Vividness and Behavioral Specificity in Visual Imagery: Not what you'd expect

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When remembering specific everyday objects or events linked to past experiences, for example personal events (e.g., the face of a relative or a pet), people generally report "seeing with the mind's eye". A pervasive aspect of people's report is the *vividness* of their mental images. Images may come from the imagination (e.g., a pink dog) or from retrieved episodic and specific representations which refer to everyday objects (e.g., your breakfast this morning). Setting aside "imagination imagery", whose vividness is entirely subjective, we can define the vividness of "realistic" imagery as: (i) The extent to which mental images reflect the composite quality (including specificity, detail, and richness) of visual representations that would have been generated if the object had actually been perceived.

Proposition (i) requires no presumptions about the underlying format of mental images (e.g., propositional) other than that they are a type of *analogue*. All that one needs to assume is some elementary properties of databases (Brachman & Levesque, 2004). That is, a memory database containing information about a given domain (of objects and relationships between these objects in the world) will contain individual images that consistently designate individual objects in the world and relationships between individual objects that designate the respective relationships in the world. Second, according to (i), vividness can be interpreted as a crude proxy for what is available in the memory database, a report about a represented object X or relationship involving X will be more or less vivid depending on the extent to which information about X is perceived to be complete (see Levesque, 1986), in turn this should be reflected in behaviour, for example, the time needed to respond to a query about X.

Some recent research (D'Angiulli, in press; 2002; D'Angiulli & Reeves, 2007; 2002; Reeves & D'Angiulli, 2003) has shown conditions in which the relationship between vividness ratings and image latency response reflects some properties of the visual systems: the system that is dedicated to process object-properties (*ventral pathway*) and the system that is dedicated to process locative properties of mental images (*dorsal pathway*). In particular, the results of these studies showed that for small images expected to recruit mainly the ventral pathway (i.e., requiring size-scaling of less than 10°) the higher the rated vividness, the faster their generation. This *vivid-is-fast* relation, it was also found, changed for large images expected to recruit mainly the dorsal pathway (i.e., requiring size-scaling of 10° or more). While the size-dependent effects gradually disappeared over the course of repeated image generation, the vivid-is-fast relation remained, although it corresponded to a much weaker effect. Based on these findings, it was concluded that differential patterns of vividness-image latency relationship can reflect "ventral" and "dorsal" imagery, and the involvement of the complex underlying working and long-term memory dynamics.

A major threat to the vivid-is-fast relationship is that it may really reflect various types of participants' expectations during lab experiments, not at all generation and use of mental images. Following up to previous research (D'Angiulli & Reeves, 2005), I show that the current evidence on the vivid-is-fast relationship, and its selective variations in some conditions, is incompatible with the main accounts based on expectations and tied to the alleged epiphenomenalism of imagery experience. In addition, presenting evidence from multiple measures, I show that vividness fits well within the *causal theory approach* to validity (Borsboom, Mellenbergh & van Heerden, 2004). To explain the data reviewed here (as well as other recent literature evidence), I develop a minimalist approach, dubbed *vividness-core principle*. This consists in a parsimonious set of propositions that: 1) builds on the vivid-is-fast relationship and Levesque's (1986) formalization of vividness in AI; 2) accounts for most everyday imagery, explaining how imagery could be useful for everyday incidental memory and undetermined object-based reasoning.

References

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