
COMMENT

A Memory-Systems Approach to the Classification of Personality Tests: Comment on Meyer and Kurtz (2006)

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In response to Meyer and Kurtz's (2006) recommended discontinuation of the terms "objective" and "projective" as descriptors of personality tests, a new classification system for personality measures is sketched out that is based on memory research. Adopting a widely used model of the organization of human memory systems (e.g., Squire, Knowlton, & Musen, 1993), a distinction between declarative and nondeclarative personality tests is proposed based on whether tests assess facets of personality represented in consciously accessible memory systems or in nonconscious memory systems whose operation is reflected in performance. The declarative/nondeclarative classification can be further refined by specifying separable memory systems within each domain of memory (e.g., episodic, semantic, priming, skill learning). It is proposed that such a new classification would be conceptually meaningful, because it links personality tests to highly refined accounts of human cognition, and heuristically fruitful, because it provides new insights into the properties and limits of existing tests and helps identify hitherto largely untapped sources for the assessment of personality.

Meyer and Kurtz (2006) recommended abandoning the terms "objective" and "projective" as descriptors of personality tests due to their unclear and misleading meanings. I wholeheartedly agree with these authors' recommendations, not least because the term "objective" is a smoke screen for measures that can be just as subjective as anything else (cf. Meyer & Kurtz, 2006) and the term "projective" is derived from untenable theoretical concepts that have continued to create confusion in the field for a long time (see, for instance, McClelland's, 1980, contention that implicit motivational needs do not respond to specific, identifiable stimuli and Schultheiss's, 2001, rebuttal of this claim). I also agree with Meyer and Kurtz (2006) that in most cases it will simply suffice to refer to assessment instruments by their specific name, because this frees a given test from the a-priori onus of proving or disproving any meta-conceptual framework (e.g., classic test theory, psychoanalytic theory) and opens the door to an empirically based evaluation of the test's validity and conceptual pedigree.

However, while Meyer and Kurtz (2006) seem to advocate altogether abandoning the classification of tests in terms of how they assess personality, I suggest that after overcoming

the outdated objective/projective distinction, the field of personality assessment might benefit from developing a better classification system that is based on well-documented findings in cognitive neuroscience. Such a classification system has the potential to bring personality assessment into better conceptual and empirical alignment with a rigorous and advanced approach to the study of the human mind and might lead to interdisciplinary cross-pollination by generating new concepts and methods for the assessment of personality. More specifically, I contend that it may be particularly fruitful to classify personality tests according to the types of memory they tap into. This approach has the advantage of combining a basic tenet of personality assessment, namely, that personality represents those aspects of a person's cognitive, affective, and behavioral operations and outcomes that are stable, repetitive, and do not change from one day to the next, with memory, a central and extensively validated concept used by cognitive psychologists, neuropsychologists, and biopsychologists to explain the consistency of cognition, affect, and behavior over time. The importance of memory for personality becomes strikingly clear in cases where accident-induced brain lesions or degenerative processes like Alzheimer's

disease subtly alter specific memory functions or obliterate entire memory systems and thus dramatically change the affected person's personality in some aspects while leaving other aspects relatively untouched (e.g., Kolb & Whishaw, 2003). Such cases also illustrate a widely accepted conclusion of research on memory, namely, that memory is not a unitary function of the human mind but can be dissected into separable functions supported by distinct cortical and subcortical networks in the brain.

One particularly comprehensive, well-validated, and widely accepted description of the architecture of human memory has been proposed by Larry Squire (e.g., Squire, 2004; Squire et al., 1993; for related proposals, see also Eichenbaum & Cohen, 2001; Tulving, 1985). Based on findings from experimental psychology, brain imaging of memory processes in normal research participants, changes of memory in neurologically impaired patients, and findings obtained with animal models of human memory, Squire distinguishes between two fundamentally different types of memory, declarative and nondeclarative, which in turn can be further differentiated into more specific memory systems. Squire defines declarative memory as a capacity for the conscious recollection of facts (semantic memory) and events (episodic memory), and thus, quite literally, those things about which a person can make declarative statements (e.g., "I once caught a four-pound salmon," "Cows are mammals," "I want to get an A in my Introduction to Physics course"). In contrast, nondeclarative memory is a heterogeneous collection of learning capacities that manifest themselves in performance measures, are not accessible to conscious awareness, and thus do not belong to the realm of things about which a person can make veridical declarations. Nondeclarative memory includes capacities for procedural learning (acquisitions of habits and skills, including instrumental learning), Pavlovian conditioning (learning about the emotional meaning of stimuli), priming (facilitated detection or identification of stimuli based on recent or extensive experience with them), and nonassociative learning (reflexes, sensitization, habituation).

I propose that Squire's framework of memory systems can be employed for the classification of personality tests into declarative measures and nondeclarative measures and, within these categories, can be distinguished according to whether they represent episodic, semantic, priming, emotional-response, habit-learning, or nonassociative instruments (see Table 1 for a tentative mapping of personality measures onto memory systems). Such a framework would have the advantage of clearly distinguishing between, on the one hand, the uniquely human faculty of *declaring* one's dispositions, needs, traits, values, and so on to others and, on the other hand, aspects of personality that represent learning-based modifications within specialized performance systems, that elude people's capacity to become aware of, remember, or communicate their enduring traits to others, and that can be assessed most validly using measures that bypass people's declarations about themselves.

Beyond this initial distinction between the declarative and nondeclarative nature of personality tests, they could be further mapped onto specific memory subsystems representing specific aspects of personality. For instance, a person's life story, which is arguably one of the most idiosyncratic and defining features of her or his personality (McAdams, 1988), is represented in the person's episodic memory (cf. Levine, 2004). A person's beliefs about her traits, such as extraversion, neuroticism, authoritarianism, or self-attributed achievement motivation, are anchored in the person's semantic memory, which represents decontextualized knowledge about the world, including the person herself (cf. Klein, Loftus, & Kihlstrom, 1996). Both measures of personality thus belong to the domain of the person's declarative memory.

In contrast, the speed with which a person automatically associates the word "I" with terms like "shy" or "insecure" and the word "others" with "daring" and "uninhibited" (e.g., Asendorpf, Banse, & Mucke, 2002) captures nondeclarative aspects of his personality and, more specifically, the degree to which certain personality attributes chronically prime self-representations. The currently popular Implicit Associations Test (Greenwald, McGhee, & Schwartz, 1998) thus taps into nondeclarative memory systems supporting semantic priming. The amount of achievement-related actions a person describes in a story about a specific picture on the Thematic Apperception Test (Murray, 1943) or its descendant, the Picture Story Exercise (McClelland, Koestner, & Weinberger, 1989), may reflect the conjoint activation of nondeclarative memory systems supporting Pavlovian conditioning (arousal potential of the situations and stimuli depicted in the picture cues) and instrumental learning (what type of imagined behavior is generated in response to reward-predictive cues) (cf. Schultheiss et al. 2006). And perhaps perceptual-cognitive tests of personality like the Rorschach (Rorschach, 1942), which examines the organization and quality of people's interpretations of inkblots, tap into various aspects of priming and emotional-learning systems because they reveal cognitive and emotional schemata that have been acquired through learning and are automatically invoked when a person tries to make sense of ambiguous information.

The memory-systems approach to the classification of personality tests is also heuristically fruitful, because it immediately makes apparent that the vast majority of personality tests developed and employed by researchers and clinicians taps into only one kind of memory, namely, the semantic function of the declarative memory system. Most measures of the Big Three or Big Five of trait psychology, of people's self-attributed motives to achieve, affiliate, dominate, explore, and so on or their self-esteem, dispositions for psychopathology, and patterns of adult attachment rely on respondents' ability to judge relatively abstract, decontextualized questionnaire items with regard to how well they represent their personality. In contrast, very few measures try to capture the same constructs through measures tapping into respondents' episodic memories. Even fewer instruments

TABLE 1
Overview of Memory Systems (Based on Squire et al., 1993) and Their Proposed Mapping Onto Personality Constructs and Tests

Type of memory	Declarative		Nondeclarative			
	Episodic	Semantic	Classical conditioning	Habit learning	Priming	Nonassociative learning
Subsystem						
Substrate	Medial temporal lobe (hippocampus)		Amygdala	Striatum	Neocortex	Reflex pathways
Representative personality construct	Life story	Self-attributed traits	Implicit motives, temperament		Implicit attitudes	?
Representative measure	Autobiography	Big Five questionnaires	Picture Story Exercise, Strange Situation Test		Implicit Associations Test	(startle eyeblink)

attempt to assess the same personality traits with instruments that directly measure at the nondeclarative level individuals' habits and skills, emotional/autonomic responses, or priming processes, despite strong and in some cases long-standing conceptual and empirical arguments for the appropriateness of such measures for the study of personality (e.g., Eysenck, 1967; Gray, 1964; Kagan, 2002). Thus, conceptualizing personality tests in terms of a memory-systems framework immediately makes apparent some glaring gaps in our test arsenal and should serve as a call to arms for the development of new and more diversified measures of personality.

Another advantage of a cognitively inspired approach to personality assessment such as the one I am advocating here is that it may help to advance not only the classification, evaluation, and development of personality measures, but also our understanding of the personality constructs upon which they are based. For instance, the well-documented lack of overlap between declarative and nondeclarative measures of seemingly unitary personality dispositions such as achievement motivation can be understood as reflecting the independence between a medial-temporal-lobe/frontal-lobe semantic memory system on the one hand (achievement motivation as assessed with a questionnaire) and a subcortical alliance between systems subserving emotional memory and instrumental learning (achievement motivation as assessed with the PSE; cf. Schultheiss et al., 2006). Research consistently shows that declarative and nondeclarative memory systems have little cross-talk and can therefore easily dissociate in neurologically impaired patients and normal research participants alike (e.g., Bechara et al., 1995; Kolb & Whishaw, 2003). This suggests that it makes little sense to talk about *the* achievement motive, when in reality different forms of achievement motivation may be manifested in separable memory systems and thereby affect behavior in different ways and under different circumstances (cf. Schultheiss, in press; Schultheiss & Pang, 2007, for further discussion of this issue and an elaboration of the declarative/non-declarative distinction as applied to motivational constructs).

The fact that memory systems can operate independently does not rule out that they can interact with each other. Interactions between declarative and nondeclarative memory

systems can be observed in the case of between-systems synergism, such as when activation of systems involved in emotional learning (amygdala) facilitates episodic memory (e.g., Cahill, 2000) and habit learning (e.g., Robbins & Everitt, 2002), and between-systems competition, such as when semantic-memory processes such as rule learning interfere with the procedural acquisition of stimulus-response contingencies (e.g., Maddox & Ashby, 2004; Poldrack & Packard, 2003). Applied to the study and assessment of personality, such findings may suggest that some aspects of personality are represented coherently across two or more memory systems and, accordingly, some personality measures may therefore tap into two or more memory systems. This case is illustrated by the assessment of self-defining peak experiences: these are episodic (i.e., declarative) memories that are stamped into a person's sense of self probably through the coactivation of episodic and emotional learning systems at the time of encoding (McAdams, 1982.; Woike, McLeod, & Goggin, 2003; see also Cahill, 2000). Competition between memory systems, on the other hand, may provide another explanation besides mere between-systems independence for the previously discussed dissociation of seemingly similar personality dispositions assessed through different instruments (e.g., achievement motivation as assessed through questionnaire versus thematic content coding of picture stories).

The classification approach advocated here also opens new perspectives for understanding what personality tests measure and what their limits are. For instance, given the heavy use clinicians and researchers make of questionnaire measures of personality, nearly all of which rely on declarative memory, it is important to ask how the contents of people's beliefs about themselves ended up in this system and thus became available for declarative assessment methods in the first place. While the idea that people have direct insight into the workings of the systems that make them behave, for instance, in an extraverted, fearful, or impulsive way usually does not find much favor (cf. Smillie, Pickering, & Jackson, 2006, for a recent critique of this idea as applied to personality traits), it appears plausible that people learn about their patterns of behavior through careful self-observation

and make inferences about their own personality based on these observations, just like an outside observer would (Bem, 1972; Wilson, 2002). Thus, extraverts may know that they are extraverted because they observe that they spend a lot of time with others and frequently engage in vigorous activities. In other words, the behavioral output of nondeclarative memory systems becomes the perceptual input for the declarative (i.e., semantic and episodic) memory systems.

The fact that semantic memory represents knowledge that can be stripped of the context and conditions under which the knowledge was acquired (source amnesia; cf. Klein et al., 1996) also suggests some limits to the validity of personality tests tapping into this system. As McClelland, Koestner, and Weinberger (1989) pointed out, people's beliefs about themselves may reflect to a large extent the expectations and values of their social environment and culture (see Kuhl & Kazen, 1994, for an experimental illustration of externally assigned goals that are misremembered as self-chosen). Whether a person considers herself to be achievement-motivated may therefore depend to some extent on how much her parents, teachers, and peers want her to pursue challenging goals. Due to source amnesia, the person herself is, of course, often unaware of the fact that her self-attributed achievement motive is derived from these social expectations (this is an issue on which the extensive literature on false memories might shed some light; e.g., Loftus, 2003).

In a worst-case scenario the convictions and beliefs that a person stores in her or his semantic memory may represent just-so explanations of past and present behavior, without any insight into the true causes of the behavior. As research on split-brain patients (Gazzaniga, 1985) and neurologically intact research participants (Nisbett & Wilson, 1977) shows, people have no problem stating reasons for their behavior, even if it can be conclusively shown that they are completely ignorant of the true elicitors of the behavior in question. Based on extensive research on split-brain and normal individuals, Gazzaniga (1985) explains this phenomenon with the existence of a left-hemispheric interpretation mechanism involving semantic-memory structures. The left-brain interpreter continually attempts to come up with coherent explanations of the person's behavior and events in the world and operates, quite frequently at the expense of veracity, to maintain a consistent sense of self. In this bleak view, the apparent consistency of personality over time (often established using declarative measures that rely heavily on left-hemispheric language functions) must be attributed to a mechanism that strives to maintain a consistent sense of self where otherwise little consistency is present in the person's behavior.¹

¹Like self-reports, informant reports typically represent declarative personality measures, because they tap into the informant's semantic and episodic memories about a target person. They are therefore limited by similar constraints as self-reports: they depend on careful observation of the target, may sometimes simply represent memories of what the target told the informer about her or his own personality (cf. McClelland, 1972) or, in

Which of these accounts best characterizes the origin of people's declarative beliefs about their personality, whether it is self-observation, self-infiltration, or a largely artificial construction of behavioral consistency, probably depends on which type of personality construct is being assessed and under which circumstances. My intent in sketching out these various accounts of the contents of self-related declarative knowledge is not to disparage one particular method of personality assessment (other methods have other drawbacks). Rather, I want to illustrate how a memory-systems perspective on personality assessment may open up new perspectives for understanding what personality tests measure by examining the operating characteristics, interconnections, and limitations of the memory systems into which they tap.

A final advantage of a classification system for personality tests that is based on a memory-systems perspective is that it can facilitate the integration of personality theory and assessment with other disciplines of psychology, most notably cognitive psychology, biopsychology, neuropsychology, and clinical psychology. Memory-system models have been researched intensively over the past 50 years, and a vast and exponentially growing body of studies attests to the fact that information is processed in separate systems, using different codes, serving different purposes, and housed in dissociable brain networks (cf. Squire, 2004; Squire et al., 1993). A memory-systems-based classification of personality measures would better enable personality researchers and clinicians to draw on this immense body of knowledge and use it to evaluate the measurement credentials of existing measures and develop better and more diverse measures in the future. Needless to say, this also would have beneficial effects on the sophistication and comprehensiveness of theory development in personality psychology. Personality researchers would then perhaps also be in a better position to inform researchers in other disciplines about the meaning of stable individual differences in the content and operation of memory systems. The classification system sketched out here is aimed at facilitating this process of interdisciplinary exchange and integration.

the worst case, may represent an attempt of the informant's left-hemispheric interpreter to maintain a consistent, plausible view of the target person. Once an informant starts looking at nondeclarative markers of personality (e.g., how frequently the target blushes, seems to automatically associate some concepts with others, or spontaneously behaves in distinct, recurrent ways), however, he or she is essentially taking on the role of the researcher or clinician who is going beyond the behavioral surface that we can easily categorize in ourselves and others using shared and salient conceptual categories (e.g., "extraverted") and digs deeper into the operating characteristics of the target's nondeclarative memory systems. In essence, then, the informant reports the results of nondeclarative measures, which is not different, for instance, from a researcher reporting findings from a study on implicit motives and implicit learning in a paper. The process through which the knowledge is shared is clearly declarative, but the way the knowledge was acquired is not.

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