

Confirmation and positive-test biases in hypothesis testing

by Dr. David Mandel

Hypothesis generation and hypothesis testing are central to intelligence analysis (Heuer, 1999). These cognitive processes often guide the collection and use of evidence and influence the conclusions analysts ultimately reach. Thus, a clear understanding of how people tend to generate and test hypotheses is arguably a basic prerequisite for analytic integrity.

Early behavioural science literature on hypothesis generation and testing suggested that people's hypothesis-testing strategies are biased such that people seek confirmation for their preferred hypotheses.

Based on his classic "rule discovery" research, Wason (1960, 1968) proposed that people seek out evidence in a manner that places greater weight on confirming one's hypothesis than on disconfirming it.

In the rule discovery paradigm, participants are told that their task is to correctly identify the rule that the experimenter is using to generate triplets of numbers. The experimenter begins by providing an example of a triplet that fits the rule and then the participant must formulate a hypothesis to test. To do so, the participant provides a triplet and the experimenter provides accurate feedback on whether the triplet is consistent or inconsistent with the rule.

What Wason found was that when the experimenter's rule was quite general, such as "increasing numbers," and the initial example, such as 2-4-6, was suggestive of a more specific rule, such as "increasing even numbers," the initial hypotheses people generated tended to favor narrower rules.

As well, Wason found that most people generated triplets to test their hypothesis that were instances of their current hypothesis. For instance, if they thought the rule was "increasing even numbers", they would generate examples like 4-6-8 or 2-10-20, but not non-conforming instances like 5-7-9.

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Confirmation Bias, cont'd

These findings led Wason to conclude that people sought evidence that confirmed their stated hypotheses.

However, in an insightful reinterpretation of the “confirmation bias” phenomenon, Klayman and Ha (1987) proposed that people do not necessarily seek out or give greater weight to confirmatory information. Rather, they prefer to test hypotheses by examining cases that conform to their stated hypothesis, as Wason had found, and they seldom select or seek out nonconforming instances to test their hypotheses.

Although the former, which Klayman and Ha call positive hypothesis tests, are hypothesis *conforming*, they are not necessarily hypothesis *confirming*.

Similarly, although the latter, which Klayman and Ha call negative hypothesis tests, are hypothesis *nonconforming*, they are not necessarily hypothesis *disconfirming*.

That is, a positive (i.e., conforming-cases) test can provide disconfirmatory evidence, just as a negative (i.e., nonconforming-cases) test can provide confirmatory evidence.

For example, an individual who believes the rule to be “increasing even numbers” and selects 4-8-12 might have his or her hypothesis disconfirmed if the rule was in fact “numbers increasing by two”. Likewise an individual wishing to test the same hypothesis via a negative test with the triple 5-9-15 would receive confirmatory support because this example would indeed not fit the rule (even though the hypothesized rule in this example is false).

Introductory discussions of cognitive factors in intelligence analysis would likely benefit by making clear the distinction between confirmation bias (a tendency to seek or give greater weight to hypothesis confirming evidence) and positive-test bias (a tendency to seek or give greater weight to hypothesis conforming evidence).

There is evidence for both types of biases (e.g., on the former, see Tetlock & Henik, 2005; on the latter, see Mandel & Vartanian 2009), but their implications for analytic rigor are not equally dire. Indeed, as some theorists have noted (e.g., McKenzie & Mikkelsen, 2000), in situations where one is testing hypotheses about low-probability events (such as major terrorist attacks), positive testing ought to provide greater sensitivity in discriminating true hypotheses from false ones.

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