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Only One? The Default Interventionist Perspective as a Unimodel—Commentary on Evans & Stanovich (2013)

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Abstract
Evans and Stanovich (2013, this issue) defend the dual-processing theories of higher cognition after first criticizing them on fundamental grounds. To make that possible, they resurrect the very distinctions between the two alleged "types" of processing that they formerly had rejected. At the end, however, the default-interventionist model they embrace, seems similar to the single-process unimodel they contest.

Deconstructing the Dual-Process Paradigm

In reflecting upon Evans and Stanovich's (2013, this issue; hereafter E&S) defense of dual-process theories, I was reminded of the Dog–Cat test that Frenkel-Brunswick (1949) used to tap individuals' tolerance of ambiguity. Subjects are first shown a picture of a dog, followed by a number of pictures representing transitional stages wherein each successive picture removes a dog-like feature and adds a cat-like feature culminating in a full-fledged picture of a cat. The question of interest was at what point do individuals decide that the dog is no longer a dog but rather is a cat. Some subjects apparently stuck to their guns long after the catlike features predominated and kept calling it a "dog" even when the image seemed to nearly meow. Somewhat analogously, E&S strip the notion of dual-process theories of most of their identifying features, one by one, while continuing to insist that the dual-process paradigm is viable and supported by converging evidence.

Not two "systems"?

First, they discard the notion of two systems noting "it is far from evident . . . that a coherent theory based on two *systems* is possible (Evans, 2006, pp. 205–206)" (Evans & Stanovich, 2013, p. 226). They therefore propose to replace the ubiquitous distinction between System 1 and System 2 with a distinction between Type 1 and Type 2 processing wherein Type 1 processing is defined as "autonomous," "not requiring working memory," and "broadly intuitive," and Type 2 processing "requires working memory," is "reflective," and is characterized by "cognitive decoupling," and "mental simulation."

But the qualitative dichotomy between Type 1 and Type 2 processing does not really work and here is why. According to the authors: "..the execution of Type 1 processing is *mandatory* when their triggering stimuli are encountered.." (p. 236, italics added), which is another way of saying that a response comes to mind immediately upon registration of the stimulus. How immediate is immediate, however? The simple answer is that it depends on the strength of the stimulus-response association or of the "if stimulus, then response" rule. As a vast number of conditioning studies demonstrate, the strength of the stimulus-response association varies along a continuum. In other words, responses can vary in accessibility or their activation potential by a given stimulus (Higgins, 1996). As Kahneman (2003) himself noted, accessibility "is a continuum, not a dichotomy" (p. 700). Some responses might come to mind quickly because they are strongly activated by the stimulus. These are what Kahneman (2003) defined as *intuitions*: "thoughts and preferences that come to mind quickly and without much reflection" (p. 699). Other thoughts require greater effort for their activation. If the quickly activated thought seemed

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appropriate to the cognizer's task, it might be adopted and acted upon. If it seemed less than satisfactory, the individual may keep on searching for more appropriate albeit less accessible notions, but only if she had the motivation and mental resources to do so (see Kruglanski et al., 2012). This kind of processing suggests a continuum, determined by motivation and resources between impulsively "seizing and freezing" on the first response that comes to mind, if such a response even existed in the individual's repertory, and investing effort in activating less accessible but more apparently appropriate rules to address the cognitive task at hand. This continuous portrayal belies the Type-1/Type-2 dichotomy advocated by E&S.[1]

Aligned versus correlated features?

Secondly, in their response to Criticism #2, E&S admit that the alignment of features characteristic of " . . . the 'received' or generic form of dual-systems theory clusters attributes . . . in ways that are not always sustainable" (p. 226) thus conceding one of the major criticisms leveled by Keren and Schul (2009) against the dual-process frameworks. Having abandoned the strong assumption of feature alignment (e.g. see Epstein, 1994), E&S adjust their dual-process position by drawing a distinction between the defining features of the two processing "Types" and their correlated features. Specifically, such features as speed, thought to constitute the quintessence of the distinction between the two systems (See Kahneman's, 2011, demarcation between "thinking fast and slow" as a key distinction between System 1 and System 2 reasoning); cognitive capacity; consciousness; associative versus rule-based nature; biased versus normative responses; and so on (see Table 1 of E&S) are no longer seen as defining features of the two types of processing but merely correlated features.

Specifically, E&S reject the notion that the two putative types of processing are coordinated to the conscious/unconscious distinction (as proposed by some authors; e.g., Lieberman, 2007, 2009), though they continue to regard consciousness as a correlated feature. As they put it "The conscious/nonconscious distinction . . . is highly problematic on account of both vague and disputable definitions of consciousness . . . and the observation that both Type 1 and Type 2 processing can have conscious and nonconscious aspects" (p. 227).

Similarly, also in response to Criticism #2, E&S describe "the most persistent fallacy in the perception of dual-process theories" as being "the idea that Type 1 processes (intuitive, heuristic) are responsible for all bad thinking and that Type 2 processes (reflective, analytic) lead to correct responses" (p. 229). Hence "it is a fallacy to assume that Type 1 processing is invariably nonnormative and Type 2 processing invariably normative" (ibid.). Presumably, however, normativeness is to be regarded as a correlated feature of the Type-1/Type-2 distinction.

However, the retreat to the correlated features thesis creates a conceptual problem. First this proposal is vague and impossible to operationalize: It is unclear what size of correlation is implied and across what conditions such correlations are to be computed. The claim that those "other features are simply correlates that occur *under well-defined conditions*" (p. 226, italics added) is misleading in that no one has attempted to specify, thus far, what such general conditions might be. This renders the correlation thesis unfalsifiable. Suppose you assumed a given attribute *X* (say speed, or consciousness) to be correlated with Type 1 (or Type 2) processing, yet it was absent where a defining feature of the Types (say autonomy, working memory demands) was present. Such an absence would be uninformative because the correlation thesis can tolerate it, but it can tolerate also the presence of the "correlated" attribute on some occasions.

Both are rule based

In response to Criticism #4, E&S admit that both Type 1 and Type 2 processes are rule-based (Holyoak, Koh, & Nisbett, 1989; Kruglanski & Gigerenzer, 2011). Hence, they regard it as "correct" that "attempts to separate rule-based processing from other kinds (typically "associative" . . .) are *misconceived*" (p. 231, italics added). After all, the notion of heuristics (which the authors view as descriptive of Type 1 processes) have been generally defined as "rules of thumb"—hence the claim that Type 1 processes are not rule-based would be incoherent. Nonetheless, E&S continue to insist that "Evidence that intuition and deliberation are both rule based cannot, by any logic, provided a bearing one way or the other on whether they arise from distinct cognitive mechanisms" (p. 231). But, if rule application is the mechanism involved in both (what they refer to as) Type 1 and Type 2 processing, then the claim for distinct cognitive mechanisms for these two cases is a non sequitur. And the implication that no dual-process theorist has ever claimed that associative processing isn't rule based is factually incorrect (See e.g., Sloman, 1996).

What is left?

Let us take stock of the criticisms of that E&S concede or themselves level against the "received view" of dual-process models. They agree (a) that the highly popular distinction between Systems 1 and 2 is incoherent; (b) that the two types of processing (however labeled) do not necessarily differ in their normativeness or degree of consciousness; (c) the two putative types of processing are both rule-based; and hence that (d) alignment of these features with the dual-mode partition, implied in

the received view, does not work. Not much seems to be left then of the notion of dual processing as commonly understood, and one wonders whether other dual-process theorists would agree with "giving away the store" in such a way. It is somewhat of a surprise, therefore, that despite it all, E&S insist that the dual-process position is fundamentally warranted by slipping back into the original distinctions that they themselves had rejected and by misinterpreting the empirical evidence.

Forward Into the Past?

I already mentioned E&S's eschewal of the notion that Type 1 processing is in some sense less normative than Type 2 processing. Yet they view findings that individual differences in working memory capacity and intelligence (both presumably contributing to Type 2 processing) are associated with "normative" answers to standard problems as strong evidence for dual processing. Furthermore, they imply that Type 1 processing is less accurate than Type 2 processing: "[W]hen the decision matters, being a cognitive miser may lead us astray" (p. 237; presumably referring to the tendency to go with the default option: Type 1 intuition). But you cannot have it both ways. Either Type 2 processing is systematically associated with normative processing or it is not, as E&S themselves explicitly asserted. But if it isn't then the idea that more cognitively endowed individuals do better on some normative tasks is no evidence for the distinction between Types 1 and 2.

Relatedly, findings "that intelligence displays positive correlations with the response traditionally considered normative . . . and negative correlations with the modal [non-normative] response" (p. 234) suggest that cognitive sophistication is correlated with the likelihood of a shift from an intuitive, nonnormative, modal response (that E&S believe characterizes Type 1 processing) to a normative Type 2 response. Contrary to the authors' assertion then, the shift from (what they call) Type 1 to Type 2 processing seems to be continuous (proportionate to magnitude of the correlation) rather than dichotomous.

As noted earlier, E&S reject out of hand the notion that the conscious/unconscious distinction is aligned with the Type-1/Type-2 dichotomy. Nonetheless, this does not stop them from approvingly citing Lieberman's (2009) imaging findings—findings that Lieberman explicitly viewed as support for the alignment of consciousness with Type 1 processing and the alignment of unconsciousness with Type 2 processing. To compound the difficulty, E&S imply that "*multiple* ..neural systems" (p. 226, italics added) underlie Type 1 and 2 processing—it is therefore unclear how evidence from the activation of a single brain region during fast processing and another region during slower processing (Greene, Nystrom, Engell, Darley, & Cohen, 2004) is evidence for Type 1 or Type 2 processing. Also, recall that the Types' relation to speed of processing was disavowed by E&S (p. 226), though it was surprisingly resurrected further on in the article when they stated that "in general, Type 1 processing is very much quicker than Type 2 processing" (p. 237).

Furthermore, despite their earlier agreement that the distinction between associative and rule-based processing is misconceived (in that both types of processing are rule based) and misapplied to the Type-1/Type-2 dichotomy, in Table 1, E&S continue to characterize one of the putative correlates of Type 1 processing as "associative" and of Type 2 processing as "rule-based," implying a distinction they eschewed earlier.

However, the one ultimate inconsistency is this: Whereas E&S fault prior critiques because "they attack not any particular theory but rather a class of theories, effectively treating all dual-process and dual-system theories alike" (p. 224), they themselves, despite prior disavowals, end up defending the received, global view of dual-process theories endowed with the very rule-following/associative, conscious/unconscious, and normative/nonnormative distinctions that they rejected earlier.

Default-Interventionist Theory As a Unimodel

The default-interventionist model to which E&S subscribe implies that the process of judgment commences with a default intuition, which refers to Type 1 processing, and occasionally is overridden by Type 2 processing. It is overridden when the individual lacks confidence in the default judgment and/or when he has the cognitive ability to engage in further thought relevant to the problem at hand. On closer look, this portrayal of the judgmental process is strikingly similar to the unimodel proposed by Kruglanski and Gigerenzer (2011; see also Gigerenzer, 2011; Osman, 2004). At last then, there seems to be a (partial) meeting of the minds even if only at the descriptive level.

From the unimodel's perspective, the "default" option referred to by E&S is an accessible response evoked by a stimulus (Higgins, 1996; Kahneman, 2003). I assume that most of cognition is purposive and that the cognitive responses that come to mind are constrained by the contextual goal of the cognitive activity. For instance, the stimulus "green" may be associated with several different notions (e.g., "go" "grass," "summer," "environment," "politics") but in the context of driving, if "green" is the color of the traffic light, then only one of these implications would be activated—namely, "go". The individual will not have a "default option," in her repertory for every situation, and occasionally an existing default might still

fail to inspire much confidence. On those occasions, one's initial judgment might be perceived as falling short of what is required, inviting a quest for further evidence. Whether or not one would carry out an extensive further thinking on a topic may depend on the ease of coming up with relevant ideas (dependent on one's sophistication in a domain and on one's cognitive ability), on the motivational importance of the issue, and on one's pool of energetic resources (Kruglanski et al., 2012). Throughout this activity, inferences (tentative or assured) are made in a rule-following fashion based on what one perceives as relevant evidence to the judgment at stake (Kruglanski & Gigerenzer, 2011). As one keeps thinking about a problem, new ideas might be activated "automatically" by a stream of stimuli encountered on the way, much in the same way as the initial default response. All this activity comes to a halt when a desired level of confidence in a judgment is reached (Chaiken, Liberman, & Eagly, 1989).

Empirical evidence for the dual-systems model?

Consider now the evidence that E&S marshal in support of their default interventionist framework: (a) experimental manipulations "designed to affect one type of processing while leaving the other intact" (p. 232), (b) "neural imaging to show that different brain areas are active when Type 1 or 2 processing is being observed" (ibid.), and (c) "the psychometric approach, which demonstrates selective correlations, . . . to show that Type 2 processing has a strong relation with cognitive ability whereas type 1 processing does not" (ibid). I consider each in turn.

Experimental manipulations. Take the *belief bias effect* in syllogistic reasoning: the often observed tendency to base judgments on beliefs rather than on what is logically warranted by the information given. According to E&S: "What Kruglanski and Gigerenzer overlooked, however, is the kind of evidence that does . . . make the case for qualitatively distinct types of processing in this paradigm" (p. 232). Such evidence consists of findings that "belief bias [is] increased and logical accuracy is decreased when people operate under time pressure, or concurrent working memory load, both of which are assumed to inhibit Type 2, reflective reasoning" (ibid). E&S argue that "If these manipulations were simply making the task more difficult" then, according to the unimodel, presumably "we might expect guessing and random error" (ibid). But therein exactly lies the rub: The unimodel implies nothing of the sort—that is, no random responding. Nor is it the issue of "making the task more difficult."

Time pressure, cognitive load, and noise reduce individuals' cognitive resources and induce the motivation for quick closure (Kruglanski, 2004). Under these conditions, responses are not random and instead gravitate toward the less demanding inference rule based on one's beliefs, prior knowledge, recently primed heuristics, or chronically accessible stereotypes. The role of cognitive resources in systematically biasing judgments toward highly accessible, and hence relatively effortless, response alternatives (what Kahneman, 2003, referred to as "intuitive") has been elaborated in Kruglanski, Belanger, Chen, et al. (2012). And a large body of empirical findings attesting to such effects within the context of a unimodel has been reviewed in Kruglanski and Webster (1996), and Kruglanski, Pierro, Mannetti, and DeGrada (2006). These analyses also suggest that cognitive ability, expertise, and sophistication render the task of deductive reasoning less demanding, hence increasing one's likelihood of making the requisite deductions (even under limited resources).

Furthermore, "strong deductive reasoning instructions" (p. 232) simply increase one's motivation to go beyond the readily accessible (and occasionally inappropriate) responses, which is in complete agreement with the unimodel. The latter, to reiterate, does not suggest that the responses would be random (as the authors impute) when capacity is limited or depleted, but rather that the responses would reflect the more accessible rule that could be overridden (e.g., if it didn't offer sufficient confidence) in the presence of sufficient motivation and cognitive resources.

Neuroscientific evidence. E&S cite imaging studies suggesting that different areas of the brain are activated when processing information quickly versus slowly (Greene et al., 2004). Relatedly, Lieberman (2009) finds that neural regions that involve reliance on stereotypes (highly accessible schemas that come quickly to mind) are different from those that are activated when conscious reasoning took place (presumably reflecting more extensive elaboration). In addition, McClure, Laibson, Loewenstein, and Cohen (2004) reported that prefrontal and frontal cortical regions (associated with cognition) were activated when decisions were made on the basis of deferred rewards (an assumed characteristic of Type 2 processing), whereas the limbic system (associated with emotion) was involved when decisions were made on the basis of immediate rewards.

Do such findings attest to the existence of two separate processing types? Several recent treatments have detailed the shortcomings of this class of interpretations. For instance, Pessoa (2008) has argued that there are no truly separate systems for emotion and cognition because

complex cognitive–emotional behavior emerges from the rich, dynamic interactions between brain networks. Indeed, he proposes that emotion and cognition not only strongly interact in the brain, but that they are often integrated so that they jointly contribute to behavior. In this manner, the neural basis of emotion and cognition should be viewed as strongly nonmodular. Related treatments have been put forward by Shackman et al. (2011) and Lindquist, Wager, Kober, Bliss-Moreau, and Barrett (2011), among others. As this debate attests, imaging evidence at this juncture is hardly compelling proof for E&S's Type-1/Type-2 partition.

Psychometric studies. E&S cite evidence that, although the average person in heuristics and biases experiments typically violates the normative statistical maxims "some people give the standard normative response" (p. 234). It turns out that the likelihood of normative responding is correlated with cognitive ability (intelligence) and motivation. Is this evidence against a single process portrayal of the judgmental process? Hardly. The heuristics and biases experiments are often deliberately and cleverly designed so that the immediate response that comes to mind is the nonnormative one. Small wonder that cognitively able individuals, more likely to have the appropriate statistical and/or logical tools in their repertory for figuring out the correct answer, are more capable of applying them to the situation at hand. Indeed, work by Nisbett, Fong, Lehman, and Cheng (1987), as well as by Sedlmeier (1999), suggests that training in statistical reasoning increases the probability of responding normatively in heuristics and biases experiments. The finding that, if not properly motivated, even cognitively able participants give subnormative responses in such studies (Stanovich & West, 1998) is thoroughly compatible with the unimodel, which, in fact, assumes that extent of processing (hence of going beyond the immediate impulse) is strongly related to processing motivation (e.g., Kruglanski et al., 2012; Kruglanski, Pierro, Mannetti, Erb, & Chun, 2007).

Conclusions

The default interventionist model that E&S advocate is a far cry from the dual-process models as they are generally portrayed in the cognitive literature. In fact, there seems little justification to regard it as a dual-process model altogether. If the "new normal" in the dual-processing paradigm is default interventionism, then this could signal the end of the ubiquitous dualistic brand of theorizing. The fact that some judgments come to mind immediately, others at an intermediate speed, and others more slowly yet or that the speed of judgment, extent of processing, and judgmental contents are affected by motivation and cognitive resources is no evidence for a qualitative duality of processing. Instead, these findings suggest a continuum of purposive cognitive activity affected by several quantitative factors integrated in the brain (Pessoa, 2008). When all is said and done then, the dual-process paradigm stripped from all its problematic features, effectively shades into a unimodel.

Note

1. The dichotomy between adopting the first idea that comes to mind and going further is random and unwarranted, as it begs the question of why there isn't a dichotomy between the second idea that comes to mind versus going further, the third idea versus going further, and so on.

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