Premature closure? Not so fast

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Dual process theory (DPT) and the intertwined concepts of heuristics and biases, popularised by Kahneman’s book *Thinking Fast and Slow*, are widely discussed models for analysing decision-making processes inside and outside medicine. The basic premise of DPT is that the brain has a fast, intuitive, but occasionally error-prone system (system 1) and a slower, energy-intensive but more accurate analytical system (system 2). Inexorably tied up with the DPT model is the idea that the errors made in system 1 are a result of shortcuts (heuristics) and predispositions (biases) and the hope that if we spent more time in system 2, cognitive errors could be mitigated.

Insights from this model have driven quality improvement and medical education efforts. Learning about how our brain succeeds and fails is interesting, humbling and motivating—but is it effective? My instinct has always been that it is, but as I have tried to answer key questions that my own DPT-based teaching inevitably brings up, I have become less certain.

**CAN I SHOW ACCURATE EXAMPLES OF SYSTEM 1 OR SYSTEM 2 THINKING?**

One of the ways to bring the model to life is to provide examples, but it is difficult to find examples of pure system 1 or system 2 thinking in clinical medicine. Like others, I use the herpes zoster rash as a system 1 prototype, but then explain how a good clinician always asks a few questions and carefully inspects the rash before declaring their conclusion. The stock system 2 example is a mathematical analysis of pretest and post-test probability of pulmonary embolus, but I eventually disclose that emotional dimensions like regret also influence the decision to order a CT angiogram. Analysis of every case shows that some aspects of the clinical reasoning process (eg, hypothesis generation) are intuitive, while other phases (eg, hypothesis verification) are more analytical. One quickly finds himself/herself telling students that cognition always exists on a continuum between pure intuition and pure analysis, but then wonders, what did that accomplish?

**CAN I TEACH STUDENTS TO DEBIAE THEMSELVES?**

If I cannot calibrate how fast or slow they think, perhaps I can teach students a hard stop so that they can catch themselves making a cognitive mistake. This too turns out to be difficult because the brain does not have an early error detection system. In her book *Being Wrong: Adventures in the Margins of Error* Schulz points out that when you are actively in the process of making a mistake, being wrong feels exactly the same as being right. It feels like the perfect strategy right up until the moment that it is not. When Sherbino et al taught cognitive forcing strategies to mitigate diagnostic error in trainees, it did not work. Part of the challenge is that debiasing, just like medical diagnosis of a patient, involves the fallible process of making a cognitive diagnosis of oneself. Prospectively categorising our impending heuristic is
difficult, prone to error and may lead to the application of an incorrect or harmful corrective strategy.13

HINDSIGHT BIAS
Although the prospects of DPT changing the way the human mind works are limited, I have always appreciated that the model provides clinicians with a useful shared vocabulary to analyse our previous mistakes. A study in this issue point out how even this may not be true.14 In a web-based study of 37 physicians, Zwaan et al demonstrated that when clinicians reviewed case vignettes, they were more likely to ‘see’ cognitive errors when they learned that the working diagnosis was incorrect than when it was correct (and regardless, clinicians did not agree on which cognitive errors were present). It is human nature to judge the quality of the decision-making process by the result rather than the logic—we cannot help it. That is the hindsight bias (irony noted).

In sports, the exact same decision-making process can conjure different adjectives depending on the outcome. If the coach or athlete undertakes a high-risk play and the team wins, he or she is hailed as confident, strategic, experienced or gutsy. If the play results in a loss, the same decision is called shortsighted, foolish, overconfident or reckless.

When a physician makes a challenging diagnosis with just a few pieces of information, she is called a brilliant diagnostician. If her diagnosis is wrong, it is called premature closure. If I missed a brain tumour in a patient with a headache last week, I may have a lower threshold for ordering a head CT scan in a similar patient today. If today’s CT detects a brain tumour, it is called learning from experience. If the CT scan is normal, it is called the availability heuristic. If a patient has flank pain and haematuria and you do not revise your diagnosis of nephrolithiasis despite a negative abdominal CT, that is called anchoring bias. In the realm of expert performance, knowledge remains the key determinant of diagnostic accuracy.20 Teachers cannot shape the thought process, but they can shape the training environment and influence the way knowledge is constructed by learners. Strategic sequencing of problems (spaced practice), compare and contrast reading strategies, expanded clinical experience and feedback on patient outcomes21–22 are more likely to build a reliable doctor than indepth study of DPT.

If you have not heard about myasthenia gravis, you cannot cognitively debias your way into that diagnosis. You can spend all day in system 2 and collect more and more information, but if you do not have a well-developed illness script that contains atypical manifestations of heart failure, you will never recognise it. In the realm of expert performance, knowledge is king.23

CONCLUSION
It is hard for me to believe I cannot train my brain. Armed with the insights of the DPT model, I know I have caught myself in moments where I have been guilty of confirmation bias in my testing or affective bias against a certain patient group. But perhaps that is the best we can hope for from the model—a few moments of insight in the 1000s of decisions we make each day. Even Kahneman, Nobel laureate and the founder of the heuristics and biases field, says at the end of his 400-page book Thinking Fast and Slow that after 30 years of study, he is no better at avoiding these biases than he was when he started. He says he may now recognise a few situations where he is at risk of making cognitive errors, but like all of us, he is still better at seeing them in other people than in himself.

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REFERENCES


7 ALQahtani DA, Rotgans JI, Mamede S, et al. Does time pressure have a negative effect on diagnostic accuracy? Acad Med 2016. Published Online First: Jan 27 [Epub ahead of print].


13 Hamm RM. Figure and ground in physician misdiagnosis: metacognition and diagnostic norms. Diagnosis 2014;1:29–33.


