In our view, the status of heuristics (mental shortcuts) and cognitive biases (distorted judgments) as a source of diagnostic errors remains unclear due to conflicting opinions and findings about this issue. On one hand, they have been claimed to be an important cause of these errors (1), while on the other, they have been found to be present when a diagnosis is correct as well as when it is incorrect (2), which casts doubts on the validity of this claim. In this paper, we shall investigate the relationship between heuristics, biases and diagnostic errors.

The notion of heuristics and biases as a source of diagnostic errors arose, it appears, from the work of Tversky and Kahneman on judgment under uncertainty (3). In numerous experiments, they demonstrated that human beings deviate from probabilistic reasoning which they considered to be the normatively rational (correct) method of reasoning under uncertainty.

They called the deviant methods which were employed, heuristics or mental shortcuts which could at times lead to cognitive biases or distorted judgments resulting in inferential errors.

It is to be noted that nearly all inferential errors due to heuristics and biases were believed to be due to faulty probabilistic reasoning by Tversky and Kahneman.

We have recently pointed out that the probabilistic method is not the preferred method of diagnosis in practice (4). Therefore, we suggest, that heuristics and biases, which are believed to result from faulty probabilistic reasoning become irrelevant as a source of diagnostic errors. We support this argument by discussing the well-known Linda experiment of Tversky and Kahneman (5) in relation to diagnosis.

In the original Linda experiment, a description which is typical of Linda being a feminist is provided to subjects who are asked if

(a) Linda is a bank teller and a feminist or
(b) Linda is a bank teller.
The answer (a) that Linda is a bank teller and feminist given by most subjects was considered incorrect because it committed the conjunction fallacy in probability theory by making a combination of two items (bank teller, feminist) more common or probable than one item (bank teller).

Tversky and Kahneman indicated that the subjects employed the heuristic of representativeness (resemblance) instead of the normatively correct probabilistic reasoning in giving this incorrect answer.

Let us now suppose we perform an experiment regarding diagnosis which is analogous to the Linda experiment.

In this experiment, a description which is typical of Jim having pulmonary embolism is provided to physicians who are asked if

(a) Jim has urinary tract infection and pulmonary embolism or
(b) Jim has urinary tract infection.

We believe most or all physicians would answer (a) that Jim has urinary tract infection and pulmonary embolism as they would consider the typical description of Jim having pulmonary embolism as greater evidence for (a) than for (b).

Their reasoning, we suggest, is likelihood based (Appendix) by which their answer (a) is correct.

We note we do not need to invoke the heuristic of representativeness as an explanation for answer (a) because probabilistic reasoning has not been employed in this instance.

Thus heuristics and biases are not a significant source of diagnostic errors in practice, we believe, because, as we have pointed out, reasoning is not probabilistic in diagnosis (4).

The correct method of diagnosis, which is employed in all clinicopathologic conferences (CPCs) and clinical problem solving exercises consists of, as we have pointed out, formulating a suspected disease as a diagnostic hypothesis
which is confirmed (or disproved) by evidence represented by a likelihood ratio (4).

With this non-probabilistic method, most diagnostic errors occur, we suggest, due to lack of knowledge and/or experience.

If we do not know about a disease, we shall not suspect and formulate it as a diagnostic hypothesis.

And if we do not have experience of encountering a wide range of presentations of a disease in different patients, we may not suspect it when it presents in an atypical manner in a patient.

We believe the most reliable method of reducing diagnostic errors is by acquiring extensive knowledge and experience about diseases.

Appendix

Likelihood of (a) given typical description/Likelihood of (b) given typical description

=

Typical description/(a) / Typical description/(b)

= Much greater than 1.

References


