

References

1. Cowen, A.S. and Keltner, D. (2017) Self-report captures 27 distinct categories of emotion bridged by continuous gradients. *Proc. Natl. Acad. Sci.* 114, E7900–E7909
2. Barrett, L.F. et al. (2018) Nature of emotion categories: comment on Cowen and Keltner. *Trends Cogn. Sci.* 22, 97–99
3. Van Gelder, T. (1998) The dynamical hypothesis in cognitive science. *Behav. Brain Sci.* 21, 615–628
4. Young, A.W. et al. (1997) Facial expression megamix: tests of dimensional and category accounts of emotion recognition. *Cognition* 63, 271–313
5. Guizzardi, G. (2007) On ontology, ontologies, conceptualizations, modeling languages, and (meta) models. *Frontiers in Artificial Intelligence and Applications* 155, 18
6. Dolnicar, S. et al. (2011) Quick, simple and reliable: forced binary survey questions. *Int. J. Market Res.* 53, 231
7. Jack, R.E. et al. (2018) Data-driven methods to diversify knowledge of human psychology. *Trends Cogn. Sci.* 22, 1–5
8. Cichocki, A. (2014) Unsupervised learning algorithms and latent variable models: PCA/SVD, CCA/PLS, ICA, NMF, etc.. In *Academic Press Library in Signal Processing* (Vol. 1) (Diniz, P.S.R. et al., eds), In pp. 1151–1238, Elsevier
9. Gilula, Z. (1986) Grouping and association in contingency tables: an exploratory canonical correlation approach. *J. Am. Stat. Assoc.* 81, 773–779
10. González, I. et al. (2008) CCA: an R package to extend canonical correlation analysis. *J. Stat. Software* 23, 1–14
11. Arora, R. and Livescu, K. (2013). Multi-view CCA-based acoustic features for phonetic recognition across speakers and domains. *Acoustics, Speech and Signal Processing (ICASSP), 2013 IEEE International Conference*, pp. 7135–7139, IEEE

Letter

Persistent Maladies:
The Case of Two-Mind
SyndromeMagda Osman^{1,*}

The reference to the word ‘mythical’ by Melnikoff and Bargh [1] is apt because, as they point out, humans have an uncanny need to understand things in binary form. It functions as an ideal that is rarely an accurate reflection of reality. The profound attraction to it has helped psychologists to discover that cognition conveniently reduces to two modes, one fast one not, one accessible one not, one biased one not, one controllable one not, etc. But could it be that we psychologists have a chronic case of

two-mind syndrome (a collection of scientific efforts that are designed to maintain a claim about the binary functioning of the mind despite significant evidence to the contrary)?

There have been other persuasive voices signalling a similar warning that the duality of the mind is not literal: ‘This book [*Thinking, Fast and Slow*] has described the workings of the mind as an uneasy interaction between two fictional characters: the automatic System 1 and the effortful System 2. You are quite familiar with the personalities of the two systems and able to anticipate how they might respond in different situations. And of course you remember that the two systems do not really exist in the brain or anywhere else’ ([2], see p. 415).

Besides the warnings, and even in light of amassing contrary evidence, as Melnikoff and Bargh [1] show, the spread of the dual-system framework covers most areas of psychology, reaching pandemic proportions. It may even be responsible for psychology’s current attention and credibility that has seen it courted by governments across the world, albeit under the more acceptable label of behavioural science. The public and private sector’s use of the dual-system framework as an explanatory tool of the mind is so

embedded that there is no scepticism. The lack of it is preventing any discussion of the serious implications in the applied world of using a flawed framework of the mind. What happens when that framework is still being used to guide public policy interventions (Box 1)? This issue is further reinforced by public uptake of the dual-system framework. Even when evidence suggests they are implausible, if they are sticky enough psychological phenomena that enter public awareness are monumentally difficult to shift. Take, for instance, subliminal advertising. The public still believe it to be a tool for unconsciously influencing our purchasing behaviour [7,8], but this is based on a falsehood that is of staggering proportions by virtue of its popularity as an idea [9]. Vicary never conducted the now infamous 1957 cinema experiment in which cinema goers were subliminally flashed ‘eat popcorn’ and ‘drink Coca-Cola’ and so never possessed data showing increases of sales of both. Yet, Vicary popularised the power of applying psychology to manipulate behaviour by targeting the unconscious. From then until now the idea has stuck regardless of the lack of any reliable evidence that subliminal advertising works [9,10].

As the authors mentioned [1], there have been compelling challenges to this

Box 1. The Illusionary Panacea for Social Ills

In the psychology of persuasion, the application of psychological research in government used to target human limitations dates back to Lippmann’s work in the 1920 [3]. A modern incarnation of this, in the form of the nudge programme, was born in 2008 [4] and is a collection of decision-support techniques that capitalises on psychological insights to improve people’s lifestyle choices.

In the academic world, the problem with the programme is that it has come unstuck. Without a good theory that specifies the mechanisms that underpin behaviour, it lacks a principled scientific way of determining why it fails when it does, which it does [5], and what it needs to do to reliably improve [6].

Beyond academia, in the media the limitations of the programme, exposed through scientific interrogation, have had a muted voice. Yet the proponents of nudge have done little to dispel the public and private sectors’ perceptions of it as a panacea for societal problems. This is a repeating pattern in the history of research on persuasion. Each development in the model of behaviour is believed, by practitioners, to have the potential to generate reliable and sustainable behavioural change at a population level, but has never succeeded in delivering.

framework for over 30 years. In their own particular formulation of the two-mind syndrome, the authors remind us of an important objection to the dual-system approach, which is that there has been no empirical test of the alignment of processes that are described as co-occurring in most dualist typologies. The authors already show in their review of the evidence that the alignment of processing characteristics (e.g., unconscious, uncontrollable, unintentional, inefficient) does not bear out according to a typical dualist account. It is worth noting that if the dual process enthusiasts wanted to mount a defence along the same lines as they have done previously, they could argue that the typology varies by the type of dual-system theory that exists, of which there are many, none of which reduces to a single agreed typology [11]. However, one might wonder how convincing a defence is, that makes a virtue of a failing in coherence across different theoretical variants of the same underpinning theoretical framework.

In any case, what is the outcome of yet another elegant and convincing dismantling of the dual-system typology? Given the diagnosis, it seems that we the psychology community are chronically suffering from two-mind syndrome. This means we still cannot quite face up to the weight of conceptual challenges, and evidence showing that our popular dual-system formulation of the mind is not scientifically warranted. The problem is that being in the grip of this syndrome has an impact on those around us (i.e., public, industry, government). We have a scientific responsibility to communicate the challenges to grand ideas, even if we are not ready to accept them ourselves. An approach of this kind helps to promote healthy scepticism in society [12], while maintaining faith in the institution of scientific progress through discovery, which depends on the push and pull between ideas.

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References

- Melnikoff, D.E. and Bargh, J.A. (2018) The mythical number two. *Trends Cogn. Sci.* 22, 280–293
- Kahneman, D. (2011) *Thinking, Fast and Slow*, Penguin
- Lippmann, W. (1922) *Public Opinion*, Harcourt Brace
- Thaler, R.H. and Sunstein, C.R. (2008) *Nudge: Improving Decisions About Health, Wealth, and Happiness*, Yale University Press
- Lin, Y. et al. (2017) Nudge: concept, effectiveness, and ethics. *Basic Appl. Soc. Psychol.* 39, 293–306
- Sunstein, C.R. (2017) Nudges that fail. *Behav. Public Policy* 1, 4–25
- Broyles, S.J. (2006) Subliminal advertising and the perpetual popularity of playing to people's paranoia. *J. Consum. Aff.* 40, 392–406
- Rogers, M. and Smith, K.H. (1993) Public perceptions of subliminal advertising: why practitioners shouldn't ignore this issue. *J. Advert. Res.* 33, 10–19
- Rogers, S. (1992) How a publicity blitz created the myth of subliminal advertising. *Public Relat. Q.* 37, 12–17
- McDonough, J. and Egolf, K. (2015) *The Advertising Age Encyclopedia of Advertising*, Routledge
- Evans, J.S.B. and Stanovich, K.E. (2013) Dual-process theories of higher cognition: advancing the debate. *Perspect. Psychol. Sci.* 8, 223–241
- Lewandowsky, S. et al. (2012) Misinformation and its correction: continued influence and successful debiasing. *Psychol. Sci. Public Interest* 13, 106–131

Forum

Pint-Sized Public Relations: The Development of Reputation Management

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Until recently, many psychologists were skeptical that young children cared about reputation. New evidence suggests that by age five, children begin to understand the broad importance of reputation and to engage in surprisingly sophisticated impression

management. These findings prompt exciting new questions about the development of a fundamental social competency.

Most of us intuitively understand the importance of reputation. We know that the way others view us constrains our ability to succeed, and we work hard to present ourselves favorably [1]. We also recognize that reputational incentives tempt others to behave dishonestly, and we tend to dislike braggarts and dishonest self-promoters (e.g., [2]). For psychologists, reputation management and evaluation in adults have long been topics of interest [1,2]. Less attention has been paid, however, to the emergence of reputational cognition in young children. Until recently, many were skeptical that complex reputational behavior could emerge before age nine (e.g., [3]). However, recent developmental studies tell a different story. According to these new findings, children's understanding of reputation expands rapidly at around age five, when children begin to track and manage the impressions they convey and recognize reputational motives and behaviors in others. Here, we review a number of these results, and we discuss how they expand our understanding of reputation management and open important avenues for future research.

Around age five, children begin to recognize that their actions can signal important information about their desirability to potential social partners, and they will vary their behavior based on audience and social context. Indeed, 5-year-old children are consistently more generous when they know they are being observed [4]. Furthermore, they appear to signal selectively, looking to cultivate positive impressions with key individuals in their social groups. In one recent experiment, young children behaved more generously when they were observed by a potential