

Commentary on “Dual-Process Theories and Consciousness: The Case for ‘Type Zero’ Cognition” by Nicholas Shea & Chris Frith

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In their excellent (2016) piece, Nicholas Shea and Chris Frith (S&F) pursue two goals. First, by untangling two sets of distinctions—conscious and unconscious *mental representations* on the one hand and automatic and deliberate *cognitive processes* on the other—S&F make a case for a kind of cognition distinct from those typically recognized by dual-process theories of cognition. S&F argue that what are often called ‘type-2’ processes are rightly characterized as conscious and deliberate, whereas type-1 processes, often described as unconscious, are better conceived of as automatic processing involving conscious representations (since these processes take as input conscious perception and output conscious judgments). S&F’s taxonomy opens up a space for what S&F call ‘type-0’ cognition, or automatic processing over unconscious states.

The existence of type-0 cognition raises the issue of the function of consciousness. As S&F observe, there is growing evidence that many mental functions once thought to require consciousness can be performed unconsciously. And some might conclude, as S&F note, that consciousness thus has no utility (e.g., Rosenthal 2008, cited on p. 1). S&F’s second goal, however, is to defend a hypothesis about consciousness’ role: that it can and often does facilitate informational integration, though it is not necessary for it.

S&F cite an impressive array of evidence of type-0 cognition, providing a compelling case for it. But I’m less moved by their account of consciousness. I am skeptical that consciousness plays even the modest role that S&F propose, in part because I believe that there is evidence for another type of processing that they mention, but do not explore in detail. As S&F acknowledge, their distinction between states and processes entails a possible fourth category: deliberative processing over unconscious states. I’ll call it ‘type-0.5’ cognition. My goal in this commentary is to explore briefly its prospects and implications.

A Case for Type-0.5 Cognition

Regarding type-0.5 cognition, S&F write:

It is an open empirical question whether cases in the fourth box [type 0.5] are merely rare or missing entirely. In any event, the paucity of reports of load-sensitive, deliberate reasoning taking place over non-conscious representations suggests that there is a tight connection of some kind between deliberate reasoning and consciousness (p. 8).

I am not sure that there is such paucity of evidence; I’ll offer here a few examples.

Consider, for instance, Dijksterhuis’ (admittedly controversial) work on ‘Unconscious Thought Theory’ (see, e.g., Dijksterhuis & Strick 2016). In a typical study, participants are asked to select between items in an array of consumer goods, which

differ along various quality dimensions. In one condition, participants are given several minutes to consciously think about which good to select before rendering a judgment; in another condition, participants are consciously acquainted with the problem, but then distracted with a different task for a period before being prompted for a decision. Remarkably, Dijksterhuis and colleagues find that participants are often equally good, and arguably sometimes better, at selecting the best consumer good in the distraction condition than in the conscious condition. A natural hypothesis is that participants engaged in unconscious deliberation, which resulted in selection of the appropriate item (cf. Rosenthal 2008, p. 832).¹

S&F might reply that such cases are not genuinely unconscious because, like examples of type-1 cognition, they involve conscious inputs and outputs. But if this processing is not type 0.5, then it is hard to see where S&F's taxonomy accommodates it. The cognition does not seem automatic, akin to the processing of type 0 or type 1 of which one is unaware (it seems, for example, rather domain general); nor does it seem to be a case of type-2 cognition, since one is totally unaware of the processing that results in conscious outputs. Perhaps what is needed is an additional distinction between the inputs/outputs of a process' being conscious and the consciousness of states in the intervening processing. In type-1 cognition, the inputs/outputs are conscious, but the states involved in the automatic processing are not; in type-2, both are conscious. We might therefore regard Dijksterhuis' work as an instance of 'type-1.5' cognition: conscious inputs/outputs, but deliberative unconscious processing.

There may nonetheless be genuine cases of type-0.5 cognition. S&F themselves cite experiments by Soto and colleagues (2011) that purportedly demonstrate the encoding of unconsciously perceived information within working memory; S&F seem to indicate that these experiments count as instances of type-0.5 cognition (p. 7). Soto and colleagues demonstrated that stimuli that had been rendered invisible to consciousness using masks nonetheless could be held in memory over a delay period (including distractors) and could be subsequently distinguished from conscious cues.

One might argue, however, that the unconscious operation of working memory in such cases is automatic. It may seem that the cognition required to complete discrimination tasks is not sufficiently domain general (cf. S&F's discussion of unconscious motor control on p. 3). But I would imagine that such effects are sensitive to load, which could be tested, though to my knowledge such experiments have not yet been run. (For evidence of other sophisticated mental operations—arithmetic and linguistic processing—on unconsciously perceived stimuli, see, e.g., Sklar et al 2012; van Gaal et al 2014).

Even we lack at present a multitude of clear experimental examples of unconsciously perceived stimuli engaging deliberative processes, this dearth of evidence could be explained for other reasons. For example, it is well known that most of our present techniques for masking stimuli greatly degrade their signal strength. Stimuli are often presented for very short durations and/or are modulated by masks that disrupt how the stimuli are processed. It could be, then, that the rarity of experimental evidence of

¹ Most criticisms of Dijksterhuis' work have focused on failures to replicate the advantage that unconscious cognition purportedly affords (see, e.g., Nieuwenstein & Van Rijn 2012). But the issue here is not whether or not type-0.5 cognition can be more successful than conscious cognition, but whether or not there is any type 0.5 cognition at all—and it would seem that this work at least suggests that there is.

type-0.5 cognition is an artifact of our main methods for investigating unconscious perception, not proof that deliberation cannot take unconscious perception as input (cf. Persuh et al 2016).

Why might weak unconscious signals engage only automatic processing? I can only speculate, but here is a hypothesis: if we think of our deliberative processing as a limited resource, it may be the case that our perceptual systems set a threshold such that only signals of a certain strength are permitted deliberative resources; other signals are simply allocated to automatic processing.² Whatever the explanation, it would seem at least open that type-0.5 cognition is more widespread than S&F think.

On the Function of Consciousness

As S&F note, the mere existence of type-0.5 cognition is compatible with their facilitation theory of consciousness' function (p. 7). But I suspect that a tacit reason that S&F are skeptical of type-0.5 cognition is that, if this type of processing were prevalent, it would be less clear that consciousness plays a role in facilitating any cognitive processes.

S&F nonetheless believe that there is independent evidence that consciousness plays this role, at least sometimes—but I think that the case for their facilitation theory is weaker than they suppose. Since I cannot review all of the evidence that S&F cite on this issue, I will discuss two studies.³

First, discussing Stocker and Simoncelli's (2008) finding that making a conscious decision that a stimulus will be on one side of a screen facilitates the process of determining where it is (p. 4), S&F propose that consciousness functions helpfully to reduce the amount of information the system uses about stimuli. Although I may be misunderstanding the evidence here, it would seem that this result could be explained equally well as an effect of attention: the conscious decision facilitates finding the stimulus insofar as it recruits attention to that side. And since there is much evidence that attention can occur outside of consciousness (see, e.g., Kentridge 2011), it is arguable that such facilitation effects could occur even in cases involving unconscious perception.

As a second example, consider S&F's treatment of the automatic stem completion effect (Debner & Jacoby 1994, cited on p. 5). There is evidence that participants, if presented with a word and then instructed to complete its word stem with a different word (e.g., first 'table' and then 'tab'), are usually able to do so (e.g., correctly report 'taboo'). But if the initial word is masked, then participants typically complete the stems with them. S&F interpret this evidence as showing that the capacity to resist the urge to complete the stem with the initially presented word requires the facilitating effect of consciousness—that is, that it is a type-2 process.

² I thank Jake Quilty-Dunn for this suggestion.

³ Without going into the details, I should also mention that some of the evidence that S&F cite in favor of their hypothesis has been experimentally questioned. For example, S&F cite Marcel's (1980) pioneering work on ambiguous-word priming (p. 4), which seems to show that conscious, but not unconscious, primes are sensitive to prior-word context—suggesting a role for consciousness. But Rohaut and colleagues (2016) recently found “strong and respective influences of conscious context and response-code on semantic processing of masked polysemous words,” concluding that “unconscious verbal semantic representations are not automatic” (p. 1). That is, it would seem that there is additional evidence of type-0.5 cognition.

But since participants in the unconscious condition are not aware of themselves as having seen the initial words, it is arguable that they do not form intentions to inhibit their automatic responses (as they do in the conscious conditions). And this could be controlled for: if participants in the unconscious condition were made aware that the first words that came to their conscious minds might be words that they had unconsciously perceived, then it is likely that they could inhibit those responses too. Thus consciousness may not be playing a facilitation role after all (I adapt this argument from Rosenthal 2008, p. 833). (For additional evidence of unconscious inhibitory control, see, e.g., van Gaal et al 2009).

Conclusions

None of the forgoing tarnishes S&F's strong case for type-0 cognition. If anything, I recommend that we should expand our thinking about the extent of the unconscious. As S&F correctly observe, understanding what—if anything—consciousness does is a crucial step for generating our theory of what consciousness is.⁴

References

- Debnar, J. A., & Jacoby, L. L. (1994). Unconscious perception: Attention, awareness, and control. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 20: 304-17.
- Dijksterhuis, A. & Strick, M. (2016). A case for thinking without consciousness. *Perspectives on Psychological Science* 11(1): 117-132.
- Kentridge, R. W. (2011). Attention without awareness: A brief review. In: Mole, C., Smithies, D. & Wu, W. (eds.), *Attention: Philosophical and Psychological Essays*. Oxford: Oxford University Press, 228-246.
- Marcel, A. J. (1980). Conscious and preconscious recognition of polysemous words: Locating the selective effects of prior verbal context. In: Nickerson, R. S. (ed.), *Attention and Performance VIII*. Hillsdale, NJ: Erlbaum, 435–57.
- Nieuwenstein, M. & Van Rijn, H. (2012). The unconscious thought advantage: Further replication failures from a search for confirmatory evidence. *Judgment and Decision Making* 7(6): 779-798.
- Persuh, M., Emmanouil, T. A., & Ro, T. (2016). Perceptual overloading reveals illusory contour perception without awareness of the inducers. *Attention, Perception & Psychophysics* 78(6): 1692-701.
- Rohaut, B., Alario, F.-X., Meadow, J., Cohen, L., & Naccache, L. (2016). Unconscious semantic processing of polysemous words is not automatic. *Neuroscience of Consciousness* 2016(1): doi: 10.1093/nc/niw010.
- Rosenthal, D. M. (2008). Consciousness and its function. *Neuropsychologia* 46: 829-40.
- Shea, N. & Frith, C. (2016). Dual-process theories and consciousness: The case for 'Type Zero' cognition. *Neuroscience of Consciousness* 2016(1): doi: 0.1093/nc/niw005.
- Sklar, A. Y., Levy, N., Goldstein, A., Mandel, R., Maril, A., & Hassin, R. R. (2012). Reading and doing arithmetic nonconsciously. *Proceedings of the National Academy of Sciences* 109(48): 19614-19.

⁴ I thank Myrto Mylopoulos and Jake Quilty-Dunn for their helpful discussion of these issues.

- Soto, D., Mantyla, T., & Silvanto, J. (2011). Working memory without consciousness. *Current Biology* 21: R912–3.
- Stocker, A. & Simoncelli, E. P. (2008). A Bayesian model of conditioned perception. In: Platt, J. C., Koller, D., & Singer, Y. (eds), *Advances in Neural Information Processing System, Vol. 20*. Cambridge, MA: MIT Press, 1409–16.
- van Gaal, S., Naccache, L., Meuwese, J. D., van Loon, A. M., Leighton, A. H., Cohen, L., & Dehaene, S. (2014). Can the meaning of multiple words be integrated unconsciously? *Philosophical Transactions of the Royal Society of London B: Biological Sciences* 369(1641): 20130212.
- van Gaal, S., Ridderinkhof, K. R., van den Wildenberg, W. P. M., & Lamme, V. A. F. (2009). Dissociating consciousness from inhibitory control: Evidence for unconsciously triggered response inhibition in the stop-signal task. *Journal of Experimental Psychology: Human Perception and Performance* 35(4): 1129-39.