

A model for testing the hypothesis that X is
necessary but not sufficient for Y

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Abstract

Some research hypotheses relate a pair of variables in terms of logical necessity and sufficiency. In psychology, one such hypothesis is that intelligence is necessary but not sufficient for creativity—unintelligent individuals are uncreative, but intelligent individuals may or may not be creative. Such a relationship is nonlinear. However, conventional statistical methods available to social scientists are inherently linear, so arguments toward such a form of relationship have rested on shaky ground. Proposed is a probability model where the predictor X is necessary but not sufficient for the response Y . This model is used to reanalyze some intelligence vs. creativity data. The necessary-but-not-sufficient relationship was supported for two out of the three creativity variables used.

Keywords: Beta distribution, Creativity, Logic, Intelligence, Nonlinear regression, Psychological measurement