João Veríssimo

Extending a Gradient Symbolic approach to the native versus non-native contrast

The case of plurals in compounds

Suggested citation referring to the original publication:
Bilingualism: Language and Cognition 19 (2016) 5 pp. 900–902
DOI http://dx.doi.org/10.1017/S1366728916000134
ISSN (print) 1366-7289
ISSN (online) 1469-1841

Bilingualism: Language and Cognition 19 (5), 2016, 900–902 © Cambridge University Press 2016 doi:10.1017/S1366728916000134

Extending a Gradient Symbolic approach to the native versus non-native contrast: The case of plurals in compounds

JOÃO VERÍSSIMO
Potsdam Research Institute for Multilingualism

(Received: January 18, 2016; accepted: January 18, 2016; first published online 3 March 2016)

The Gradient Symbolic Computation (GSC) model presented in the keynote article (Goldrick, Putnam & Schwarz) constitutes a significant theoretical development, not only as a model of bilingual code-mixing, but also as a general framework that brings together symbolic grammars and graded representations. The authors are to be commended for successfully integrating a theory of grammatical knowledge with the voluminous research on lexical co-activation in bilinguals. It is, however, unfortunate that a certain conception of bilingualism was inherited from this latter research tradition, one in which the contrast between native and non-native language takes a back seat.

More specifically, in the GSC model of code-mixing, monolingual and late-learned grammars are indistinguishable, except that they may vary in general parameters such as their 'strength'. There is, however, much evidence for selective differences between native and non-native representations, and these should also be modelled, if the GSC is to have wider applicability.

Here, we illustrate how the GSC framework can be used to model both native and non-native grammars by changing the weights of specific constraints. We consider a phenomenon that involves the contribution of multiple constraints and displays interesting native versus non-native contrasts: the PLURALS-IN-COMPOUNDS EFFECT. This effect concerns the avoidance of regular plurals inside compounds (**rats catcher*), relative to both irregular plurals (*?mice catcher*) and singular forms (*rat catcher*).

Table 1 displays the target behaviour for our model, the results of a study by Murphy (2000), in which native and non-native speakers were asked to form novel compounds from verbs and nouns (e.g., *catches rats*). Tables 2 and 3 display GSC grammars that generate synthetic compounds, for native and non-native speakers.

The first two constraints in Tables 2 and 3, *MORPHSTRUC and *SYNSTRUC, militate against morphological and syntactic structure, respectively, ultimately creating a preference for synthetic compounds instead of their syntactic counterparts (e.g., *catcher of rats*). The plurals-in-compounds effect arises from the three constraints that follow. Firstly, a MORPHOLOGICAL constraint against regular inflectional processes feeding lexical compounding (Kiparsky, 1982). We formalise it as MORPHSTEM, which states that the compound's non-head must be a lexicalised stem (like *mouse* or *mice*), rather than a morphologically structured plural (like *rat-s*). The next constraint, SEMSING, is violated by non-heads with plural SEMANTICS and explains why irregular plurals inside compounds are less acceptable than singulars. This difference in acceptability is typically smaller than the one between regular and irregular non-heads (Clahsen, Gerth, Heyer & Schott, 2015); therefore, we attribute a smaller weight to SEMSING than to MORPHSTEM. The plurals-in-compounds effect has also been argued to result from a PHONOLOGICAL constraint against sibilant codas. As the evidence for such a phonological constraint is scant (Berent & Pinker, 2007), we attribute a small weight to *PHONFINALSIB. Finally, as in the keynote article, PARSE ensures the expression of every element of semantic representation.

Table 2 shows a clear plurals-in-compounds effect for native speakers: forms like *rats catcher* are rare because they violate all three constraints (morphological, semantic, and phonological); forms like *mice catcher* only violate the semantic constraint and are more frequently produced; and compounds with singular non-heads are the most acceptable response.

In order to model Murphy's (2000) results with non-native speakers, only two constraints need to be adjusted (see Table 3). Firstly, by eliminating the semantic constraint (i.e., setting the weight of SEMSING to 0), irregular plurals become the most frequent response. Secondly, by reducing the weight of the morphological constraint (MORPHSTEM, from −2.5 to −1), a smaller plurals-in-compounds effect is obtained and responses

Address for correspondence:
João Veríssimo, Potsdam Research Institute for Multilingualism, University of Potsdam, Haus 2, Campus Golm, Karl-Liebknecht-Straße 24–25, 14476 Potsdam, Germany
joao.verissimo@uni-potsdam.de

Table 1. *Proportions of regular and irregular plurals inside compounds, in Murphy's (2000) study and in the current model.*

	Murphy (2000)		Model probabilities	
	Native group	Non-native group	Native	Non-native
Regular (*rats catcher*)	2 %	46 %	2 %	41 %
Irregular (*mice catcher*)	28 %	76 %	24 %	71 %

Table 2. *GSC grammar of synthetic compounds for native speakers.*

Native								
Input:	*MorphStruc	*SynStruc	MorphStem	SemSing	*PhonFinalSib	Parse		
catcher(*rats*/*mice*)	−1	−4	−2.5	−2	−0.25	−1	*Harmony*	*Prob.*
catcher (of) rats		−4					−4	0.12
rat catcher	−1					−1	−2	0.86
rats catcher	−1		−2.5	−2	−0.25		−5.75	**0.02**
catcher (of) mice		−4					−4	0.09
mouse catcher	−1					−1	−2	0.67
mice catcher	−1			−2			−3	**0.24**

Table 3. *GSC grammar of synthetic compounds for non-native speakers.*

Non-native								
Input:	*MorphStruc	*SynStruc	MorphStem	SemSing	*PhonFinalSib	Parse		
catcher(*rats*/*mice*)	−1	−4	−1	0	−0.25	−1	*Harmony*	*Prob.*
catcher (of) rats		−4					−4	0.07
rat catcher	−1					−1	−2	0.52
rats catcher	−1		−1	0	−0.25		−2.25	**0.41**
catcher (of) mice		−4					−4	0.04
mouse catcher	−1					−1	−2	0.26
mice catcher	−1			0			−1	**0.71**

containing regular plurals become more common. Both of these changes find independent support in Clahsen et al.'s (2015) study, in which non-native speakers rated compounds with irregular plurals as being acceptable (indicating that no semantic constraint is at play), and rated regular plurals as more acceptable than native speakers (indicating a reduced morphological constraint). As can be seen in Table 1, our model's predicted probabilities are remarkably similar to the proportions obtained in Murphy's study.

To conclude, we note that if native and non-native grammars differ in the weights of compounding constraints, it is hard to see how this could result from "the probability distribution of forms in [learners'] linguistic experience" (Goldrick et al.). This is because plurals (both regular and irregular) are extremely rare inside compounds. Instead, the fundamental difference between native and non-native language would have to be in the learning biases that are brought to the language acquisition task (e.g., Johnson & Newport, 1989).

References

Berent, I., & Pinker, S. (2007). The dislike of regular plurals in compounds: Phonological familiarity or morphological constraint? *The Mental Lexicon*, *2*, 129–181.

Clahsen, H., Gerth, S., Heyer, V., & Schott, E. (2015). Morphology constrains native and non-native word

https://doi.org/10.1017/S1366728916000134

formation in different ways: Evidence from plurals inside compounds. *The Mental Lexicon*, *10*, 53–87.

Goldrick, M., Putnam, M., & Schwartz, L. (2016). Coactivation in bilingual grammars: A computational account of code mixing. *Bilingualism: Language and Cognition*. doi: dx.doi.org/10.1017/S1366728915000802.

Johnson, J. S., & Newport, E. L. (1989). Critical period effects in second language learning: The influence of maturational state on the acquisition of English as a second language. *Cognitive Psychology*, *21*, 60–99.

Kiparsky, P. (1982). From cyclic phonology to lexical phonology. In H. van der Hulst & N. Smith (Eds.), *The structure of phonological representations*. Dordrecht: Foris.

Murphy, M. (2000). Compounding and the representation of L2 inflectional morphology. *Language Learning*, *50*, 153–197.