This is an excerpt from a report on the Perceptual Learning and Perceptual Recognition II Workshop at the University of Toronto, Mississauga in May of 2012, written by Kevin Connolly, John Donaldson, David M. Gray, Emily McWilliams, Sofia Ortiz-Hinojosa, and David Suarez, and available at http://networksensoryresearch.utoronto.ca/Events_%26_Discussion.html

4. What Counts as Cognitive Penetration?

In his talk, Rob Goldstone presented a putative case of cognitive penetration: people internalize mathematical rules in a way that modifies their perception. In particular, people proficient in mathematics attend to equations in a way that follows the order of operations. So, for instance, if they are given the equation 14 - 4 ÷ 2, they will attend to the "÷" before the "-" in conformity with the order of operations.

In his commentary on Goldstone's talk, Michael Rescorla gave a brief history of research into cognitive penetration. The New Look movement in psychology, which arose in the middle of the 20th century, held that cognitive penetration was ubiquitous, citing, for example, studies purporting to show that hungry perceivers would see more items as edible, and impoverished perceivers would see coins as larger. This brought into doubt the prima facie plausible claim that there can be a *tribunal of experience*—that perception can be made to answer to beliefs. In the 1980s, however, Jerry Fodor and Zenon Pylyshyn argued that perception was in fact modular and segregated from cognition, and that if there was any cognitive penetration then it was of a sort so trivial as not to be worthy of the name: shifts in attentional focus, choosing to wear glasses, and so on (Fodor & Pylyshyn 1981; Fodor 1983; Pylyshyn 1999).

Rescorla suggested that if take on board the lessons of the historical debate over cognitive penetration, we might then conceive of Goldstone's case, not as a case of cognitive penetration, but as a largely attentional phenomenon. In the Q and A, Kevin Connolly pushed Rescorla's point. Suppose we train someone with no knowledge of the meaning of the mathematical symbols to attend to equations in a way that follows the order of operations. What this shows in the mathematics case is that knowledge of the order of operations is not constitutive of the perception that the person knowledgeable of math has. Rather, there is something more basic, the attentional habit common to both the math expert and the person with no knowledge of mathematics who is trained to attend in the way that the expert does. If one has that habit, then one might have the same type-experience that the math expert has, even if one has no knowledge of the order of operations.

Goldstone's talk also offered a second, perhaps more convincing case of cognitive penetration. $\frac{X+4}{3+4}$ and $\frac{X*4}{3*4}$ may look similar, at least at first glace. However, to someone proficient in mathematics, in the second case the 4s look like they can be canceled, but not in the first case. Fiona Macpherson suggested that the grouping of the 4s in the second case might actually manifests itself in one's perceptual phenomenology. The idea is that unlike in the first case, in the second case we see the 4s as grouped together. It is a putative case of cognitive penetration in which one's knowledge of mathematics affects one's perceptual phenomenology through the grouping of particular numbers.

References:

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