



Putting old tools to novel uses: The role of form accessibility in semantic extension



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ABSTRACT

An increase in frequency of a form has been argued to result in semantic extension (Bybee, 2003; Zipf, 1949). Yet, research on the acquisition of lexical semantics suggests that a form that frequently co-occurs with a meaning gets restricted to that meaning (Xu & Tenenbaum, 2007). The current work reconciles these positions by showing that – through its effect on form accessibility – frequency causes semantic extension in production, while at the same time causing entrenchment in comprehension. Repeatedly experiencing a form paired with a specific meaning makes one more likely to re-use the form to express related meanings, while also increasing one's confidence that the form is never used to express those meanings. Recurrent pathways of semantic change are argued to result from a tug of war between the production-side pressure to reuse easily accessible forms and the comprehension-side confidence that one has seen all possible uses of a frequent form.

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1. Introduction

At both the individual and community levels, languages must strike a balance between specificity and reuse, ease of understanding and ease of production (Piantadosi, Tily, & Gibson, 2012; Zipf, 1949). Extending a form to new uses allows the language user(s) to re-use existing resources to refer to novel concepts. For example, a child's communicative needs are well served by extending the words s/he knows to referents with which they have never been paired in the child's experience (e.g. referring to unknown animals as *kitty*). As pointed out by several researchers in the field of child language acquisition, over-extensions in production need not be reflected in comprehension. A child may know full well that a *cow* is not – or at least unlikely to be – a *kitty* but, having not yet learned to produce the form *cow*, may nonetheless use the form *kitty* to refer to a large horned bovine (e.g., Bloom, 1973; Clark, 1973; Gershkoff-Stowe, 2001; Gershkoff-Stowe & Smith, 1997; Huttenlocher, 1974; Naigles & Gelman, 1995; Thomson & Chapman, 1977). When you have no access to *cow*, a *kitty* – presumably the semantically closest form you *can* access – will do. At the community level, the tendency to extend accessible forms to new uses may be responsible for the finding that almost all frequent forms have more than one meaning (Piantadosi et al., 2012; Zipf, 1949). When a language has no way to refer to a novel concept, an existing form may be pressed into service, especially one that is easily accessible.

While extension is useful, too much extension impairs the speaker's or the language's ability to communicate semantic distinctions to the listener (a common problem in second language acquisition; Harley & King, 1989; Treffers-Daller & Calude, 2015). According to Braine and Brooks (1995), extension is held in check by the competing force of *entrenchment*

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(see also Regier & Gahl, 2004; Stefanowitsch, 2008). The entrenchment hypothesis has arisen from the need to account for the disappearance of overgeneralization errors in child language in the absence of negative evidence (Baker, 1979; Braine, 1971; Pinker, 1989). According to the notion of entrenchment, repeatedly encountering a form paired with a particular function in comprehension leads one to infer that the form cannot be used in any other way. This knowledge is then assumed to guide production, curbing over-extension errors.

The research reviewed above suggests that form frequency has two contradictory effects. Frequent, easily accessible forms are likely to be extended to new uses in production but restricted to their experienced uses in comprehension. Conversely, infrequent forms may be mapped onto overly broad meanings in comprehension, but put only to specific, experienced uses in production. The forms one puts to new uses in production should therefore be precisely the forms that one is confident of never having heard used that way.

In the experiments below, we document this perception-production dissociation and examine the conditions under which it arises (see also Kapatsinski, 2009, for a real-language example). We argue that reuse of knowledge (entrenched form-meaning mappings) learned in comprehension to guide production is crucial to curb the over-extension of frequent forms. While production and perception are usually eventually brought into alignment, comprehension does not always bend production to its will. Whether it does or does not can determine the trajectory of diachronic change, including the ubiquitous process of grammaticalization (e.g. Bybee, 2003; Bybee, Perkins, & Pagliuca, 1994; Givón, 1979; Hopper & Traugott, 2003), whereby generations of speakers create grammatical, closed-class items such as *gonna* out of lexical ones by extending them to an increasing range of uses.

1.1. From frequency through accessibility to semantic extension

Models of language production agree that forms linked to similar meanings compete with each other for selection (e.g. Dell, 1986; Levelt, 1989). The evidence for this claim comes from many sources. For example, naming a picture is more difficult if one is primed with a word that is semantically related to the picture name (e.g. naming the picture of a cat when primed with *dog* would be harder than when primed with *fog*; Schriefers, Meyer, & Levelt, 1990). Even without priming, picture naming studies show that words with many semantic neighbors are harder to retrieve (Mirman, 2011). When the competition fails to resolve in time, a blend error results, as in (1), where two semantic competitors *yard* and *lawn* are both selected for execution.

(1) They are putting in a new yawn (MacKay, 1992, p. 212)

All else being equal, competition is resolved in favor of the form that would best cue the intended meaning. However, all else is not always equal. Form selection can be influenced by non-semantic factors that influence a form's *accessibility* in the moment of production. Ferreira and Griffin (2003) demonstrate that recent exposure to a homophone can increase a form's accessibility and cause it to be chosen for production. For example, when a participant is presented with a sentence containing the word *none*, s/he may mistakenly name the picture of a priest with the semantic competitor *nun*. This example demonstrates that form selection can be driven by form accessibility, even to the point of producing an outright error when the (temporarily) more accessible form selected for production does not match the intended meaning well enough (see also Burke, Kester Locantore, Austin, & Chae, 2004; Gershkoff-Stowe, Connell, & Smith, 2006).

Of all the influences on form accessibility, perhaps the strongest is the frequency of the form (see Jurafsky, 2003, for a review). Even before the effect of frequency on accessibility in production was documented empirically by Oldfield and Wingfield (1965), Zipf (1949) intuited its existence and considered the implications for semantic change. Zipf saw linguistic forms as tools used to accomplish communicative goals. Just as an artisan uses tools to accomplish various tasks, so does a speaker use forms to convey various meanings. Zipf likened the lexicon to a workbench, where frequently used tools/words are placed closer to the artisan/speaker, rendering them more accessible. When the artisan wishes to accomplish a task, he needs to pick a tool to use. Provided that several tools can accomplish the task – even though some may be more suited to it than others – the artisan may pick the tool that is easier for him to access. As a result, frequently used tools will take over the tasks of other tools. Analogously, frequently used linguistic forms will be extended to new functions. And indeed, if one looks at a dictionary of any language, it is the most frequent words that are most polysemous (Piantadosi et al., 2012; Zipf, 1949; see also Bybee, 2003).

Despite the intuitive appeal of the tool metaphor, and the finding that frequent, more accessible forms do tend to have more uses (Piantadosi et al., 2012; Zipf, 1949), observational research seldom can establish the direction of causality. One may well argue that semantic extension is inevitably followed by an increase in frequency: a form used for more purposes is almost of necessity more frequent than a form that has fewer uses (e.g. Haspelmath, 1999). In contrast, an increase in frequency of use need not necessarily result in semantic extension.

The primary aim of the present paper is to establish that semantic extension can indeed be caused by a form's high frequency. We take an experimental approach, as an experiment affords us an opportunity to *manipulate* form frequency and observe the effects of this manipulation on the likelihood of semantic extension. Specifically, if high frequency causes semantic extension (Bybee, 2003; Kapatsinski, 2009; Zipf, 1949), then frequent forms should be preferentially chosen to express a novel meaning.

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