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CRITICAL NOTICE

The enduring enigma of reason

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In *The Enigma of Reason*, Mercier and Sperber (M&S) present and defend their interactionist account of reason. In this piece, I discuss briefly the points of agreement between M&S and myself and, more extensively, the points of disagreement, most of which pertain to details of the evolutionary components of their account. I discuss in particular the purported modular nature of reason; their account of myside bias as an optimum/adaptation; and the claim that reason thus construed must be an individual-level and not a group-level adaptation. In the final section, I offer brief considerations on an alternative account of reasoning, where the focus is on how sociocultural environments may tune the social production and evaluation of arguments.

KEYWORDS
adaptationism, argumentation, evolutionary psychology, reason, social interaction

1 | INTRODUCTION

Hugo Mercier and Dan Sperber's *The Enigma of Reason* (hereafter M&S) is a real tour de force, the culmination of the innovative, creative work they have been doing for almost a decade on the fundamental but so far largely neglected connections between reasoning and argumentation (Mercer & Sperber 2011). As such, it is bound to remain influential for years, maybe decades, to come. In the book, they develop and defend what they refer to as the interactionist account of reason: "reason, we maintain, is first and foremost a social competence" (M&S, p.11). This account is contrasted with what they refer to as intellectualist views, according to which reason and reasoning are phenomena primarily pertaining to the individual thinking subject, as capacities that enable her to achieve greater knowledge and make better decisions through purely individualistic processes. M&S convincingly argue that the intellectualist approach is misguided.

Despite agreeing with M&S on many points, in what follows, I explain why certain aspects of their account do not seem entirely successful to me, particularly their reliance on evolutionary

psychology.[1] I start by briefly spelling out some of the points of agreement between M&S and myself in Section 2. In Section 3, I elaborate on three points of disagreement: the purported modular nature of reason; their account of myside bias as an optimum/adaptation; and the claim that reason thus construed must be an individual-level and not a group-level adaptation. In Section 4, I offer brief considerations on what an alternative account of reasoning as "tuned *for* social interaction *by* social interaction" might look like.[2] Indeed (and this explains my title above), I take it that, as long as we have not properly addressed the influence of sociocultural processes in how reasoning capacities are shaped, we have not really elucidated the enigma of reason—even if M&S have already made significant progress in the right direction.

But before moving on, we must be clear on what exactly is the phenomenon we are interested in, even if only as a first approximation: what is this thing called reason? Indeed, it is quite natural to even ask whether reason is a thing at all (M&S, p. 33). Interestingly, it is only fairly late in the book that M&S address the definitional issue explicitly for the first time, at the beginning of Chapter 3. Their answer to this question is roughly that reason/reasoning is a species of the genus inference; what differentiates reasoning from other, unreflective kinds of inferences, such as catching a ball in the air (which M&S, perhaps controversially, classify as an inference), is that, when reasoning, *we attend to reasons.* When reasoning, we are interested not only in *whether* something is the case, but also in *why* we should believe something to be the case.[3]

Beyond these definitional questions, M&S also offer a substantive account of reasoning as a form of metarepresentational intuitive inference, based on the notion of *intuitions about reasons* (i.e., whether a certain proposition or fact counts as a reason for another). "Reasoning, we have argued, is produced by a metarepresentational module, the specific domain of which is the relationship between reasons and the conclusions they support." (M&S, p. 182) For M&S, reasoning is a reflective process in which we draw inferences by attending to reasons, that is, by paying attention to support/warrant/justify relationships between beliefs, propositions, or facts. (For the present purposes, we may remain neutral on the ontological status of the relata in these relationships.)

2 | GENERAL POINTS OF AGREEMENT

As suggested above, I wholeheartedly agree with the gist of M&S's interactionist account of reason, as opposed to classical, individualistic accounts. Elsewhere, I have argued in more detail for the

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[1] I thus find myself very much in agreement with C. Heyes' general assessment of the book: "The central thesis of *The Enigma of Reason*—that reasoning has a social function—is convincing; the argument that it was genetic evolution which did the tuning is less so. A likely alternative, which Mercier and Sperber's book does not address squarely, is that reasoning is tuned *for* social interaction *by* social interaction." (Heyes, 2017)

[2] Notice that 'alternative account' need not be understood as 'competing account'. As Sperber notes in a blog post in response to Heyes' review (http://cognitionandculture.net/blog/dans-blog/cecilia-heyes-on-the-social-tuning-of-reason), an account of how sociocultural environments may tune the social production and evaluation of arguments might well be a complement to or extension of their evolutionary story rather than a competing account. Nevertheless, by not devoting much attention to these socio-cultural components (by Sperber's own admission in the blog post), Mercier and Sperber make a methodological choice that has important consequences. Indeed, I suspect that a thorough account of how social interactions tune reasoning capacities would lead to a revision of certain aspects of M&S's evolutionary account.

[3] For convenience, let me clarify the terminology a bit. *Reason*, used in the singular (as in the title of the book), is used to refer to the relevant faculty (or module, as M&S prefer) and is, later in the book, distinguished into four kinds: two retrospective ones, explanation and justification, and two prospective ones, inquiry and argumentation (M&S, p. 129). *Reasoning* corresponds to the production and evaluation of reasons in argumentation and inquiry. And *reasons*, as in 'attending to reasons', are of two kinds: an *objective reason* is a fact that objectively supports some conclusion, and a *psychological reason* is a mental representation of an objective reason (M&S, pp. 111–112). What matters for their discussion are predominantly psychological reasons.

fruitfulness of a dialogical, multiagent perspective to account for deductive reasoning specifically (Dutilh Novaes, 2013, 2015, 2016). But in fact, the interactionist, dialogical perspective applies more broadly to reasoning in general, not only to deductive reasoning—that is, if reasoning is understood in the sense adopted by M&S, as attending to reasons.[4] Indeed, while reasons are produced by the lone thinker for her own consumption in classical accounts, in the interactionist account, reasons are primarily produced for social consumption (self-consumption being the limit case rather than the norm). Throughout the book, they show that the interactionist account is able to make sense of a number of features of reason that remain poorly explained or outright mysterious in classical, individualistic accounts.

Thus seen, reason is the faculty that enables us to engage in what has been described as the practice of 'giving and asking for reasons' (Brandom, 1994), a practice that is arguably central to the ways in which human sociality is shaped. This is a theme that M&S develop in detail, emphasizing the thoroughly *normative* nature of the phenomenon:

> By giving reasons to explain and justify yourself, you do several things. You influence the way people read your mind, judge your behavior, and speak of you. You commit yourself by implicitly acknowledging the normative force of the reasons you invoke: you encourage others to expect your future behavior to be guided by similar reasons (and to hold you accountable if it is not). You also indicate that you are likely to evaluate the behavior of others by reasons similar to those you invoke to justify yourself. Finally, you engage in a conversation where others may accept your justifications, question them, and invoke reasons of their own, a conversation that should help you coordinate with them and from which shared norms may actually progressively emerge. (M&S, pp. 185–186).

Moreover, while the scope of the practice is very broad indeed, giving and asking for reasons is crucial, particularly for how we manage our *epistemic/cognitive lives*:

> The argumentative use of reasons helps genuine information cross the bottleneck that epistemic vigilance creates in the social flow of information. It is beneficial to addressees by allowing them to better evaluate possibly valuable information that they would not accept on trust. It is beneficial to communicators, allowing them to convince a cautious audience. (M&S, p. 194).

While reasoning thus understood, as underpinning social practices of giving and asking for reasons, arguably permeates much of human life, it is particularly conspicuous in specific contexts, such as legal, political (cf. Chapter 17), and scientific (cf. Chapter 18) contexts. In particular, M&S show that being expected to provide reasons to convince one's peers is one of the hallmarks of good science, and even the brightest minds display subpar performances when working as 'solitary geniuses'. A case in point (M&S, Chapter 18): Newton's work in astronomy is far superior to his work in alchemy, arguably because with the former, but not with the latter, he had to convince a community of well-informed, skeptical peers.

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[4] If one adopts a broader conception of reasoning that encompasses other forms of inference, perhaps even the unreflective inferences that M&S discuss in Chapter 3, then not all instances of reasoning would count as essentially geared toward social interaction. This may seem as if a definitional/terminological question that is largely a matter of stipulation, but in fact, I am convinced that M&S's focus on attending to reasons as what is characteristic of reasoning is a methodologically fruitful move.

3 | DISAGREEMENTS

In line with their previous joint work, and with Sperber's longstanding theoretical commitments, M&S adopt an evolutionary perspective to address the issue of the function(s) of reason, a move they justify in the following terms:

> The main function of reason is social. Why resort to an evolutionary approach? Because this is the only approach that explains the fact that complex inheritable traits of living things tend to produce beneficial effects. Outside of an evolutionary perspective, it is quite unclear why human reason, or anything else for that matter, should have any function at all. (M&S, p. 176).

> While reason has obviously benefited from various cultural enhancements, the very ability of a species to produce, evaluate, and use reasons cries out for an evolutionary explanation. (M&S, p. 3).

The perspective they adopt is, however, not merely evolutionary: it is also *adaptationist*,[5] as indeed most of the work conducted under the heading of evolutionary psychology is. It is precisely the adaptationist commitment that is the source for what I take to be the less convincing aspects of their account. Schematically, an adaptationist explanation typically proceeds by observing a trait in an organism, postulating that it must be an adaptation and indeed an *optimal solution* (not only a satisficing one) to the function(s) it is supposed to be a response to, and then formulating an account that presents itself as the best explanation for the purported adaptiveness and optimality of the trait, given the purported function(s) attributed to it.

As far as I can see, M&S assume without much hesitation or in-depth discussion that reason, as they understand it, must be an adaptation. "Reason is an adaptation to the hypersocial niche humans have built for themselves." (M&S, p. 330) The hypothesis that reasoning may be a product of nonselective forces in evolution (e.g., an exaptation), or perhaps not a product of biological evolution at all, is, as far as I can see, not seriously entertained in the book. Similarly, no explicit argument is offered, as far as I can see, for why reason thus understood must be an adaptation. The gist of their argument seems to be: reason must be an adaptation, but if conceived as having the function of supporting the cognitive processes of the lone reasoner, it does not seem to perform this function very well.[6] So there must be a different function that reason is in fact responding to, given that it cannot be anything other than an adaptation.

But what if reason thus conceived is not an adaptation after all? To be clear, I am not claiming that reason is obviously not an adaptation; there is certainly some prima facie plausibility to this idea. I am simply suggesting that it might be best not to take it for granted that reason *must be* a biological adaptation.[7]

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[5] See Godfrey-Smith (2001) for different versions of adaptationism.

[6] "Failures of reasoning are lazily explained by various interfering factors and by weaknesses of reason itself. Again, this doesn't make much evolutionary sense. A genuine adaptation is adaptive: a genuine function functions." (M&S, p. 331) But how do we know that reason is a genuine adaptation?

[7] See Lloyd (2015) on why an evolutionary explanation should not start with "what is the function of this trait?" as a research question but instead should start with "does this trait have a function?".

3.1 | Modularity

According to M&S, reason corresponds to a specialized module that produces intuitive, metarepresentational conclusions about reasons—and indeed *only* about reasons (M&S, p. 329).

> Reason is, we argued, one module of inference among many. Inferential modules are specialized; they each have a narrow domain of competence and they use procedures adapted to their narrow domain. (M&S, p. 328).

By describing reason as a module, M&S take a stance against a number of unifying accounts of inference, such as Bayesian, probabilistic models. It is not entirely clear, however, what hinges on construing reason as a specialized module, that is, what the theoretical pay-off is of this particular move. True enough, adaptationism and modularity often go well together as the picture of autonomous modules lends itself smoothly to the idea of specific traits being selected for, while other traits in the organism remain largely stable: it is easier for evolution to 'tinker' with modular organisms. So, it might be that M&S insist on the modular nature of reason so as to lend further support to their adaptationist account. (They also emphasize the flexibility and plasticity of modules [M&S, pp. 74–75].)

However, despite offering a fairly detailed description of the main features of this putative module (a metarepresentational module producing intuitive inferences about reasons), no decisive arguments are offered to support the claim that this module in fact exists. Indeed, toward the end of their discussion on this point, M&S recognize that their conclusions have a modest reach:

> In any case, we have not found any module: we are merely speculating, with, we hope, sensible arguments, that the identification of reasons might well be the job of a dedicated module. (M&S, p. 144).

I must confess that I am not convinced by their arguments. In particular, talk of modules brings up the conceptual difficulty of defining the right level of granularity for what should count as a module, given that inferential modules of various kinds will be linked to a number of other inferential modules. Moreover, I do not immediately see how the modularity claim might be put to the (empirical) test, especially as M&S recognize that there are a number of important connections in place between their putative reason module and other modules.

One way the putative relative independence of the reason module might be empirically corroborated is if specific brain lesions affect reasoning capacities while leaving other cognitive capacities mostly intact. It is well known that brain lesions can affect very specific capacities in circumscribed ways, such as the capacity to read letters without affecting how the patient reads numbers or the capacity to read without affecting writing (as discussed in detail in Dehaene, [2009]). Is there any evidence of a similar pattern with reasoning capacities, such that a person's ability to attend to reasons is compromised while no other cognitive abilities are seriously compromised? If there were such evidence, then M&S's account of reasoning as a largely autonomous module would be given additional support. (Naturally, a module need not correspond to a specific brain region, but my general point is that independence of function may be observed in certain pathological cases.)

However, my own guess is that attending to reasons is so deeply intertwined with numerous other aspects of human cognition that an impairment of reasoning capacities would be accompanied by significant disruption of other cognitive capacities. Of course, this is an empirical question to be further investigated, but to my mind, M&S have not presented sufficiently compelling (empirical or otherwise) evidence for the existence of a reason module.

3.2 | Myside bias as an adaptation

As noted above, M&S go to great lengths to argue for the adaptive nature of reason. Prima facie, this is a tall order in view of the numerous empirical findings suggesting that human reason is biased and lazy, as extensively discussed by M&S themselves and thus summarized[8]:

> Human reason is both biased and lazy. Biased because it overwhelmingly finds justifi-cations and arguments that support the reasoner's point of view, lazy because reason makes little effort to assess the quality of the justifications and arguments it produces. (M&S, p. 9).

As already mentioned, the gist of their argument is to claim that the primary function of reason has been misconstrued in classical accounts, which explains its apparent failure; if you want to use a screwdriver to do the job of a hammer, no wonder that it performs poorly. M&S claim that instead of allowing us to achieve greater knowledge and make better decisions, which it does not do very well, the function of reason is to produce and evaluate reasons in social practices of giving and ask-ing for reasons, which are fundamental aspects of human sociality. They then go on to argue that these two features, being biased and being lazy, are in fact *advantageous* for reason's function as socially conceived.

> In our interactionist account, reason's bias and laziness aren't flaws; they are features that help reason fulfill its function. People are biased to find reasons that support their point of view because this is how they can justify their actions and convince others to share their beliefs. (M&S, p. 331).

> When defending a point of view, the myside bias is a good thing. *It is a feature, not a bug.* This fits with the prediction of the interactionist approach. If the function of rea-soning, when it produces reasons, it to justify one's actions or to convince others, then it *should* have a myside bias. (M&S, p. 219).

At the individual level, the claim seems to be that being very certain of your own beliefs and to a large extent insensitive to contrary evidence will make people better arguers because they are likely to convey a greater degree of conviction to others in argumentative situations; they will thus be more likely to convince others. As for laziness, the principle of least effort would dictate that the reasons to be produced should be only as good as required by the situation (M&S, p. 331). When facing a gullible interlocutor, why spend precious cognitive resources in formulating arguments that are unnecessarily strong? And so, M&S draw a Panglossian conclusion: it is actually all for the best.

> We have also repeatedly stressed that all of this is for the best: in the right context, these features of reason should turn into efficient ways to divide cognitive labor. (M&S, p. 264)

(I will further comment on the idea of division of cognitive labor shortly.) But is it really the case that myside bias and laziness thus described constitute an optimal solution for the social,

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[8] As M&S recognize themselves, that the production of reasons is lazy and biased is not so much a prediction but rather a 'retrodic-tion' of previously existing data, which they then seek to explain in a way that is more satisfactory than what is achieved within the intellectualist approach (perhaps an inference to the best explanation). But it seems to me that their explanation of myside bias is not fully convincing. Notice also that, in their account, bias and laziness are predominantly a feature of the *production* of reasons: in eval-uating reasons, we are, they claim, much less prone to bias and laziness.

argumentative function of reasoning?[9] One prediction that seems to follow from these considerations is that people who are more prone to myside bias would be better at convincing others than people who can more clearly see the different sides of a question. Granted, disturbing recent events in world politics seem to suggest that uttering lies and pseudoarguments often enough and loudly enough, with a great amount of conviction, does seem to work as a strategy to sway large numbers of voters. But it seems equally plausible that perhaps, in less heated, less polarized situations, the more convincing arguers are those who can anticipate the audience's responses and tailor their arguments to the audience's needs. (In fact, in political contexts, a significant amount of knowledge about the cognitive profiles of intended audiences goes into designing campaigns.) M&S do raise this possibility: "But wouldn't justification or conviction be better served if reason allowed us also to find arguments against our side, even if only to refute them?" (M&S, p. 222) Indeed, a long and venerable tradition both in rhetoric and in dialectic (e.g., Aristotle in the *Topics*) emphasizes the importance of seeing the different sides of a question, including arguments and counterarguments, in order to argue convincingly for a given position.

M&S's answer to this objection is that it would be unnecessarily costly to take the other side's perspective in order to anticipate possible objections. Given the interactive nature of dialogue, justifications and arguments are refined with the interlocutors' feedback (M&S, p. 227), thus giving rise to a *division of cognitive labor.*

> If we take an interactionist perspective, the traits of argument production typically seen as flaws become elegant ways to divide cognitive labor. The most difficult task, finding good reasons, is made easier by the myside bias and by sensible laziness. […] By using bias and laziness to its advantage, the exchange of reasons offers an elegant, cost-effective way to solve a disagreement. (M&S, p. 236).

Notice that the myside bias and laziness only lead to finding good *enough* reasons, not good reasons *tout court.* It is the interactive nature of argumentation and division of labor that may eventually lead to good reasons *tout court.* However, the notion of division of cognitive labor introduces a *group/collective perspective* that does not seem to be the one M&S are primarily interested in. (See next section on levels of selection.) Indeed, from the group perspective, a combination of myside bias and sensible laziness may well be an optimal solution to how we organize our social and cognitive lives as it may give rise to an efficient division of labor. However, this is not a satisfactory response to the objection that, *from the individual-level perspective,* myside bias in particular does not seem to be an optimal solution at all, perhaps not even a satisficing one. (Selective laziness is more plausible as an optimum given the principle of least effort and the general observation that organisms are always negotiating trade-offs between costs and rewards.)

Naturally, whether people more prone to myside bias are better at convincing others is a question that could be investigated empirically. As it stands, however, M&S have not convincingly established that myside bias is an adaptive feature *for the individual,* and indeed more adaptive than not having this trait. (This is also pressing in view of their emphasis on reputation and the importance of not looking daft when producing poor arguments—p. 227). Even if the relevant evolutionary environment will not have resembled the highly regimented contexts in which anticipating your interlocutor's objections is clearly useful—courts of law, scientific argumentation, debating—it seems quite plausible that being attuned to your intended audience

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[9] It is not clear to me whether M&S fully commit to the claim that myside bias is an optimal rather than merely a satisficing solution. At a number of places, they acknowledge that reason does its job somewhat imperfectly, but when they talk about it all being for the best, then it sounds more like they endorse the idea that reason is an optimal adaptation, not only a satisficing one.

in an argumentative situation would be a more adaptive trait than the stubborn dogmatism of myside bias. That this is so is reinforced by the idea (which M&S seem to endorse, p. 98) that human mind-reading capacities are an adaptive trait for humans. Myside bias is ultimately a form of mind-reading failure, which further suggests that it is best not seen as an adaptation, given the importance of being able to appreciate one's interlocutor's perspective for social interaction.

3.3 | Levels of selection

As suggested in the previous section, M&S's account of myside bias as an individual-level adaptation does not appear to be fully convincing. Perhaps a more convincing story might be told for myside bias as a group-level adaptation in terms of division of cognitive labor.[10] However, M&S explicitly state that their evolutionary account of reasoning is an individual level-hypothesis, not a group-level one:

> Couldn't the evolution of reason, then, be a case of group-level rather than individual-level selection for cognitive cooperation? No, ours is definitely not a group-level selection hypothesis. In fact, it would be inconsistent with the interactionist approach to reason to think of it as a group-level adaptation. (M&S, p. 333).

> Group-level selection favors the pursuit of collective benefits over that of individual benefits. Reason as we have described it is, by contrast, a mechanism for the pursuit of individual benefits. An individual stands to benefit from having her justifications accepted by others and from producing arguments that influence others. She also stands to benefit from evaluating objectively the justifications and arguments presented by others and from accepting or rejecting them on the basis of such an evaluation. These benefits are achieved in social interaction, but they are individual benefits all the same. (M&S, p. 333).

In other words, in M&S's account, the selective pressure to be a good arguer is not related to advantages for the group that this trait would confer but rather to advantages for the individual herself, such as: influencing others when producing arguments; establishing a reputation as a reliable informant; and exercising epistemic vigilance when receiving information from others. Basically, the picture underpinning their account is of individual humans essentially in competition with each other, who will not shy away from deceiving trusting receivers, and who will not be easily deceived (M&S, p. 188). M&S note that critics have described their theory as 'cynical' for these reasons (M&S, p. 333). While this may be a bit of an exaggeration, in the end, their account does emphasize competition by downplaying cooperation (while still retaining a modicum of cooperation). This feature of their theory becomes salient, especially when compared to another recent ambitious account of human cognition, namely, Tomasello's "shared intentionality hypothesis", where the focus lies on cooperative social interaction among humans (Tomasello, 2014).

I have three arguments against M&S's adoption of an exclusively individual perspective, focusing only on the benefits of the trait for the individual. The first is internal: by bringing in the idea of division of cognitive labor when defending the claim that myside bias is an adaptation, M&S are

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[10] I am well aware that group-level adaptation is a controversial concept in evolutionary biology. At this point, I am merely mapping the theoretical possibilities available. Moreover, as well put by Norman (2016, p. 690): "to posit collaboration is not to posit group selection."

surreptitiously introducing an element of collectivism. So, either they forfeit the idea of division of cognitive labor or they accept that there is a collectivist component in their account after all (even if not fully-fledged group selection—perhaps an instance of *social selection*, as suggested by Norman [2016, p. 690]).

The second argument is empirical. As they note, their account predicts that receivers are not easily deceived as natural selection would favor individuals who are highly epistemically vigilant and mistrustful. This is, however, not borne out by empirical work on deception detection, which suggests that deception detection abilities in humans are just above chance (Levine, 2010) and that our default assumption when receiving information from fellow humans is that they speak the truth (Levine, 2014). What is more, it has been argued that this presumption of honesty is highly adaptive both for the individual and for the species (Levine, 2014). So, these findings seem to be at odds with the prediction that natural selection would favor mistrustful individuals given that such individuals do not seem to prevail in the current population.

The third argument is more general, perhaps not an argument properly speaking but rather a deep-seated commitment to the idea that cooperation is a key component of human cognition given our hypersocial nature. When it comes to reason (also if understood in M&S's sense, i.e., as a social competence), a plausible story can be told about the collective benefits of the relevant traits emerging in the population, such as the coordination of actions and the communication of more complex thoughts. One such story is the one defended by A. Norman in a paper responding to M&S's earlier work; according to him, "[r]eason afforded our ancestors a powerful way to build and maintain the shared outlooks necessary for a highly collaborative existence." (Norman, 2016, p. 685)

In sum, M&S's restricted individual-level focus fails to consider the potential collective benefits of the emergence of reason and the fact that it appears to be essentially cooperative, thus leaving out an important part of the story.

4 | REASONING TUNED BY SOCIAL INTERACTION

But what is reason then if it is not an individual-level biological adaptation? In this section, I sketch the outlines of an alternative proposal. I do not rule out that reason may be a biological adaptation after all—perhaps an adaptation geared toward highly cooperative social structures, as suggested by Norman (2016). But the hypothesis that reason thus conceived (as the capacity to attend to reasons when drawing inferences) may not be an adaptation at all, or that it is not a trait emerging exclusively from biological evolutionary processes, deserves consideration. Perhaps reason thus understood is a fairly recent cultural product, by and large related to schooling and other cultural institutions. If this is the case, then one should expect it to take radically different forms in different cultures.

M&S do raise this possibility, noting that it is incompatible with the evolutionary approach they defend (M&S, pp. 278–279). They take it that the available empirical evidence speaks against the cultural hypothesis, referring to the (putative) early onset of reasoning and argumentative abilities in children, which suggests that these abilities are not a product of schooling (M&S, p. 291), and to the (putative) universal prevalence of argumentative practices across cultures (M&S, p. 286). However, their interpretation of both sets of data is not uncontroversial. Firstly, the data they cite on the development of children's argumentative skills mostly pertain to WEIRD populations,[11] that is, to children who are typically exposed to some form of formal schooling (even as preschoolers) or, in

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[11] People from Western, Educated, Industrialized, Rich, and Democratic (WEIRD) societies (Henrich, Heine & Norenzayan, 2010).

any case, to specific dialogical practices by caregivers. Moreover, they also note the observed effects of parenting styles in the development of reasoning skills in children; parents who practice a reasoned approach seem to raise children who are better at reasoning and arguing themselves (M&S, p. 293). This observation, in fact, underscores the presumed effect of social interactions for the development of reasoning skills. Secondly, while they refer to observations and experiments (with adults) in a few non-WEIRD cultures (the K'iché Maya in Guatemala, the Lozi in Zambia, the inhabitants of the Trobriand Islands studied by E. Hutchins), where argumentative practices similar to those of WEIRD cultures were observed, these findings in just a few cases obviously do not yet confirm the universal claim that they seek to establish. There are many, many more non-WEIRD cultures that have not (yet) been studied in this respect. (Indeed, the cross-cultural study of argumentative practices is a fascinating but thus far largely unexplored field, and M&S should be commended for encouraging and pursuing this important and challenging line of research.)

But what exactly would it mean for reasoning to be tuned *by* social interaction? What would it mean for reasoning to be a cultural product? To address these questions, it may prove useful to consider one paradigmatic case of a biologically evolved trait in humans and one paradigmatic case of a culturally evolved trait. Spoken language is (most likely) a feature in humans emerging from our genetic endowment as a species, a result of biological evolutionary processes. As such, it is universal (every known human population has a signaling system that we do not hesitate to call a language), and the emergence of the trait in individuals occurs without the need for specific training (though exposure is crucial). Written languages, by contrast, are clearly a cultural product with a very recent history, having emerged independently in just a handful of circumstances (times/places) in world history. Writing skills, unlike speaking, typically require a fair amount of formal training to be mastered, as noted by M&S themselves (pp. 72–73). But of course, any culturally evolved skill, including writing, must latch on to cognitive and physical possibilities determined by our biological endowment, which may then be recycled and reused for novel purposes (as per the 'neural reuse' hypothesis (Anderson, 2010; Dehaene, 2009, referred to by M&S).

Is reasoning—understood as the capacity to attend to reasons reflectively when drawing inferences, which is most conspicuous in social practices of giving and asking for reasons—more like spoken languages, or is it more like written languages, both in ontogenetic and in phylogenetic terms? I submit that reason is closer to written languages than to spoken languages as a cognitive skill: sociocultural environments, including a certain amount of training and exposure to specific linguistic practices, play a significant role in how reasoning skills develop in individuals and how these skills emerged in the history of the human species.

Naturally, reasoning skills thus conceived must still latch on to pre-existing features in humans in order to emerge (both phylogenetically and ontogenetically). I submit that two key components are: (a) human prosocial traits such as the tendency to cooperate and coordinate for action, the ability (and desire) to engage in complex linguistic communication, and the ability to adopt others' perspectives (albeit with limitations), and (b) the penchant to seek and formulate causal connections between phenomena, which is involved in the ability to view A as a *reason* for B. These two components (and perhaps others as well) provide the substratum upon which reasoning skills emerge, supported by specific sociocultural interactions.

Perhaps another helpful analogy here is between reason and numerical cognition with exact quantities (basic arithmetic). While we do seem to have an evolved capacity to determine exactly very small quantities—what is known as subitizing—and to estimate larger quantities, the onset of exact basic arithmetic in an individual requires a significant amount of sociocultural 'programming' that latches on but takes us beyond these evolved capacities (De Cruz, 2016). Incidentally, it is tempting to take basic arithmetic to be a universal trait in humans given its widespread prevalence. But the discovery of cultures that

do not engage in the practice of counting as we know it (Pirahã, Munduruku) has forced us to reconsider the presumed universality of exact numerical cognition and to rethink the phylogenetic emergence of numeral cognition in human populations. Similarly, when it comes to reasoning, it seems that the possibility of hitherto unidentified human cultures that solve their coordination and conflict problems in ways that do not involve social practices of attending to/giving and asking for reasons cannot be ruled out.

Admittedly, at this point, these are just some sketchy suggestions, which are not likely to convince anyone who is not already broadly sympathetic to this general approach. However, the idea that much of human cognition is a result of enculturation processes and cultural learning has been gaining traction in recent years (Henrich, 2015; Heyes, 2012) and, in fact, has venerable origins in the work of the soviet psychologist Vygotsky (1931). There is much work still to be done on the hypothesis that reasoning is significantly shaped by social interaction and sociocultural environments—that is, that it might be closer to a cultural phenomenon rather than to a biological adaptation.[12] With these considerations, I merely intend to establish the viability of an alternative to M&S's research program. This alternative program would tackle, among other issues, the phylogenetically early cognitive features that provide the substratum for the emergence of reasoning/argumentative practices; the *longue durée* development of these practices; and the ontogenetic development of reasoning skills in human individuals. The concept of *cognitive integration* (Menary, 2013) may provide a suitable conceptual framework for this program by focusing on how phylogenetically early forms of cognition are built upon by more recent cultural innovations that are a product of cultural evolution and niche construction.[13] Quite likely, the emergence of reason was a complex process characterized by feedback loops between genetic and cultural processes.

5 | CONCLUSIONS

In this piece, I have tried to convey my deepest respect and admiration for the groundbreaking work of M&S; they are freeing us from centuries of a misguided individualistic paradigm, which is an impressive feat indeed. (Although, as I have argued elsewhere [Dutilh Novaes, 2017], the individualistic conception of reason only became pervasive in the early modern period.) But I have also expressed some of my reservations toward a number of details of their account, especially with respect to its evolutionary underpinning (while not claiming that an evolutionary perspective as such is not fruitful). Furthermore, I have sketched the contours of an alternative research program, one where sociocultural aspects would occupy a more central position than in M&S's program. (In the coming years, I will be developing some aspects of this alternative program, with which I hope to further clarify the enduring enigmas of reason.)

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[12] I take it that it is unhelpful to think of these two categories as mutually exclusive; doing so reinforces the dated nature versus nurture dichotomy. Indeed, cultural learning itself is a biological adaptation in humans.

[13] In other words, the cultural hypothesis is not restricted to the version of it that M&S criticize, namely, that reasoning is an 'invention' of the last couple of centuries and purely a product of formal schooling. There are more subtle and interesting ways to approach social cognition from a cultural perspective, for example Heyes and Frith (2014).

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