

Aran Arslan and Frank Zenker (Bogazici University, Istanbul) - Cohen's error-rates and the body of knowledge in behavioral science

In 1965, Jacob Cohen had recommended that researchers in behavioral science adopt error-rates for false positive (α) and false negative errors that mirror what he called the 'general relative seriousness' of these errors. Cohen also argued that the consequences of an α -error are about four times as serious as those of a β -error. This ratio of $\alpha/\beta=1/4$ became a widely accepted convention for null hypothesis testing research in behavioral science. The reasonableness of $\alpha/\beta=1/4$ depends on seeking to preferentially minimize the negative consequences incurred if an individual researcher were to contribute a mistake to the body of scientific knowledge, and so depends on epistemic considerations.

If, by contrast, one also considers the negative practical consequences of an action that is based on an erroneous hypothesis test-result, then the reasonableness of $\alpha/\beta=1/4$ becomes questionable. Already the typically expectable action in response to a negative test-result for a contagious disease shows decisively that failing to accept a true H1 hypothesis (β -error) can have practical consequences that are more serious than those of erroneously rejecting it. This holds for both individuals and social groups. Epistemic grounds can thus suffice to favor low α -error-rates over low β -error-rates if adding a falsehood to the body of scientific knowledge is less desirable than missing out on a truth, i.e., if a "mistaken discovery" is a less preferred scientific contribution than a "missed discovery." But Cohen's convention of $\alpha/\beta=1/4$ not only ignores that a β -error can have more serious practical consequences than an α -error.

The replication crisis in behavioral science also shows that conventionally accepting $\alpha/\beta=1/4$ at the level of an individual researcher's contribution does—already before practical considerations are even considered—incur long run negative epistemic consequences at the collective level. This not only speaks strongly against Cohen's error-rates. It also makes their conventional acceptance crucial in explaining the current state of scientific knowledge in behavioral science.