A case for functional-cognitive cross-talk

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Abstract

A case for the benefits of functional-cognitive cross-talk is presented, concerning the relationship between confidence in memory and the associated accuracy. While cognitive theorists have long accepted that confidence and accuracy are typically related, a behavioral explanation was only recently advanced. We argue that had this connection been made earlier, then the applied domain of eyewitness identification research may have earlier reconsidered, the now largely debunked, but once strongly and long-held, idea that an eyewitness's confidence is at best weakly related to the accuracy of their identification.

A case for functional-cognitive cross-talk

All applied psychology aims to change behavior. Yet, the approach of behaviorism has been considered obsolete and cast aside by many cognitive psychologists and cognitive neuroscientists (Roediger, 2004). De Houwer, Hughes, and Barnes-Holmes (2017) provide a corrective to this approach, arguing, "…applied psychology can be fortified by strengthening its functional core" (p. [*TYPESETTER: insert page number from target article here*]). We agree that the near century long behavioral tradition still has a lot to offer. Indeed, many current cognitive scientists do make use of these principles. The functional-cognitive framework proposed by De Houwer et al. will promote more of this type of cross talk in the future.

The main contribution of this comment will be to substantiate the authors' claims that applied psychology will benefit from being remapped onto "…a common set of general functional principles…" (p. [*TYPESETTER: insert page number from target article here*]; De Houwer et al., 2017). We focus on a case in which behavioral principles were used to explain confidence in memory judgments in the basic cognitive literature, and we argue that those principles would also have been helpful in evaluating related claims in the applied domain. It is important to note from the start that the use of confidence ratings as a proxy for memory strength may seem at odds with a functional approach. This usage could run the risk of confounds identified by De Houwer et al. (2017) in the sense that it would be unfruitful to assume a one-to-one relationship between confidence ratings and memory strength. However, the fact that there is not a direct mapping does not in itself render the measure invalid as long as researchers acknowledge this fact. Indeed it is generally well understood that confidence ratings can

be influenced by many factors (e.g., sex), much in the same way as the key pecking of pigeons and the lever presses of rats. The important point for all of these measures is the way in which they are interpreted and more of a functional-cognitive cross-talk can help refine interpretations. For the remainder of the paper, we will assume that the level of confidence can be informative about the strength of a memory without assuming a one-to-one relationship.

In a series of list learning memory experiments, Mickes, Hwe, Wais, and Wixted (2011) asked participants to rate their confidence that items presented in a retrieval phase had been presented during the previous study phase. They found that confidence and accuracy were strongly related. That is, responses made with low confidence were low in accuracy and responses made with high confidence were high in accuracy. This was not news. This relationship has been found to be strong in countless memory experiments. What was new, however, was that participants could not further calibrate their confidence to reflect the accuracy of very strong memories. Mickes et al. drew from behavioral principles to explain this puzzling result:

> The key consideration for purposes of understanding why participants are apparently unable to scale their strongest memories is that the learning process that may account for a participant's general ability to scale memory strength involves differential error feedback. Such training may be necessary for people to make effective use of their own internal sense of memory strength. In this regard, Skinner (1953) once made the following argument: "Strangely enough, it is the community which teaches the individual to 'know himself'" (p. 261). More specifically, Skinner argued that certain aspects of mental life remain undifferentiated in the absence of explicit discrimination training. To make this point, he used the example of color: "Anyone who as suddenly been required to make fine color discriminations will usually agree that he now 'sees' colors which he had not previously 'seen' " (p. 260). It is conceivable that it is the same way with the subjective sense of memory strength. Through discrimination training involving differential error feedback, people come to be able to accurately gauge to the strength of their own memories such that the

> relationship between confidence and accuracy becomes quite strong... (p. 256)

Using these principles, Mickes et al. argued that memories recalled with the highest levels of strength are unlikely to generate error feedback (because they are highly likely to be correct). For this reason, there is not the opportunity to learn to discriminate between the strongest memories and therefore people cannot report confidence at a finer grain scale.

This is an example of the type of cross talk between cognitive and functional levels that is advocated by De Houwer et al. (2017). Namely, they write, "First, when a specific phenomenon or intervention can be linked with a more general functional principle, it allows one to utilize not only the functional knowledge about that general principle but also the cognitive models that have been developed to account for other instances of that general principle or the general principle itself" (p. [*TYPESETTER: insert page number from target article here*]). In this example, the specific phenomenon to be explained is confidence in a memory judgment (a cognitive effect). This phenomenon is linked with the more general principle of error feedback in discrimination training (a behavioral/functional principle), such that the existing functional knowledge about the way in which feedback from the environment shapes our behavior can be applied to understand decision making in memory.

Although Mickes et al. (2011) originally invoked the functional explanation to explain the puzzling results at the highest levels of confidence, it can also be applied to the broader spectrum of confidence-accuracy results in general. More specifically, if the process of learning to calibrate confidence proceeds through repeated pairings of a particular memory strength to a certain level of error feedback from the environment,

then this predicts a clear confidence-accuracy relationship. However, in early eyewitness identification research it was believed that there was at best a weak confidence-accuracy relationship (e.g., Krug, 2007; Penrod & Cutler, 1995; Wells & Murray, 1984). This belief has had serious consequences in the criminal justice system to the extent that, for example, juries are now often warned to discount confidence of an eyewitness altogether (e.g., New Jersey Model Criminal Jury Charges, 2012). Yet over time, it has become increasingly clear that under adequate testing conditions, this relationship is much stronger than once believed (e.g., Brewer, Keast, & Rishworth, 2002; Brewer & Wells, 2006; Palmer, Brewer, Weber, & Nagesh, 2013; Sauerland, Sagna, & Sporer, 2012; Wixted, Mickes, Clark, Gronlund & Roediger, 2015; Wixted, Mickes, Dunn, Clark, & Wells, 2016). This outcome could arguably have been predicted from an earlier move to a functional approach.

This example could be seen as applying the cognitively-inspired analytic-abstractive (CIAA) approach defined by De Houwer et al. (2017) and supports their claim that CIAA research can bridge functional and cognitive approaches to drive useful new developments. However, in the interests of balance it is important to acknowledge that many cognitive researchers are already steeped in functional ideas and naturally make reference to them throughout their work. For example, a recent taxonomy of attentional control draws heavily on principles of associative learning to explain the influences of past experience on attentional allocation (e.g., Awh, Belopolsky, & Theeuwes, 2012). In this sense, the purported divide between functional and cognitive approaches that is described by De Houwer et al. seems somewhat overstated.

Nevertheless, we do agree that the formalization of the approach that is provided by the functional-cognitive framework is likely to increase this type of cross-talk.

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