A bi-factor theory of the four-factor model of cultural intelligence: Meta-analysis and theoretical extensions

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A B S T R A C T

Today's pervasiveness of intercultural interactions has spawned scholarly interest in cultural intelligence (CQ) – the capability to function effectively across cultures. Applying meta-analytic techniques, we harness the recent explosion of research on the four-factor model of CQ to address three fundamental, yet unresolved theoretical issues. First, we explicate the benefits of conceptualizing and modeling CQ as a bi-factor model where each factor provides both unique and holistic information. Results shed light on Gelfand's puzzle of whether to facet or not and clearly show the value of the four factors. Second, we advance and test a theoretical model delineating differential relationships between the four CQ factors and three forms of intercultural effectiveness. Findings, based on 199 independent samples (N = 44,155), underscore the value of a nuanced, theoretical model of CQ with differential effects of the four factors. Finally, going beyond prior research, we also address mediated and moderated relationships and expand our understanding of the CQ nomological network. We discuss the implications of these findings for theorizing about the CQ factors and suggest directions for future research.

1. Introduction

Cultural Intelligence (CQ), defined as the capability to function effectively in intercultural contexts (Ang & Van Dyne, 2008; Earley & Ang, 2003), is ubiquitous, given that intercultural interactions are a pervasive feature of people's social and professional lives. Ang et al. (2007) drew on Sternberg (1986) to delineate a four-factor model of CQ and provided preliminary evidence that the four CQ factors (motivational CQ, metacognitive CQ, cognitive CQ, and behavioral CQ) differentially predict important intercultural effectiveness outcomes. Since then, research on CQ has evolved rapidly, and many scholars have attested to the theoretical and practical utility of the CQ concept. For example, Gelfand, Imai, and Fehr (2008) concluded that "CQ has begun to demonstrate its theoretical elegance, empirical potential, and practical importance in a remarkably short period of time" (p. 376). The conclusion of Matsumoto and Hwang's (2013) review of cross-cultural competence models emphasized "the promising evidence for assessing CQ" (p. 867).

Despite the excitement surrounding the promise of CQ, important questions about the theoretical bases of CQ remain unanswered. First, although Ang et al. (2007) conceptualized CQ as an aggregate multidimensional construct, there is no clear consensus on the conceptualization of CQ and how it should be modeled. Some studies have used a single-factor model (e.g., Adair, Buchan, Chen, & Liu, 2016; Rockstuhl, Seiler, Ang, Van Dyne, & Annen, 2011). Other research has modeled CQ as comprising four correlated factors (e.g., Presbitero, 2016). Still other studies have combined/split factors (e.g., Bücker, Furrer, & Lin, 2015) or have examined a single CQ factor in isolation (e.g., Chua, Morris, & Mor, 2012). Each of these studies made important contributions to the cumulative knowledge about CQ. Still, inconsistency in modeling CQ is troubling because it suggests that findings across studies may not be comparable and even worse, may be misleading.

Second, research has not replicated Ang et al.'s (2007) initial evidence of differential validity of the four CQ factors. As Gelfand et al. (2008: 379) observed, "theorizing on the facets [four factors] can be imprecise, inconsistent, and/or contradictory." Some scholars have emphasized metacognitive and behavioral CQ as predictors of task performance (e.g., Ang et al., 2007), while others have focused on motivational CQ as a predictor of task performance (e.g., Chen, Liu, & Portnoy, 2012). This inconsistency is problematic because it demonstrates a lack of shared understanding of the theoretical utility of the four CQ factors.

Third, although some studies have considered more complex and more complete models that include mediation and moderation (e.g., Chen, Kirkman, Kim, Farh, & Tangirala, 2010; Xu & Chen, 2017), we

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lack cumulative knowledge about the CQ nomological network. This is problematic because it suggests that our understanding of these more complex models is piecemeal and may not reflect stable patterns of relationships. Addressing these three issues is important because lack of theoretical clarity about the fundamental nature of CQ and the four dimensions and lack of replication of CQ relationships suggests that recommendations scholars have made to managers may be inappropriate.

We address the first problem by advancing and testing a bi-factor CQ model that simultaneously accounts for the effects of a latent CQ factor as well as the effects of specific CQ factors. Bi-factor models have a long history in intelligence research (Gustafsson & Balke, 1993; Holzinger & Swineford, 1937) and have seen a recent resurgence in the context of modeling psychometric multidimensionality (Chen, West, & Sousa, 2006; Morin, Arens, & Marsh, 2016; Reise, 2012).

A specific advantage of bi-factor models, particularly relevant here, is that they simultaneously model coexisting general (i.e., latent CQ) and specific (i.e., CQ factors) constructs. They are called bi-factor models because item responses are modelled as a function of both a general and a specific factor. That is, in a *five*-factor bi-factor CQ model, one general factor (latent CQ) and four specific factors (metacognitive, cognitive, motivational, and behavioral CQ) are used to explain the covariance among a set of CQ items.

Thus, in the debate about whether CQ should be represented as a single-factor or a four-factor model, the bi-factor CQ model highlights a third option: overall CQ comprises both a general factor reflecting shared variance among CQ factors, and specific factors reflecting relevant specificity unexplained by this general factor. Throughout the manuscript, we use the terms *overall* CQ to refer to the theoretical construct of CQ and *latent* CQ to refer to the empirical general factor reflecting shared variance among the four specific CQ factors.

Responding to the second problem, we apply meta-analytic techniques to test Ang et al.'s (2007) theoretical model of CQ. Faced with a 'reproducibility crisis,' numerous scientists have argued that replication is a crucial cornerstone of cumulative science (Bettis, Helfat, & Shaver, 2016). Meta-analyses are often heralded as "*the* tool for accumulating data and synthesizing them into generalizable knowledge" (Eden, 2002, p. 841; emphasis in original) because they overcome difficulties associated with primary studies, such as sampling and measurement error

(Schmidt & Hunter, 2014).

Finally, in response to the third problem, we advance theorizing on CQ, extend Ang et al.'s (2007) theoretical arguments for differential CQ effects, and test a mediated CQ model where proximal intercultural effectiveness outcomes differentially mediate the effects of the four CQ factors on more distal intercultural effectiveness outcomes. We also advance and test more nuanced theoretical arguments for interactive effects of metacognitive CQ with the other three CQ factors. Although Earley and Ang (2003) conceptualized the CQ factors as acting in concert to affect outcomes, we are aware of only one study (Chua & Ng, 2017) that has examined interactive effects of CQ factors. Thus, we offer a more nuanced understanding of CQ that goes beyond examination of CQ factors in isolation. Taken together, these extensions make important theoretical contributions to the CQ literature because they lead to more precise and comprehensive understanding of the effects of the four CQ factors (Gelfand et al., 2008).

We structure the remainder of this paper as follows. First, we provide a brief overview of the four-factor CQ model. We then discuss the advantages of modeling CQ as a bi-factor model that accounts for a latent CQ factor as well as each of the four factors. We next discuss unresolved theoretical issues in the CQ literature and advance specific hypotheses about (a) differential relationships between specific CQ factors and intercultural effectiveness outcomes, (b) mediators of CQ effects, and (c) the moderating role of metacognitive CQ. We then describe our methods and results and conclude by discussing the theoretical and practical importance of differentiating among the four CQ factors as the basis for providing a roadmap for future CQ research.

2. The four-factor CQ model

Ang and colleagues (Ang & Van Dyne, 2008; Earley & Ang, 2003) drew on Sternberg's (1986) multiple loci of intelligence framework that differentiated between cognitive, motivational, and behavioral loci of intelligence. Cognitive loci of intelligence comprise metacognition (i.e., understanding one's own and other's cognitions) and cognition (i.e., what one knows). Motivational loci of intelligence encompass the affective intensity and direction of attention. Behavioral loci of intelligence include verbal and nonverbal actions that result from mental processes.
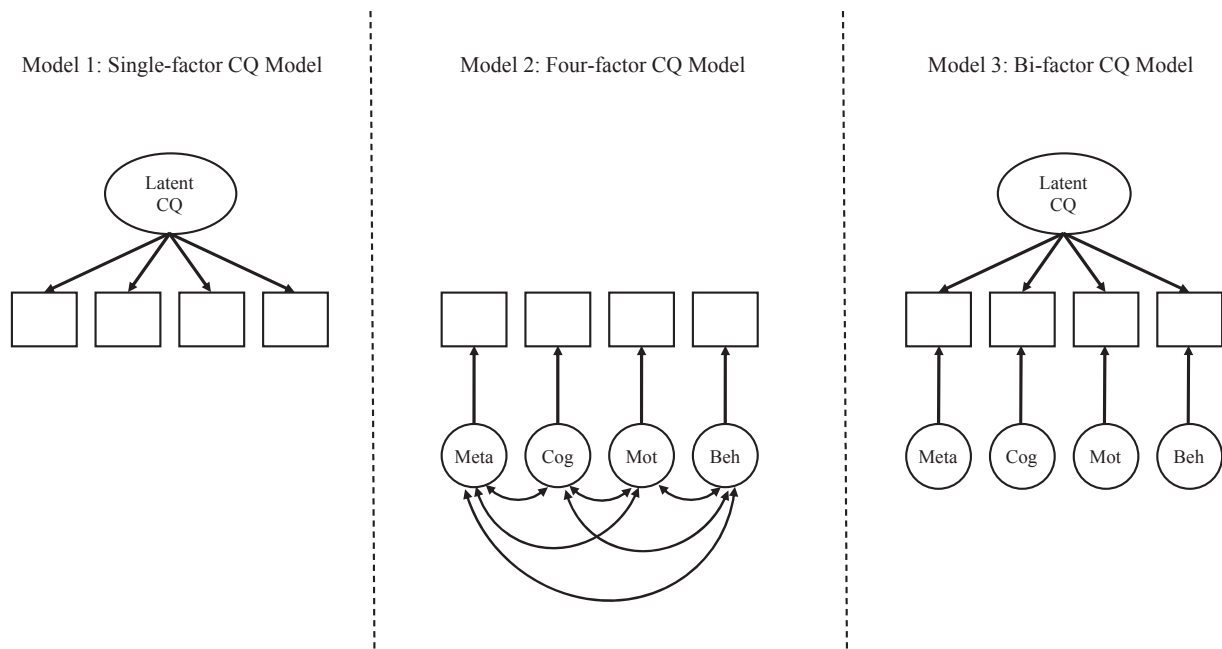

Fig. 1. Three conceptual models of CQ that correspond to a single-factor, four-factor, and bi-factor model of CQ. Not shown in the figure are relationships of latent variables with intercultural effectiveness outcomes.