

Degree and Quantity – Semantics and Conceptual Representation

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The domain of degree and quantity is one in which it is instructive to explore the relationship between semantic formalism and conceptual representation. Examples such as the following are evidence that speakers refer to and compare degrees. In current semantic theory, this is standardly captured by enriching the ontology to include degrees as a basic type (type *d*).

- (1) The path is 45 meters long. (2) Anna has more books than Zoe.

Quantities and measures such as length are of course also mentally represented, and there is extensive work in psychophysics and the psychology of number cognition on the nature of these representations (see e.g. Dehaene 1997 and Gescheider 1997 for overviews). In this talk, I argue for the benefit of incorporating findings from these areas into the degree-based semantic framework.

One case study involves the strength of the ordering relationship among degrees. In degree semantics, it is standard to conceptualize scales as totally ordered sets of degrees (e.g. Kennedy 2007). But extensive psychological research has shown that our most basic abilities to compare quantities and measures are characterized by tolerance or threshold dependence rather than total ordering: for three objects *a, b, c* it might be the case that *a* is perceived as no different from *b* along the relevant dimension and likewise *b* no different from *c*, but *c* is perceived to stand in a ‘greater than’ relationship to *a*. Allowing the possibility of tolerant or semi-ordered scales in degree semantics yields an account of lexical items and constructions that appear to encode tolerant comparison (Fulst 2007, Solt 2016). For example, (3) implies that significantly more than half of Americans have broadband, and (4) conveys that Anna’s height is more than slightly greater than Zoe’s:

- (2) Most Americans have broadband internet access.
(3) Anna is tall compared to Zoe.

A second area where psychological findings are relevant relates to the nature and origin of degrees themselves. A view that goes back to Creswell (1977) is that degrees – particularly on dimensions such as beauty and strength that lack measurement units – can be conceptualized as equivalence classes of individuals. But the corresponding scale is an ordinal scale. Considerable work in psychophysics has shown that subjects in fact represent ‘non-measurable’ dimensions such as taste intensity, pain intensity and even beauty on interval- or ratio-level scales (e.g. Price et al. 1983, Ribe 1988). Assuming scale structures based on the psychological ones explains the acceptability of examples such as the following, which are puzzling under the equivalence class view:

- (4) Anna is twice as beautiful as Zoe.
(5) The burn was twice as painful as the cut.

A final cognitive psychological finding to be discussed is that numerical magnitudes are spatially represented, a prime example being the left-to-right orientation of the mental number line, which is manifested in the well-known SNARC effect (Fias & Fischer 2005). I will suggest that such findings can shed light on the proper representation of coarse scale granularity as it has been invoked to account for the approximate interpretation of round numbers (Krifka 2007). For example, a coarse-grained scale of time measurement might be one based on the visual of the clock face.

Taken together, observations in these areas point to the need to invoke a richer and more psychologically grounded view of scales into formal semantics.

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