Comparing word meanings for their sensory underpinnings in early-blind and sighted people

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While we experience the world through multiple sensory modalities, the visual modality often dominates. The primacy of vision is also seen in words' semantic representations, with participants generally rating word meanings as being most strongly associated with the visual modality, even for concepts strongly associated with other senses, such as instruments and food. Visual dominance in the semantic representation of words could reflect first-hand sensory experience—we experience the world predominantly through vision. On the other hand, information about vision can also be extracted from language (e.g., in conversation, reading, listening to the radio; Lewis & Lupyan, 2019). In order to disentangle the direct role of perceptual experience and the role of language in word meanings, we investigated the sensory associations underlying word meanings in a group of individuals who lack visual experience, i.e., early-blind individuals, as well as sighted individuals. If lack of visual experience affects semantic representations, we may see compensation from other sensory modalities. We asked 17 early-blind and 17 matched sighted Dutch native speakers to rate 100 Dutch nouns on their perceptual associations across six senses (vision, audition, haptics, gustation, olfaction and interoception) on a 0 (not at all) to 5 (very much) scale, following the procedure of Lynott et al. (2020). To cover a range of concepts, there were five semantic categories (20 words per category) thought to be strongly associated with different sensory modalities: animals (vision), instruments (audition), tactile objects (haptics), food (gustation), odor objects (olfaction). Using linear mixed effects models with participants and items modelled as random effects, we found a significant interaction between participant group and sensory modality. Follow-up contrasts with Bonferroni correction indicated a significant effect for ratings of the haptic modality only, such that early-blind participants rated words as more strongly associated with haptics than sighted participants. In exploratory analyses we separately examined each semantic category and observed the same pattern across all categories, except for animals: i.e., higher haptic ratings from the early-blind participants than sighted participants. In addition, early blind participants rated instruments as more associated with interoception than sighted participants. Our results support a role for both sensory and language experience in words' conceptual representations. Since early-blind participants did not differ from sighted participants in their ratings of words' visual associations, this suggests information about vision can be learned indirectly from other input, such as language. However, early-blind participants did provide stronger ratings of haptic associations, implying a form of perceptual compensation in semantic representations. This pattern of results supports hybrid models of semantics that suggest both perceptual and linguistic information is critical in word meaning (e.g., Connell, 2019; Louwerse, 2011).

References

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