

## Book Review

### *Rationality and the Reflective Mind*

by **Keith E. Stanovich**

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Review by **CATHAL WOODS**

Human beings often produce a less than optimal response to a variety of problems. For example, in response to the question,

If a bat and a ball together cost \$1.10 and the bat is a dollar more than the ball, how much is the ball?

many of us will answer “10 cents.” If we double-check our answer by adding together what we take the prices of the two items to be (expecting the result to be \$1.10), or by subtracting the two costs (expecting the result to be \$1), we see our mistake and can then apply more math to work out that the answer is 5 cents. Where do the two answers come from? And what is needed in order to reliably produce the second, correct, answer, to this and various other problems?

In response to data concerning such problems, psychologists have posited two types of cognitive processes. Processes of type 1 are “fast and frugal,” meaning that they operate quickly and require little to no effort. Processes of type 2, by contrast, are slow and require deliberate effort. The first type are automatically provoked by stimuli and execute themselves autonomously, producing a response that seems to appear “out of nowhere”; the second might not be invoked at all, and produce a response only if attention can be sustained.

Getting the bat-and-ball problem right requires simple arithmetic, but not only this, as is clear from the fact that while all but young children lack this intelligence, a great many of us give the incorrect response. Knowledge of mathematics, logic, probability and various topically

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specialized thinking processes are necessary in order to arrive at the correct responses on such problems, but they are not sufficient.

In *Rationality & The Reflective Mind*, Keith Stanovich considers the implications of the differences in individuals' responses to problems and continues his thinking on the difference between intelligence and rationality, a project that has been on-going since at least his 1999 book *Who Is Rational?*, which David Hitchcock reviewed in *Informal Logic* 20.3<sup>1</sup>

Stanovich suggests that people able to override type 1 responses and deploy type 2 responses are more likely to get rationality problems right. Further, he claims that those who are of higher intelligence and who have stronger thinking dispositions are more able to use type 2 thinking. This is so even though he (and his colleagues Richard West and Maggie Toplak in their labs) have found that the intelligence and thinking dispositions are sometimes (as between intelligence and my-side bias, anchoring, framing, bias blind spot) not at all related to the different biases which can cause wrong responses (p. 163) and only weakly so in others. More important for Stanovich is the fact that "there is never a negative correlation" (p. 15) and that the normative answer is less often given by "subjects of lower general intelligence" (p. 24).

Stanovich focuses in particular on the thinking dispositions, claiming that (even though "the data on thinking dispositions largely parallels that on intelligence" p. 15 n.5) there is "substantial and growing" evidence (p. 34 n.4) that thinking dispositions predict performance when intelligence has been controlled for, particularly those dispositions which reflect "the tendency to strip unnecessary context from problems" (p.44). Stanovich thus turns to his explication of intelligence and thinking dispositions.

The main innovation of the book is to distinguish between *the algorithmic mind* and *the reflective mind*, within the broad category of type 2 processes. The algorithmic mind is home to what Stanovich calls "mindware" or again "crystallized rationality," the processes by which information is transformed and which build models of the world (often contrary-to-fact), such as mathematics, logic, decision-making and others. The reflective mind is home

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<sup>1</sup>[http://ojs.uwindsor.ca/ojs/ledy/index.php/informal\\_logic/article/view/2283/1727](http://ojs.uwindsor.ca/ojs/ledy/index.php/informal_logic/article/view/2283/1727)

to dispositions such as the tendency to collect information before making up one's mind, tendency to seek different viewpoints, seeking nuance and avoiding absolutism, and many others.

Stanovich allocates functions to the two minds in accordance with the difference between what is measured by IQ tests and what is measured by rational and critical-thinking tests. If a function is tested by IQ tests, Stanovich seems to hold, then it belongs to the algorithmic mind and only to it.

This principle of division produces an interesting result when it comes to the function of overriding the type 1 response, one of the “most critical” type 2 functions (p. 20). Stanovich attributes the capacity for *initiating* override of type 1 responses to the reflective mind and the capacity for *sustaining* override is given to the algorithmic mind. Override of type 1 processes is one of the functions of decoupling (p. 71) which also has the function of separating (or “quarantining” in the apt term of Nichols & Stich) what is known from the ongoing algorithmic processing, to “prevent representations of the world from becoming confused with representations of imaginary situations” (p. 48).

This allocation is made in accordance with the difference between what is measured by IQ tests and rationality tests. Stanovich is persuasive on the point that IQ tests don't measure the “macro-level strategizing” (p. 41) or “epistemic regulation” (p. 42) that is important to rationality. IQ tests eliminate or reduce the need for the reflective mind by alerting test-takers to the need for algorithmic reasoning. Tests of rationality, by contrast, attempt to be less obvious in the need for such thought and so a test-taker can go wrong either by failing to engage the relevant algorithmic process or by some error in the algorithmic process.

IQ tests also differ from tests of rationality (and Stanovich here (p. 39) mentions critical thinking (CT) tests explicitly) in that they attempt to make decoupling easier by abstracting from specific knowledge. For example, asking whether or not the inference “All living things need water; roses need water; so, roses are living things” is valid sets up an opposition between a conclusion known to be true and an invalid inference. Such a question would not be found on an IQ test but only on a CT test. The corresponding question on an IQ test would be entirely ab-

stract, labeling classes only as As, Bs and Cs in order to avoid the conflict.

Stanovich suggests that IQ tests are not entirely successful, however, at eliminating general knowledge, and, with respect to override, mentions mind wandering in passing (p. 51, p. 70), to which we might add boredom and the pain of mental effort. IQ tests thus do require sustained override and decoupling. Indeed, he thinks it likely that decoupling is “the key aspect of the brain's computational power that is being assessed by measures of fluid intelligence” (p. 50).

One odd thing about this picture is that it makes the algorithmic mind home to two quite different types of function. One type is the algorithmic processes (also called “knowledge bases”) which calculate the alternative responses to problems (math, logic, scientific reasoning, etc.) and a second type which is engaged in suppressing the type 1 response and keeping simulations from being interfered with by what is known. This (second) type might rather be of the reflective mind, or some further mind if we distinguish reflection from attentional control (p. 54) (see also the discussion of the dorsolateral prefrontal cortex (p. 75), and the discussions of the work of Lieberman and of Evans (pp. 77-78)).

The difficulty in assuming that IQ tests dictate the functions of the algorithmic mind becomes most evident when Stanovich follows his division of initiating and sustaining through to the logical conclusion that the concept of “executive function” is badly named because tests of it are highly structured by examiners, such that the initiation of override comes from an external source, leaving only the sustaining of override to vary and be measured. Tests of “executive” function, then, require no work from the executive (p. 56ff.).

However, “executive function” could (properly) cover both initiating and sustaining, contrary Stanovich's attempt to make it more specific. Or it might be that sustaining is (or involves) a continuous initiation: even if the instructions come from a tester to begin with, how long the individual can persist for depends not so much on this outside impetus (the external incentives are often not very great) but on the internalized decision of the individual as to whether she will continue in the suggested manner or default to some autonomous process (or give up without giving a response at all).

It's also not clear that the initiation of override and decoupling are type 2 processes—as Stanovich recognizes with respect to the particular quality of the shortness and length of time such a process can take (p. 78). If the reflective mind is type 2 in the sense of requiring deliberate deployment, then a regress or bootstrap problem would arise with respect to suppressing a type 1 response and deploying an alternative process. Rather, the ability to override and deploy activates itself as though out of nowhere, alongside (though as a judge of and often in competition with) the type 1 process. But that would mean that there is a sense in which the person whose reflection is automatically engaged would not be reflective (and so, perhaps, not rational!). The same point would apply to any highly rational person who automatically seeks nuance, gathers evidence, etc. An issue here is perhaps that “autonomous” is ambiguous between “autonomous engagement” and “autonomous operation to completion.” The epistemically virtuous person might be said to have a reflective mind that autonomously engages other processes, which operate slowly and with effort.

Another issue here might be variety amongst dispositions. Some thinking dispositions, perhaps those that fit comfortably under the heading of “cognitive style,” might describe the general manner of good reasoning. (All of the more specific mindwares have this feature too: properly following a decision-making procedure, for example, would exhibit a tendency to collect information, to consider future consequences, to explicitly weigh pluses and minuses, and so on. This makes the distinction between the thinking dispositions and the mindwares somewhat blurry, as it might become a matter of generality and specificity of content.) The reflective mind is additionally associated with meta-representation, with thinking *about* thinking processes, noticing that the processes typically deployed are unsuccessful and simulating (using the algorithmic mind) how they might be adjusted or replaced. A reflective disposition might thus be quite different from the thinking dispositions and associated with executive function. And it might also be an independent indicator of rationality, if a person is disposed to evaluate whether or not the type 1 response is adequate and invoke the appropriate algorithmic response if it is not—such as the mathematical process which yields the answer “5 cents” to the bat-and-ball problem. (That is, assuming that a person has

has such a process; Stanovich also attends to the problem of “mindware gaps.”)

Another type 1 vs. type 2 tension arises with respect to what Stanovich calls “contaminated” mindwares or “crystallized inhibitors,” such as, among others, superstitious thinking, believing that intuition is superior and believing that introspection is incorrigible. Stanovich takes all of the crystallized processes to be of type 2, but we might distinguish between the specific form of contamination and the propensity for the type. For example, my specific culture might teach me that my country is the greatest country on Earth and that all the others are to be faulted, but the tendency towards such patriotism and in-group bias is perhaps a feature of the autonomous mind, which has then been given specific form by the specific culture. Similarly, many people are inclined towards superstitious thinking, though the precise objects or events considered lucky or unlucky will vary across cultures. In this way, many of the items listed as contaminated mindware have strong roots in the autonomous mind. See, in this connection, the discussion of religion (on pp. 170-1): we all have cognitive models that support religion; these are filled in different ways by different religions.

In another way, various of the contaminated mindwares are akin to thinking dispositions. Contaminated mindwares are not just improper alternatives to uncontaminated mindwares; they also interfere with the ability to initiate override and think deliberately. Some of them, such as authoritarianism, discourage turning to other methods in addition to promoting themselves. (Notably, the diagram of mindwares on p. 99, discussed on p. 103, includes “evaluation-disabling strategies” as a sub-kind of contaminated mindware.)

In these various ways, I think various clarifications remain to be made in the theoretical framework and even in the most basic concepts of “type 1” and “type 2.”

At a lower level of analysis, Stanovich provides a taxonomy of rationality problems using the major sub-concepts of his theory (expressed in negative terms): missing mindware, contaminated mindware, override initiation failure, override sustain failure, and—one I have not mentioned thus far—associative cognition, a sort of biased type 2 reasoning. The bat-and-ball problem, for example, is categorized as a failure to initiate override (p. 107) and Stanovich works through dozens more. (Unfortunately,

Stanovich excludes the role of emotions in rationality, and does so almost entirely throughout the book, which critical reasoning theorists will consider a notable gap.)

More useful still is the analysis of more than 60 of the various tests and measures of the major sub-concepts and of a variety of other medium-to-large-scale “dimensions of rationality” in Chapter 10 (co-written with Richard West and Maggie Toplak). For each measure, Stanovich provides a key article or articles on it, a test item, a practical application, and any information concerning training or education along that dimension. These are the first steps towards a grand goal: to develop measures of an individual’s rationality quotient (RQ) as distinct from her intelligence quotient, and to improve performance on it. These three tables alone, covering some 41 pages, are worth the price of the book. They provide a comprehensive overview of the research into the various dispositions (such as open-minded thinking, need for cognition, unbiased information processing, resistances to framing, anchoring, and vividness) and basic aspects of the mind-ware (such as the importance of sample size and base rates, regression to the mean, and the role of randomness) which teachers of critical reasoning and logic could use to inform their efforts to inculcate good reasoning in students. As Stanovich notes, there are conceptual overlaps and repetitions at this level too, but the analyses and diagnoses offered by psychologists ought to be familiar to critical thinking instructors and incorporated into courses.

In sum, then, this is a wide-ranging and provocative work. Its range is so comprehensive that the reader is required to engage with many different literatures and so with multiple sets of terminology. Moreover, different portions of this book come from other places (especially 2009a and 2009b) and a number of copy-editing errors and a type-setting which often eliminates the space between punctuation and capital letters contribute to a somewhat patch-work feel. The overall structure of the work is an inference to the best explanation, attempting to show how research from a variety of disciplines and sub-disciplines are consistent with a single framework. Such inferences are by nature difficult to judge; the real proof of the framework I suppose will depend on its use to researchers in composing and discussing further studies. The book’s theoretical bent will be of interest to philosophers of mind and of reasoning, and those interested in informal logic

and critical reasoning will greatly appreciate to attempt to articulate a framework for talking about overriding type 1 responses and be excited by the taxonomy in chapter 6 and the tables of last chapter, which provide a guide to reasoning errors and summarize what the existing psychological literature has to say about their remediation.

## References

- Stanovich, Keith (1999) *Who Is Rational? Studies of Individual Differences in Reasoning*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Stanovich, Keith (2009a) Distinguishing the reflective, algorithmic, and autonomous minds: Is it time for a tri-process theory? In Jonathan Evans & Keith Frankish (Eds.), *In Two Minds: Dual Processes And Beyond*, pp. 55-88. Oxford: Oxford University Press.
- Stanovich, Keith (2009b) *What Intelligence Tests Miss: The Psychology of Rational Thought*. New Haven: Yale University Press.

*Cathal Woods*  
*Department of Philosophy*  
*Virginia Wesleyan College*  
*Norfolk, VA 23502*  
*U.S.A.*  
*cwoods@vwc.edu*