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Commentary/Mercier & Sperber: Why do humans reason?

The chronometrics of confirmation bias: Evidence for the inhibition of intuitive judgements

Edward J. N. Stupple^a and Linden J. Ball^b

^aCentre for Psychological Research, University of Derby, Derby DE22 1GB, United Kingdom; ^bDepartment of Psychology, Lancaster University, Lancaster LA1 4YF, United Kingdom.

e.j.n.stupple@derby.ac.uk http://psychology.derby.ac.uk/staff/Ed_Stupple.html

l.ball@lancaster.ac.uk <http://www.psych.lancs.ac.uk/people/LindenBall.html>

Abstract: Mercier & Sperber claim that the phenomenon of belief bias – which they consider to be an archetypal manifestation of a general confirmation bias in human reasoning – provides fundamental support for their argumentative theory and its basis in intuitive judgement. We propose that chronometric evidence necessitates a more nuanced account of belief bias that is not readily captured by argumentative theory.

Mercier & Sperber's (M&S's) impressive argumentative theory reassesses the function of reasoning, not as involving the noble pursuit of truth, but instead as a Machiavellian

communicative art with persuasion and self-interest at its core. A case in point is the infamous *confirmation bias*, whereby individuals seem motivated to seek confirmatory evidence for their existing beliefs and hypotheses and fail to look for counter-evidence or counter-arguments (Nickerson 1998). M&S claim that a quintessential demonstration of confirmation bias that supports their theory can be seen in the phenomenon of *belief bias*, where some contemporary theories suggest that people try to confirm believable conclusions but disconfirm unbelievable ones (see the selective processing model described by Evans 2007, and the multinomial model of Klauer et al. 2000). Thus, in both the case of believable and unbelievable conclusions, M&S claim that people show a motivation “to confirm their initial intuition” (sect. 3.3, para. 3) with unbelievable conclusions effectively promoting an intuition-guided *debias* (Evans 2000) leading to improved logical responding. M&S further propose that, when people deal with an unbelievable conclusion, “it is not that they reason *more* in this case. . . . It is just that the direction reasoning takes is mostly determined by the participants’ initial intuitions” (sect 3.3, para. 3).

Our contention, however, is that this latter claim flies in the face of current chronometric evidence in the belief-bias literature, which suggests that a more subtle interpretation of the phenomenon is needed that is not couched purely in terms of the operation of a general confirmation bias. In particular, processing-time data for syllogistic arguments consistently indicate that participants reason *most* when the conclusion is *believable* but *invalid* (Ball et al. 2006; Stuppel & Ball 2008; Thompson et al. 2003). Such a finding is inconsistent with M&S’s view that people simply seek support for prior beliefs. Confirmatory mental models of the premises of arguments with

believable-invalid conclusions are readily available, so why should significantly longer processing times arise with these problems? We propose instead that many participants show a capacity to inhibit confirmation-oriented processing with such arguments, with the resulting attempt at logical analysis taking time to apply. Of course, the complexity of the required logical processing means that a belief-based response may still often win out, perhaps with people defaulting to such a response under cognitive load (cf. Quayle & Ball 2000). This would produce a response pattern that looks like confirmatory behaviour, but where the chronometric data support a very different account of the processing that is actually taking place.

To elaborate on our proposals we outline three possible routes that participants could take through Evans's (2007) selective processing model when confronted with belief-oriented syllogistic arguments (cf. Ball, 2010; Evans 2009). First, participants could employ a pure response bias and respond in accordance with belief without engaging any analytic processing whatsoever, either for a truth-seeking or argumentative purpose. Second, in accordance with argumentative theory, participants could seek confirmatory evidence so as to warrant the acceptance of believable conclusions (including believable-invalid ones) and the refutation of unbelievable conclusions (including unbelievable-valid ones). Finally, participants could attempt to suspend notions of belief and disbelief altogether. For example, rather than searching for a supporting model for an believable-invalid conclusion, they would inhibit a heuristic response as well as confirmatory-oriented analytic response, instead engaging in an exhaustive search for a model of the premises that provides a counter-example to the given conclusion.

The important question that follows from our analysis is this: What if examples of all three reasoning approaches were present in belief-bias data sets? We suggest that the resulting aggregation of these strategies would lead to the pattern of response times that has typically been observed (Ball et al. 2006; Stupple & Ball 2008; Thompson et al. 2003), with believable-invalid conclusions being associated with extended processing times relative to other problems because of the presence of a sub-set of reasoners who resist intuitive judgements. This group of reasoners would most likely be those described by Stanovich and West (2000) as adopting the “normative construal” of the task because they possess the cognitive capacity needed to reason through demanding deductive problems.

This latter interpretation of chronometric findings is supported by data that we have recently acquired (for a preliminary report, see Ball, 2010) demonstrating that increased response times for believable-invalid problems are predictive of increased overall response accuracies across belief-oriented problems (i.e., these times reflect the behaviour of high-ability reasoners). These data also concur with the observation by Thompson et al. (2010) that the participants who spend more time reasoning are more likely to reach a logical conclusion. However, Thompson et al. propose an alternative interpretation of the inflated inspection times for believable-invalid problems that is more in keeping with argumentative theory than our account. In their Modified Verbal Reasoning theory they suggest that participants are motivated to find confirmatory support for believable problems and so allow an extended response deadline for such problems (perhaps an attractive proposition for the argumentative theory). Thompson et al. claim that since the reasoning process is more difficult for invalid than valid problems,

this combined with the increased motivation to support believable conclusions results in the corresponding increase in response times for believable-invalid problems. We would argue, however, that in adopting this perspective one would expect a far greater acceptance rate for believable-invalid problems than is observed (acceptances are typically in the 50%–70% range), since a confirming model is readily available to those participants who expend the effort trying to find one.

In sum, we disagree with M&S's assertion that a motivated attempt at confirmation necessarily drives belief-bias effects in syllogistic reasoning. Instead, we claim that many participants attempt to seek out the deductive truth of presented arguments and do so at the considerable cognitive expense of inhibiting their *intuitive judgements*, as is particularly evident in the case of syllogisms with believable-invalid conclusions. On this issue, at least, we would argue against M&S's argumentative theory, but perhaps we cannot rule out having done so in order to confirm a pre-existing hypothesis.<C-Text ends>

References

- Ball, L. J. (2010) The dynamics of reasoning: Chronometric analysis and dual-process theories. In: *The science of reason: A festschrift for Jonathan St. B. T. Evans*, ed. K. I. Manktelow, D. E. Over & S. Elqayam, pp. 283-307. Psychology Press.
- [EJNS]
- Ball, L. J., Phillips, P., Wade, C. N. & Quayle, J. D. (2006) Effects of belief and logic on syllogistic reasoning: Eye-movement evidence for selective processing models. *Experimental Psychology* 53:77–86. [EJNS]

- Evans, J. St. B. T. (2000) Thinking and believing. In: *Mental models in reasoning*, ed. J. García-Madruga, N. Carriedo & M. J. González-Labra, pp. 41–56. Universidad Nacional de Educacion a Distanzia. [EJNS]
- Evans, J. St. B. T. (2007) *Hypothetical thinking: Dual processes in reasoning and judgement*. Psychology Press. [EJNS]
- Evans, J. St. B. T. (2009) How many dual process theories do we need: One, two or many? In: *In two minds: Dual processes and beyond*, ed. J. St. B. T. Evans & K. Frankish, pp. 33–54. Oxford University Press. [EJNS]
- Klauer, K. C., Musch, J. & Naumer, B. (2000) On belief bias in syllogistic reasoning. *Psychological Review* 107:852–84. [EJNS]
- Nickerson, R. S. (1998) Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology* 2:175–220. [EJNS]
- Quayle, J. D. & Ball, L. J. (2000) Working memory, metacognitive uncertainty, and belief bias in syllogistic reasoning. *Quarterly Journal of Experimental Psychology, Section A: Human Experimental Psychology* 53:1202–223. [EJNS]
- Stanovich, K. E. & West, R. F. (2000) Individual differences in reasoning: Implications for the rationality debate? *Behavioral and Brain Sciences* 23:645–65. [EJNS]
- Stuppel, E. J. N. & Ball, L. J. (2008) Belief-logic conflict resolution in syllogistic reasoning: Inspection-time evidence for a parallel-process model. *Thinking & Reasoning* 14:168–81. [EJNS]
- Thompson, V. A., Newstead, S. E. & Morley, N. J. (2010) Methodological and theoretical issues in belief-bias: Implications for dual process theories. In: *The*

science of reason: A festschrift for Jonathan St. B. T. Evans, ed. K. I. Manktelow,
D. E. Over & S. Elqayam, pp. 309-337. Psychology Press. [EJNS]

Thompson, V. A., Striener, C. L., Reikoff, R., Gunter, R. W. & Campbell, J. D. (2003)
Syllogistic reasoning time: Disconfirmation disconfirmed. *Psychonomic Bulletin
& Review* 10:184–89. [EJNS]