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Error Management Theory

Background and Definition

One of the great challenges for humans is figuring out what is going on in other people's minds. People don't always disclose exactly what they are thinking, they can behave in very ambiguous ways, and sometimes they can be downright deceptive. For example, when a woman smiles at a man, is she sexually interested in him or just being nice?

Sometimes the errors people make in judging others are systematic, meaning that they tend to be biased in one direction or another. For example, judgments might be systematically biased toward a false positive error or a false negative error. In judging others, you would make a false positive error if you believed that a person had a particular thought or intention when the person actually did not. If you judged that the woman was sexually interested in the man, for instance, when she actually was not, you would make a false positive error. On the other hand, you would make a false negative error if you believed that a person did not have a particular thought or intention when the person actually did. If you judged that the woman was not sexually interested in the man when she actually was, you would make a false negative error.

Error management theory proposes that the direction of a bias in social judgment is tied to how costly different kinds of errors are. For example, consider how smoke alarms are designed. Failures to detect fires (false negative errors) are extremely costly, whereas false alarms (false positives) are usually just inconvenient. So, when engineers make smoke alarms, they tend to design them to be biased away from the more costly false negative error by setting a low threshold for fire detection. As a consequence, smoke alarms will tend to be systematically biased toward false positive errors (false alarms). A low threshold for fire detection will cause smoke alarms to make more errors overall, but it will minimize the cost of errors when they inevitably occur (i.e., the errors will tend to be false alarms rather than missed fires).

Error management theory proposes that the same principle of design applies to the evolution of judgment mechanisms in the human mind. Ancestrally, in many areas of social judgment, the costs of false positive and false negative errors differed. When the costs of false negatives are greater, error management theory predicts a bias toward false positives (as in the smoke alarm example); when the costs of false positives are greater, error management theory predicts a bias toward false negatives.

Examples and Evidence

One example of a false-positive bias is in men's estimations of women's sexual interest. For an ancestral man, failing to detect sexual interest in a woman resulted in a missed reproductive opportunity, which was highly costly to his reproductive success.

The opposite error (believing that a woman was interested when she was not) was perhaps a bit embarrassing, but probably was less costly overall. Thus, error management theory predicts that natural selection designed a bias in men toward slightly overestimating a woman's sexual interest in order to reduce the likelihood of a missed sexual opportunity; this leads modern men to "overperceive" women's sexual interest. (The same prediction does not apply to women's perceptions because women need to invest very heavily in each offspring and because reproductive opportunities tend to be easier for women to acquire; see sexual strategies theory). Evidence of this bias has been gathered in many types of studies. In laboratory studies of interactions between male and female strangers, men viewing the interaction tend to infer greater flirtatiousness in the female than do women viewing the interaction. In surveys of people's past experiences, women report more cases in which men overestimated their sexual interest than in which men underestimated it, whereas men's reports of women's over and underestimation errors do not differ. When men and women are shown romantic movies, men's subsequent tendency to "see" sexual interest in photographs of neutral female faces is greater than women's.

An example of a false negative bias is in women's judgments of men's interest in commitment during courtship. Women must invest heavily in each offspring produced and therefore they tend to be very careful in choosing mates and in consenting to sex. One feature women prefer in mates is investment—a man's ability and willingness to invest time and resources in caring for a woman and her offspring. However, women must predict a man's tendency to invest from his behaviors, and therefore their judgments will be susceptible to some degree of error. Here again, there is an asymmetry in the costs of the errors in the judgment task. Judging that a man will commit and invest when he actually will not (a false positive error) could result in the woman consenting to sex and being subsequently abandoned. In harsh ancestral environments, this literally could have been deadly to the woman's offspring. The opposite error—believing that the man is not committed when he actually is (a false negative)—would typically result only in a delay of reproduction for the woman, which would tend to be less costly. Error management theory therefore predicts that women will tend to be skeptical of men's commitment, especially during the early phases of courtship. This prediction has been tested by comparing men's and women's impressions of male courtship behaviors.

Relative to men, women express skepticism about a variety of male courtship tactics, including buying flowers, cooking a gourmet dinner, and saying I love you. These two examples concern judgments in courtship, but the odds that the costs of the two error types are identical for any particular area of judgment are essentially zero, and therefore error management theory applies to a broad array of judgment tasks. Other biases that may be explained by error management theory include the following:

- The tendency for people to overestimate the dangerousness of unfamiliar others.
- The tendency for people to infer that they will be caught if they attempt to “cheat” in certain types of social interactions, even when they know that their identity is concealed from others.
- The tendency for people to avoid close contact with non-contagious sick, injured, or unfamiliar others who actually pose little risk.
- The tendency for people to have certain positive illusions that cause them to strive to attain goals that are in fact very difficult to attain, but if they are attained lead to substantial benefits.

Implications and Importance

Psychologists often debate whether humans are “rational” or “irrational.” Those arguing that humans are irrational cite evidence of bias and errors in human judgment. Error management theory suggests that judgment strategies biased toward less costly errors are expected to evolve, and are actually superior to unbiased strategies. Therefore, mere evidence of bias is not necessarily evidence of irrationality or poor judgment, as is often claimed.

There are practical implications of understanding error management biases. The Safeway supermarket chain made news in the 1990s because of their service-with-a-smile policy, which required all employees to smile and make eye contact with customers. The female employees in the chain filed complaints about this policy because they found that men tended to misinterpret their friendliness as sexual interest, leading to instances of sexual harassment. Knowledge of error management biases and the cues that trigger them may help to create better social policies.

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Also see evolutionary psychology, heuristics, positive illusions, sexual strategies theory

Further reading

Haselton, M. G. & Nettle, D. (in press). The paranoid optimist: An integrative evolutionary model of cognitive biases. *Personality and Social Psychology Review*.