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How People Take Psychological Tests: Understanding Item Response Processes on Self-Report Personality Inventories

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Abstract

Self-report personality inventories are the backbone of clinical and personnel assessment psychology. This paper considers how people take psychological tests by focusing on self-report item response process. Task decomposition of test item responding illuminates the processes which underlie task performance and result in a score. Attention to test item response processes has been advocated as a basis for construct validity. Developments in cognitive psychology permit detailed analysis of task components. Following a historical overview, a cognitive architecture is described which illustrates sequential and parallel processing of item content activating working, declarative, and episodic memory in a self-presentational process. Activation of working and episodic memory processes involves explicit and implicit mental simulations. Task decomposition provides insight into personality inventory test-taking behaviors, illuminates self-report personality test data, and generates hypotheses for empirical investigation. Implications for an integrative functional taxonomy of personality tests considering response process are discussed.

Introduction

Used widely in clinical assessment and personnel selection, self-report personality inventories are the backbone of personality assessment. Responding to personality test items—the psychological components that are present in creating a response--is a complex interaction between test stimuli, memory, and motivation. Response processes are the psychological mechanisms that underlie what people do, think, or feel when interacting with, and responding to, the test item or task. Response processes are responsible for generating observed test score variation.

Item Response Processes and Construct Validity

Response processes have been identified as one of five validity components in the *Standards for Educational and Psychological Tests* (American Education Research Association, 2014), demonstrating the fit between constructs and the performance engaged in by test takers. With respect to construct validity, two foundational approaches have been proposed (Embretson, 1983): *construct representation* and *nomothetic span*. Construct representation focuses on theoretical mechanisms that underlie task performance: the psychological processes that result in a test score. The operation of construct representation is task decomposition: the processing, components, strategies, and knowledge that the examinee applies to produce the response. By contrast, nomothetic span refers to the pattern of significant relations among measures of the same or different constructs, (i.e., the traditional framework for convergent and discriminant validity). This psychometric approach favors correlational and factor analytic approaches to construct validity.

Shortcomings of traditional psychometric models of construct validity based on the multitrait-multimethod matrix demand reconceptualization of construct validity (Boorsbom, Mellenbergh, & van Heerden, 2004). Understanding response processes has received inadequate attention in the personality assessment literature. Traditional, psychometric sources of construct validity have overshadowed efforts to provide substantive validity evidence via attention to response processes. A meta-analysis of 283 tests from the 16th *Mental Measurements Yearbook* found that response processes were mentioned in only 1.8% of cases (Hubley & Zumbo, 2017).

Item Response Processes and a Taxonomy of Tests

Test taxonomies have been proposed based on item response formats, including type of reasoning employed, nature of cognitive continuum employed, and kind of response yielded. One potential taxonomy of tests is based on the declarative/non-declarative memory distinction, i.e., whether tests assess facets of personality represented in consciously accessible or in nonconscious memory systems whose operation is reflected in implicit performance measures (Schultheiss, 2007). Personality tests may be classified as declarative measures or nondeclarative measures…" according to whether they represent episodic, semantic, priming emotional-response, habit learning or non-associative instruments" (Schultheiss, 2007, p. 197). Schultheiss argues that self-report personality tests primarily tap into only one kind of memory, namely, the semantic function of the declarative memory system, an assertion that will be considered in the discussion below. Alternatively, nondeclarative memory tasks (e.g., life story techniques, TAT, IAT, and Rorschach Test) capture constructs as implicit measures tapping implicit and episodic memory. In the model described below, which implicates declarative and episodic memory in both explicit and implicit modes, this simplistic distinction may need to be revised. As will be presented here, a dual process cognitive model of thinking (Frankish, 2010) may be applied to all types of response-based psychological testing and serve as an integrative framework for personality assessment.

With the emergence of social-cognitive psychology in the last half of the 20th century, concern about test item properties that predominated in the 1950's and '60s shifted to within-subjects processes with increasing recognition of item by person interactions. Information processing models from social-cognitive psychology permit innovations in the understanding of information processing, knowledge, memory structures--including explicit and implicit self-concepts--and sequential dual process models (Evans, 2008). While classes of response processes have been proposed as a potential taxonomy of tests (Bornstein, 2011), including a transtheoretical taxonomy of tests based on functions associated with methods utilized (introspective, informant-based, interviews, etc.; Mihura & Graceffo, 2014), these proposals advocate the importance of understanding test response processes but do not describe the actual processes themselves. Developments in social cognitive psychology provide detailed models for decomposition of tasks underlying test response processes.

Cognitive Models of Item Response Processes

Schema Theory and Trait Activation of Self-Concepts

Schema theory is a major development in conceptualizing self-knowledge and self-presentation. Self-schemas (or schemata) are complex cognitive knowledge structures. Self-knowledge is encoded as semantic and episodic mental representations of self, others, and objects in the social world (Markus, 1977.) Self-schemata are active, working knowledge structures which inform perception, memory, and behavior. Responding to personality inventory items involves interactions between item properties and cognitive structures (i.e., schema organization). Traits are empirically-related behavioral and cognitive representations reflecting an underlying continuum: a tendency for exhibiting behavioral and attitudinal exemplars to a greater or lesser degree. Reading a personality item is a classic example of priming defined as "the incidental activation of knowledge structures, such as trait concepts and stereotypes, by the current situational context" (Bargh, Chen, & Burrows, 1996, p. 230).

In responding to a test item, the test taker scans item content and activates self-comparisons. "The presence of a schema may be detected by the speed and the accuracy of processing self-relevant matter, by the amount of schema-relevant material recalled or recognized, and the focus of a schematic's attention when encountering social information" (Fekken & Holden, 1992, p. 104). The threshold theory of test item responding holds that each individual's response patterns can be represented by a different curve relating underlying item attributes, such as judged item desirability values and the individual's probability of endorsement of the item (Voyce & Jackson, 1977). This parameter of the subject operating characteristic defines the point on the item desirability dimension at which the individual begins to endorse test items along a quantitative dimension marking the transition from a false to a true response in the case of dichotomous items (Kuncel 1973, 1977). These decisions indicate the subjective processes of item endorsement.

Differential item response latencies depend on the degree to which a test stimulus is congruent with a person factor. Traits are empirically-related behavioral and cognitive representations reflecting an underlying continuum; a tendency for exhibiting exemplars to a greater or lesser degree. Trait presence facilitates the processing of trait-consistent, self-descriptive information and inhibits the processing of trait inconsistent, non-self-descriptive information. In threshold theory, item endorsement involves designating an exemplar of the emergent pole as self-descriptive or, alternatively, designating an exemplar of the implicit pole as non-self-descriptive (Holden, Kroner, Fekken, & Popham, 1992).

Dual process theories (Evans, 2007; Kahneman & Frederick, 2002) make a significant contribution to understanding how people read and interpret test items. This theory has resulted in dual-process frameworks that postulate a distinction between fast, intuitive, automatic, heuristic, and emotionally charged processes (heuristic, 'System 1' or 'Type 1' thinking) versus slow, conscious, controlled, deliberate and analytic processes (deliberate 'System 2' or 'Type 2' thinking; Evans, 2007; Stanovich, West, & Toplak, 2014; Strack & Deutsch, 2014). Reading test items subconsciously activates implicit (type 1) trait constructs and self-concepts. Attitudes and affective reactions are triggered automatically by the mere presence of relevant objects and events. Type 2 processes are activated to assess and evaluate the desired response including its significance for the assessment situation. This model will be discussed in detail below in the context of cognitive architectures of thinking.

Sequential Information Processing Models

Classic studies of decision latency and choice reaction time reveal the cognitive process and sequence of events or stages which fills the latent period between the presentation of a stimulus and the initiation of a response (Smith, 1968). Sequential stage processing includes stimulus preprocessing, stimulus categorization, response selection, and response execution. Formal sequential item response processing models emerged in the literature in the 1970’s. Responding to test items involves initial encoding (stimulus comprehension), self-referent decision-making, and response selection stages.

By the mid-1980’s, three stage sequential-simultaneous item response models became normative (Rogers, 1974; Angleleitner et al, 1986). In the *Encoding stage*, subjects first read the item and form an internal representation of its meaning. In the *Item-self comparison stage*, subjects compare meaning with internally stored information about themselves. In the *Utility control stage*, the latent decision may be checked for its utility, especially with regard to its congruence with social norms and values. Item response models detail a complete model of the item response process linking stimulus properties (item length, ambiguity, and extremity) and person interactions (reading speed, verbal ability, schema organization, and motor speed) in a sequential process (e.g. Holden, Fekken, & Cotton, 1991).

The intrapsychic response process was described as the cognitive and affective process that goes on within a given subject between the moment he or she begins to read a given personality questionnaire item and the moment he or she records the subsequent response (Kuncel & Kuncel, 1995). Schwarz (1999) explicates how respondents make sense of test questions, including the role of conversational inference, how respondents access autobiographical memory, make frequency estimations, and the role of context effects in shaping self-report. Sequential mapping of response stages permits identification of information processing factors and points where errors in item processing may occur, e.g., difficulty understanding or applying item content, understanding intended usage, lack of item content familiarity, insufficient experience on which to base a response, and social desirability (Kuncel & Kuncel, 1995).

Increasingly detailed and complex models of item response processes were proposed involving lexical, syntactic, semantic, and pragmatic mental representations (Helfrich, 1986). In responding to test items, cognitive demands on the test taker are intense. These processes include linguistic comprehension, prototype comparison, subjective estimates of nearness or distance from trait or behavioral prototypes, and fuzzy sets associated with loose boundaries and probabilistic reasoning (Helfrich, 1986; Kuncel & Kuncel, 1995). Early conceptualizations were limited to conscious (declarative, primarily semantic self-concepts) evaluation processes. Further developments in cognitive psychology postulated implicit models of cognition and information processing, and activation of non-declarative memory in response processes (Schacter, 1992; Greenwald & Banaji, 2017). Subsequent theory and empirical work demonstrated that “people classify their experiences as good or bad and do so immediately, unintentionally, and without awareness that they are doing so” (Bargh & Chartrand, 1999, p. 474).

Over four decades, the cognitive revolution provided new tools to conceptualize processes of responding to personality inventory items with increasing complexity and sophistication. Initially described as relatively simplistic, sequential cognitive process models, these developments occurred simultaneously with developments in dual process and implicit models of mental knowledge structures and types of memory, illuminating how test stimuli influence processing components, strategies, and knowledge structures applied in the production of test responses.

The Cognitive Architecture of Item Responding

Cognitive Architectures and Social Cognition

Similar to cognitive architectures—schematic models of human cognition--which became prevalent in the 1990's (e.g., Kihlstrom, Cantor, Albright, Chew, Klein, & Niedenthal, 1988),[1] Wyer and colleagues proposed a detailed cognitive architecture that is especially useful for task decomposition of personality inventory item responses (Figure 1; Wyer & Srull, 1989; Wyer & Radvansky, 1999).[2] The model specifies multiple information processing stages and iterations en route to a judgment or behavioral decision: comprehension, memory activation and retrieval, inference integration, and generation of behavioral responses. Processing at various stages is automatic or deliberative, sequential, and simultaneous. The heuristic model mirrors the sequential, self-referential, performative processes for the activation and retrieval of social information with processes that occur in daily life.

Cognitive architecture models highlight the role of memory in information processing (Squire, Knowlton, & Musen, 1993). The declarative memory system consists of abstract, factual knowledge accessible to conscious recall (introspection). Procedural memory involves rules and skills, also accessible to conscious awareness. Reading personality test items activates working memory. "Working memory contains activated representations of the person, his or her processing goals, the local environment, and other currently active declarative memory structures" (Kihlstrom, Cantor, Albright, Chew, Klein, & Niedenthal, 1988, p. 148).

The Wyer and Srull cognitive architecture will be described in detail. It is composed of three major memory units, four special purpose processing units, and an Executor that directs the flow of information between these units. The memory units include the Work Space (analogous to working memory), the Permanent Storage Unit (long-term declarative and episodic memory), and a Goal Specification Box (typically retrieval instructions or goals). The latter unit is a temporary repository of goal schemas or sequences of cognitive steps that are involved in the pursuit of particular objectives, in this case responding to test items under conditions of the psychological assessment's procedures and purposes. The model takes into account factors from dual processing theory (Kahneman & Egan, 2011), interleaving fast, heuristic processing, and slow, deliberative, propositional thinking, under the rubric of the overriding goal schema.

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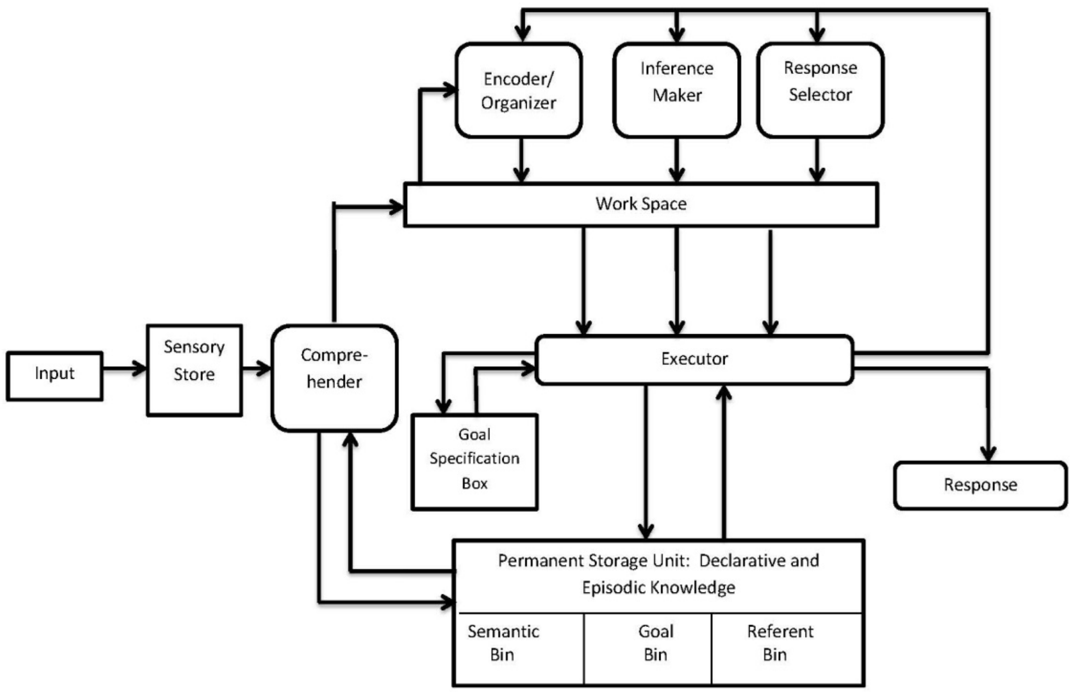
[1] Kotseruba and Tsotsos (2020) describe 89 different cognitive architectures, 49 of which are in use and have yielded over 900 studies.

[2] R. Wyer (personal communication January 6, 2020) indicated that his 1999 architecture has not been substantially altered. He has integrated more explicit factors from dual process theories to the 1999 model (Wyer & Kardes, 2017).

Figure 1

Wyer & Srull Cognitive Architecture



Note. (Wyer & Radvansky, 1999, p.92).

Special purpose processing units integrate and analyze information and deposit the output into the memory units. The *Comprehender* automatically interprets linguistic input information in terms of general semantic (verb, noun, and adjective) concepts. The *Encoder/Organizer* performs higher-order interpretations of information and activates mental representations. The *Inference Maker* combines the implications of information to form a subjective judgment. The *Response Selector* transforms subjective inferences into an overt response. The memory units come into play in the course of goal-directed processing. The *Executor* directs the flow of information between processing units and memory storage units. In doing so, it takes instructions from a global schema that specifies the sequence of operations to be performed and the type of information required. Initial comprehension processes are performed automatically and independently of any specific processing objectives that exist.

The output of the *Comprehender* is referred to the Work Space, where it is reviewed by the *Executor*. Mental representations are retrieved from Permanent Storage by activation of the configuration by probe_cues (multiply coded in all sensory modalities), or features that circumscribe the type of information being sought. The output of goal-directed processing is ultimately deposited in Permanent Storage, where it becomes available for future goal-directed activity. Knowledge is represented in Permanent Storage memory in multiple modalities, including semantic and metaphorical meanings of the concept, visual images, behavioral dispositions, subjective reactions and bodily sensations, each of which functions as a symbol that can be used to index and construct a representation of the referent in memory.

The Permanent Storage Unit consists of a set of content addressable storage bins (semantic, referent, and goal oriented). The most obvious are trait concepts that are used to characterize self-concepts and behaviors. Referent bins contain experiential (episodic) knowledge accumulated about persons, objects, events, and prototypes. Whereas general semantic bins constitute a mental dictionary of words and phrases, the referent bins, in combination, serve as an encyclopedia for stored knowledge about the physical and social world and self-concepts. With frequent activation and retrieval, these “memory organization packets” can become hard wired into schemas: the more frequently a category is activated the more accessible that information becomes. Affect-related constructs and features have the same status in the model as other concepts and enter into cognitive processing in similar ways. For example, concepts associated with affective states exist in the semantic and episodic bins in Permanent Storage. They differ from other attribute concepts in that their defining features include representations of subject’s internal subjective reactions. Affect- or emotion-based schemas may be generalized into semantic models or scripts.

In considering item response processes, an important aspect of the cognitive processing model is the relation between the Work Space and Permanent Storage. The Work Space is a temporary repository of input information and prior knowledge, and output from these processing stages. The Work Space contains (a) new stimulus information transmitted to it by the *Comprehender*; (b) previously formed knowledge representations drawn from Permanent Storage; (c) abstract encodings of new stimuli information in terms of trait or more general behavior concepts; (d) integrated representations of the information formed with relevance to prototypic persons or events; (e) subjective judgments; and (f) episodic representations of overt responses. This cognitive architecture recognizes the sequential and parallel processing of information under the auspices of the *Executor* and the prevalent goal schema, naming completing the test items under the psychological assessment project.

Self-presentation in item response processes. In contrast to processing information about the physical world, responding to personality inventory items involves self-referential information processing, that is, accessing semantic or episodic memory (self in past, present, and future perspective) that has a distinctive neural signature (viz., the medial prefrontal cortex). Responding to self-report items activates implicit and explicit cognitive, affective, and sensory subprocesses: the activation of self-referential declarative and autobiographical memory, self-evaluation, and processes of self-regulation, as dual process interactions. Self-evaluative processes in item responding include social comparisons, self-standard comparisons, and temporal factors related to episodic memory. Test takers also engage in self-esteem maintenance operations while taking tests: maintaining coherent, temporally stable, and motivational aspects of self-presentation in the assessment situation.

Episodic-embodied activation. In contrast to computational models of human cognition where experience is extracted, transduced, redescribed, and stored in abstract, amodal form (e.g., Anderson, 1983), embodied cognition advocates assert that information processing is coded by sensory modalities, as “thinking involves partial reproduction or simulation of experiential and motor states. Thinking is an experiential reenactment or ‘embodied simulation’” (Winkielman et al, 2015, p. 132). Mental simulations are imitative episodic mental representations of events, real and potential. When solving self-referential problems, "individuals engage in simulation heuristics, operations that resemble 'the running of a simulation model' (Tversky & Kahneman, 1982). "Mental simulations are imitative episodic mental representations…In contrast to semantic representations, which are more general or abstract, mental simulations typically entail detailed mental representations of a specific or hypothetical event" (Kappes & Morewedge, 2016, p. 405). Neural and conceptual models link mental simulations with corresponding sensory-motor systems during the behavior being simulated. In short, responding to personality test items activates remembering, re-experiencing past, and simulating future or potential experience (Schacter & Madore, 2016).

Social Desirability Revisited

Responding to personality test items is a self-presentational activity subject to performative biases (Johnson, 1981). The role of social desirability in responding to personality inventory items has preoccupied researchers and clinicians since the early development of self-report tests. Early on, the socially desirable response style was defined as a general tendency to endorse personality inventory items judged to be socially acceptable by people in general (Edwards, 1957). In early social desirability research, researchers focused on test takers' tendency to endorse items based on acquiescence and the social desirability valence of test items (Messick & Jackson, 1961). An item's social desirability valence was determined by correlating item endorsement frequencies with independently rated item social desirability by groups of subjects taking a personality inventory (e.g., Rosen, 1956).

Classical models of social desirability based on characteristics of test items may be revised in light of research and developments in social cognition. Social desirability is a form of motivated cognition in self-evaluation and presentation. Early research revealed bi-dimensionality in social desirable responding, labeled Alpha and Gamma dimensions of social desirability (Wiggins, 1964). Paulhus (1986) formulated a classic two-factor model of social desirability: impression management and self-deceptive enhancement. In the model described here, social desirability processes operate in both semantic and episodic memory, linked to explicit and implicit, dual process processing systems, when self-attributes are activated by test stimuli. Self-evaluation and esteem regulation operations play out in the form of desired self-simulation where positive attributions are claimed and negative attributions denied (Kernis, 2003; Paulhus, 1986, 1998).

Cognitive psychology permits a detailed and nuanced revision of impression management (Holtgraves, 2004). The test taker reads and interprets the test item (encoding), generates an opinion or a representation of behavior (comprehension), formats (self-referent decision) and edits a response (response selection). Several cognitive models have been proposed to account for impression management: a) semantic exercise (based on semantic evaluation of item content); b) self-schema model (elimination of unfavorable features of self-schemas); and c) adopted-schema model (referencing schemas that define the traits of an ideal respondent). These latter strategies involve simulations of ideal self-presentations discussed above.

In contrast to impression management, which is rooted in conscious, instrumental processes of self-presentation (a form of other deception), self-deceptive enhancement is a more complex and subtle form of defensiveness where positive illusions override undesirable self-characteristics, which are eliminated from the desired self-concept. High self-enhancement has been linked to dissociations in implicit and explicit self-esteem (Bosson, Brown, & Zeigler-Hill, 2003; Zeigler-Hill, 2006). Implicit self-esteem is the introspectively unidentified (or inaccurately identified) effect of the self-attitude on evaluation of self-associated and self-dissociated objects (Greenwald & Banaji, 1995; Greenwald & Banaji, 2017). The adaptive triggers, benefits, detriments, and psychodynamics of deceptive self-enhancement have been extensively debated (Paulhus & Reid, 1998; Zeigler-Hill & Jordan, 2011). Activated discrepancies between an individual's implicit and explicit self-esteem are associated with heightened self-serving and self-protective responses (Kernis, 2003). In processing social-relevant information, the test taker may engage in unconscious type 1 heuristic strategies which influence retrieval of information. Within the context of the psychological evaluation, retrieval may be influenced by confirmation biases in both activation and retrieval where only self-confirmatory information is accessed.

Summary of the Cognitive Item Response Process Model

The task decomposition of item responding describes sequential and simultaneous processing of personality item content in declarative and nondeclarative memory systems, activating a process of retrieval and formulation of a response choice linked to the goal specifications. Reading a personality inventory item activates implicit and explicit knowledge structures encoded and stored in long–term memory. Item response processes are automatic and parallel processed, based on multiple coding, and involve referential processes between systems of semantic and episodic memory and representation The process involves categorical, schematic, event-based, and sensory-encoded (visual, olfactory, auditory, proprioceptive) information. Responses to test items involve activation of propositional, semantic declarative memory about known aspects of the self. Additionally, responding evokes "constructive episodic simulations" (Schacter & Addis, 2007: Schacter, Addis, & Buckner, 2008), the re-experiencing of previous and simulation of potential experience. Remembering past events or simulating future events draws on similar kinds of information in episodic memory, involving scene construction, prospection (imagination of future scenarios), simulation, and mental time travel (Suddendorf, Addis, & Corballis, 2009).

Application of Task Decomposition to a Taxonomy of Psychological Tests

The general properties of the cognitive process and task decomposition model described here may be applied to assessment tasks that are based on responses from subjects, including informant-based assessments: "The specific type of processing that is involved presumably depends on the specific processing objectives being pursued, and thus, the nature of the instructions contained in the goal schema that governs this processing" (Wyer & Srull, 1986, p. 334). While the underlying cognitive processes are virtually identical, differences occur as to types of memory (declarative or nondeclarative, semantic or procedural, emotional or self-schemas, autobiographical memory), cognitive problem-solving strategies accessed, and desired response outputs.

In contrast to types of stimuli (the traditional test taxonomy) or type of memory accessed (Osterlind & Merz, 1994; Teglasi, 2013), a test taxonomy may be based on outputs – the actual interpretive data that is scored (e.g., creation of a percept, or formation of a narrative). This may include spontaneous self-report (tell me about yourself?); free association (tell me whatever comes to mind without censoring?); cued self-report (tell me your earliest memory, specific memories; semi-structured and structured clinical interview questions?); explicit self-concept/other concepts (self-report personality inventories or informant-based assessment?); visual percepts involving explicit and implicit self-concept/concepts of others (what might this be? tell me a story?); and factual knowledge (how far is it from Paris to New York?), involving both declarative and nondeclarative processing.

Conclusion

From an observer's viewpoint, responding to a personality inventory may appear deceptively simple. The process of responding to a test item takes place in a matter of seconds. On the 567 item MMPI-2, for example, with a typical completion time of 60-90 minutes, subjects complete the item response process in less than 10 seconds per item. The efficiency of this process is based on the automaticity of response processes. When the processing objective of responding to an item has been achieved and a response selection has been made, the system *Executor* activates a "clear Work Space routine." The process starts again on the next item. When questioned afterward about their endorsement strategies, the great majority of subjects are unable to provide much insight to their thinking process (Nisbett & Wilson, 1977; Wilson & Nisbett, 1978). Individuals can fluently adjust endorsement thresholds and outputs depending on the assessment situation context and instructions. Test takers can consciously change their self-presentations on demand. In cognitive psychology terms, context and instructions alter the covert and overt processes of intuitive, representational, propositional, and strategic simulations that model item responses.

Responding to personality inventory items mirrors processes observed in ordinary social cognition including antecedent and simultaneous processes of comprehension, self-presentation, and validation of social information. Conventional thinking about psychological testing distinguishes between self-report and performance-based tests (Teglasi, 2013). Based on the proposal advanced here, this distinction may need to be revised. The cognitive process model of test item response encompasses all types of response-based psychological tests forming a foundation for an integrative model of personality assessment. Responding to a personality inventory may be viewed as a type of skilled performance; "personality measures--often regarded as capturing typical performances—are more like ability tests (measures of maximal performance) than most people realize" (Johnson & Hogan, 2006, p. 217).

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References

Anderson, J. R. (1983). *The architecture of cognition*. Harvard University Press.

American Education Research Association, National Council on Measurement in Education, & American Psychological Association (2014). *Standards for Educational and Psychological tests*. American Educational Research Association.

Angleleitner, A., John, O. P., Lohr, F. J. (1986). It's what you ask and how you ask it: An itemmetric analysis of personality questionnaires. In A. Angleleitner & J. S. Wiggins

(Eds.), *Personality assessment via questionnaires: Current issues in theory and Measurement* (p. 61-108). Springer Verlag.

Bargh, J. A., & Chartrand, T. L. (1999). The unbearable automaticity of being. *American Psychologist*, *54* (7), 462-479.

Borsboom, D., Mellenbergh, G. J., & van Heerden, J. (2004). The concept of validity. *Psychological Review*, *111*(4), 1061-1071.

Bornstein, R. F. (2011). Toward a process-focused model of test score validity: Improving psychological assessment in science and practice. *Psychological Assessment*, *23*(2), 532-544.

Bosson, J. K., Brown, R. P., Zeigler-Hill, V., & Swann, W. B. (2003). Self-enhancement tendencies among people with high explicit self-esteem: The moderating role of implicit self-esteem. *Self and Identity*, 2(3), 168-187.

Embretson, S. E. (1983). Construct validity: Construct representation versus nomothetic span. *Psychological Bulletin*, *93*(1), 179-197.

Evans, J. S. (2008). Dual-processing accounts of reasoning, judgment, and social cognition. *Annual Review of Psychology*, 59: 255–278.

Greenwald, A., & Banaji, M. (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Psychological Review*, 102(1), 4-27.

Greenwald, A., & Banaji, M. (2017). The implicit revolution: Reconceiving the relation between conscious and unconscious. *American Psychologist*, 72(9), 861-871.

Fekken, C. G., & Holden, R. R. (1992). Response latency evidence for viewing personality traits as schema indicators. *Journal of Research in Personality*, 26(2), 103-120.

Frankish, K. (2010). Dual-process and dual-system theories of reasoning. *Philosophy Compass*, *5*(10), 914-926.

Helfrich, H. (1986). On linguistic variables influencing the understanding of questionnaire items. In A. Angleleitner & J. S. Wiggins (Eds.), *Personality assessment via questionnaires: Current issues in theory and measurement* (p. 178-188). Springer Verlag.

Holden, R. R., Fekken, G. C., & Cotton, D. H. G. (1991). Assessing psychopathology using structured test-item response latencies. *Psychological Assessment*, *3*(1), 111-188.

Holden, R. R., Kroner, D. G., Fekken, G. C., & Popham, S. M. (1992). A model of personality test item response dissimulation. *Journal of Personality and Social Psychology*, *63*(2), 272-279.

Holtgraves, T. (2004). Social desirability and self-report: Testing models of socially desirable responding. *Personality and Social Psychology Bulletin*, *30*(2), 161-172.

Hubley, A. M., & Zumbo, B. D. (2017). Response processes in the context of validity: Setting the stage. In B. D. Zumbo & A. M. Hubley (Eds.), *Understanding and investigating response processes in validation research* (p. 1-12). Springer.

Johnson, J. (1981). The “self-disclosure” and “self-presentation” views of item response dynamics and personality scale validity. *Journal of Personality and Social Psychology,* 40, 761-769.

Johnson, J. A., & Hogan, R. (2006). A socionanalytic view of faking. In R. L Griffith & M. H. Peterson (Eds.), *A Closer Examination of Applicant Faking Behavior* (p. 209-231).
IAP Publishing.

Kahneman, D. & Egan, P. (2011). *Thinking, fast and slow* (Vol. 1). Farrar, Straus and Giroux Kappes, H. B., & Morewedge, C. K. (2016). Mental simulation as substitute for experience. *Social and Personality Psychology Compass*, *10*(7), 405-420.

Kihlstrom, J. F., Cantor, N., Albright, J. S., Chew, B. R., Klein, S. B., & Niedenthal, P. M. (1988). Information processing and the study of the self. *Advances in Social Experimental Psychology*, Vol. 21. Social Psychological Studies of the Self (p.145-178.)

Kotseruba, I., & Tsotsos, J. (2020). Forty years of cognitive architectures: Core cognitive abilities and practical applications. *Artificial Intelligence Review,* 53: 17-94.

Kuncel, R. B. (1973). Response processes and relative location of subject and item. *Educational and Psychological Measurement,* 33(3), 545-563.

Kuncel, R. B. (1977). The subject-item interaction in itemmetric research. *Educational and Psychological Measurement*, 37(3), 665- 678.

Kuncel, R. B. & Kuncel, N. R. (1995). Response-process models: Toward an integration of cognitive-processing models, psychometric models, latent trait theory, and self-schemas. In P. E. Shrout & S. T. Fiske (Eds.), *Personality Research, Methods, and Theory: A Festschrift Honoring Donald W. Fiske* (p. 183-199). Lawrence Erlbaum Associates.

Markus, H. (1977). Self-schemata and processing information about the self. *Personality and Social Psychology*, *35*(2), 63-78.

Mihura, J. L., & Graceffo, R. A. (2014). Multimethod assessment and treatment planning. In C. J. Hopwood & R. F. Bornstein (Eds.), *Multimethod clinical assessment* (p. 285-318).
Guilford Press.

Nisbett, R., & Wilson, T. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review,* 84(3), 231-259.

Osterlind, S., & Merz, W. (1994). Building a taxonomy for constructed-response test items. *Educational Assessment*, 2(2), 133-147.

Paulus, D. L. (1986). Self-deception and impression management in test responses. In A. Angleleitner & J. S. Wiggins (Eds.), *Personality assessment via questionnaires: Current issues in theory and measurement* (p. 143-165). Springer Verlag.

Paulus, D. L. (1998). Interpersonal and intrapsychic adaptiveness of trait self enhancement: A mixed blessing? *Journal of Personality and Social Psychology, 74*(5), 1197-1208.

Paulus, D. L. (2002). Socially desirable responding: The evolution of a construct. In H. I. Braun, D. N. Jackson, & D. E. Wiley (Eds.), *The role of constructs in psychological and educational evaluation* (p. 49-69). Erlbaum.

Rogers, T. B. (1974). An analysis of two central stages underlying responding to personality items: The self-referent decision and response selection. *Journal of Research in Personality*, 8(2), 128-138.

Rosen, E. (1956). Self-appraisal and perceived desirability of MMPI personality traits. *Journal of Counseling Psychology*, 3(1), 44-51.

Schacter, D. (1992). Implicit knowledge: New perspective on unconscious processes. *Proceedings of the National Academy of Science*, 89(23), 1113-1117.

Schacter, D. L., & Addis, D. R. (2007). On the constructive simulation of past and future events. *Behavioral and Brain Sciences*, *30*(3), 331-332.

Schacter, D. L., Addis, D. R., & Buckner, R. (2008). Episodic simulation of future events: Concepts, data, and applications. *Annals of the New York Academy of Sciences*, 1124: 39-60.

Schacter, D., & Madore, K. (2016). Remembering the past and imaging the future: Identifying and enhancing the contribution of episodic memory. *Memory Studies*, 9(3), 245-255.

Schultheiss, O. C. (2007). A memory systems approach to the classification of personality tests: Comment on Meyer and Kurtz (2006). *Journal of Personality Assessment*, *89*,2, 197-201.

Schwarz, N. (1999). Self-reports: How the questions shape the answers. *American Psychologist*, *54*(2), 93-105.

Smith, E. E. (1968). Choice reaction time: An analysis of major theoretical positions. *Psychological Bulletin*, 69(2), 77-110.

Squire, L. R., Knowlton, B., & Musen, G. (1993). The structure and organization of memory. *Annual Review of Psychology*, 44: 453-495.

Stanovich, K. E., West, R. F., & Toplak, M. E. (2014). Rationality, intelligence and the defining features of Type 1 and Type processing. In J. Sherman, B. Gawronski, & Y. Trope (Eds.), *Dual processes of the social mind (*p. 80-91). Guilford Press.

Strack, F., & Deutsch, R. (2014). The reflective—impulsive model. In J. W. Sherman, B. Gawronski, & Y. Trope (Eds.), *Dual-process theories of the social mind* (p. 92-104). Guilford Press.

Suddendorf, T., Addis, D. R., & Borballis, M. C. (2009). Mental time travel and the shaping of the human mind. *Philosophical Transactions of the Royal Society Bulletin*, 364(1521), 1317-1324.

Teglasi, H. (2013). The scientific status of projective techniques as performance measures of personality. In D. H. Saklofske, C. R. Reynolds, & V. L. Schwean (Eds.), *Oxford library of psychology*. *The Oxford handbook of child psychological assessment* (p. 113–128). Oxford University Press.

Tversky, A., & Kahneman, D. (1992). The simulation heuristic. In D. Kahneman,
P. Slovic, & A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases* (p. 201- 208). Cambridge.

Voyce, C. D., & Jackson, D. N. (1977). A evaluation of the threshold theory for personality Assessment. *Education and Psychological Measurement*, 37, 383-408).

Wilson, T., & Nisbett, R. (1978). The accuracy of verbal reports about the effects of stimuli on evaluations and behavior. *Social Psychology*, 41(2), 118-131.

Winkielman, P., Niedenthal, P., Wielgosz, J., Eelen, J., & Kavanagh, L. (2015). Embodiment of cognition and emotion. In M. Mikulincer & P. Shaver (Eds.), *APA Handbook of Personality and Social Psychology: Volume 1. Attitudes and Social Cognition* (p. 151-175. American Psychological Association.

Wyer, R. S., & Srull, T. S. (1989). *Memory and cognition in its social context*. Lawrence Erlbaum Associates.

Wyer, R. S., & Radvansky, G. A. (1999). The comprehension and validation of social information. *Psychological Review*, *106*(1), p. 92.

Wyer, R., & Kardes, F. (2017). *Multiple Processes in Consumer Judgment: A Selective Review and Conceptual Framework*. Unpublished manuscript.