Psychological Engineering: A Functional–Cognitive Perspective on Applied Psychology

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The functional–cognitive framework for psychological research implies that functional and cognitive researchers operate at two separate but mutually supportive levels of explanation. From a functional–cognitive perspective, all applied psychologists are ultimately directed at the functional level but they can differ in the way they conduct functional research and the degree to which they seek guidance from cognitive models. We propose a taxonomy that encompasses four different types of applied psychology and evaluate the merits of each type. We also argue that applied psychology can be fortified by strengthening its functional core, thus evolving into a more integrated but still diverse discipline of psychological engineering. Finally, we explore the implications of these ideas for applied memory research.

General Audience Summary
This is a meta-theoretical paper about the different approaches that applied psychologists can adopt in their research. It not only focuses on differences but also on what the different approaches have in common and how the different approaches relate to each other. Based on this analysis, a possible future for applied psychology is explored.

Keywords: Functional psychology, Cognitive psychology, Levels of explanation

In a recent paper, Hughes, De Houwer, and Perugini (2016) likened the current state of psychological science to an archipelago of islands, each home to a different “tribe” of researchers. The members of the various tribes differ not only with regard to the topics that they study (e.g., psychopathology, social behavior) but also with regard to the approach that they adopt when studying these topics. Generally speaking, communication between the different islands is limited. This is particularly the case for two groups of islands, one group that adopts a cognitive approach and a second group that adopts a functional approach. The cognitive approach has dominated psychology for about half a century now. It aims to uncover mental mechanisms, that is, the way in which organisms process information (see Bechtel, 2008; Gardner, 1987). The functional approach, on the other hand, can be linked to behaviorism, at least certain forms of behaviorism such as radical behaviorism as it was introduced by B. F. Skinner (see Chiesa, 1992, 1994; Hayes & Brownstein, 1986) and to more recent scientific approaches such as contextual behavioral science (Hayes, Barnes-Holmes, & Wilson, 2012). Functional psychologists, as we will call them, are interested primarily in the environmental determinants of behavior, that is, in the

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way that behavior is a function of the (present and past) environment.\(^1\)

The cognitive approach is often thought of as a reaction against—and thus as incompatible with—the functional approach. For instance, in a column about the state of behaviorism at the centenary of B.F. Skinner’s birth, Roediger (2004) cited Tulving who argued that

“psychology now designates at least two rather different sciences, one of behavior and the other of the mind. They both deal with living creatures, like a number of other behavioral sciences, but their overlap is slim, probably no greater than psychology or sociology used to be when the world was young. No one will ever put the two psychologies together again, because their subject matter is different, interests are different, and their understanding of the kind of science they deal with is different. Most telling is the fact that the two species have moved to occupy different territories, they do not talk to each other (any more), and the members do not interbreed. This is exactly as it should be.”

The great divide between cognitive and functional approaches in psychology can also be seen in applied psychology. On the one hand, many applied psychologists are inspired by cognitive research and organized in societies such as the Society for Applied Research in Memory and Cognition. On the other hand, there is a sizeable group of applied functional researchers who have their own organizations (e.g., Association for Behavior Analysis International, Association for Contextual Behavioral Science), meetings, and journals. Also in applied psychology, there is little evidence of communication between these cognitive and functional tribes.

In contrast to the position of scholars such as Tulving, in the present paper we argue that much can be gained from a closer interaction between cognitive and functional researchers, also in the domain of applied psychology. In a first section that provides the background for the rest of the paper, we summarize the work of De Houwer (2011) and Hughes et al. (2016) who (a) highlighted the fact that cognitive and functional approaches in psychology are not mutually exclusive but situated at different, mutually supportive levels of explanation and (b) distinguished two ways of doing functional research (i.e., effect-centric and analytic-abstractive). In the second section, we argue that all applied psychology is ultimately directed at the functional level of explanation. At the same time, four types of applied psychology can be distinguished, including a new type that draws on both general functional principles and cognitive theories. In the third section, we evaluate the relative merits of the four types of applied psychology. In the fourth section, we explore one implication of the idea that all applied research is ultimately functional in nature: it entails that all applied researchers can communicate in functional terms. We discuss ways of promoting communication at the functional level so that applied psychology can evolve into a more integrated but still diverse discipline that could be referred to as “psychological engineering.” As such, we hope to provide the blueprint of a future for applied psychology in which the divide between different islands in the psychological archipelago is bridged and communication is not only possible but routine.

Before we start, we would like to point out that the central argument of the paper is inherently abstract in that it is not tied down to specific research topics. Applied psychology covers many areas of research, ranging from applied memory research, engineering psychology, and industrial-organizational psychology, to the psychology of educational tests and measurement. The primary distinction between these different areas of applied psychology concerns the topic that is addressed (e.g., memory, the way humans interact with the physical world, the selection of employees, assessment of educational skills). In this paper, we do not single out specific topics within applied psychology but focus on the approaches that applied researchers adopt when studying a certain topic (i.e., the functional and cognitive approach and how they relate to each other). As such, we hope that the present paper provides the necessary starting point for the deployment of the functional–cognitive framework in a wide range of areas of applied psychology. Nevertheless, in order to illustrate what the functional–cognitive framework could mean for specific areas of applied psychology, we included a section at the end of the paper in which we discuss some of the implications of the framework for a research area that is at the core of this journal (i.e., applied memory research).

The Functional–Cognitive Framework for Psychological Research: The Cognitive and Functional Approaches in Psychology are Situated at Two Separate but Mutually Supportive Levels of Explanation

The present paper builds on the functional–cognitive framework for psychological research that was first described by De Houwer (2011; see Hughes et al., 2016, for an update; see Bechtel, 2005, for similar ideas). At the core of this framework lies the idea that the functional and cognitive approaches in psychology are situated at two separate but mutually supportive levels of explanation. Within the functional level of explanation, behavior is explained in terms of the (current or past) environment and the way organisms interact with the environment. For instance, the fact that a dog salivates upon hearing a bell could be attributed to the prior pairing of the bell and food (Pavlov, 1927). Whereas functional explanations identify which events in the environment influence behavior, cognitive explanations specify how those events influence behavior. More specifically, cognitive explanations describe the mental (i.e., information processing) mechanisms by which events in the environment influence behavior (Bechtel, 2008; Gardner, 1987). For instance, one could argue that the pairing of bell and food leads to associations in memory through which subsequent presentations of

\(^1\) We use the term “functional” in the mathematical sense of “function of” (i.e., behavior is a function of the environment) rather than in the teleological sense of “function for” (i.e., behavior serves a purpose). This also clarifies the distinction between functional psychology as we see it (i.e., the study of environment-behavior relations) and functional psychology as the approach adopted by a group of American psychologists (e.g., John Dewey) at the start of the 20th century.

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