar] that reads as

- (2) [+/-Scalar]: This feature signals the relevance of a range of values to a conceptual category. With respect to [-dynamic] SITUATIONS it signals the relevance of gradability. Those SITUATIONS for which a scale is conceptually possible will have the feature [+scalar]. Those SITUATIONS for which a scale is impossible will be [-scalar]. With respect to SUBSTANCES/THINGS/ESSENCES [scalar] will signal the relevance of size or evaluation. This will be the feature which characterizes augmentative/diminutive morphology in those languages which display such morphology. (Lieber 2016a: 39)

The analyses of Wierzbicka (1996) and Lieber (2007) highlight two important aspects of evaluative morphology. Lieber’s analysis focuses on the importance of scalarity in evaluative morphology and Wierzbicka’s analysis highlights the importance of the category of size in the meaning of evaluatives. Both proposals, however, have some shortcomings to which we turn our attention.

Although Lieber is right to highlight the role of scalarity in evaluative morphology, it is not clear how the feature [scalar] could be used in order to derive the correct semantics of evaluative formations. It should also be mentioned that an analysis which is based on positive and negative values (e.g. [-scalar] and [+scalar]) is rejected by Wierzbicka (1996: 108-109).

A well-known problem with Wierzbicka’s analysis relates to antonymy and the use of primitives such as SMALL and BIG. It is certainly not the purpose of the present paper to provide an overall theory of semantic features, but it is worth mentioning that the option to use semantic primitives such as SMALL/BIG is problematic from a semantic perspective. The basic characteristic of a semantic primitive is that it is not further analyzable. This means that we cannot decompose SMALL and BIG into smaller pieces of semantic information. But if SMALL and BIG cannot be further decomposed, it is unclear how one would establish a relation of antonymy between the two (Löbner 2013: 244).

In addition, to date, there is a gap in the relevant literature on the mechanism by which a component of meaning is added to the base. A treatment of this issue is offered in a series of publications within the realms of Rochelle Lieber’s Lexical Semantic Framework (Lieber 2004, 2007, 2010, 2015, 2016b). This framework applies a decompositional approach to meaning and makes use of a repository of universal semantic features (i.e. semantic primitives) to which every particular language has access. As we saw above, the feature that accounts for evaluative morphology is [scalar]. Although Lieber offers a detailed formal treatment of affixational processes involving affixes such as *-er*, *-ee*, and *non-*, she does not elaborate upon evaluative morphology in any detail.

Finally, a description of the semantics of evaluative morphology is more complex than the approach in (2) suggests. Consider the following from Grandi and Körtvélyessy (2015b: 13):

“[...] a linguistic construction can be defined as evaluative if it has the function of assigning a value which is different from that of the standard or default (within the semantic scale to which it pertains) to a concept: this value usually coincides with a shift towards the negative or positive end of the scale and is assigned without resorting to any parameters of reference which are external to the concept itself. [...] For example, the Italian sentence *questa é una casetta* ‘this is a small house (lit. house-DIM)’ means that the house in question is small with respect to the standard size of Italian houses.” (Grandi and Körtvélyessy 2015b: 13)

This passage introduces some crucial characteristics of evaluative morphology that any semantic account must take into consideration. Crucially, evaluation assigns a value that is different from the default within a pertinent scale. Furthermore, the assignment of this value is not based on parameters of reference which are external to the concept itself (on this also see among others Jurafsky 1996; Körtvélyessy 2015; Štekauer 2015).

Based on the foregoing discussion we propose that the analysis of the semantics of evaluative morphology should not be treated in isolation from advancements in the study of the semantics of scales in other fields in which the use of comparison classes is uncontroversial (Cresswell 1977; Klein 1980; Kennedy 2007; Barner and Snedeker 2008; Bale 2011; Tessler et al. 2017).

A comparison class provides a standard of comparison or frame of reference. Jurafsky (1996) uses a similar notion, namely, that of the prototypical exemplar of a category. In the *casetta* “small house” example from Grandi and Körtvélyessy (2015b: 13) the comparison class is other Italian houses. In a similar vein, the comparison class in the sentence in (3) is the set of *9-year-old* children.

(3) John is tall for a 9-year-old.

A major difference between evaluation in morphology and evaluation in syntax is that in morphological formations the comparison class is always explicit, whereas in syntax the comparison class could be left implicit. Consider for example that in (4), the comparison class, i.e. the set of all people, is implicit:

(4) John is tall.

The introduction of comparison classes in the treatment of the semantics of evaluative morphology has an important ramification. In particular, comparison classes induce a presupposition, that is, the derived word in morphology or the subject in syntax is a member of the comparison class. Thus, the sentences in (5) imply the truth of the sentences in (6). Irrespective of whether *John* is tall for a 9-year-old or not, *John* is a 9-year-old. In a similar vein, the sentence in (5b) presupposes that I am holding a bomb.

- (5) a. John is tall for a 9-year-old.
b. I am holding a bomblet.

- (6) a. John is a 9-year-old.
b. I am holding a bomb.

In contrast to the traditional additive approach, this view of the semantics of evaluative morphology suggests that evaluation is relational and not additive in nature. The semantics of evaluative morphology involves a comparison between the derived lexeme and the set of things denoted by the base lexeme (i.e. the comparison class) with respect to a pertinent scale. It is this relational nature of evaluative morphology that we tackle and model in the present study. Despite the complex state of affairs exhibited by evaluative formations, we will show that the semantics of evaluative morphology can be accounted for in a straightforward manner in terms of frames.

3 Frames

In what follows, we give a brief overview of the way frames are used as formats for describing concepts, with an emphasis on word formation.

Frames are recursive attribute-value structures that provide information about referents. They can be represented as either attribute-value matrices, as also used, for example, in Head-driven Phrase Structure Grammar (HPSG, Pollard and Sag 1994), or as directed graphs. In the latter formalization a frame is “a directed, connected graph with nodes labeled by types and arcs labeled by attributes” (Petersen and Osswald 2014: 248). Attributes are always functional, in that there cannot be two arcs labeled with the same attribute going out from one node. The central node is the reference node² and is marked by a double border; rectangular borders are used for arguments. Consider for example the partial frame of the concept >ball<³ as a directed graph and as an attribute-value matrix:

²The reference node stands for the referential argument. In the case of nouns, for example, it stands for the so-called “R” argument that suggests ‘referential’ and is involved in referential uses of NPs (Williams 1981; Wunderlich 2012).

³Concepts will be included in brackets > <.



Figure 2: Partial frame for >ball< as a directed graph and as an attribute-value matrix

Figure 2 informs us that the *SHAPE* of >ball< is *round*. The double border marks the central node that refers to the extension of the concept. It should be mentioned that all frames which we will present in the paper will be partial and will include information that is uncontroversial. That is, it is taken for granted that >ball< has at least one characteristic, that is its *SHAPE*. In the present study we will model only those attributes that are necessary for the discussion. *ball* in Figure 2, for example, as a physical object has many more attributes (e.g. *COLOR*) which we do not model in the partial frame.

3.1 Word formation and frames

In frame-based approaches, word formation is generally treated in terms of referential shifts (see for example Löbner (2013) and Schulzek (2014) on *-er* and possessive compounds in German, and Kawaletz and Plag (2015) and Plag et al. (forthcoming) on English *-ment* nominalizations). The derived *walker* serves as an illustrative example (from Löbner 2013: 312).

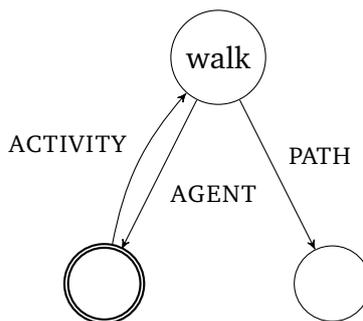


Figure 3: Frame for >walker<

The concept >walk< has at least two attributes, namely *AGENT* and *PATH* as for example in *We walked to the station*. Thus, >walker< is formed by shifting the reference to the value of the attribute *AGENT* of >walk<. Observe that in accordance with bidirectional functionality,

there is an attribute *ACTIVITY* that links the new referent back to the original referent node; a *>walker<* is engaged in a walking activity.

Kawaletz and Plag (2015) analyze *-ment* nominalizations in a similar manner. Consider, for example, the frame for the derived *bumfuzzlement* in Figure 4 (from Kawaletz and Plag 2015: 312).

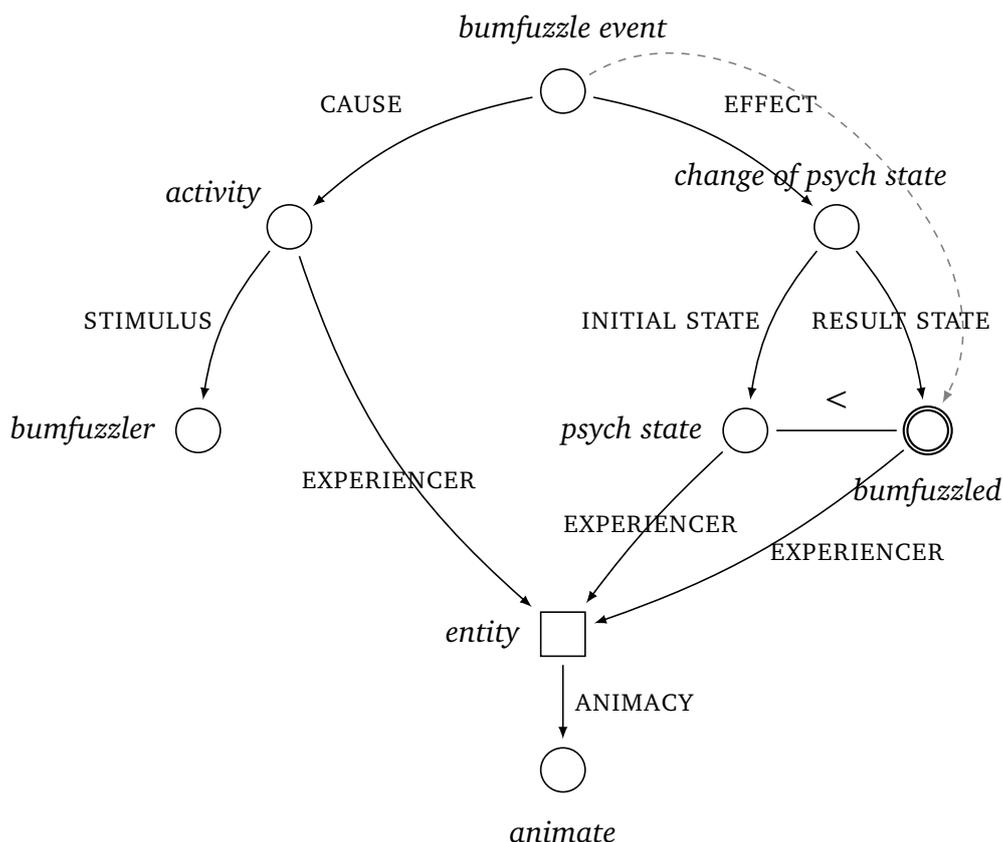


Figure 4: Partial frame for the nominalization *bumfuzzlement* in a RESULT STATE reading

In their analysis, the verb *bumfuzzle* is a complex event of psychological causation and consists of two sub-events: a CAUSE and an EFFECT. The CAUSE is an activity and the EFFECT is a change of psych state with an INITIAL STATE and a RESULT STATE. Thus, the RESULT STATE reading of *bumfuzzlement* is understood as a shift from the original referential node, i.e. *bumfuzzle event*, to the node *bumfuzzled*, which specifies the arc of RESULT STATE.

4 Evaluation and frames

In the previous section we presented cases in which the reference is shifted to an argument of the base. For example, we saw that the concept *>walker<* is formed by shifting the refer-

ence from the original referential node, WALK, to the value of the attribute AGENT of >walk<. Evaluative morphology in English, however, serves a rather different function. Crucially, evaluation assigns a value that is different from the default within a pertinent scale.

The issue now arises how best to capture and model this function of evaluative morphology. In order to tackle this issue we have to be specific with respect to two aspects. The first aspect is the general format of concepts one assumes. Feature structures, on which frames are based, offer a straightforward modeling of the pertinent scale and the value the concept has for that scale. In a frame, the pertinent scale (e.g. size) is considered a functional attribute (i.e. SIZE) which assigns a particular value to the referent of the frame.

The second aspect is the mechanism by which we account for the properties of evaluative morphology. We propose to capture evaluation in terms of a lexical rule that models the interaction of the semantics of the process of evaluation and the semantics of the base. Lexical rules have a long tradition in constraint-based models and have been used as a mechanism to reduce redundancy and to capture generalizations in the lexicon (see among others, Bresnan 1982; Pollard and Sag 1994; Briscoe and Copestake 1999; Sag 2012; Bonami and Crysmann 2016).

Lexical rules will be given in the form of attribute-value matrices and not in the form of graphs. Attribute-value matrices (contrary to graphs) make explicit reference to phonological and categorial features, and allow us to express scope. Attribute-value matrices have been used by HPSG (Pollard and Sag 1994; Riehemann 1998; Koenig 1999) and other constraint-based models (see Bonami and Crysmann 2016 and literature therein) to capture morphological phenomena. In frame-based approaches, attribute-value matrices have also been used for syntactic and computational purposes (see for instance Kallmeyer and Osswald 2013; Osswald and Van Valin 2014). As we will show, the use of attribute-value structures proves to be very useful with respect to the analysis of evaluation.

In what follows, we exemplify how the system we described above can account for the semantics of evaluative formations. We use the core category of SIZE and the affixes *mini-*, *-let*, and *super-* as starting points. Some of these affixes, such as *super-* are polysemous. The polysemy of these affixes can be considered as structured polysemy along the lines of Jurafsky (1996) and Prieto (2005), in that there is a core (size) from which other senses emerge.

4.1 Diminution

In (7), we give the rule for diminution via prefixation.

$$(7) \left[\begin{array}{l} \textit{lexeme} \\ \text{PHON /prefix-}\boxed{1}\text{/} \\ \text{CAT N} \\ \text{SEM} \left[\begin{array}{l} \text{S-FRAME } \boxed{2} \text{ !} \left[\begin{array}{l} \text{SIZE } \beta \\ \dots \end{array} \right] \end{array} \right] \\ \\ \text{M-BASE} \left[\begin{array}{l} \textit{lexeme} \\ \text{PHON } \boxed{1} \\ \text{CAT N} \\ \text{SEM} \left[\begin{array}{l} \text{S-FRAME } \boxed{2} \left[\begin{array}{l} \text{SIZE } \alpha \\ \dots \end{array} \right] \end{array} \right] \end{array} \right] \\ \\ \beta < \alpha \end{array} \right]$$

The rule in (7) gives a parallel representation of phonological information (PHON), morphosyntactic information (in particular, category, CAT), and semantic information (SEM) of both the derived lexeme and the morphological base (M-BASE). The M-BASE feature accounts for the internal structure of morphologically complex words and is equivalent to the morphological daughters notation (M-DTRS) used in Bonami and Cysmann (2016). Another important part of attribute-value matrices is structure sharing. Structure sharing is used to indicate that information in feature structures is identical. This is expressed by boxed numerals which are called *tags*, as for example $\boxed{1}$.

Let us first elaborate upon the information with respect to the M-BASE. In (7), the M-BASE has the phonology $\boxed{1}$, its category is N(oun), and its semantic information is given in the form of a semantic frame (S-FRAME). The S-FRAME includes functional attributes that assign values to the referent of the frame, in this case the referent of the M-BASE. In (7), the M-BASE has a SIZE attribute with a value which we label α . This is the default value that is culturally or socially associated with the referent of the frame. The three dots in the S-FRAME indicate that there might be other attributes as well.

We now turn our attention to the derived lexeme that is phonologically realized as /prefix- $\boxed{1}$ /, where $\boxed{1}$ is the phonology of the base lexeme. That is, the derived lexeme and the base lexeme share the phonological value $\boxed{1}$. The value of CAT is the same for both the derived and the base lexeme. That is, both are specified as N(ouns).

The “S-FRAME $\boxed{2}$! [SIZE β]” notation needs to be addressed in more detail. First, the boxed numeral $\boxed{2}$ shows that the value of the S-FRAME of the derived lexeme must be identical to the S-FRAME part of the M-BASE. Second, the “!” notation, which is borrowed from Sag (2012: 119), informs us that the values of the S-FRAME for the derived and base lexemes are identical except for the value of SIZE which we label β . In particular, the value of SIZE is β for the derived lexeme and α for the base lexeme.

Observe that the lexical rule in (7) captures a non-trivial characteristic of evaluative mor-

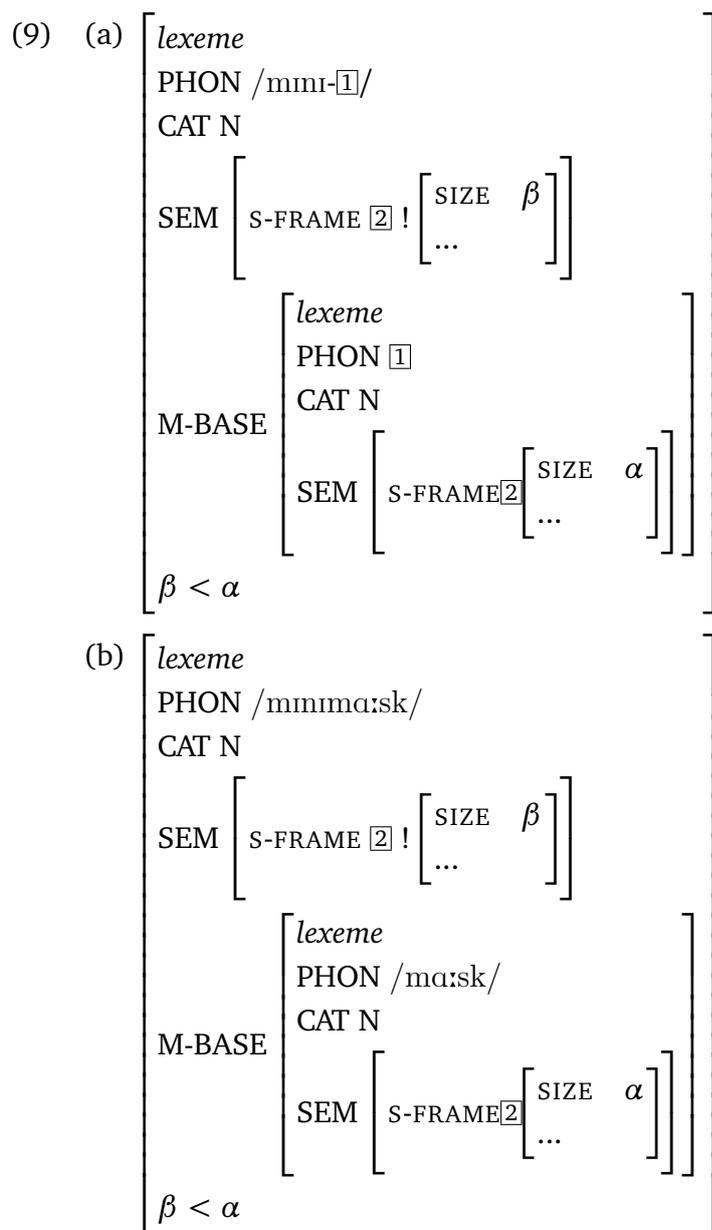
phology which is very hard to formalize in lexical semantics. In particular, the value assigned by evaluation “is assigned without resorting to any parameters of reference which are external to the concept itself” (Grandi and Körtvélyessy 2015b: 13). As mentioned in Section 2, comparison classes induce the presupposition that the derived word in morphology is a member of the comparison class. The lexical rule in (7) combined with an important part of feature structures, i.e. structure sharing, allows one to account for this fact in a straightforward manner.

Let us now turn to the way we can derive the function of diminution in (7). The different values with respect to the attribute *SIZE* in (7) show that the derived lexeme and the base lexeme differ with respect to the scale of *SIZE*. The value α is the default value for the base and β is the new value that is assigned via evaluation. The final part of the rule in (7) comes with a constraint that regulates the relation between the two. In particular, (7) comes with a constraint on the relation between α and β , i.e. “ $\beta < \alpha$ ” (“ β is smaller than α ”). This constraint fixes the relation between the derived lexeme and the base lexeme as one of diminution and derives the desired semantics, in that the derived lexeme is smaller on the scale of *SIZE* than the base lexeme.

Let us apply the rule in (7) to evaluative formations with the prefix *mini-*. This prefix is used to flag small size as in the following:

- (8) (a) A small, exquisite Pende ivory **mini-mask** is included with these works, but seems set aside and lost in the excitement of the other pieces on display. (COCA ACAD 2006)
- (b) On her right was a **mini-vineyard**; clusters of small emerald, sourish grapes were peeping out of dark-green leaves and creepy vines supported by rusty metal structures. (COCA FIG 2005)

The referents of *mini-mask* and *mini-vineyard* denote something smaller than the standard of the categories *mask* and *vineyard* respectively. The attribute-value matrix in (9a) gives the general rule for the prefix *mini-*, and (9b) models the interaction between base and suffix semantics in the derived *mini-mask*.



In accordance with the rule for the prefix *mini-* in (9a), the phonological parts in (9b) are fixed to /mα:sk/ for the M-BASE and /mmimα:sk/ for the derived lexeme. Furthermore, *minimask* is a noun, since the addition of *mini-* to *mask* does not alter categorial information. The derived lexeme and the base lexeme differ with respect to the value of the attribute SIZE. In accordance with the constraint “ $\beta < \alpha$ ”, the value for the derived lexeme is smaller than the value of the same attribute in the base lexeme. This means that the referent of *mini-mask* is smaller on the scale of SIZE than the standard of the category *mask*, i.e. the base.

Evaluation with respect to SIZE is also evident in words derived by suffixation, as for example by the suffix *-let*. In the following examples, *bomblet* and *flatlet*, denote things that are smaller on the scale of SIZE than the standard of the categories *bomb* and *flat*, respectively.

- (10) (a) No reason to waste an expensive mine in such a remote place. he had stepped instead on a **bomblet**, a small and festively yellow cluster of ordnance that had not detonated above the eradicated convoy but rather bounced away, free and clear, and landed here in the grass. (COCA FIC 2004)
- (b) They were in the car, preparing to drive off, before she spoke.' There's a nice little **flatlet** on the second floor. Bathroom, bedroom with double bed, kitchen off. (BNC 1991)

In (11a) we give the general rule for the suffix *-let* and in (11b) we model the derived lexeme *bomblet*.

- (11) (a)
$$\left[\begin{array}{l} \textit{lexeme} \\ \text{PHON } /[\underline{1}]\text{-l\text{ot}}/ \\ \text{CAT N} \\ \text{SEM } \left[\text{S-FRAME } [\underline{2}] ! \left[\begin{array}{l} \text{SIZE } \beta \\ \dots \end{array} \right] \right] \\ \text{M-BASE } \left[\begin{array}{l} \textit{lexeme} \\ \text{PHON } [\underline{1}] \\ \text{CAT N} \\ \text{SEM } \left[\text{S-FRAME } [\underline{2}] \left[\begin{array}{l} \text{SIZE } \alpha \\ \dots \end{array} \right] \right] \end{array} \right] \\ \beta < \alpha \end{array} \right]$$
- (b)
$$\left[\begin{array}{l} \textit{lexeme} \\ \text{PHON } /b\text{oml\text{ot}}/ \\ \text{CAT N} \\ \text{SEM } \left[\text{S-FRAME } [\underline{2}] ! \left[\begin{array}{l} \text{SIZE } \beta \\ \dots \end{array} \right] \right] \\ \text{M-BASE } \left[\begin{array}{l} \textit{lexeme} \\ \text{PHON } /b\text{om}/ \\ \text{CAT N} \\ \text{SEM } \left[\text{S-FRAME } [\underline{2}] \left[\begin{array}{l} \text{SIZE } \alpha \\ \dots \end{array} \right] \right] \end{array} \right] \\ \beta < \alpha \end{array} \right]$$

The attribute-value matrix in (11b) reads as follows: in accordance with the general rule for the suffix *-let* in (11a), the derived lexeme *bomblet* has the phonology /bɒmlət/, is a noun and is a member of the category *bomb*. The semantic contribution of *-let* to the derived lexeme is captured by a change in the value of the attribute *SIZE*; the value in the base is α , whereas, the new value for the derived lexeme is β . In accordance with the constraint “ $\beta < \alpha$ ”, *bomblet* is smaller on the scale of *SIZE* than the standard of its respective base, i.e. *bomb*.

4.2 Augmentation

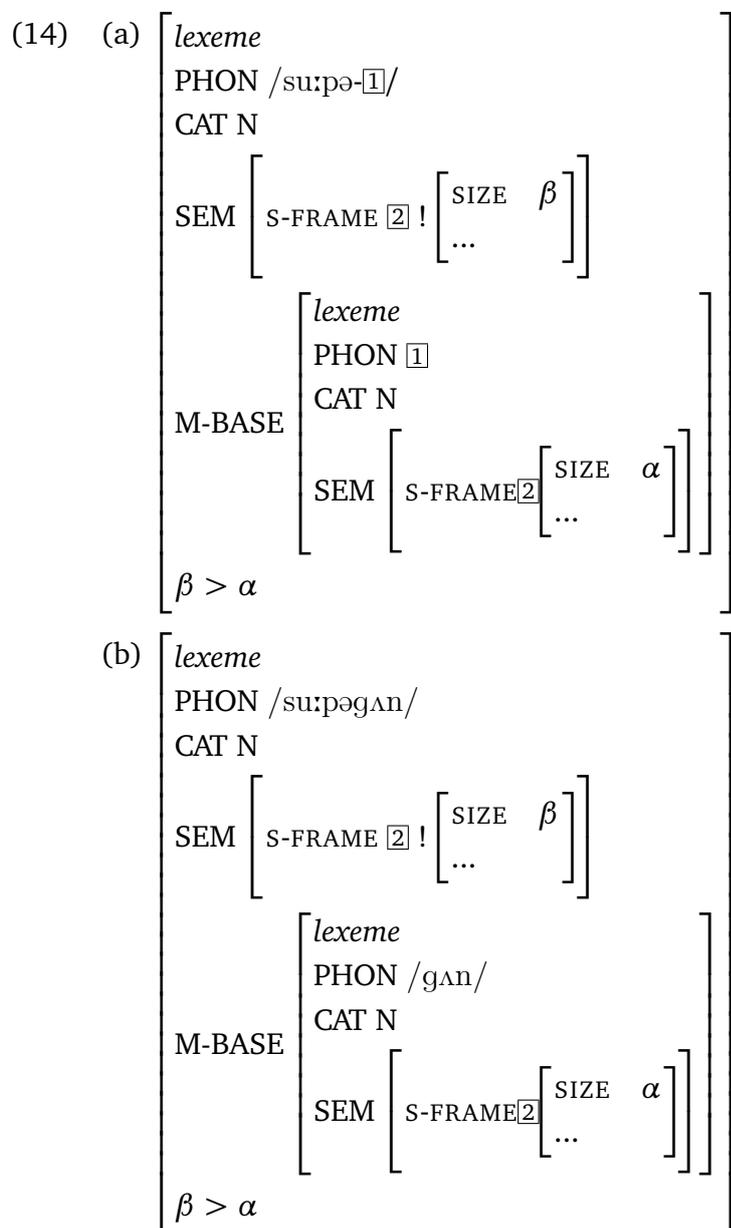
The semantics of augmentation can be modeled in a similar vein. In particular, the rule for diminution in (7) includes the constraint “ $\beta < \alpha$ ” that derives the semantics “X is smaller on the scale of *SIZE* than the standard of its category”. We propose to model augmentation in terms of a similar lexical rule that comes with the constraint “ $\beta > \alpha$ ” (“ β is larger than α ”). The attribute-value matrix in (12) models prefixal augmentation.

$$(12) \left[\begin{array}{l} \textit{lexeme} \\ \text{PHON} / \textit{prefix-}\boxed{1} / \\ \text{CAT N} \\ \text{SEM} \left[\text{S-FRAME} \boxed{2} ! \left[\begin{array}{l} \text{SIZE} \quad \beta \\ \dots \end{array} \right] \right] \\ \\ \text{M-BASE} \left[\begin{array}{l} \textit{lexeme} \\ \text{PHON} \boxed{1} \\ \text{CAT N} \\ \text{SEM} \left[\text{S-FRAME} \boxed{2} \left[\begin{array}{l} \text{SIZE} \quad \alpha \\ \dots \end{array} \right] \right] \end{array} \right] \\ \\ \beta > \alpha \end{array} \right]$$

In order to illustrate how this rule works, consider the following evaluative formations which are based on the prefix *super-*. In these examples, the derived lexemes denote something bigger than the standard of the category they belong to:

- (13) (a) Orban’s foundry continued to turn out barrels of different sizes; none was as large as the first **supergun**, though some measured more than 14 feet. (COCA MAG 2007)
- (b) The biggest problem that some of the individual executives are said to have known about when they sold their stock involves mounting delays and cost overruns for the twin-deck A380 “**superjumbo**,” the world’s largest passenger jet. (COCA NEWS 2014)

The referent of *supergun* is larger than a conventional gun and the referent of *superjumbo* is bigger than a standard jumbo jet. In (14a), we model the rule for the prefix *super-* and in (14b), we provide the attribute-value matrix for *supergun*.



In these figures, the constraint “ $\beta > \alpha$ ” regulates the relation between β and α and renders *supergun* an augmentative.

Could the proposed analysis help us advance our understanding of other senses of evaluative affixes? In particular, evaluative affixes in the languages of the world are polysemous and have a range of readings that goes beyond the category of SIZE (e.g. contempt, affection, approximation, female gender). The polysemy of evaluation can be captured in two ways.

First, as we already saw in Section 2, multiplicity of readings can be accounted for in terms of general semantic mechanisms such as metaphor. The mechanism of metaphor is evident, for example, in the link we observe between evaluation and the female gender. In the case of diminution, this link is based on the opposition female/male (e.g. women are smaller than men). The relation between women and augmentation is based on yet another opposition, namely mother/child (for details and more examples see Jurafsky 1996: 546).

There are senses, however, such as approximation, resemblance, exactness, partitive, and briefness which cannot be easily accounted for by general mechanisms such as metaphor, as for example approximation in the Cantonese diminutive *hong hong* ‘reddish’ or the Greek *ksinutsikos* ‘sourish’ (Jurafsky 1996: 549). Such cases are accounted for by a mechanism which Jurafsky calls “lambda-abstraction-specification”. This mechanism allows one to derive second-order senses of evaluation with the semantics “smaller than the prototypical exemplar x on the scale of y ”. For example, the Cantonese diminutive *hong hong* ‘reddish’ or the Greek *ksinutsikos* ‘sourish’ involve a scale of *redness* and *sourness* respectively. Although one could propose that most cases of lambda-abstraction-specification do involve metaphor, as for example a transition from SIZE to AMOUNT in partitive senses or from SIZE to DURATION in briefness, “there is no motivated explanation of why this particular set of metaphors is employed” (Jurafsky 1996: 559).

In the present study, we remain agnostic on whether such cases should be accounted for by metaphor or lambda-abstraction-specification. Our analysis, nonetheless, allows one to account for cases of lambda-abstraction-specification by the same general mechanism of modification we proposed for the scale of SIZE. More specifically, the scale in question (e.g. *amount* in partitive readings or *duration* in briefness) is labeled using an appropriate attribute (e.g. AMOUNT and DURATION respectively), and the desired semantics follows from different values of the relevant attribute in the base lexeme and the derived lexeme.

Another issue is the range each evaluative affix covers. For example, although both *mini-* and *micro-* are diminutives, they may cover different ranges in the scale of size. A way to account for this observation, would be via the introduction of rules which specify the exact range each affix covers. The identification of the exact range evaluative affixes cover, however, is a non-trivial task and is still a desideratum. In fact, as Bauer et al. (2013) show, we can only state some general rules. As a general rule, for example, we can state that *nano-* is used to denote something extremely small and *micro-* is used for something (abnormally) small. Thus, lexemes derived by *nano-* are generally smaller than lexemes derived by *mini-* or *micro-*, and lexemes derived by *micro-* are smaller than lexemes derived by *mini-*. But what about other affixes such as *hyper-* and *mega-*? Is *hypermarket*, which is bigger than a *supermarket* bigger, smaller or the same size as a *megamarket*? The details of the exact range each affix covers are not the focus of the present study and we leave this matter to psycholinguistic experimentation. The results of this research can, nevertheless, be accommodated in our approach via the introduction of specific rules for each affix.

In the following section we show that the way we modeled evaluation has ramifications for the way we classify affixes into diminutive and augmentative.

5 A classification of evaluative formations

An open issue in the study of evaluative morphology is the classification of affixes into diminutive and augmentative. This issue is particularly evident in the recent work of Bauer et al. (2013). Bauer et al. (2013) aim to classify the prefixes *maxi-* and *midi-* into diminutive and augmentative, and propose to use paradigmatic contrast as a criterion for this classification. The application of this criterion to the prefix *maxi-* leads the authors to classify *maxi-* as an augmentative because it stands in a paradigmatic contrast with the prefix *mini-*. The classification of the prefix *midi-* which denotes medium size is not as straightforward. According to the authors, “Strictly speaking, it should perhaps not be classified as an augmentative, but we treat it here nevertheless, as it stands at least in a paradigmatic contrast with *mini-*” (Bauer et al. 2013: 406).

In the present study, we will approach the classification of evaluative formations into diminutive and augmentative from a rather different perspective. That is, in order to classify a lexeme prefixed by an affix as either diminutive or augmentative, we will take into consideration the relation of the respective derived lexeme to a comparison class of which it is a member with respect to a scale (as we did in the previous section). Consider the evaluative formations in (15):

- (15) (a) A small, exquisite Pende ivory **mini-mask** is included with these works, but seems set aside and lost in the excitement of the other pieces on display. (COCA ACAD 2006)
- (b) He now owns a white nine-seater Mercedes **micro-bus**, large enough to transport him, his eight children, and his wife, Danuta, to their A-frame dacha in the Kazubian forest. (COCA MAG 1990)
- (c) The researchers first obtained a flat, electrically insulating membrane and pierced one small hole into it. Then they inserted a boron nitride **nanotube**, only a few dozen nanometers in length, through this hole. (COCA MAG 2013)
- (d) Examples of the ‘user-specific’ approach are provided by commercial minibuses and **midibuses**, hired village buses, community buses, -and social car schemes. (BNC 1989)
- (e) If you’re tall and can’t find a **maxidress** that’s long enough, go to the fabric store for a matching or contrasting solid block of color in the measurements you need. It’s not just about adding length, but also about adding flair and ending up with a custom maxidress that nobody else has! (COCA MAG 2014)
- (f) Meanwhile, Scott D. Sullivan, WorldCom’s former chief financial officer, continues construction on his 24,000-square-foot **megamansion** in Boca Raton [...] (COCA NEWS 2002)
- (g) Orban’s foundry continued to turn out barrels of different sizes; none was as large as the first **supergun**, though some measured more than 14 feet. (COCA MAG 2007)

Of the seven evaluative formations in (15), one, i.e. *midibus* cannot be easily classified into diminutive or augmentative, three are clearly diminutive (i.e. *mini-mask*, *micro-bus*, and *nanotube*), and three are clearly augmentative (i.e. *supergun*, *maxidress*, and *megamansion*). Why are these formations diminutive or augmentative respectively? Does this relate to a paradigmatic contrast between the various affixes or is it a product of the comparison between each derived formation and a comparison class of which it is a member with respect to a scale? In what follows, we show that the latter approach can derive the correct classification of the formations in (15) into diminutive and augmentative.

There are three reasons for which it is not judicious to use paradigmatic contrast as a criterion for the classification of evaluative affixes into diminutive and augmentative. First, in order to classify evaluative affixes into diminutive and augmentative, one must use a criterion that applies to all affixes. That is, the proposed criterion must not have local application. The application of paradigmatic contrast as a criterion by Bauer et al. (2013), however, was specifically introduced by the authors in order to treat *maxi-* and *midi-*. Second, it is not clear how paradigmatic contrast is defined with respect to evaluative prefixes. In particular, what does it mean to assume that *midi-* and *mini-* stand in a paradigmatic contrast? To the best of our understanding, this means that the referent of a lexeme derived by *midi-* denotes something bigger than the referent of a lexeme derived by *mini-*. A basic problem with this line of argument is that, based on paradigmatic contrast, the same affixed word could be, at the same time, both a diminutive and an augmentative. Consider for example the application of this criterion to *midi-skirt*. The referent of *midi-skirt* denotes something longer than the referent of *mini-skirt*. Thus, *midi-skirt* is a diminutive. At the same time, however, the referent of *midi-skirt* denotes something shorter than the referent of *maxi-skirt*. This renders *midi-skirt* an augmentative. This is, of course, a wrong prediction that follows from the criterion of paradigmatic contrast. Third, this criterion introduces parameters of reference which are external to the concept itself since it introduces a comparison between different affixes.

The approach defended in the present study can derive the correct semantics. First, it does not introduce parameters of reference which are external to the concept itself since the derived lexeme is a member of the comparison class and, thus, avoids the pitfalls of a classification that is based on paradigmatic contrast between affixes. Second, the application of the notion of comparison class which provides a standard of comparison is not local and, thus, can apply to all evaluative formations. An approach that is based on a standard of comparison makes the following prediction:

(16) ... “smaller than X” < X < “bigger than X”...

Based on (16), derived lexemes the referent of which is “smaller than X on the scale of SIZE”, where X is the standard of comparison, are diminutives, whereas, derived lexemes the referent of which is “bigger than X on the scale of SIZE” are augmentatives. Thus, the fact that *mini-mask*, *micro-bus*, and *nanotube* in (15) are diminutive formations, whereas *supergun*, *maxidress*, and *megamansion* are augmentative formations respectively, does not relate to a contrast between the various affixes. *mini-mask*, *micro-bus*, and *nanotube* are diminutives because the referents of these lexemes denote something smaller on the scale of SIZE than the

standard of the category denoted by their respective bases. A *nanotube*, for example, is much smaller than a standard tube since it has a diameter of about 4 nanometers. In a similar vein, *supergun*, *maxidress*, and *megamansion* are augmentative formations because the referents of these lexemes denote something bigger on the scale of SIZE than the standard denoted by their respective bases.

Let us now turn our attention to *midi*-lexemes, the classification of which escapes traditional approaches. We propose that in order to classify *midi*-lexemes we need to examine the relation of these lexemes to a comparison class of which they are a member with respect to a scale. Thus, whether a *midi*-lexeme is augmentative or diminutive is not to be decided on the basis of its relation with *mini*- or *maxi*-lexemes (or any other affix or affixed word for that matter), but on the basis of the relation between the *midi*-lexeme in question and the standard of the category denoted by its respective base lexeme. Unfortunately, contrary to affixes such as *super*- or *mini*-, *midi*- is marginally productive and words derived with *midi*- are often lexicalized. The examples in (17) can nevertheless inform the discussion:

- (17) a. Examples of the ‘user-specific’ approach are provided by commercial minibuses and **midibuses**, hired village buses, community buses, -and social car schemes. (BNC 1989)
- b. Since then, they trimmed the trees in the forest, because storms had weakened the trunks of many of the trees over the years. I now have a **midi-forest**, and I was sad, but I was assured that it was for my own safety and protection. (GLOWBE)
- c. A **MIDI tower** is a mix of a mid tower and a mini tower. A bit smaller than your average mid tower. (<http://www.overclock.net/t/419192/whats-a-midi-tower>)
- d. She was wearing a fringed dark purple **midi-skirt** and a pink muslin shirt from the early seventies, which had tiny mirrors sewn into it, and which was clinging unashamedly to her breasts. (BNC 1991)
- e. She loves clothes, is addicted to fashion magazines but gets ‘weirdly embarrassed’ when she has to dress up (today she is wearing a maroon **midi-dress** from Asos with opaque tights and flat black patent brogues). (GLOWBE)

In (17a), the lexeme *midibus* denotes something smaller in size than the standard bus. Thus, it is a diminutive. In a similar vein, *midi-forest* in (17b) is also a diminutive. The example in (17c) needs to be addressed in more detail. First, it shows that *midi*-lexemes are not to be confused with *mid*-lexemes which denote something which covers a medial or intermediate position. Second, it is clear from the example in (17c), that *MIDI tower* is a diminutive.

In the examples in (17c) and (17d), the lexemes *midi-skirt* and *midi-dress* respectively seem to be augmentatives. In particular, a *midi-skirt*, and a *midi-dress* reach to below the knee. Assuming that the knee is the default length value for the standard *skirt* and *dress*, *midi-skirt* and *midi-dress* are augmentative formations.

Based on these findings, one could propose that *midi*-lexemes fall into two classes. The first class covers cases such as *midibus*, in which the *midi*-lexeme denotes something smaller

than the standard of the category denoted by the base lexeme. The second class accounts for a clearly defined subset of *midi*-lexemes in which the derived lexeme is an augmentative formation. In particular, when the base lexeme is a garment, the derived *midi*-lexeme is an augmentative. The derived *mididress*, *midicoat*, and *midiskirt* denote a *dress*, a *coat*, and a *skirt* respectively that reach to below the knee. Assuming that the default length value for the standard *dress*, *coat*, and *skirt*, is the knee, *mididress*, *midicoat*, and *midiskirt* are augmentative formations. Some scholars may find the fact that *midi*-lexemes fall into two classes worrisome, but it should be noted that the class of augmentative *midi*-lexemes is clearly defined, in that it involves bases which are garments.

To sum up, in this section, we offered a clear-cut classification of English evaluative formations into diminutive and augmentative. We showed that in order to classify a lexeme prefixed by an affix as either diminutive or augmentative, we need to take into consideration the relation of the respective lexeme to the standard of the category of which the derived lexeme is a member with respect to a pertinent scale. The application of this criterion to *midi*-lexemes suggested that there are two different sets of *midi*-formations. The first involves cases such as *midibus* in which the *midi*-lexeme is a diminutive, i.e. it denotes something smaller than the standard of the category denoted by the base (e.g. *bus*). The second includes cases in which the base noun is a garment (e.g. *midicoat*) and the derived word is an augmentative.

6 Conclusion

Although the intuitive effects of evaluative morphology are clear, the semantic details are certainly not. In the present study, we sought to explicitly model the semantics of evaluative morphology. To this end, we invoked a frame-based approach and modeled the way evaluation modifies the semantic frame of the base.

We drew on corpus-extracted data from English diminutive and augmentative affixed formations and motivated a treatment of evaluation in terms of lexical rules using the formalism of attribute-value matrices. The explicit formal treatment and modeling of evaluative morphology in the present paper allows one to gain a better understanding of an issue that figures prominently in lexical-semantic studies, namely, the interaction between the semantics of the base and the semantics of the affixational process.

We challenged the view that evaluation can be modeled in terms of the addition of a semantic component to the base lexeme and proposed a model that builds on the idea that evaluation is relational and not additive in nature. Thus, the proposed analysis takes into consideration crucial characteristics of evaluation that remain unaccounted for under the traditional additive view.

In our analysis we did not resort to the use of primitives such as SMALL/BIG or SCALAR. Instead, we modeled the contribution of evaluation in terms of lexical rules that make use of feature structures. Under the proposed analysis the values of the S-FRAME for the derived and base lexemes are identical except for the value of the relevant scale (e.g. SIZE). The rules come with constraints that fix the relation between the derived lexeme and the standard of the respective category, as one of diminution or augmentation. In particular, we modeled

diminution in terms of a constraint on the relation between the values α of the base lexeme and β of the derived lexeme. That is, β is smaller than α (“ $\beta < \alpha$ ”). In a similar vein, we modeled augmentation in terms of the constraint “ $\beta > \alpha$ ” that reads as follows: the value β for SIZE in the derived lexeme is larger than the value α for the same attribute in the base lexeme that serves as the standard of comparison.

The treatment of evaluation we proposed in the present paper allows one to model senses of evaluative morphology that are not easy to capture in terms of general semantic mechanisms such as metaphor. These are second-order senses of evaluation such as partitive, approximation, and briefness, with the semantics “smaller than the prototypical exemplar x on the scale of y ”; senses which Jurafsky (1996) treats in terms of lambda-abstraction-specification. Our analysis allows one to account for cases of lambda-abstraction-specification by the same general mechanism of modification we proposed for the scale of SIZE. The relevant scale (e.g. *amount* in partitive readings or *duration* in briefness) is labeled using an appropriate attribute (e.g. AMOUNT and DURATION respectively), and the desired semantics follows from different values of the relevant attribute in the base lexeme and the derived lexeme.

The way we modeled evaluation has ramifications for the way we classify affixed formations into diminutive and augmentative. We challenged the idea that paradigmatic contrast can be used as a criterion for the classification of evaluative affixes into diminutive and augmentative. Based on the relational nature of evaluative morphology, we proposed that in order to classify a lexeme prefixed by an affix as either diminutive or augmentative, we must take into consideration the relation of the respective lexeme to the standard of the category denoted by the base lexeme. The application of this criterion to *midi*-lexemes revealed that *midi*-formations can be classified into two classes. The first involves cases such as *midibus* in which the *midi*-lexeme is a diminutive, i.e. it denotes something smaller than the standard of the category of denoted by the base (e.g. *bus*). The second includes cases in which the base noun is a garment (e.g. *midicoat*) and the derived word is an augmentative.

The proposed analysis highlights an important tenet of frames. That is, semantic information is structured. Information is not a mere list of features, but comprises a complex network of attributes that assign particular properties to the referent of the frame. The fine-grained make-up of frames allowed us to delve deeply into the structure of lexemes and model evaluation as a relation between the derived lexeme and a comparison class, of which the derived lexeme is a member, on a pertinent scale (e.g. SIZE). The proposed analysis fills a gap in the study of evaluation in morphology and other fields in which the use of comparison classes is uncontroversial. This view allows us to reevaluate the way word formation processes manipulate the base lexeme and offers new perspectives on the modeling of modification in the semantics of word formation.

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