

The Dual-Process Turn: How recent defenses of dual-process theories of reasoning fail

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Abstract: *In response to the claim that the properties typically used to distinguish System 1 from System 2 cross-cut one another, Carruthers, Evans, and Stanovich have abandoned the System 1/System 2 distinction. Evans and Stanovich both opt for a dual-process theory, according to which Type-1 processes are autonomous and Type-2 processes use working memory and involve cognitive decoupling. Carruthers maintains a two-system account, according to which there is an intuitive system and a reflective system. I argue that these defenses of dual-process theory face two problems. First, as pointed out by Sloman, these new dual-process theories cast the net of “reasoning” too wide. Second, and more importantly, this singular distinction cannot accomplish the explanatory work needed to support dual-process theory. These theorists must fall back on using various properties from the Standard Menu in explanations, thereby committing these accounts to a “Standard View” that they had hoped to avoid. Thus, these theorists face a dilemma: either the distinction between intuitive and reflective (or autonomous and working memory involving) falls back on using the properties of the Standard Menu, or it lacks the explanatory promise that made dual-process theory attractive.*

1. Introduction

On what we might call the “Standard View” of two-system theory, System 1 is fast, heuristic, associative, evolutionarily old, and automatic while System 2 is slow, serial, rule-based, evolutionarily new, and controlled. The exact cocktail of properties might differ somewhat from theory to theory, but we are led to believe that there is some core set of properties on the “Standard Menu” (see Table 1 below) common to all theories (see Evans & Frankish 2009). Particularly if we do not require there to be two token systems, two-system theory is best understood as the thesis that System 1 and System 2 (henceforth S1 and S2) are cognitive kinds, namely, cluster kinds (see Samuels 2009, Boyd 1999). So, ‘S1’ and ‘S2’ are natural kind terms. These kinds are supposed to give the two-system theory explanatory and predictive power, especially with respect to reasoning errors.

Recently, in response to the claim that these properties cross-cut one another (Keren & Schul 2009, Evans 2008), some prominent two-system theorists have abandoned the System 1/System 2 distinction and adopted monothetic¹ dual-process accounts. Carruthers (2013) maintains a two-system theory that distinguishes intuitive from reflective reasoning, which, he argues, is different than the received S1/S2 distinction. According to Carruthers, intuitive processes are unconscious while reflective processes are conscious. Stanovich (2009, 2011), Evans (2008, 2009), and Stanovich & Evans (2013a/b) have abandoned two-system theory, but maintain that reasoning processes are of two kinds: Type-1 processes are autonomous and, so they claim, do not use working memory, whereas Type-2 processes require working memory because they involve cognitive decoupling and mental simulation. ‘Type-1’ and ‘Type-2’ are, on this account, natural kind terms that figure in explanations of the heuristics and biases literature. Because both Evans and Stanovich abandon the claim that these kinds of processes must be carried out by distinct kinds of systems, their views are a species of dual-process theory rather than two-system theory.^{2 3} Evans continues to maintain a two-mind hypothesis and Stanovich now endorses a tripartite division of the mind.

I agree that the properties on the Standard Menu cross-cut one another. Although their accounts differ in important respects, Carruthers, Evans, and Stanovich’s dual-process theories share similar deficiencies stemming from the fact that each are monothetic: for each theorist, the singular pair of properties that are supposed to establish natural kinds fails to do so. I argue that Evans, Stanovich, and Carruthers’s accounts of natural cognitive kinds face two problems. First, their accounts allow too much to count as reasoning, as Sloman (2014) briefly notes. Second, each theory faces a dilemma: either the singular property that is necessary and sufficient for being a Type-1 (or intuitive) process cannot accomplish the explanatory work needed to support

dual-process theory, which undercuts the theory as an account of natural kinds (since natural kinds should be explanatorily powerful, projectable, and used in prediction), or the account tacitly uses the various properties from the Standard Menu, thereby committing that account to the Standard View. I conclude that Evans and Stanovich's recent move from two-system theory to dual-process theory and Carruthers's move from the S1/S2 distinction to an intuitive/reflective distinction do not succeed as defenses of the dual-process thesis.

Table 1: The Standard Menu

System 1/ Type-1 Processes	System 2/ Type-2 Processes
Fast	Slow
Parallel	Sequential
Heuristically Based	Rule Based
Automatic	Controlled, Volitional
Unconscious/ preconscious	Conscious
Evolutionarily Old	Evolutionarily New
Mostly Shared with non-Human Animals	Uniquely Human
Pragmatic Reasoning	Abstract Reasoning
Implicit/ Tacit	Explicit
Subpersonal	Personal
Independent of/low demands on Cognitive Capacities	Dependent upon/ high demands on Cognitive Capacities
Not Easily Altered	Malleable
Universal Among Humans	Varies by Individual and Culture
Independent of Normative Beliefs	Influenced by Normative Beliefs
A Set of Systems	A Single System

2. Rejecting the Standard Menu

It is important to note that Evans, Stanovich, and Carruthers are all unsatisfied with the Standard View for a similar reason: the properties on the Standard Menu cross-cut one another. For the purposes of this paper, I will assume that a natural kind corresponds to a family of clustering properties that cluster due to an underlying mechanism or because these properties favor one another. The categories corresponding to natural kinds are projectable and figure in

explanations (see Boyd 1999 for a defense of this view). By ‘natural cognitive kinds’ I mean natural kinds within the domain of cognitive science. My subsequent arguments will depend on the claim that there is widespread cross-cutting, and so I will note the ways in which Carruthers, Evans, and Stanovich claim that the properties on the Standard Menu cross-cut one another. I focus on Carruthers and Evans’s examples because they have provided clear examples of cross-cutting. My purpose here is not to *argue* that the properties on the Standard Menu cross-cut one another, but merely to note the ways in which Carruthers, Evans, and Stanovich have admitted that these properties cross-cut one another.

I begin with Evans (2008, 2006). He claims that there is evidence of “a distinction between stimulus-bound and higher-order control process in many higher animals (Toates 2006), including rodents” (2008, p. 258). Furthermore, it is implausible that there is a common S1 to all animals “with a single evolutionary history” (p. 259). Evans (2006) argues that there is good reason to think that many Type-1 systems are evolutionarily new (p. 202). The processes responsible for belief bias are “certainly not ‘ancient’ in origin” even though they have other Type-1 features (p. 203). Importantly, Evans also rejects the characterization of S1 as associative, since “theories that contrast heuristic with analytic or systematic processing (Chen & Chaiken 1999, Evans 2006) seem to be talking about something different from associative processing” (2008, p. 261). He also says it is unwise to characterize S2 as rule-based “if only because it implies that S1 cognition does not involve rules” (2006, p. 204). The associative/rule-based distinction cross-cuts other important properties on the Standard Menu, since “rules can be concrete as well as abstract and any automatic cognitive system that can be modeled computationally can in some sense be described as following rules” (2006, p. 206, see also Gigerenzer & Regier 1996). Evans also says that S2 should not be characterized as “abstract and

decontextualized” since these do not correlate with “slow, sequential, explicit, and rule-based” (2008, p. 261). While being conscious and being controlled are both associated with Type-1 processing, Evans points out that it is “far from clear” to what extent “conscious thinking really is ‘in control’ of behavior,” and unconscious cognition can be intentional (2006, p. 204). Thus, the “automatic-controlled distinction between the Systems 1 and 2 is far from clear cut” (p. 204) and “fraught with difficulties” (p. 206).

Carruthers (2013) offers several cases of cross-cutting to establish that S1 and S2, as divided by the Standard Menu, are not natural kinds and to distinguish his own intuitive/reflective distinction from the S1/S2 distinction. First, heuristics can be rational, and are almost always ecologically rational (Gigerenzer, Todd, & ABC Research Group, 1999). Indeed, intuitive reasoning is often better than reflective reasoning, since decisions made using intuitive reasoning may lead to greater satisfaction with the outcome (Wilson et al. 1993). Thus, Carruthers denies his previous claim that heuristics are “quick and dirty” (2009, p. 110). Furthermore, reflective reasoning may employ heuristics (p. 16). Next, Carruthers (2013) claims that intuitive reasoning can be slow, as when subjects use the “sleeping on it” heuristic or when subjects gain information about their partner’s immune system through saliva obtained through kissing (Barrett, Dunbar, & Lyceett, 2002). Furthermore, Dijksterhuis, Bos, & van Baaren (2006) found that, for some reasoning tasks, subjects’ intuitive responses conform to norms better than their reflective reasoning, and their work suggests (Carruthers argues) that unconscious reasoning may be slow. Carruthers also points to work in animal reasoning literature which suggests that rats and pigeons can track randomly “changing rates about as closely as is theoretically possible to do” (Carruthers, 2013, p. 14) (Gallistel & Gibbon, 2001, Balci, Freestone, & Gallistel 2009). Carruthers argues that non-human animals engage in unreflective

processes that can be flexible and rule-governed (p. 6). Importantly, he does so by claiming that intuitive processes are not associative, and so must be rule-based (Gallistel & Gibbon 2001, and Gallistel & King 2009).

Other theorists sympathetic to dual-process theory have noted cross-cutting examples as well. For example, Mallon & Nichols (2011) note that rule-based process may be fast, as in the spotting of grammatical errors. (For cross-cutting examples from critics of dual-process theory see Keren & Schul, 2009, Kruglanski & Gigerenzer, 2011). It should give us pause that prominent dual-process theorists, who at one time used the Standard Menu to distinguish kinds, have rejected the Standard Menu. Now, since clustering does not require perfect correlation, dual-process theorists might maintain the S1/S2 distinction using the Standard Menu by arguing that these examples are mere outliers to an otherwise genuine correlation. However, given these numerous examples, it is incumbent on advocates of the S1/S2 distinction to argue, contra Evans, Stanovich, and Carruthers, that these properties do cluster.

3. Two or three new proposals, and the stone soup objection

Evans and Stanovich moved away from the Standard View independently, but for similar reasons. Stanovich says that the S1/S2 distinction is problematic for two reasons: first it implies that there is just one S1, when in fact there is a set of module-like systems, which he calls The Autonomous Set of Systems (or TASS) (2009, 2011). While he has recently been more explicit on this point, even in his 1999 monograph he claimed that S1 was a set of systems. Second, Stanovich admits that the properties on the Standard Menu do cross-cut one another. In response, he writes that “the defining feature of Type-1 processing is its autonomy—the execution of Type-1 processes is mandatory when their triggering stimuli are encountered, and they do not

depend on input from high-level control systems" (2011, p.19). However, he goes on to say that some properties from the Standard Menu will closely correlate with autonomous processes: they will be fast, will not use much executive functioning or central processing, and will be able to operate in parallel, but these properties are not *essential* to a process's being Type-1.⁴ The defining feature of Type-1 processing is autonomy.

Evans began to talk of processes rather than systems in his 2008 literature review of dual-process theory. In response to the examples of cross-cutting he provides, he suggested moving to a distinction between processes rather than systems, "since all theorists seem to contrast fast, automatic or unconscious processes with those that are slow, effortful, and conscious" (2008 p. 270, see also Evans 2009). The move from *system* kinds to *process* kinds is less significant to the dialectic than it might appear. If the properties on the Standard Menu cross-cut one another in ways such that they cannot distinguish natural *system* kinds, then those same properties (which do not cluster) cannot distinguish natural *process* kinds either. Dual-process and dual-system theories are both theories about what natural cognitive kinds exist. The former claims that there are two kinds of *processing*, while the latter claims that there are two kinds of *systems*. If the properties on the Standard Menu do not cluster, then the set of non-clustering properties cannot be used to identify kinds of processes or systems. Thus, given that these properties do cross-cut one another, there is not a distinction to be made between kinds of systems or processes using the properties on the Standard Menu.⁵ Evans (2011) latter claimed that the real distinction between Type-1 and Type-2 processes is autonomy/working memory involving, just as Stanovich did. Evans (2009) defines autonomy as those processes "that can control behavior directly without need for any kind of controlled attention" (p. 42).⁶ While Evans and Stanovich differ in important respects, they agree on how to divide Type-1 and Type-2 processes (Evans &

Stanovich 2013a), and since this distinction is the target of this article, I will treat their accounts together.

Carruthers has recently argued that, while the property clusters on the Standard Menu do not mark out natural kinds, there is a real distinction between intuitive and reflective systems. That is, ‘intuitive’ and ‘reflective’ are natural kind terms designating kinds of systems. Intuitive and reflective systems are systems whose processing is unconscious or conscious respectively. Again, contra the Standard View, Carruthers argues that unconscious processes can be slow, controlled, and conform to the highest normative standards (2013, p. 2-3), and conscious processes can employ heuristics and do not necessarily lead to improvement.

What is the relation between these proposals? Both claim that reasoning processes are of two kinds. For this reason alone, we may call both dual-process theories of reasoning. Both also agree that using the properties on the Standard Menu to identify and distinguish the two kinds is hopeless because the properties on the Standard Menu cross-cut one another. Finally, they agree that there is a single pair of properties that divide reasoning into two natural kinds, and so their views are monothetic. These accounts differ in two crucial respects. First, Carruthers’s assumes that reflective reasoning and intuitive reasoning (themselves distinct kinds of processes) are subserved by reflective and intuitive systems respectively. Stanovich claims that there are two systems (the algorithmic mind and reflective mind) that carry out Type-2 processing and many systems that carry out Type-1 processing, while Evans wishes to remain agnostic as to how many systems carry out Type-2 processing. Second, the way in which these theorists divide the two kinds are incompatible, given the abandonment of the Standard Menu: Carruthers claims that the real distinction is between intuitive and reflective processes whereas Evans and Stanovich claim that the real distinction is between autonomy and those involving working memory. Carruthers

says that intuitive processes may “nevertheless be employing working memory to process the task instructions and maintain the ensuing representations long enough for the intuitive systems to generate an answer” (2013, p. 20).

One of the virtues of the Standard Menu was that it unified the dual-process theories. In his reply to Evans & Stanovich (2013), Keren (2013) says he is reminded of a Russian folktale in which a fool is taught to make “stone soup” by boiling a stone in water. This alone is sufficient for making that water into stone soup, though one could add any kind of meat or vegetables in order to improve taste. Keren says that “inspecting the different labels proposed and the various terminologies employed to characterize the presumed two systems and their corresponding alleged processes strongly suggest that it has become a stone soup where everything goes” (p. 257). Dual-process theorists might once have replied by citing their shared allegiance of the general way that they divided the two processes. There might have been minor disagreements as to which properties should be cut from the Standard Menu, but these theorists could always point to the many properties of the Standard Menu they held in common with one another. Now that recourse is undercut, and if these theorists continue to call themselves “dual-process theorists,” the term indeed begins to look like a stone soup.⁷

4. What is a reasoning process?

The broader that we cast “reasoning,” the more plausible it is that reasoning processes are of more than one kind, but the less interesting the claim that reasoning is of two or more kinds becomes.⁸ Thus, while it is difficult for anyone to define reasoning, it is a pressing issue for dual-process theorists. Because there are many properties on the Standard Menu, many processes were excluded from the S1/S2 distinction because they did not fit into either category. In a way,

then, the Standard Menu drew boundaries around the concept of reasoning and also divided reasoning processes into two kinds. However, Evans, Stanovich, and Carruthers's accounts fail to draw boundaries around reasoning, which threatens to trivialize their accounts.

Let me begin with Evans and Stanovich. The instances of belief formation paradigmatic of Type-1 processes are indeed autonomous in Evans and Stanovich's sense. However, many autonomous processes are not reasoning processes at all. As Sloman (2014) notes, Stanovich & Evans "are casting their net too wide. The vast majority of what goes on in the body and the brain meet this definition of Type-1 processing including (say) laughing when being tickled" (p. 71). Although this is merely a passing comment, Sloman reveals an important way in which Evans and Stanovich's new account is weaker than the Standard View. Let me say why: absent-mindedly driving a car, sneezing, and breathing are all autonomous, but are not reasoning processes. As such, absent-minded driving, sneezing, and breathing should not count as Type-1 processes since Type-1 processing was supposed to be about *reasoning*. If one uses the Standard Menu to characterize Type-1 processes, then these kinds of processes are ruled out, but on Evans and Stanovich's monothetic accounts, they are not.

Carruthers's account faces a similar problem: unconscious processes surely include the vast majority of what goes on in the mind. Again, reflexes, absent-minded driving, and breathing are all unconscious. However, these unconscious processes should not count as intuitive reasoning processes.

There are two replies, both of which will require some alternative way to distinguish reasoning and non-reasoning processes. First, these theorists might admit that Type-1 or intuitive processes are indeed pervasive: absent-minded driving, sneezing, and breathing are Type-1 processes/intuitive processes. Problematically, if the concepts Type-1 and Type-2 or intuitive

and reflective apply so broadly, then it becomes trivial that there are Type-1 and Type-2 processes or intuitive and reflective processes. It is true that my breathing is a different kind of process than my construction of a counterfactual possibility. How could any of us doubt this? Problematically, this watered down version of dual-process theory seems compatible with several one-system accounts of reasoning such as Gigerenzer (2011), Keren & Schul (2009), Osman (2004), or Kruglanski & Gigerenzer (2011). What made dual-process theory so interesting was the radical claim that reasoning itself is divided into two kinds of processes and (on some accounts) underwritten by two very different kinds of cognitive systems.

Perhaps the interesting dual-process claim is that some Type-1 processes are reasoning processes. In other words, that there are some reasoning processes that are autonomous (or unconscious) in the same way that absent-minded driving, sneezing, and breathing are autonomous (or unconscious). However, to assess whether this claim is true we would need some principled way of determining whether or not a process is a *reasoning* process, and we currently do not have one.

Second, dual-process theorists might claim that Type-1 or intuitive processes are only meant to mark a distinction *within* reasoning. That is, Type-1 processes are *reasoning* processes that are autonomous, or intuitive processes are unconscious *reasoning* processes. This reply avoids the above objection, since most autonomous or unconscious processes are not *reasoning* processes, but, in order to assess the truth or substantiveness of this claim, we need to know the boundaries of the concept reasoning such that reasoning is supposed to be divided into two neat kinds. Again, the broader the extension of the concept reasoning, the more plausible it is that reasoning is divided into more than one kind (perhaps more than two kinds). However, the

broader the extension of the concept reasoning, the less interesting becomes the claim that reasoning is of two or more kinds.

5. A dilemma: loss of the promise of explanatory power or falling back on the Standard Menu

I will argue that, in moving to monothetic accounts, Stanovich, Evans, and Carruthers's new theories lack the promise of explanatory power that the Standard View possessed. Evans, Stanovich, and Carruthers face a dilemma: either their account lacks the explanatory power that the Standard View promised (and, thus, inferences to the best explanation for dual-process theory are undercut), or they must tacitly assume properties on the Standard Menu cluster when offering explanations. In practice, Carruthers has taken the former horn of this dilemma, while both Evans and Stanovich have fallen into the latter.

Let me begin with the first horn: Evans, Stanovich, and Carruthers's accounts lack the explanatory power promised by the Standard View. On Evans and Stanovich's accounts, autonomy does little explanatory work on its own. Evans & Stanovich's (2013a) definition of autonomy follows Fodor's (1983) definition of automaticity: autonomous processes are "mandatory when their triggering stimuli are encountered and they are not dependent on input from high-level control systems" (2013a, p. 236). Now consider experiments that have been taken to support dual-process theory because of the plausible explanation that dual-process theory offers. However, let us only use the mandatory/controlled distinction. Consider the classic example of the representativeness heuristics: Linda the bank-teller (Tversky & Kahneman 1983). What does the Type-1 processing explain here? At best, it explains why it is that one response "beats out" a second response. One response (which happens to be the incorrect one) "comes to mind" more quickly (since it is mandatory) than a controlled process (which requires the use of

working memory). Since Evans and Stanovich's accounts are default-interventionist, and since subjects are cognitive misers, it may be that no Type-2 process is initiated. But this does not offer an explanation for why most subjects say that Linda is more like a feminist bank-teller—it only offers an explanation for why most subjects offer a specific response: a Type-1 process is mandatory, and so the Type-1 response will "come to mind" regardless of what the subject does. However, this explanation fails to answer why it is that subjects respond in the way that they do: why is it that subjects tend to say that Linda is more likely a feminist bank-teller?

Crucially, the lack of an explanation persists even when we include those properties that Stanovich & Evans (2013a) say will be closely correlated with autonomy: that the process is *fast*, *efficient*, and *parallel* does not help explain why subjects tend to deliver the response that they do. The problem is not merely that the monothetic properties (i.e. autonomous/working memory involving) alone fail to provide an explanation for results often taken to support dual-process theory: even those properties that are supposed to correlate with autonomy cannot do the explanatory work needed to motivate dual-process theory. Since the natural kinds posited by dual-process theory were introduced to explain why subjects tend to deliver the responses they do in experiments like the Linda case, the very reason for positing Type-1 and Type-2 processes as natural kinds has been undercut.

The obvious reply for the dual-process theorist is to say that autonomous processes are heuristic or associative. The description of Linda "fits better" with the claim that she is a feminist than that she is a bank-teller. This might be because a feminist is associated with words in the description of Linda, or it might be that the Type-1 process utilizes a representativeness heuristic. This might work as an explanation, but only by using properties from the Standard Menu that are supposed to cross-cut the autonomous/working memory involving distinction. In practice, this is

exactly what Stanovich and Evans do. While they tell us that Type-1 and Type-2 processes are distinguished using a singular property pair, they then assume there is a clustering of properties along the lines of the Standard Menu in their explanations. Importantly, the properties needed to do the explanatory work (such as associative or heuristic) are exactly the properties they claim do not cluster with the new distinction they draw. This is the second horn of the dilemma.

After telling us that being autonomous is a necessary and sufficient condition for being a Type-1 process, Stanovich (2011) goes on to claim that autonomous processes include: “behavioral regulation by the emotions; the encapsulated modules for solving specific adaptive problems that have been posited by evolutionary psychologists; processes of implicit learning; and the automatic firing of overlearned associations” (p. 19-20). Stanovich defines Type-2 processing using the contrary of each property he used to define Type-1 processing. Thus, Type-2 processing is non-autonomous, slow, does put pressure on central computing, is serial (i.e. not parallel), and is often language based (2011, p. 20). All hypothetical thinking is Type-2 processing, though the converse does not hold (2011, p. 47). This way of identifying Type-1 processes begins to look like Stanovich’s (1999) cluster proposal, since Type-1 processes are autonomous, modular (and so evolutionarily old and fast), and heuristic. So at least some properties from the Standard Menu remain in the account, and, as such, will be open to the problematic cross-cutting cases that made Evans and Stanovich move away from Type-1/Type-2 processing as cluster kinds. Again, recall that Evans (2006, 2008) and Carruthers (2013) have explicitly argued that autonomous process need not be associative or heuristic processes. Perhaps Stanovich is an outlier here, wanting to maintain that associative or heuristic processes do correlate with autonomous processes. However, if Stanovich wishes to maintain that associative,

heuristic, and autonomous processes cluster, then it is incumbent on him to argue against Evans and Carruthers who have provided evidence to the contrary.

As with Evans and Stanovich's suggested distinction between autonomous and controlled processes, Carruthers's distinction lacks the promise of explanatory power and experimental evidence that was supposed to make dual-process theory so attractive. First, since Carruthers's distinction between intuitive and reflective processes amounts to the difference between unconscious and conscious processes, the intuitive/reflective distinction does not add any explanatory power for those of us who already thought that there exists unconscious and conscious processes. Worse still, this new distinction lacks the power to account for the explanandum of dual-process theory. Suppose we know that a process is conscious: this alone does not tell us much about the resulting output of that process. It is hard to say exactly what *functional* difference consciousness makes to the output of a process.⁹ Surely consciousness is not epiphenomenal, but it would be odd to claim that *consciousness* is the difference-maker between subjects' varying responses in the reasoning and decision-making literature. In fact, since Carruthers argues that reflective processes can employ heuristics and the performance of intuitive processes sometimes approximates "that of an ideal Bayesian reasoner" (2013, p. 6), it is clear that the intuitive/reflective distinction cannot explain why subjects tend to respond incorrectly in so many of the paradigmatic experiments from the reasoning and decision-making literature. Thus, it is unclear what explanatory power Carruthers's account buys us for two reasons. First, it amounts to the conscious/unconscious distinction, and so adding intuitive/reflective to our mental ontology does not add explanatory power. Second, the conscious/unconscious distinction cannot explain the data from the heuristics and biases literature.

One might attempt to find a way out of the dilemma as follows: *autonomy* and *working memory involving* are natural cognitive kinds, each of which corresponds to a cluster of properties, and these categories are therefore projectible and explanatorily powerful. Since a process is Type-1 if and only if it is autonomous, Type-1 processing is a natural cognitive kind as well, and (likewise) since a process is Type-2 if and only if it involves working memory, Type-2 processing is also a natural kind. Carruthers might reason similarly, *mutatis mutandis*: *unconsciousness* and *consciousness* are cognitive kinds, so *intuitive* and *reflective* processing are cognitive kinds as well. For the sake of argument, I will assume that autonomy, working memory involving, conscious, and unconscious are natural kinds. Responding to this line of argument will require treating Evans and Stanovich separately from Carruthers. I begin with Evans and Stanovich.

In order for the above inference (from *autonomy* and *working memory involving* being natural kinds to Type-1 and Type-2 processes being natural kinds) to be valid, it needs to be the case that Type-1 processes are *identical* to autonomous processes, and Type-2 processes must be *identical* to working memory involving processes. To see why, consider the above argument: a process is Type-1 if and only if that process is autonomous. Autonomy is a natural kind. Therefore, Type-1 is a natural kind. The argument is invalid unless we strengthen the first premise to: Type-1 processing is autonomous processing.¹⁰ However, in order to have a substantive empirical identity claim (e.g. water=H₂O) we must have some understanding of each half of the identity claim. However, if Evans and Stanovich defend their view by *identifying* Type-1 and Type-2 processes with *autonomous* and *working memory involving* processes respectively, then we do not have an independent understanding of each half of the identity claim, since we have no handle on the extension of the concepts Type-1 and Type-2 apart from

the stipulations of dual-process literature. We cannot introduce a new natural kind (X) into our ontology merely by saying that X is identical to some known natural kind.

Perhaps Evans and Stanovich might say that they are fine with all of this. Type-1 and Type-2 processes are not *new* natural kinds. Rather, the substantive claim is that the Type-1/Type-2 (i.e. autonomous/working memory involving) distinction is superior to the S1/S2 distinction, and, in displacing the S1/S2 distinction, dual-process theory has made progress. That is, Type-1 and Type-2 are successor concepts for S1 and S2. However, now the dual-process theorist runs back into the first horn of the dilemma: their successor concepts promise less explanatory power than the S1/S2 distinction promised.

Even if Carruthers succeeds in establishing natural kinds, he does not succeed in establishing successor concepts for S1 and S2. Again, in order for the inference (from *unconscious* and *conscious processes* being natural kinds to *intuitive* and *reflective processes* being natural kinds) to be valid, it needs to be the case that intuitive processes are *identical* to unconscious processes, and reflective processes must be *identical* to conscious processes. Carruthers's view does not run into my first objection, since we have some pre-theoretical understanding of intuitive, reflective, unconscious, and conscious processing. Now, it seems that Carruthers intends his distinction as a successor concept, since he takes the Standard Menu as his point of departure, and he himself adopted the S1/S2 distinction in the past (see Carruthers 2009). However, for his distinction to be a successor to the S1/S2 distinction, it should provide similar explanatory promise as the S1/S2 distinction. This drives Carruthers back towards the first horn of the dilemma: the intuitive/reflective distinction lacks the same explanatory promise as the S1/S2 distinction. If Carruthers does not intend intuitive and reflective as successor concepts, then it is unclear why the intuitive/reflective distinction would need to be introduced at

all, since the kinds to which intuitive/reflective are identical (i.e. the kinds unconscious and conscious respectively) are already in our ontology. I conclude that using the clusters of properties that correspond to the (putative) natural kinds autonomous, working memory involving, unconscious, or reflective will not help these accounts.

6. Conclusion

Dual-process theory has rightly come under scrutiny. The recent move by dual-process theorists to monothetic accounts will not help. First, in rejecting that the properties on the Standard Menu cluster, Evans, Stanovich, and Carruthers lose a way to limit what we conceive of as reasoning. These theorists might reply that their distinctions were never meant to define ‘reasoning processes.’ However, these theorists owe us a way to draw boundaries around reasoning in order to avoid threats of triviality. More importantly, these new ways of dividing cognitive processes lack the explanatory promise of the Standard View that made dual-process theory attractive as an account of natural cognitive kinds. As a result, both Evans and Stanovich sometimes fall back into using properties from the Standard Menu that they claimed did not correlate with their new distinction. They thereby tacitly commit themselves to the Standard View. Assuming that the Standard Menu cannot distinguish two kinds of reasoning, then, we would be wise to abandon dual-process theory.

Notes

¹ I use the term ‘monothetic’ as opposed to ‘essential’ because, while Evans, Stanovich, and Carruthers all offer necessary and sufficient conditions for the two kinds of reasoning, ‘essences’ have typically been taken to be modal in nature as well. I will not hold these theorists to the claim that Type-1 or intuitive processing *could not* have been otherwise.

² I take a process to be a series of events that can be individuated naturally (as opposed to merely conventionally), and a system to be (*inter alia*) that which carries out processes.

³ As I use the terms here, ‘two-system theory’ is a version of ‘dual-process theory:’ all two-system theories are dual-process theories, but the converse does not hold.

⁴ The only example of cross-cutting that would be a problem for this small cluster, given the cross-cutting cases outlined above, is Carruthers’s claim that unconscious processing (i.e. that which he calls ‘intuitive’) can be slow.

⁵ One might object: if the new division, which dual-process theorists use to displace the Standard Menu, leaves out the cross-cutting properties in favor of some reduced set of properties, this is no problem. However, what is doing the work in this reply is the limiting of properties rather than the switch from *system* talk to *process* talk.

⁶ Evans and Stanovich’s definitions of autonomy are very similar to the way that many would define ‘automatic.’ Since Evans and Stanovich talk about ‘autonomous processes’ instead of ‘automatic processes,’ I will do the same when addressing their accounts.

⁷ It is not the critics who insist on maintaining the ‘dual-process’ label. Dual-process theorists continue to use it. Furthermore, dual-process theorists seem to regard each other as allies, and, at times, downplay the differences between their own versions of dual-process theory.

⁸ Furthermore, note that the broader we cast “reasoning,” the more likely it will be that there are more than just two kinds of processes.

⁹ This difficulty remains even if we reject the possibility of zombies or that Mary learns something new.

¹⁰ To see further why Type-1 and autonomous processes would be identical, consider that cluster kinds are identified by a cluster of properties. Thus, if Type-1 and autonomous are perfectly correlated (as Evans & Stanovich claim), then Type-1 could just as easily be identified by the cluster of properties that identifies autonomy. Since the same cluster would identify Type-1 and autonomous processes, Type-1 and autonomous processes would be identical.

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