

A multiple-task reduction approach to measuring perceptual expertise in fingerprint analysis

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Single-trial measurements of human performance are notoriously poor indicators of an individual's overall performance on a given task. Similarly, we argue that single-task measurements are poor indicators of an individual's overall performance in a multifaceted expert domain. In this talk, we describe a novel multiple-task reduction approach to measuring expert performance in the domain of fingerprint analysis. Using an all-possible-combinations method, we reduced a series of ten domain-specific perceptual tasks down to three tasks that most optimally distinguished between trained fingerprint examiners and novices. We were able to explain a surprising amount of variance in participants' performance across the ten original tasks using just 34 trials from the top three most discriminating tasks. The resulting measurement tool — an Expertise Quotient (xQ) for fingerprints — also accounted for more variance in performance than any one task alone, including one highly face valid task that closely resembled examiners' daily work. We consider the use of the xQ as a robust and generalisable measure of fingerprint expertise in training, selection, and competency testing contexts. We also discuss the general applicability of this multiple-task reduction approach to capturing human performance in other complex domains of expertise in medicine, defence, and education.