

Inspection time and the relationship among elementary cognitive tasks, general intelligence, and specific cognitive abilities

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Abstract

The relationship between inspection time (IT) and paper-and-pencil tests of cognitive ability is well documented. However, the extent to which IT relates to cognitive ability through general intelligence or through group factors such as performance has not been fully addressed. Another unresolved issue is whether IT relates to psychometric intelligence independent from other elementary cognitive tasks. The current study examined these issues in a sample of 6–13-year-old twins drawn from the Western Reserve Twin Project (WRTP) ($n = 568$ participants). Analyses suggest that IT and other elementary tasks predict general intelligence. IT also predicts Performance ability while other elementary tasks do not. Furthermore, IT contributes variance to cognitive ability independent from other elementary tasks. These suggest that multiple indices of elementary cognitive ability are necessary to fully understand their relationship with complex psychometric measures. © 2001 Elsevier Science Inc. All rights reserved.

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1. Introduction

Since Nettlebeck and Lally's (1976) classic paper reporting the relationship between inspection time (IT) and general intelligence, one of the main goals of IT research has been to understand why IT predicts performance on more complex paper-and-pencil measures of intelligence. Gudnick and Kranzler's metaanalysis in the current special issue echoes Deary and Stough's (1996) suggestion that research has gone beyond asking *whether* IT correlates with complex cognitive ability and has turned instead to asking *how* IT contributes to psychometric intelligence.

Carroll (1993, 1997) suggests that cognitive abilities may be divided into group factors such as crystallized intelligence, fluid intelligence, and processing speed and that these group factors, in turn, load on a higher-order general intelligence or 'g' factor. One important issue is whether IT relates to psychometric intelligence at the general 'g' level or whether IT contributes to group factors. This issue is of central importance because it examines the extent to which IT indexes specific vs. general processes.

Crawford, Deary, Allan, and Gustafsson (1998) conducted an analysis comparing a visual IT task to WAIS-R subtests. Crawford et al. fit a confirmatory model to the data hypothesizing General Intelligence as well as orthogonal Verbal, Performance, and Freedom From Distractibility group factors. IT was hypothesized to also load on the Performance factor. In this way, it was possible to examine whether IT contributed independent variance to both 'g' and the Performance factor. The loading between IT and 'g' was -0.19 while the loading between IT and performance was -0.38 . Crawford et al. concluded that the results were "... disappointing for a view which posits that basic information processing speed partly determines individual differences in 'g'" (p. 37). Thus, Crawford et al. suggest that IT operates primarily at the level of the group factor of speed and does not constitute a unitary aspect of cognitive performance. This general pattern has also been found in other studies using both nonverbal (Deary, 1993; Nettlebeck, Cheshire, & Lally, 1979; Nettlebeck & Lally, 1976) and Verbal IT tasks (McGeorge, Crawford, & Kelly, 1996).

Confirmatory studies to date have not examined the relationship between IT and psychometric intelligence in the context of other elementary cognitive tasks. Luo and Petrill (1999) examined a battery of nine elementary cognitive tasks to examine their relationship with one another, with WISC-R subtests and with academic achievement. Luo and Petrill found that elementary cognitive tasks could be characterized by three latent group factors (Learning/Memory, Speed, and IT) as well as a latent elementary 'g' factor. The elementary cognitive task general factor correlated .67 with psychometric general intelligence. The group factors of Learning/Memory, Speed, and IT were found to contribute much less variance to psychometric 'g.' These results suggest that elementary tasks relate to psychometric intelligence through 'g,' a finding in contrast to the results of Crawford et al. (1998).

However, it is premature to make direct comparisons between Luo and Petrill and Crawford et al. First, of the three measures that comprised the IT factor used by Luo and Petrill, two of them required motoric responses while other studies of IT used nonmotoric

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