S&W propose that ability predicts performance when Systems 1 and 2 are brought into conflict. If this is correct, capacity theorists might argue that the "pull" for System 1 and System 2 processing is the same across subjects. Like high ability subjects, low ability subjects attempt System 2 reasoning but are overwhelmed by problem complexity and fall back on the default system. However, the mechanisms separating high and low ability subjects may have nothing to do with capacity. As S&W (sect. 6.1, para. 4) suggest, the "pull" toward the normative rules of System 2 may be stronger for higher ability subjects. If "the most important difference between [System 1 and System 2] is that they tend to lead to different task construals" (sect. 6, para. 4), then the principle difference between ability levels may be the representations upon which further operations are performed, as the selection task results suggest. These representational differences may lie in the degree of decontextualization (e.g., gist, verbatim) or in type of decontextualized representation (e.g., inductive, deductive).

In focusing on individual differences, S&W have dealt a damaging blow to extremists positions on rationality. They have thereby also provided some clues as to the processes distinguishing high from low ability individuals. Decontextualization, both a product and a producer of formal educational and economic success (Rogoff & Lave 1984; Schooler 1984), may rarely be demanded in our everyday affairs. Nevertheless, the stakes are sometimes quite high when such System 2 processing does not take place, when politicians, religious leaders, and scientists fail to reason independently from erroneous beliefs, physicians disregard statistical base rates in forming diagnoses, and students do so when assessing career opportunities.

When decontextualization failures are related to psychometric intelligence, we must not leap too quickly to capacity explanations. The need to evaluate other plausible explanations is great, for if decontextualization is a domain-general ability, and if that ability is determined, to some degree, by capacity limitations, then there may be little hope for educators who seek to prepare low ability students for the demands of an increasingly technological society.

Individual differences and Pearson's *r*: Rationality revealed?

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Abstract: Regardless of the clarity of the patterns they produce, individual differences in reasoning cannot validate norms of rationality. With improved reliability, these correlations will simply reveal which sorts of biases go together and which predict the intelligence of the decision maker. It seems necessary, therefore, to continue efforts to define rational thought independently of intelligence.

The heuristics-and-biases paradigm suggests that ordinary people often fail to think rationally. This view is supported by reliable differences between average or modal human judgments and relevant normative standards. Individual differences are typically banished to the error term of the test statistic, and thus much information is lost. Stanovich & West (S&W) bring individual differences back into focus. This is an important development because (ir)rational thinking presumably occurs within individuals, and some individuals reason more rationally than others.

Group-level analyses not only ignore systematic variations among people, they also work against the vindication of human judgment (Krueger 1998a). Significant discrepancies between predicted (i.e., normative) and average actual judgments signal the violation of a norm. Such violations can easily be detected even if only a minority of participants responds non-normatively. For example, significant minorities allow past investments to affect decisions about the future, show intransitive preferences, and conform to the false judgments of a planted majority. Klar and Giladi (1997) concluded that people believe that "everybody is better than average." On the average, individual group members were indeed liked more than the group itself, but there was no difference in the modal response. Statistical outliers can thus distort group-level analyses and bias inferences about general psychological processes.

The individual-differences approach is more conservative in drawing categorical conclusions regarding (ir)rationality. Instead, it reveals some interesting patterns. In S&W's (1998c) study, rational reasoning appears to transfer from one task to another. Correlations among individual differences in rational responding ranged from .12 to .36 (M = .25, judging from Tables 1 and 2). However, with the exception of the argument-evaluation task (23 items), reasoning was assessed by only 1 (e.g., outcome bias) to 8 (e.g., syllogistic reasoning) problems. Once reasoning abilities are measured more reliably with multiple-item scales, these correlations will probably increase and strengthen the argument that performance errors cannot explain norm violations. Increased reliability will also boost the correlations between normative reasoning and the psychometric g factor of intelligence (now M = .23, Tables 2 and 3). S&W's (1998c) data already show that these correlations increase with the number of problems used to measure reasoning (r = .42).

Improved measurement will raise two new questions. First, is there a g factor of rational thinking? If high intertask correlations remain when intelligence is controlled, it will be possible to postulate the existence of trait of rationality. Second, will rationality remain separate from intelligence? As correlations between rationality and intelligence increase, the temptation to subsume the former under the latter will also increase. S&W entertain the idea that being rational is just one way of being smart. They suggest that "examining individual differences may actually reinforce confidence in the appropriateness of the normative models applied to problems in the heuristics and biases literature." Some biases (overprojection and overconfidence), however, are unrelated to intelligence. This state of affairs is unlikely to change with improved measurement. Another bias (ignoring noncausal base rates) is even negatively correlated with intelligence. These exceptions to the "positive manifold" remain inexplicable if g is the only benchmark for rationality.

The attempt to justify normative models of rationality with correlations between rational responding and g undermines efforts to devise and deploy independent criteria of rationality. The positive manifold among measures of rationality and intelligence simply suggests that good traits go together, just as bad traits do. It can be shown that g is a factor contributing to rational judgment, but this does not say much about the quality of the normative models themselves. Correlations between rational reasoning and other desirable person characteristics share this limitation. As noted by S&W, Block and Funder (1986) found that well-adjusted adolescents are most generous in attributing a person's role-conferred success to that person's disposition. Although this finding nicely demonstrates that the fundamental attribution error does not necessarily predict other negative person characteristics, it cannot speak to the normative adequacy of the attributions themselves.

Another provocative idea of S&W is that normative responses are "not prescriptive for those with lower cognitive capacity." This conclusion conflicts with the claim that correlations between normative responding and g support the general validity of the norms. If the standard norms only apply to the bright, what norms are the dim-witted to be held to? How bright does a person have to be to be held to conventional standards of logical and statistical reasoning?

Criteria for normative reasoning must be found and justified independent of g. Most normative models are derived from some algebraic, probabilistic, or logical calculus. Their judgments are rational because they avoid contradictions, and not because they seem reasonable to well-educated and well-intentioned decisionmakers (Dawes 1998). Sometimes, models that used to appear normative turn out to be flawed because contradictions are discovered. New models, which avoid these contradictions, then replace the old models. Some of these new models may improve predictions of human performance (as, for example, in the case of social projection; see Krueger 1998b), but they are not chosen for that reason.

What about motivation?

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Abstract: In their use of correlations as a means to distinguish between different views on the normative/descriptive gap, Stanovich & West discuss the competence component but neglect the activation-utilization component of performance. Different degrees of motivation may introduce systematic variation that is confounded with the variation explained by cognitive capacity.

In their discussion of the normative/descriptive gap, Stanovich & West (S&W) distinguish transitory performance errors from nontransitory computational limitations. They report significant correlations between tasks and conclude that this renders the performance-error view unlikely while being (weak) evidence for the computational-limitations view. However, their argument neglects an important aspect: being higher in cognitive capacity is not equivalent to investing more cognitive capacity. That is, besides measuring cognitive capacity, we must also measure the motivation to invest cognitive effort for a specific task at hand. Consider the case of stable cognitive capacity (as is usually assumed), but varying effort between problems (due to motivation, interest, situation, method, etc.). This blurs the distinction between transitory and nontransitory factors. That is, although cognitive capacity is stable, computational limitations may not be stable, owing to different degrees of cognitive effort. Thus, different degrees of cognitive effort may introduce systematic variation that is confounded with the variation explained by cognitive capacity. Consequently, both arguments cannot be made: that significant cross-task correlations speak against the performance errors view, and that significant correlations between performance and cognitive capacity indicate that the normative/descriptive gap is due to computational limitations.

The question of actual motivation is also important for the discussion of System 1 and System 2 processing. One prediction would be that individuals who are more highly motivated tend to do more System 2 processing. This is the essence of the effort-model of decision making: more cognitive effort leads to better decisions (in the sense that decisions do better conform to a normative model; Smith & Walker 1993). The intuition seems to be that participants will calculate more, think harder, or somehow see the appeal of axioms when they are faced with larger stakes. For higher motivation to change decision strategies and to increase performance, (1) one must believe that one's current decision strategy is insufficient in terms of desired accuracy; (2) a better strategy must be available; and (3) one must believe that one is capable of executing the new, more rational strategy (Payne et al. 1992). It is plausible that all three preconditions will be correlated with measures of cognitive capacity. In addition to stable dispositions, varying motivation (owing to different tasks and situations) may influence processing systems. Whether people activate System 1 or System 2 processing may depend on what people feel to be appropriate processing for the task at hand. For instance, in face-to-face interaction, contextual thinking could possibly be considered more appropriate than decontextualized thinking. Or, as implied by S&W, in a framing task people may be less likely to show a framing effect under high motivation, while a high degree of motivation may be detrimental to performance in tasks that subjects find attractive and that require heuristic strategies (McGraw 1978).

In summary, individual difference data provide a useful basis for deepening our understanding of the normative/descriptive gap in the judgment and decision making literature. It is necessary, however, to make a distinction between competence and activation-utilization. As Overton and Newman (1982) argue, two distinct components are required for a complete psychological theory. One is a competence component that is an idealized model of an individual's abstract knowledge in a given domain (as discussed in the target article). The activation-utilization component encompasses the psychological procedures and situational factors that determine the manifestation of the competence (which is not sufficiently discussed in the target article).

g and Darwinian algorithms

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Abstract: Stanovich & West's assumption of discrete System 1 and System 2 mechanisms is questionable. System 2 can be understood as emerging from individuals who score high on several normally distributed cognitive mechanisms supporting System 1. Cognitions ascribed to System 1 and System 2 appear to be directed toward the same evolutionary significant goals, and thus are likely to have emerged from the same selection pressures.

In demonstrating that individuals who are high in *g* (System 2) are able to inhibit the operation of Darwinian algorithms (System 1) and thereby engage in decontextualized and abstract reasoning, Stanovich & West (S&W) have made an important contribution and provided a corrective to the views of many evolutionary psychologists. These psychologists downplay the importance of the domain-general abilities assessed by *g* and even question their existence (e.g., Tooby & Cosmides 1992). Moreover, many psychologists, including S&W, have not fully appreciated how the pursuit of goal states might allow for the evolution of domain-general mechanisms (MacDonald 1991). People able to devise and imitate social strategies and learn about unforeseeable contingencies in a manner that is largely free of context would be at an advantage in achieving evolved goal states such as social status and mating in complex, nonrecurring environments. The key is to understand the relation between goals states, Darwinian algorithms, and *g*.

Goal states are reflected in the emotional and motivational aspects of behavior as these are related to the pursuit of personally significant ends (Campos et al. 1989). The Five Factor Model of personality captures individual differences in the relative importance of the psychological rewards associated with the attainment of evolutionarily significant goals, including individual differences in the salience of psychological rewards related to successful risk-taking in pursuit of resources, sexual gratification, and social status (MacDonald 1991; 1995; 1998). We have no doubt that the evolution of heuristics aimed at solving recurrent problems of our evolutionary past is the best strategy in static environments that present recurrent problems and that many of these heuristics are still relevant today (Caporael 1997; Tooby & Cosmides 1992). However, an evolutionary advantage for attaining evolved goals such as social status in complex, rapidly changing, nonrecurring environments would be achieved by domain-general mechanisms able to: (1) abstract general principles independent of context; (2) learn nonrecurrent contingencies quickly and efficiently, and, via a large working memory; (3) manage several concurrent goals.