# Kind formation by similarity

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In Cognitive Science, similarity is considered as a basic organizing principle in human cognition classifying objects, forming concepts, and making generalizations (Tversky 1977). It will be argued in this paper that there are natural language expressions that (i) denote similarity and (ii) serve the purpose of forming ad-hoc kinds. Assuming that the notion of kinds in linguistics roughly corresponds to the notion of concepts in psychology (Carlson 2010, Prasada et al. 2013), the analysis of these expressions is of special interest because it confirms the basic role of similarity in concept formation.

We focus on demonstratives like German *so*, Polish *tak* and English *such* – called similarity demonstratives in Umbach & Gust (2014) – which modify nouns, verbs and even adjectives. In (1a), for example, Anna's car is said to be similar in certain respects to the car the speaker points at. In (1b), Anna's manner of dancing is said to be similar to the dancing event the speaker points at. Finally, in (1c) Anna's height is said to be similar to the height of the person the speaker points at.

The semantic analysis of similarity demonstratives is based on the notion of direct reference (Kaplan 1989) while assuming that they express similarity to – instead of identity with – the target of the demonstration gesture. Empirical evidence will be provided that in the nominal and the verbal case (though not the degree case) the similarity classes created by the use of the demonstratives establish ad-hoc generated subkinds of the kind denoted by the noun or verb.

(1) a. (speaker pointing to a car)
So ein Auto hat Anna auch. 'Anna has such a car / a car like this, too.'

b. (speaker pointing to a dancing event)
So tanzt Anna auch. 'Anna dances like this, too.'

c. (speaker pointing to a person)
So groß ist Anna auch. 'Anna is this tall, too.'

The notion of similarity is spelt out in multidimensional representations integrated into referential semantics. While concepts talk about real world entities, conceptual representations live in an abstract space which is constituted by a multidimensional attribute space. Generalized measure functions provide the link between real world entities and representations by mapping these entities to points in the attribute space. Attribute spaces come with an additional structure suitable for representing different levels of granularity. We characterize the classificational power of concepts by classifiers which operate on multidimensional attribute spaces and have to reflect consistency constraints and general principles like convex extensions. We get a qualitative similarity notion where entities are similar if their representations (which are context dependent) are indiscernible with respect to the given classificational system (Pawlak 1998, Gust & Umbach 2015).

Our approach models fundamental properties of conceptual structures such as (a) classify individuals in a stable way, (b) may have fuzzy borders and internal structure, (c) can be referenced like entities, (d) construct possible and generic instances, (e) may have context dependent representation and, (f) are suitable for representing the meaning of natural language expressions (Gust & Scheffczyk 1991).

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