Cognitive Biases or Inadequate Searching?

To the Editor:

In a recent issue of CHEST (December 2011), Schwartzstein and Parker describe an interesting and physiologically nuanced clinical case and attribute a resident’s failure to solve it to cognitive biases. While we agree with the importance of cognitive biases in reasoning, we disagree with the attribution of the resident’s errors to availability and anchoring. We propose an alternative framework for evaluating his errors, one which may be more instructive for avoiding them in the future.

The authors’ attributions of cognitive biases in the case are based on an expositional essay by Croskerry. Croskerry’s conceptions of cognitive biases deviate substantially from original descriptions, and he provides no empirical support for his altered formulations. The availability heuristic, as originally described, is a rule of thumb by which the frequency of an event is judged by the ease with which the event comes to mind; usually, the frequency of a rare event is estimated to be higher than its actual frequency as when shark attacks are judged as more common than swimming pool drownings. Unless we are willing to attribute any poorly reasoned “first-stab” provisional diagnosis to availability bias, it would not appear to have been operative in the presented case. Anchoring refers to mental fixation on an irrelevant numerical anchor and the associated failure to sufficiently adjust subsequent numerical estimates away from the anchor. There are no numerical anchors in this case.

The resident’s errors in judgment are more adequately explained in the context of the search-inference framework, which characterizes thinking as a search for goals, possibilities, and evidence conducted by cognitive system II. (This is contrasted with a system I or rapid and intuitive assessment with little deliberate thinking.) With the goal of determining the cause of gas-exchange abnormalities in an ICU patient, the resident identified a common potential cause (pulmonary embolism), but his search for other possibilities was inadequate. It is not that the resident “could not think of another explanation,” but rather that he made no apparent effort to do so. This error of inadequate search (or inadequate effort) can be avoided by active and deliberate formulation of a comprehensive differential diagnosis, especially in cases that are not straightforward, such as this one.

The failure to dismiss pulmonary embolism (and to expand the search for other possibilities) was compounded by an inadequate search for evidence, represented by failure to discover the distressed abdomen and declining respiratory system compliance as well as neglect of other evidence that both militated against pulmonary embolism and pointed to the correct diagnosis. Confirmation bias is present in this case but it is due to inadequate searching.

Anchoring and availability, depending on how you define them and what evidence you require, may or may not have been operative in this case. Still, these cognitive biases do little to elucidate the resident’s series of errors and omissions, and the admonition, “don’t focus too much on what you think of first,” seems unlikely to avert similar error sequences in the future because it offers no guidance on what to focus on instead. The resident would be better advised to slow down (less system I and more system II) and to search more deliberately for goals, possibilities, and evidence. Indeed, it was such effortful searching that led the authors to the correct diagnosis in this case, the resident’s unwavering enthusiasm for pulmonary embolism notwithstanding.

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Response

To the Editor:

I thank Drs Aberegg and O’Brien for their letter regarding our recent article in CHEST.1 Their concerns focus on two issues that arose in our discussion of cognitive bias: the definitions of availability and anchoring bias and the failure to describe “inadequate search” as the primary cognitive mistake.

Tversky and Kahneman2 describe the availability bias as the assessment of a “probability of an event by the ease with which instances or occurrences can be brought to mind.” The resident in this case was convinced that the diagnosis of pulmonary embolism was correct because he had seen many cases of pulmonary embolism in the past, and these cases were associated with gas exchange abnormalities. The ease with which this diagnosis was brought to mind enhanced the probability (as judged by the resident) of it being correct. Tversky and Kahneman3 define availability bias as “the tendency for things to be judged more frequent if they come to mind enhanced the probability (as judged by the resident) of it being correct. Tversky and Kahneman3 define availability bias as “the tendency for things to be judged more frequent if they come to mind.”

I also describe the resident’s thinking as being affected by anchoring bias. Although the original description of anchoring derived from experiments with numbers, I believe my use of the term here is also an appropriate interpretation in a medical context: “anchoring is the tendency to fixate on specific features of a presentation too early in the diagnostic process.”4 The problem was not that the resident failed to notice that the patient had bilateral lower extremity amputations or a distended abdomen; rather, he had “fixated” on his original diagnosis and was unwilling to modify his thinking based on these data. Use of the term, anchoring, in this way is in the spirit of Kahneman,4 who writes, “the availability of a diagnostic label...makes it easier to anticipate, recognize and understand.” As a medical educator, I find that identification of this common cognitive error as “anchoring” facilitates teaching students and residents about decision making.

Finally, Drs Aberegg and O’Brien assert that the real problem was an inadequate search for other possibilities, an explanation that could be used for any and every erroneous diagnosis that was based on a list of possibilities, no matter how long, if it did not include the ultimate answer. More importantly, however, many questions in medicine do not lend themselves to an easy search of textbooks or the medical literature. Aberegg et al propose teaching medical students to use Internet searches based on the chief complaint to ensure an adequate search has occurred. Following that strategy for “rising PaCO₂,” the resident’s description of the major problem in this case, I went through the first five pages of Internet hits and found no references that would give you the correct answer for this case, other than those that cite the article that is the topic of this discussion.1 I agree that we must slow down and use system II reasoning. But it is my contention, and the focus of the Interactive Physiology Grand Rounds series,6 that reasoning based on an analysis of a problem using basic principles of physiology and pathophysiology can lead one to an accurate diagnosis in these more complex cases.

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References


Obesity and Mortality in Critically Ill Patients

Another Case of the Simpson Paradox?

To the Editor:

We read with interest the article of Martino et al in a recent issue of CHEST (November 2011) reporting that obese critically ill patients survive at least as often as patients who are of normal weight. However, we believe this conclusion could send a misleading message. Although mortality rate has been adjusted on the APACHE (the Acute Physiology and Chronic Health Evaluation) II score in a multivariate analysis, a strong limit of this study...