



# Cognitive interference model of computer anxiety: Implications for computer-based assessment

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## Abstract

In this paper, the cognitive interference model of computer anxiety (CIM-CA) is introduced as a theoretical framework for the assessment of computer anxiety and its effect on computer-based test (CBT) performance and test equivalence. Unlike other situation-specific anxieties, research on computer anxiety has not been founded on clear theories or models. Hence, the CIM-CA is intended as a new heuristic framework for representing the dispositions and cognitive processes that predispose individuals to react with state computer anxiety over a range of situations involving computers. In particular, the model focuses on the mediating role of negative computer thoughts on the computer anxiety–performance linkage. The CIM-CA model also provides a theoretical framework for analysing the effect of computer anxiety on CBT performance. Future research opportunities pertaining to the computer anxiety–performance linkage are discussed in the context of computerised cognitive assessment.

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## 1. Introduction

Over the past three decades, computers have played an integral role in the scoring of psychological tests (Butcher, Perry, & Atlis, 2000). The rise in popularity of computer-based testing is most likely attributable to the many advantages of using this technology, including increased test security, cost reduction, instantaneous score reporting, highly precise measurement of test scores and response times, and automatic record keeping for item analysis (Bugbee, 1996; Drasgow & Olsen-Buchanan, 1999; Mazzeo & Harvey, 1988; Mead & Drasgow, 1993; Parshall, Spray, Kalohn, & Davey, 2002; Tseng, Macleod, & Wright, 1997). In light of these advantages, many employers, psychologists, educators and researchers have converted conventional or paper-and-pencil (p&p) tests to computer-based test (CBT) formats (see McDonald, 2002; Neil, 1996; Segall & Moreno, 1999; Van de Vijver & Harsveld, 1994). Two pertinent issues relating to the use of automated tests for psychological assessment are the equivalency of computer-generated scores and corresponding p&p scores, and the validity of test score interpretations (Clauser, Kane, & Swanson, 2002; Ford, Vitelli, & Stuckless, 1996; Green, 1988; Neuman & Baydoun, 1998; Steinberg, Thisen, & Wainer, 1990; Van de Vijver & Harsveld, 1994; Vogel, 1994). Equivalency is concerned with numeric score comparability, while the validity of CBT interpretation is concerned with the underlying constructs that the test purports to measure (Association of Test Publishers, 2000; Van de Vijver & Harsveld, 1994). Attempts to establish construct equivalence provide valuable evidence on whether the attributes measured by computerised assessment methods are similar to those attributes assessed through conventional methods. One potential source of validity error that needs to be considered in computerised testing is computer anxiety.

Although the construct of computer anxiety is steeped in conceptual ambiguity, Moldafsky and Kwon (1994) contend that it is a “real phenomenon” (p. 301). They further note that one third of the individuals within most populations experience computer anxiety to some degree, ranging from a preference not to use computers through to heart palpitations when anticipating using computers. At a most fundamental level, computer anxiety has been associated with the avoidance of, and resistance to, computer technology (Deane, Henderson, Barrelle, Saliba, & Mahar, 1995a; Deane, Henderson, Mahar, & Saliba, 1995b; Kay, 1990). Hence, computer anxiety is one possible barrier to the acquisition of computer skills and has thus been associated with poorer performance on tasks involving simple computer operations (Mahar, Henderson, & Deane, 1997; Reznich, 1996). Some evidence also suggests that computer anxious examinees may perform more poorly on computerised tests of cognitive ability than their non-anxious counterparts (Shermis & Lombard, 1998; Tseng, Tiplady, Macleod, & Wright, 1998). As a result, a number of researchers have discussed the importance of considering the behavioural and cognitive aspects of computer anxiety as a potential source of interference in CBT administration (Deane et al., 1995b; Glass & Knight, 1988; Schulenberg & Yutzenka, 1999; Shermis & Lombard, 1998; Tseng et al., 1998). It is important to note, however, that some studies have shown that computer anxiety has little impact on examinees test performance (Powers, 1999; Vispoel, Rocklin, & Wang, 1994; Vogel, 1994).

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