Category Boundaries in Conceptual Spaces

Symposium Proposal - SOPHA 2018

1 Background and motivations

Thresholds are at the heart of linguistic, philosophical, and psychological accounts of categorization (viz. Bartsch & Vennemann 1972; Fara, 2000; Hampton, 2007; Kennedy, 2007; Williamson, 1994). These accounts entertain that for a predicate like *tall* to apply to an object, the object needs to surpass a threshold along a relevant underlying dimension, such as height. However, thresholds might merely play a secondary role and may be derived from other information language users have at their disposal, such as the typical instances of application of a predicate. This insight was voiced by Eleanor Rosch in 1978, who wrote: "Another way to achieve separateness and clarity of actually continuous categories is by conceiving of each category in terms of its clear cases rather than its boundaries" (Rosch, 1978).

An influential account along these lines is Peter Gärdenfors' conceptual space (CS) framework, in which prototypical values within a continuous metric space determine the border between categories. Those values are taken to ground our representations: they come first in terms of representation and learning, and they partition conceptual space into regions of points that are closer to a given prototype than to alternative prototypes, thereby explaining the more or less extended character of categories and their boundaries.

In a series of influential papers and two books (Gärdenfors, 2000; 2014), Gärdenfors has established the fruitfulness of the CS framework to deal with the way in which conceptual representations are built and lexically deployed. In recent years, the CS framework has been further developed by several researchers to account for various phenomena, including vagueness and the emergence of borderline cases (Douven et al. 2013), the notion of degree of membership (Douven and Decock 2014; Douven et al. 2016), but also the evolution of language (Jäger 2007), and the phenomenon of meaning negotiation (Warglien and Gärdenfors 2015).

The aim of this symposium is to bring together four researchers whose recent work relies on the CS framework, in order to discuss ongoing developments that all bear on the main topic of the conference, namely the discrete vs continuum opposition, with emphasis on the assignment of boundaries to ordinary categories. The symposium will consist of a short introduction, followed by three main contributions each with theoretical and experimental content (see abstracts in the next section). One contribution concerns the issue of category boundaries for color terms, another the phenomenon of meaning negotiation and variation in language, and a third the relation between typicality and membership for gradable adjectives. The contributions aim to show the reality and fruitfulness of the notion of typicality in relation to the meaning of various categories, from perceptual to more abstract. Another goal is to discuss the phenomenon of individual variability about meaning, and how the phenomenon can be accommodated in the CS framework.

2 Contributions to the symposium

1. "Delving Deeper into Color Space"

So far, color naming studies have relied on a rather limited set of color stimuli. Most importantly, stimuli have been largely limited to highly saturated colors. Because of this, little is known about how people categorize less saturated colors and, more generally, about the structure of color categories as they extend across all dimensions of color space. This paper presents the results from a large Internet-based color naming study, which involved color stimuli ranging across all available chroma levels in Munsell space. These results help answer such questions as whether English speakers use so-called basic color terms more frequently for more saturated colors, how deep inside color space basic color categories extend, and whether these categories are graded not only along the value and hue dimensions – as is already known – but also along the chroma dimension.

2. "Meaning and Identity Negotiation in Conceptual Spaces"

This paper argues that Gärdenfors' Conceptual Spaces framework (Gärdenfors 2000, 2014) can be used to formalize social meaning differences between linguistic expressions (subtle meaning differences between pronunciations, words and/or constructions that express aspects of speakers' identities), and that integration of conceptual space structure into evolutionary signaling games (Jäger & van Rooij 2007, Jäger 2007, Gärdenfors 2014, Warglien & Gärdenfors 2015) can be used to develop more predictive and explanatory models of socially driven linguistic changes (Labov 1963).

Following proposals by Barker (2002, 2013) for vague predicates, this paper argues that socially meaningful expressions have two distinct (but related) functions:

1. They allow speakers to communicate slight differences in the location of the expressions' referent in their conceptual space.

2. They allow speakers to communicate information about the structure of their conceptual space and the arrangement of its prototypes.

It is shown that both of these functions play a role in language variation and change and illustrate this proposal with three case studies:

1. Variation in pronunciations of the second vowel in word "Iraq" by American politicians in the mid 2000s (Ir[æ]q vs Ir[[a:]]q (Hall-Lew et al. 2010)).

2. Variation and change in grammatical gender marking by French politicians in the late 1990s ("Madame le ministre" vs "Madame la ministre" (Burnett & Bonami (2018))).

3. Variation and change in the use of slurs (reclamation) in the late 1990s (Halberstam 1998, Livia 2002).

3. "Typicality and Membership in Gradable Adjectives"

The CS framework has been used to deal with categories that admit degrees of membership (so-called fuzzy categories). Graded membership there is derived by sampling instances from regions consisting of multiple prototypical values (Decock & Douven, 2014; Douven

et al. 2013). That is, the multiplicity of prototypical points for a concept generates a multiplicity of possible thresholds between categories, namely the points equidistant between prototypical values of those categories. From that multiplicity of thresholds, a notion of degree of membership intermediate between 0 and 1 can easily be defined for an item, as the proportion of thresholds the item surpasses. The CS model has been tested experimentally: Douven, Wenmackers, Jraissati, and Decock (2016) have shown that for color adjectives such as blue and green, one can find a strong correspondence between the observed degree of membership of an item under a color category C (revealed by the proportion of participants placing the item in C), and the predicted degree of membership for that item (based on a measure of the partitions of conceptual space that include the item under C; see below for details). Douven (2016) has found the same correspondence for the shape categories vase and bowl in relation to a stimulus set gradually morphing a vase to a bowl (Douven, 2016; Gärdenfors, 2000; Labov, 1973).

What those studies suggest is that prototypical values constrain our verdicts of membership. However, it remains an open issue whether this account of degree of membership applies to categories in general, in particular categories not directly perceptual. One class of potentially problematic cases concerns relative gradable adjectives, such as *tall, heavy*, or *expensive*. For such expressions, the notion of membership degree appears intuitively meaningful (Smith, 2008) but it is disputed whether such expressions have prototypical values (Kamp and Partee 1995).

This paper presents the results of an empirical study showing that the account can be extended successfully to that class. Whereas the standard CS account derives membership judgments from the assumption that typical instances are equally typical, it is found that the predictions of the account significantly improve if typical instances themselves come with a gradient. Another issue discussed concerns whether inter-individual differences in typicality can be revealed and whether they are reflected in individual differences of membership judgments.

3 Selected References

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