Should we perform extensive psychologic testing of our surgical trainees?

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See related article on pages 1804-10.

When Herman Witkin and colleagues proposed the concept of field dependence in 1962 and developed it further in *Personality Through Perception: An Experimental and Clinical Study*¹ and *Psychological Differentiation: Studies of Development*,² cardiac surgery was setting its first steps away from a pioneering endeavor into a successful evidence-driven therapeutic process. Field dependence or independence is a 1-dimensional model of variation in cognitive style. A cognitive style describes how persons think about, perceive, and remember information and is an essential component in the domains of education and management.

It is said that there are as many cognitive styles as there are individuals. But it is the mission of science to identify dimensions in these cognitive styles, to test for these dimensions, and possibly to influence some of these toward applications in daily life. Most of us have been confronted with some of these tests in different psychometric evaluations in high school. One of the best known is the embedded figures test. Students are shown simple geometric figures, such as circles or dots, and asked to find the embedded figure. Field-independent individuals will identify the figure faster and will be less influenced by the surrounding visual information. It has been shown by Terry Musser³ that field dependence interrelates with affective skills and motor control and has neurologic as well as social implications.

The article in this *Journal* of Sheikh and colleagues⁴ is groundbreaking in the sense that it opens up a Pandora's box of possibilities in optimizing our technical learning processes. Those involved in technical training on a daily basis have identified the variabilities in surgical skills progress in surgical trainees but also in senior licensed surgeons. Interesting also is the differentiation between field dependence and spatial visualization in this analysis.

Sheikh and colleagues⁴ mention repeatedly that field dependence is only 1 dimension of technical learning. So their article presents only univariate differences in very specific but essential surgical skills within a reduced group of

learners; in fact, only positive correlations were identified and most certainly no causal relationships. If field independence is later confirmed as a positive factor in technical learning, then there is still no proof that it is therefore a criterion for surgical excellence. Indeed, it will need to be balanced against the crew- and resource-management criteria under which surgeons have to work with surgical crews of nurses, perfusionists, and anesthesiologists and have to be aware of the crew's differences in cognitive styles.

So possibly a more balanced field dependence will prevail, or possibly an optimized variance of field dependence related to circumstances or sources of distraction. It will also be challenging to study evolution in field dependences through possibly corrective processes. Another domain in which crew-resource interfaces and focus on mission execution are of extreme importance is military flight. Thomas Carretta⁵ examined field dependence as a measure for the selection of military pilots in a cohort of 1977 military pilot candidates but could not identify any positive correlation. More recent work⁶ on a cohort of 100 military candidates identified the field dependence versus independence cognitive style as important in producing optokinetic illusion and thus important in pilot selection.

Sheikh and colleagues⁴ refer repeatedly to one of the most significant steps forward in surgical training: the use of simulation training and preferably low-fidelity simulation models. If an effect of field dependence is indeed confirmed, then simulation training will need to be redesigned for certain individual trainees, possibly in environments where there is less distraction. Blended and distributed cloud-based simulation training⁷ allows for this facility and still permits repeated qualitative and quantitative evaluations by experts.

It would be extremely interesting to submit not just surgical trainees but experienced surgeons to these same tests and future tests of field dependence.

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