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Commentary on Wälchli - The Dynamic Potential of Probabilistic Semantic Maps

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The Dynamic Potential of Probabilistic Semantic Maps

Comment on ‘Similarity Semantics and Building Probabilistic Semantic Maps from Parallel Texts’ by Bernhard Wälchli (2010)

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Probabilistic semantic maps (also known as ‘statistical’ or ‘second-generation’ semantic maps) represent semantic space as a “probability space which can be modeled by statistical methods which need concrete databases as input” (Wälchli 2010: section 5). They are neither robust nor comprehensive, but **dynamic**, i.e. they assume different shapes depending on the data-set considered. According to Wälchli (2010: section 1), this dynamicity is consistent with the “dynamicity of psychological similarity based on perception of situations”, and with the idea that categories are formed in the speaker’s mind on the basis of similarity among exemplars.

Critics of probabilistic semantic maps (see e.g. van der Auwera 2008) often point to a major disadvantage of such maps, namely, that it is impossible to incorporate diachronic information into them. Knowledge of the relevant diachronic processes which lead to the polysemy patterns of grammatical elements at the synchronic level can be added to traditional semantic maps, making them more enlightening and more informative. By contrast, there is no principled way to do so on a probabilistic semantic map. In other words, traditional semantic maps, based on the “usual *va et vient* between armchair hypothesis building and empirical validation” (van der Auwera 2008:44) are better because they are inherently diachronic in nature and are also truly semantic, i.e. based on “strong semantic links that are historical” (van der Auwera 2008:43, adapted) rather than on weak links that are not. Unlike probabilistic semantic maps, traditional maps based on large samples of languages are also predictive to some extent, i.e. they are able to represent—in a more or less explicit way—which diachronic changes are more likely and which are disfavored or even impossible.

Such a criticism targeted at probabilistic semantic maps is possibly well-founded. However, the way in which semantic space is represented in this kind of maps can turn out to be useful also when addressing diachronic issues. The purpose of this short commentary is to elaborate on some characteristics of probabilistic semantic maps which are not considered by Wälchli in all their implications,¹ and to suggest that probabilistic maps have the inherent potential to be used as tools for interpreting diachronic tendencies, although the ways to exploit this potential might not be obvious at first sight.

This potential is directly connected to the dynamic character of probabilistic semantic maps. As Wälchli correctly observes, “semantic space is not universal, not even language-specific, but different for every individual and **changing over time**” (Wälchli 2010: section 2, my emphasis). Probabilistic semantic maps are a kind of average over individual semantic spaces in a given population, and their shape changes with every new exemplar presented. They are therefore highly unstable configurations and comprise “constellations of exemplars with varying degrees of activation” (Wälchli 2010: section 4). The meaning of a category in such an approach is not an

¹This is by no means to be intended as a flaw in Wälchli’s argumentation, which is primarily concerned with the theoretical bases of probabilistic semantic maps.

abstract concept but simply amounts to the range of individual meanings of exemplars of that category.

Now, many attested cases of semantic change involve reorganization of the meaning of a category triggered by the extension of a marker encoding that category to new situations, or by the increase in number of peripheral members of that category, which may eventually affect the speaker's perception of the category itself. Other changes may involve progressive loss of peripheral exemplars of a category and mutual reinforcement of their nuclear or prototypical members, resulting in a contraction of the range of meanings of the category (see Sansò to appear for such a case in the history of Italian). Dealing with such instances of semantic change often requires us to adopt a similarity-based view of meaning which is also the (implicit) theoretical foundation of probabilistic semantic maps according to Wälchli. Such maps may therefore become suitable tools for modelling the interaction between different exemplars within the same semantic space and its effects over time.

Adapting probabilistic semantic maps to this task is not at all trivial, and I do not have many concrete suggestions in this respect. A possible road-map might look as follows: given two or more populations of exemplars from different diachronic stages of the same language, it is possible to draw two or more probabilistic maps representing their semantic space. These maps will then exhibit differences that can be interpreted as the visual correlate of different stages in the processes of interaction among exemplars within that semantic space (such as, for instance, the emergence of prototypes, or the extension of a grammatical marker to new contexts over time). This road-map might be taken to be nothing but wishful thinking, given that diachronic datasets are very difficult to obtain for many languages. The construction of comparable datasets for different diachronic stages, however, is not an impossible task for a number of better-investigated languages: the insights gained from the comparison of maps for different stages of these languages can provide a robust statistical basis for a general theory of semantic change, and can subsequently be used as a key for interpreting similar changes in other languages, based on the uniformitarian principle that what is known can be used as a key for interpreting what is unknown. Furthermore, possible suggestions on how this goal can be achieved may come from relatively "distant" fields of linguistic theory, in which the problem of interaction between different entities within the same space has long been debated. One of these sources of inspiration (Croft 2007) could be the theory of the best exemplar, as applied, for instance, to phonology by Pierrehumbert (2001). In this theory, each phonological category "is represented in memory by a large cloud of remembered tokens" (Pierrehumbert 2001:140) of that category. As a result, the prototypical instances of a phoneme are represented by numerous tokens, while infrequent, less prototypical instances are represented by less numerous tokens. The difference in token count is the main ingredient in explaining the various frequency effects attested in historical phonological processes and the dynamics of interaction between phonemes over time.

References

- Croft, W. 2007. Exemplar semantics. Unpublished manuscript, University of New Mexico.
- Pierrehumbert, J. 2001. Exemplar dynamics: Word frequency, lenition and contrast. Frequency and the emergence of linguistic structure, ed. by J. Bybee, P.J. Hopper, 137-157. Amsterdam: Benjamins.

- Sansò, A. to appear. Grammaticalization paths or prototype effects? A history of the agentive reflexive passive in Italian. Language Sciences special issue 'Prototypes and grammaticalization – Grammaticalization as prototype?', ed. by T. Mortelmans.
- van der Auwera, J. 2008. In defense of classical semantic maps. *Theoretical Linguistics* 34/1. 39-46.
- Wälchli, B. 2010. Similarity semantics and building probabilistic semantic maps from parallel texts. *Linguistic Discovery*, this issue.

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