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Title: Interacting conceptual spaces

Abstract: How should we represent concepts and how can they be composed to form new concepts, phrases and sentences? These questions are fundamental to cognitive science and thereby human-like artificial intelligence. Conceptual spaces theory gives a way of describing structured concepts, not starting from linguistic assumptions, but from cognitive considerations about human reasoning. Conceptual spaces describe a "semantics of the mind", modelling mental descriptions of concepts. The key idea is that human beings represent concepts geometrically in certain fundamental domains of understanding such as space, motion, taste and colour. These domains are combined to form a conceptual space describing the features of interest, and a concept is then described by convex subsets of the relevant domains.

In this talk I will describe how conceptual spaces theory can be unified with grammatical composition, giving a way of combining concepts that is in line with linguistic structure. The methods I describe come from a category-theoretic approach to natural language processing, which has been very successful in that domain. This talk aims to expand the applicability of those methods.

Relevant literature:

- Gärdenfors, P. (2014). *The geometry of meaning: Semantics based on conceptual spaces*. MIT Press.
- Bolt, J., Coecke, B., Genovese, F., Lewis, M., Marsden, D., & Piedeleu, R. (2017). *Interacting conceptual spaces I: Grammatical composition of concepts*. arXiv preprint arXiv:1703.08314.
- Coecke, B., Sadrzadeh, M., & Clark, S. (2010). *Mathematical foundations for a compositional distributional model of meaning*. arXiv preprint arXiv:1003.4394.