

## Going interactive: How to increase the utility of psychometric measures

IN 1955 MAIER suggested that the relationship between ability and job performance is altered by a person's level of motivation, such that an increase in motivation will increase the positive impact of ability on performance. This is an example of an interaction between two individual differences variables that, when statistically significant, can provide an inexpensive way of extracting extra predictive variance from ordinary psychometric measures. The aim of this article is to draw the attention of *SDR* readers to the potential utility of measuring interactions between individual differences variables and to illustrate a straightforward way in which they may be calculated.

### Interactions in action

In three different studies (two military, one commercial) the measurement of interactions between ability and neuroticism allowed us to increase the amount of variance in performance accounted for by these psychological variables by 9 per cent, from an average of 23 per cent to 32 per cent. The particular nature of this interaction was that ability seemed to buffer the impact of neuroticism on performance, such that neuroticism only impaired performance in low ability individuals. This interaction means that attempts to correlate neuroticism directly with performance in a full ability range sample are likely to produce non-significant results, as the low ability individuals whose performance is damaged by neuroticism are balanced by the high ability individuals who show no such impairment. Only when the interaction is taken into account will the underlying relationship between neuroticism and performance emerge, and the

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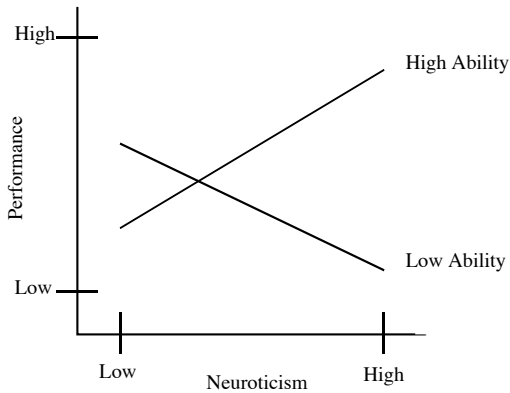
predictive power contained within neuroticism become available for use as a selection tool.

The precise causal mechanism behind this interaction is unclear – perhaps neurotic but able individuals manage their negative emotions better than those lower down the ability scale – but the point to note is that measuring this interaction allowed us to unlock a significant amount of extra predictive power from ordinary measures of ability and neuroticism. To put this in perspective, values as low as one per cent are viewed as having utility in large scale selection scenarios (Schmidt & Hunter, 1998).

### How to do it

There is some debate about the correct way to measure interactions between variables. Without wishing to start a long-winded statistical argument, one effective method is as follows:

1. Obtain a data set for two individual differences variables that you suspect may be interacting (e.g. ability and neuroticism) and a performance criterion in a data handling spreadsheet such as SPSS or Excel.
2. Standardise the individual differences variables (i.e. z-score them).
3. Multiply the values in the two individual differences variables columns together and put the resulting values in a new column labelled with the interaction term (e.g. ability x neuroticism).
4. Use hierarchical regression to test for the significance of the interaction term as a



**Figure 1: Hypothetical interaction between ability and neuroticism when predicting organisational performance**

predictor of performance, with main effect predictor variables (e.g. neuroticism and ability) being entered in step one and the interaction term in step two (this is easily performed in SPSS).

5. If the interaction emerges as significant ( $p < .05$ ) in step two plot it as a graph for ease of interpretation.

Figure 1 presents a graph of a hypothetical interaction between ability and neuroticism (in this case plotted using lines but 3D surface graphs may also be used).

Once an interaction has been found to be significant (and has been shown to be robustly valid by follow-up studies), a suitable method must be found to apply it to selection scenarios. One simple technique is to use a sliding pass mark. Using the interaction between ability and neuroticism that we found in our recent studies as an example, the pass mark that an individual must attain on ability would be adjusted to take account of their neuroticism score. In other words, individuals with high neuroticism scores would need to score higher on ability to perform as well as their less able but less neurotic peers.

## Conclusions

In today's highly competitive world, improving the predictive validity of one's selection procedures by even one per cent is likely to confer a useful advantage, both by bringing the gains that accompany the right people and avoiding the costs associated with selecting the wrong people. Advice on how to improve the predictive validity of selection procedures is often little more than a thinly disguised sales pitch for one or other fashionable and expensive psychometric test or service. The message in this article is that this need not be the case and that by measuring interactions between individual differences variables it may be possible to unlock useful amounts of extra predictive power from ordinary psychometric tests that many organisations probably already have in their selection toolkits. Any readers with practical or theoretical questions on this topic should feel free to contact us and we will do our best to assist.

## References

- Maier, N. R. F. (1955). *Psychology in industry*. Boston: Houghton-Mifflin.
- Schmidt, F. L. & Hunter, J. E. (1998). The validity and utility of selection methods in personnel psychology: Practical and theoretical implications of 85 years of research findings. *Psychological Bulletin*, 124, 262–274.

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