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Continuing Commentary

Commentary on **Stanovich, K. E. and West, R. F. "Individual differences in reasoning: Implications for the rationality debate?" BBS 23(5):645–726 [October 2000]**

Abstract of the original article: Much research in the last two decades has demonstrated that human responses deviate from the performance deemed normative according to various models of decision making and rational judgment (e.g., the basic axioms of utility theory). This gap between the normative and the descriptive can be interpreted as indicating systematic irrationalities in human cognition. However, four alternative interpretations preserve the assumption that human behavior and cognition is largely rational. These posit that the gap is due to (1) performance errors, (2) computational limitations, (3) the wrong norm being applied by the experimenter, and (4) a different construal of the task by the subject. In the debates about the viability of these alternative explanations, attention has been focused too narrowly on the modal response. In a series of experiments involving most of the classic tasks in the heuristics and biases literature, we have examined the implications of individual differences in performance for each of the four explanations of the normative/descriptive gap. Performance errors are a minor factor in the gap; computational limitations underlie nonnormative responding on several tasks, particularly those that involve some type of cognitive decontextualization. Unexpected patterns of covariance can suggest when the wrong norm is being applied to a task or when an alternative construal of the task should be considered appropriate.

Freud's dual process theory and the place of the a-rational

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Abstract: In this commentary on Stanovich & West (S&W) we call attention to two points: (1) Freud's original dual process theory, which antedates others by some seventy-five years, deserves inclusion in any consideration of dual process theories. His concepts of primary and secondary processes (Systems 1 and 2, respectively) anticipate significant aspects of current dual process theories and provide an explanation for many of their characteristics. (2) System 1 is neither rational nor irrational, but instead a-rational. Nevertheless, both the a-rational System 1 and the rational System 2 can each have different roles in enhancing evolutionary fitness. Lastly, System 1 operations are incorrectly deemed "rational" whenever they increase evolutionary fitness.

We would like to raise two matters concerning the target article by Stanovich & West (2001) (henceforth S&W). The first concerns a dual processing system conceptualized by Freud (1895; 1900; 1911; 1915; 1940/1964). Freud termed his System 1 "the primary process" and his System 2 "the secondary process." Given that Freud's two systems theory predates any cited in the target article by more than 75 years, his theory ought not be omitted. In fact, Freud deserves priority because he anticipated, on the basis of clinical experience and theoretical considerations, the more recent experimentally established dual process findings. The primary process operates in the unconscious, appears early in development, and obeys laws different from the secondary process. These different laws are marked by "a compulsion to associate" (Freud 1895/1964, p. 338). Moreover, as Anna Freud later elaborated:

> when the "primary process" prevails, there is no synthesis of ideas, affects are liable to displacement, opposites are not mutually exclusive and may even coincide, and condensation occurs as a matter of course. (A. Freud 1936, p. 7)

Further, Freud (1915/1964) held that primary process mentation is incapable of representing negation, degrees of certainty, and past or future – primary process is always in the present tense (pp. 186–87). On the other hand, secondary process mentation is capable of representing past and future as well as the present, and constitutes an instrument for testing reality based on standard logic and considerations of truth and falsity.

Thus, in terms of S&W's Table 3 (*BBS* 23(5), p. 659), Freud's primary process, like other examples of System 1 theories, operates as an associative system. The primary process does frequently seem to function in a holistic fashion, although treating the part as a whole also occurs. Like other System 1 theories, the primary process can be quick and inflexible; however, since it is not bound by the constraints of logic and rationality, primary process mentation can also be characterized as highly (even overly) variable. The primary process is operative in implicit and unconscious cognition and it is highly contextualized and personal. Primary process mentation operates on the basis of isolated and often nonessential features rather than on complex relationships among features (Brakel et al. 2000; Brakel 2001). From the standpoint of normative expectations such thinking will seem irrational, either because so much appears to be ignored, or so little is over-interpreted, occasioning a response that seems excessive. The secondary process is quite different in that it is rule-based, decontextualized, and depersonalized. In secondary process mediated judgments and categorization tasks, nonessential features are overlooked in favor of salient relationships among features. The secondary process functions in accord with the basic tenets of logic and as such is vital for explicit learning and inference.

Two other aspects of Freud's conception of the primary process help explain why System 1 is personalized, conversational, and socialized. In Freud's conception, primary process (System 1) is linked closely to basic motivations that have other people as their main objects and serve important personal and interpersonal needs. Although not always the most adaptive (in any sense), the primary process provides the quickest avenue for immediate satisfaction of these personal and interpersonal needs. The second

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important aspect concerns the developmental dimension. The primary process is called primary because it precedes the secondary process in development. According to some of our own evidence, the primary process appears to prevail until about seven years of age (Brakel et al. 2002). However, even though primary process is then largely replaced by secondary process, the primary process continues to operate unconsciously and may appear consciously under circumstances of stress and conflict. (Brakel & Shevrin, submitted a; submitted b) From a Freudian standpoint, the primary and secondary process systems are co-existent throughout adult life.

The second matter concerns whether the primary process, and the other System 1 operations, need to be considered "rational" in any way – including "evolutionarily rational." We would like to suggest that, (1) System 1 operations, like the primary process, are neither rational nor irrational, but instead *a*-rational; (2) nonetheless, both the a-rational System 1 and the rational System 2 can each have different roles in enhancing evolutionary fitness; (3) System 1 (primary process type) operations are deemed "rational" (incorrectly, in our view) precisely when their operations effect increased evolutionary fitness.

(1) The a-rationality of System 1 can be seen in a certain category mistake made by birds, frogs, and people. A bird responds to a big black cloth just as it does to a bird bigger than itself. A frog swallows BB pellets with the same alacrity as it does bugs and flies. A spider-phobic person responds with dread to a plastic or rubber replica of a spider much as he/she does to a real spider. In all of these instances we are not dealing merely with ambiguous or unclear perceptions. In each instance, the black cloth, BB pellet, and spider replica, even when seen up close and (certainly in the human case and likely in the others) accurately perceived, still occasion the fearful flight, swallowing, and dread reactions. We are dealing with "funny System 1 categories" – something to flee from, something to swallow, something to fear – that include items resembling the truly biologically relevant exemplars only superficially. Individual features, often nonessential ones, determine category membership. Now, while it could be argued that in the human case the individual is aware of the seeming irrationality of his/her response, nevertheless the fearful response to the replica spider persists based on the a-rational category match. Unlike people, birds are not rational and therefore cannot be irrational. Birds make no rational appraisals of the a-rational category matches underlying their urgent flights from big black cloths. Where there is no capacity to choose in a rational fashion, behavior predicated on a-rational principles is not irrational.

(2) Both System 1 and System 2 can play different roles in evolutionary fitness. There is general agreement that employing the basic rules of logic, especially in the service of reality testing, can be useful to individuals who are capable of such rational cognitive feats. Indeed, as pointed out in the target article, such capacities certainly can further individual goals. But clearly, insofar as System 2 operations are invaluable, not just in the psychology lab but in obtaining food, shelter, and mates, having these capacities will also enhance the reproductive fitness of individuals. With respect to System 1 operations, these too can enhance evolutionary success – but precisely because System 1 is not a rational system and therefore does not have the constraints of rationality.

Suppose bugs, whose life cycles are much faster than those of frogs, evolve forms that weigh as much as metal BBs and even taste like them. Frogs behaving on the basis of their System 1 category will eat better and reproduce more successfully than would frogs who could make System 2 inferences like, "If round and weighty and metallic tasting, then not food, don't swallow." Likewise, the bird with the "funny category" titled "flee, it is big!" will be able to avoid more novel non-avian-but-nonetheless-dangerous-things. Further, unless useless flights are too much of an energy drain, the birds with a-rational categories will do better reproductively than "rational" birds, who would, for example, fail to avoid dangerous human-made items such as pieces of steel hoisted skyward in a construction area. Even if useless flights compromise reproductive potential, they are still less damaging than sudden death. In the human case, to the extent that spiders are truly dangerous, it is best to avoid anything that might possibly be a spider – even if the judgment is made under the quick and dirty System 1 – since spider bites can be fatal, and avoiding rubber spiders merely silly.

The phenomenon of stranger anxiety provides a more general example of a possible adaptational advantage of a-rational mentation in people. Although stranger anxiety does not occur in all healthy babies, it does occur in many at around eight months. Infants younger than eight months, largely System 1 thinkers, can be comfortably cared for by any nurturing adult. Not so when certain babies become more capable of even rudimentary System 2 categorizing and infer, "since these are not my parents, I should be wary." (For further examination of the evolutionary role of a-rational mentation, see Brakel 2002).

Note here that both of our examples concerning people demonstrate that evolutionary explanations can provide only necessary, but not sufficient conditions for a-rational mediated behaviors in human beings. On the basis of temperament, some normal babies may have a very mellow version of wariness. And with regard to spider phobias, indeed spiders, rather than butterflies, may have been selected by evolution as a target for phobias; but for each spider phobic there must also be specific psychological experiences that result in the development of a phobia.

(3) When a-rational mechanisms yield success, it is not on the basis of rationality, but because they function with fewer constraints and more category inclusiveness. While we are not claiming that these System 1 operations work most of the time – many pointless flights, nutrition-less swallowings take place – they work just often enough to enhance reproductive fitness and evolutionary success. But when this outcome is thought to demonstrate "evolutionary rationality," more than just a misnomer is involved. It is precisely the "evolutionary a-rationality" that has contributed to enhanced reproductive fitness. In other words, System 1 operations, whether or not successful, do not result from irrationality or error in an otherwise rational system. Rather, the evolutionary utility of System 1 is due to precisely its nonrational or arational principles – principles operating quite differently from System 2 rationality.

As we stated above, Freud posited that although there is developmental progression whereby primary process is largely supplanted by secondary process, primary process continues to operate, often unconsciously, often influencing behavior significantly. Indeed, for Freud, primary process and secondary process systems are co-existent throughout adult life. Now more than a century later, as it becomes clearer that a-rational System 1 and rational System 2 are each important for enhancing evolutionary fitness in different ways, Freud's early conceptualizations of dual processing systems look better and better.

The problems that generate the rationality debate are too easy, given what our economy now demands

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Abstract: Stanovich & West (S&W), following all relevant others, define the rationality debate in terms of human performance on certain well-known problems. Unfortunately, these problems are very easy. For that reason, if System 2 cognition is identified with the capacity to solve them, such cognition will not enable humans to meet the cognitive demands of our technological society. Other profound issues arise as well.

The rationality debate revolves around a set of problems, nearly all of which, of course, are well known to the participants in this

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