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CULTURAL INTELLIGENCE

Measurement and Scale Development

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Although globalization has increased the importance of intercultural competencies, and although a large number of constructs have been used by practitioners to assess intercultural competencies, much of this research is not based on a firm theoretical foundation, and much of this research does not provide rigorous evidence of the construct validity of the measures. Responding to the importance of intercultural competencies and this gap in the measurement literature, this chapter discusses the development and validation of the CQS: the Cultural Intelligence Scale.

Cultural intelligence (referred to here as CQ) is the capability to function effectively in culturally diverse settings (Earley & Ang, 2003). Cultural intelligence is based on contemporary conceptualizations of intelligence as multidimensional (more than general mental ability), which includes the capability to adapt to others and to situations (Sternberg & Detterman, 1986). Specifically, CQ focuses on adaptive capabilities focused on culturally diverse situations. Building on this framework, we explain the process we used to develop and validate a 20-item, four-factor measure of cultural intelligence that includes meta-cognitive CQ, cognitive CQ, motivational CQ, and behavioral CQ.

In this chapter we report results of a cumulative series of studies (using over 1,350 respondents with diverse demographic and cultural backgrounds)

that provide construct validity evidence for the four-factor measure of CQ. Confirmatory factor analysis demonstrates a clear four-factor model of cultural intelligence, with high internal consistency and test-retest reliability for each factor. Additional analyses demonstrate other essential psychometric properties (e.g., discriminant, incremental, and predictive validities) of the scale and demonstrate that cultural intelligence can be differentiated from other capabilities such as cognitive ability and emotional intelligence. Results also demonstrate that CQ increased explained variance in cultural judgment and decision making as well as mental well-being, over and above the effects of demographic characteristics, cognitive ability, and emotional intelligence. In sum, results suggest that the four-factor model of cultural intelligence has important selection and training implications for those who function in situations characterized by cultural diversity.

Selecting and developing individuals who can function effectively in culturally diverse domestic and international settings is a significant challenge facing most organizations (Adler, 2002; Black, Gregersen, Mendenhall, & Stroh, 1999; Caligiuri, 2000; Gelfand, Erez, & Aycan, 2007; Kraimer, Wayne, & Jaworski, 2001; Lievens, Harris, Van Keer, & Bisqueret, 2003; Takeuchi, Tesluk, Yun, & Lepak, 2005; Tsui & Gutek, 1999; Williams & O'Reilly, 1998). Based on the rigorous development of the CQS measure of cultural intelligence, we argue that cultural intelligence provides an important and practically relevant measure of intercultural competencies that has direct relevance to managers and employees. We also suggest that cultural intelligence has important relevance to those in culturally diverse domestic settings as well as those who have cross-border international responsibilities.

◆ *The Four-Factor Model of Cultural Intelligence*

Cultural intelligence (CQ) is a theoretical extension of contemporary approaches to understanding intelligences (Earley & Ang, 2003). Traditionally, the study of intelligence focused mainly on "g," the academic or cognitive factor intelligence. More recently, multiple intelligence theory (Sternberg, 1988) proposed nonacademic intelligences (Hedlund & Sternberg, 2000) that emphasize the capability to adapt to others. These newer forms of intelligence include interpersonal intelligence (Gardner, 1993), emotional intelligence (Goleman, 1995; Salovey & Mayer, 1990), and social intelligence (Cantor & Kihlstrom, 1985; Ford & Tisak, 1983). Each of these formulations of intelligence, however, assumes that familiarity with culture and context guides individual thoughts and social behaviors. As elaborated in Earley and Ang, these relatively general capabilities may not apply when individuals have different cultural backgrounds.

Although those doing research on emotional and social intelligence do not limit their models to a single culture, they also do not acknowledge the importance of cultural diversity and they do not consider forms of intelligence that specifically include the capability of functioning effectively in situations characterized by cultural diversity. Cultural intelligence (the capability to cope and interact effectively in situations that are culturally diverse) is an etic construct (Aguinis & Henle, 2003) that can meaningfully be applied across cultures. Although cultural intelligence is associated closely with culture, it is not an emic, indigenous, culture-bound or culture-specific construct. In other words, CQ does not represent capability within a single culture—such as those of France, Brazil, or China.

Cultural intelligence is an important individual capability that is consistent with contemporary conceptualizations of intelligence: the ability to adapt and adjust to the environment (Cantor & Kihlstrom, 1985; Gardner, 1993; Mayer & Salovey, 1993; Sternberg, 2000). Specifically, we argue that just as nonacademic intelligences such as EQ (emotional intelligence) complement IQ (cognitive intelligence) because both are important for high-quality personal relationships and effectiveness in this increasingly interdependent world (Earley & Gibson, 2002), cultural intelligence is another complementary form of intelligence that explains adapting to diversity and cross-cultural interactions. In sum, cultural intelligence differs from other types of intelligence such as IQ and EQ because it focuses specifically on settings and interactions characterized by cultural diversity (for additional information on CQ, see Ang and colleagues [2007]). Also, consistent with contemporary views of intelligence, we theorize that cultural intelligence is a complex set of individual capabilities that reflect different loci of intelligences (see Sternberg, 1986). Following a symposium of intelligence experts, Sternberg and Detterman (1986) developed a framework that locates intelligence at multiple levels—as attributes of individuals (e.g., biological, mental, motivational, behavioral) and as an attribute of the environment (e.g., context, societal demands). Biological approaches focus on the genetics of intelligence (e.g., understanding the biological process related to intelligences and locating the genetic code for intelligences). Mental approaches focus on metacognitive and cognitive capabilities (e.g., the knowledge and cognitive processes that an individual possesses). Motivational approaches argue that there is more to intelligence than mental capability (e.g., most cognition is motivated, and motivation to think determines quality and quantity of cognition). Thus, the magnitude and direction of an individual's

energy represent motivational intelligence. Finally, behavioral approaches focus on what individuals do (i.e., their actions), rather than on what they think or feel. In our research, we focus on the three loci of individual intelligence with direct relevance to human interaction: the mental (metacognition and cognition), motivational, and behavioral aspects of intelligence. Further, we argue that differentiating multiple forms of cultural intelligence will enable more fine-grained understanding of key individual capabilities that enhance functioning in culturally diverse settings.

So far we have differentiated cultural intelligence from existing nonacademic intelligences and have used Sternberg's (1986) work on loci of intelligence as a conceptual basis for proposing four factors of CQ (metacognition, cognition, motivation, and behavior). Before describing these four aspects of CQ in more detail, we acknowledge the large and increasing amount of research with relevance to CQ: culture (Adler, 2002; Erez & Earley, 1993; Hofstede, 1991; Nisbett, 2003; Triandis, 1994), expatriate adjustment (Bhaskar-Shrinivas, Harrison, Shaffer, & Luk, 2005; Black, Mendenhall, & Oddou, 1991; Black & Stephens, 1989; Caligiuri, Hyland, Joshi, & Bross, 1998; Mendenhall & Oddou, 1985; Shaffer, Harrison, Gregersen, Black, & Ferzandi, 2006; Takeuchi, Yun, & Tesluk, 2002), expatriate selection and training (Spreitzer, McCall, & Mahoney, 1997), expatriate performance (Caligiuri, 2000; Hechanova, Beehr, & Christiansen, 2003; Kraimer et al., 2001; Ones & Viswesvaran, 1997; Tung, 1988), global leadership (House, Hanges, Javidan, Dorfman, & Gupta, 2004), global teams (Kirkman, Gibson, & Shapiro, 2001), cross-cultural training (Black & Mendenhall, 1990; Bhawuk & Brislin, 2000; Landis, Bennett, & Bennett, 2004; Lievens et al., 2003), and intercultural communication (Ting-Toomey, 1999; Gudykunst & Ting-Toomey, 1988).

It is also important to differentiate cultural intelligence from prior research on the general topic of cultural competence. This is because it is important to avoid proliferation of constructs and scales. It is also critical to show that new constructs (a) are strongly grounded in theory, (b) have strong psychometric characteristics, and (c) improve our ability to predict and understand meaningful outcomes. To date, scholars and consultants have introduced numerous constructs focused on the general topic of cultural competence. Most of these constructs and measures, however, do not fit the three criteria outlined above. More specifically, review of the numerous intercultural competency scales included in Paige's (2004) summary of the literature highlights several gaps that CQ addresses. First, most intercultural competencies scales mix ability and personality (a partial list includes the CCAI: Cross-Cultural Adaptability Inventory; CCWM: Cross-Cultural World Mindedness; CSI: Cultural Shock Inventory; ICAPS: Intercultural Adjustment Potential Scale; MAKSS: Multicultural Awareness-Knowledge-Skills Survey; OAI: Overseas Assignment Inventory, and Prospector). Although personality characteristics can be relevant to cross-cultural adjustment, including stable dispositional traits in competency models muddies the validity and precision of these models. Second, although many scales include items that are similar to CQ, none of the existing scales are based explicitly on contemporary theories of intelligence, and none of the scales systematically assess the four aspects of intelligence.

In sum, contemporary globalization and the breadth of existing research on intercultural competencies show the potential benefits of a measure of cultural intelligence that is theoretically based and psychometrically rigorous. Second, since none of the existing research focuses specifically on

intelligence as the conceptual basis for differentiating individual capabilities to function effectively in situations characterized by cultural diversity, CQ is unique in its focus. Third, cultural intelligence has the potential to enrich these other streams of research, just as this existing research can inform future research on cultural intelligence. In sum, this chapter introduces a new measure that has a strong conceptual foundation based explicitly on theories of multiple loci of intelligence, including metacognition, cognition, motivation, and behavior. In the next section, we describe each of the four factors of CQ in more detail.

METACOGNITIVE CQ

Metacognitive CQ is an individual's cultural consciousness and awareness during interactions with those who have different cultural backgrounds. The metacognitive factor of CQ is a critical component of cultural intelligence for at least three reasons (O'Neil & Abedi, 1996; Pintrich & DeGroot, 1990). First, it promotes active thinking about people and situations when cultural backgrounds differ. Second, it triggers critical thinking about habits, assumptions, and culturally bound thinking. Third, it allows individuals to evaluate and revise their mental maps, consequently increasing the accuracy of their understanding.

COGNITIVE CQ

Cognitive CQ is an individual's cultural knowledge of norms, practices, and conventions in different cultural settings. Given the wide variety of cultures in the contemporary world, cognitive CQ indicates knowledge of cultural universals as well as knowledge of cultural differences (Triandis, 1994). The cognitive factor of CQ is a critical component

of cultural intelligence because knowledge about cultural similarities and differences is the foundation of decision making and performance in cross-cultural situations.

MOTIVATIONAL CQ

Motivational CQ is an individual's capability to direct attention and energy toward cultural differences. Using the expectancy-value framework of motivation (Eccles & Wigfield, 2002; Kanfer, 1990), we conceptualize motivational CQ as a special form of self-efficacy (Bandura, 1986) and intrinsic motivation (Deci & Ryan, 1985) in cross-cultural situations. Self-efficacy and intrinsic motivation play an important role in CQ because successful intercultural interaction requires a basic sense of confidence and interest in novel settings.

BEHAVIORAL CQ

Finally, behavioral CQ is an individual's capability to exhibit appropriate verbal and nonverbal actions when interacting with people who differ in cultural background. Behavioral CQ is based on having and using a broad repertoire or range of behaviors and is a critical component of CQ because behavior is often the most visible characteristic of social interactions (Gumperz 1982; Gudykunst & Kim, 1984; Scollon & Scollon, 1995; Wiseman, 1995). Cultures vary in their behavioral repertoires in three ways: (a) the specific range of behaviors that are enacted; (b) the display rules for when specific nonverbal expressions are required, preferred, permitted, or prohibited; and (c) the interpretations of specific nonverbal behaviors (Lustig & Koester, 1999). In cross-cultural interactions, nonverbal behaviors are especially critical because they function as a "silent

language" that conveys meaning in subtle and covert ways (Hall, 1959).

Given the proliferation of constructs and measures in management, organizational behavior, and psychology, it is essential to show that cultural intelligence can be differentiated from other capabilities. It is also important to show that CQ increases our understanding (above and beyond existing related constructs in cross-cultural research) and that CQ predicts meaningful outcomes. For discriminant validity, we focus on differentiating CQ capabilities from cognitive ability and emotional intelligence capabilities (Mayer & Salovey, 1993) as well as adjustment and mental well-being (Ward & Kennedy, 1999). For incremental validity, we propose that cultural intelligence will make an incremental contribution to the literature only if it increases predicted variance in outcomes above and beyond that of demographic characteristics, cognitive ability (IQ), and emotional intelligence (EQ). For predictive validity, we examine the extent to which CQ predicts the outcomes of cultural judgment and decision making (CJDM), adjustment, and mental well-being.

♦ *Scale Development of the 20-Item Cultural Intelligence Scale (CQS)*

Based on review of the intelligence and intercultural competencies literatures, supplemented by interviews with eight executives who had extensive global work experience, we developed operational definitions of the four theoretically based aspects of CQ. Metacognitive CQ is the capability for consciousness during intercultural interactions. We drew on educational and cognitive psychology operationalizations of metacognition (e.g., O'Neil &

Abedi, 1996; Pintrich & DeGroot, 1990) for awareness, planning, regulating, monitoring, and controlling cognitive processes of thinking and learning. Cognitive CQ is knowledge of norms, practices, and conventions in different cultural settings. We used cultural knowledge domains identified by Triandis (1994) and supplemented these with Murdock's (1987) Human Relations Areas Files. Cultural knowledge includes knowledge of the economic, legal, and social systems in other cultures (Triandis, 1994). Motivational CQ is the capability to direct attention and energy toward learning and functioning in intercultural situations. We drew on Deci and Ryan (1985) for intrinsic satisfaction and Bandura (2002) for self-efficacy in intercultural settings. Finally, behavioral CQ is the capability to exhibit appropriate verbal and nonverbal actions when interacting with people who differ in cultural background. We drew on intercultural communication research for verbal and nonverbal flexibility in cross-cultural interactions (Gudykunst et al., 1988; Hall, 1959).

ITEM POOL GENERATION

Hinkin (1998) suggested starting with twice as many items as targeted for the final scale to allow for psychometric refinement. We aimed for a parsimonious scale with four to six items for each CQ dimension to minimize response bias caused by boredom and fatigue (Schmitt & Stults, 1985) while providing adequate internal consistency reliability (Hinkin & Schriesheim, 1989). Using the above operational definitions for the four CQ dimensions, we started with 53 items for the initial item pool (13–14 per CQ dimension). Each item contained one idea, was relatively short in length, and used simple, direct language. Since negatively worded items can create artifacts (Marsh,

1996), we used positively worded items. Next, a non-overlapping panel of three faculty members and three international executives (each with significant cross-cultural expertise) independently assessed the randomly ordered 53 items for clarity, readability, and definitional fidelity (1 = very low quality; 5 = very high quality). We kept the 10 best items for each dimension, resulting in an initial set of 40 items.

STUDY 1: SCALE DEVELOPMENT

Business school undergraduates ($n = 576$; 74% female; mean age 20; 2 years of work experience) in Singapore voluntarily completed the 40-item initial CQ questionnaire (1 = strongly disagree; 7 = strongly agree) for partial fulfillment of course requirements. In our analysis, we expected to confirm a four-factor structure since we designed the measure to reflect the four theoretical dimensions of CQ. Accordingly, we assessed dimensionality with confirmatory factor analysis (CFA: LISREL 8: maximum likelihood estimation and correlated factors). We used CFA for this analysis because our items were based on an a priori four-factor structure of intelligence.

Starting with the initial 40 items, we conducted a comprehensive series of specification searches in which we deleted items with high residuals, low factor loadings, small standard deviations or extreme means, and low item-to-total correlations. We retained 20 items with the strongest psychometric properties as the Cultural Intelligence Scale (CQS): four metacognitive CQ, six cognitive CQ, five motivational CQ, and five behavioral CQ (see the Appendix for the Cultural Intelligence Scale, page 240). CFA demonstrated a good fit of the hypothesized four-factor model to the data: $\chi^2 (164 df) = 822.26$, ($p < .05$) since the Comparative Fit Index (CFI = .92) was over .90 and

the Root Mean Squared Error of Approximation (RMSEA = .08) was less than .09. Standardized factor loadings for items in the four scales (.52–.80) were significantly different from zero (t -values: 9.30–17.51, $p < .05$).

We compared this four-factor correlated model with alternate theoretically possible models to assess relative fit compared to (a) an orthogonal four-factor model (Model B), (b) three factors—metacognitive CQ and cognitive CQ versus motivational CQ versus behavioral CQ (Model C)—(c) two factors—metacognitive CQ and cognitive CQ versus motivational CQ and behavioral CQ (Model D)—(d) two factors—metacognitive CQ versus cognitive CQ, motivational CQ, and behavioral CQ (Model E)—and (e) one factor (Model F).

Nested model comparisons (see Table 18.1, page 241) demonstrate the superiority of the hypothesized four-factor model because each of the $\Delta\chi^2$ statistics exceeds the critical value based on degrees of freedom. Model A (correlated four factors) demonstrated a better fit than Model B (orthogonal four factors) ($\Delta\chi^2 [6df] = 377.50, p < .001$). Model A (four factors) also had a better fit than Model C (three factors), which combined metacognitive CQ and cognitive CQ ($\Delta\chi^2 [3df] = 411.91, p < .001$). Likewise, Model A (four factors) was a better fit than the two alternate two-factor models: Model D (metacognitive CQ and cognitive CQ versus the other two factors: $\Delta\chi^2 [5df] = 1314.99, p < .001$) or Model E (metacognitive CQ versus the other three factors: $\Delta\chi^2 [5df] = 1631.17, p < .001$). Finally, Model A (four factors) was a better fit than Model G with one factor ($\Delta\chi^2 [6df] = 1931.52, p < .001$).

In sum, Model A, the hypothesized model, had the best fit. We averaged items for each factor to create scales representing each of the four CQ factors. Table 18.2 (page 242) reports means, standard deviations, correlations, and alphas. The four

factors were moderately related (.21–.45), with acceptable variances (.75–1.03). The corrected item-to-total correlations for each subscale (.47–.71) demonstrated strong relationships between items and their scales, supporting internal consistency. Composite reliabilities exceeded .70 (metacognitive CQ = .71, cognitive CQ = .85, motivational CQ = .75, and behavioral CQ = .83; Fornell & Larcker, 1981). The appendix lists the twenty items in the cultural intelligence scale.

STUDY 2: GENERALIZABILITY ACROSS SAMPLES

A second, non-overlapping sample of 447 undergraduates in Singapore (70% female; mean age 20; 2 years of work experience) voluntarily completed the 20-item CQS for partial fulfillment of course requirements. CFA analysis demonstrated a good fit of the data to the hypothesized four-factor model: $\chi^2 (164df) = 381.28$, CFI = .96, and RMSEA = .05 ($p < .05$). Standardized loadings (.50–.79) were significantly different from zero (t -values: 8.32–12.90, $p < .05$), with moderate correlations between factors (.23–.37) and acceptable variances (.87–1.05). Corrected item-to-total correlations for each subscale (.46–.66) demonstrated strong relationships between items and their scales, supporting internal consistency.

Results of Study 2 extend the results in Study 1 and provide additional support for the four factors of CQ as measured by four items for metacognitive CQ ($\alpha = .77$), six for cognitive CQ ($\alpha = .84$), five for motivational CQ ($\alpha = .77$), and five for behavioral CQ ($\alpha = .84$). Table 18.3 (page 242) reports descriptive statistics and correlations for the four factors of cultural intelligence in Study 2, and Figure 18.1 (page 243) reports completely standardized parameter estimates for the four-factor model.

APPENDIX: Cultural Intelligence Scale (CQS)

Read each statement and select the response that best describes your capabilities. Select the answer that BEST describes you AS YOU REALLY ARE (1 = strongly disagree; 7 = strongly agree)

<i>CQ Factor</i>	<i>Questionnaire Items</i>
<i>Metacognitive CQ:</i>	
MC1	I am conscious of the cultural knowledge I use when interacting with people with different cultural backgrounds.
MC2	I adjust my cultural knowledge as I interact with people from a culture that is unfamiliar to me.
MC3	I am conscious of the cultural knowledge I apply to cross-cultural interactions.
MC4	I check the accuracy of my cultural knowledge as I interact with people from different cultures.
<i>Cognitive CQ:</i>	
COG1	I know the legal and economic systems of other cultures.
COG2	I know the rules (e.g., vocabulary, grammar) of other languages.
COG3	I know the cultural values and religious beliefs of other cultures.
COG4	I know the marriage systems of other cultures.
COG5	I know the arts and crafts of other cultures.
COG6	I know the rules for expressing nonverbal behaviors in other cultures.
<i>Motivational CQ:</i>	
MOT1	I enjoy interacting with people from different cultures.
MOT2	I am confident that I can socialize with locals in a culture that is unfamiliar to me.
MOT3	I am sure I can deal with the stresses of adjusting to a culture that is new to me.
MOT4	I enjoy living in cultures that are unfamiliar to me.
MOT5	I am confident that I can get accustomed to the shopping conditions in a different culture.
<i>Behavioral CQ:</i>	
BEH1	I change my verbal behavior (e.g., accent, tone) when a cross-cultural interaction requires it.
BEH2	I use pause and silence differently to suit different cross-cultural situations.
BEH3	I vary the rate of my speaking when a cross-cultural situation requires it.
BEH4	I change my non-verbal behavior when a cross-cultural situation requires it.
BEH5	I alter my facial expressions when a cross-cultural interaction requires it.

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NOTE: Use of this scale granted to academic researchers for research purposes only. For information on using the scale for purposes other than academic research (e.g., consultants and nonacademic organizations), please send an email to cquery@culturalq.com.

Table 18.1 Comparing the Fit of Alternative Nested Models With CFA (Study 1)^a

	<i>Model</i>	χ^2	<i>Df</i>	<i>NNFI</i>	<i>CFI</i>	<i>SRMR</i>	<i>RMSEA</i>	$\Delta\chi^2$	<i>p-value</i>
A	20-item four-factor model	822.26	164	.91	.92	.06	.08		
Alternate nested models: ^b									
B	(a) Four-factor orthogonal model	1199.76	170	.87	.88	.17	.11	377.50	$p < .001$
C	(b) Three-factor model (metacognitive CQ and cognitive CQ combined versus motivational CQ versus behavioral CQ)	1234.17	167	.86	.88	.08	.11	411.91	$p < .001$
D	(c) Two-factor model (metacognitive CQ and cognitive CQ combined versus motivational CQ and behavioral CQ)	2137.25	169	.79	.81	.12	.15	1314.99	$p < .001$
E	(d) Two-factor model (metacognitive CQ versus the other three factors combined)	2453.43	169	.75	.77	.12	.16	1631.17	$p < .001$
F	(e) One-factor model with all items loading on a single factor	2753.78	170	.72	.75	.12	.17	1931.52	$p < .001$

a. $n = 576$

b. Compared to the hypothesized four-factor model

STUDY 3: GENERALIZABILITY ACROSS TIME

A subset of respondents ($n = 204$, 76% female, mean age 20) from Study 2, Singapore cross-validation sample, completed the CQS again 4 months later (at the

start of the next semester) in exchange for partial fulfillment of course requirements. We used these responses to analyze temporal stability of the CQS.

We used procedure suggested by Vandenberg and Lance (2000) to examine longitudinal measurement invariance of the

Table 18.2 Means, Standard Deviations, Scale Reliabilities, and Intercorrelations (Study 1)^a

	<i>MN</i>	<i>SD</i>	1	2	3	4
1. Metacognitive CQ	4.71	.75	(.71)			
2. Cognitive CQ	3.03	.84	.39 ^b	(.85)		
3. Motivational CQ	4.72	.80	.45 ^b	.33 ^b	(.75)	
4. Behavioral CQ	4.10	.03	.28 ^b	.36 ^b	.21 ^b	(.83)

a. $n = 576$. Reliability coefficients are in parentheses along the diagonal.

b. $p < .01$

Table 18.3 Means, Standard Deviations, Scale Reliabilities, and Intercorrelations (Study 2)^a

	<i>MN</i>	<i>SD</i>	1	2	3	4
1. Metacognitive CQ	4.89	0.87	(.77)			
2. Cognitive CQ	3.16	0.89	.23 ^b	(.84)		
3. Motivational CQ	4.74	0.92	.32 ^b	.25 ^b	(.77)	
4. Behavioral CQ	4.22	1.05	.37 ^b	.34 ^b	.31 ^b	(.84)

a. $n = 447$. Reliability coefficients are in parentheses along the diagonal.

b. $p < .01$

CQS, using CFA and an augmented covariance matrix as input (rather than a multi-sample approach) to account for time-wise correlated errors. We used a 20-item/two-measurement occasion matrix and specified eight latent variables (four T1 CQ factors and four T2 CQ factors), with unique variances of identical items correlated across time (Jöreskog & Sorbom, 2003).

We began with a correlated four-factor model with no constraints (parameters at T1 and T2 freely estimated). Results demonstrated an acceptable fit (Model A: $\chi^2 [692df] = 981.18$, CFI = .95, RMSEA = .04), indicating that the four-factor model held across the two time periods (see Table 18.4, page 244). We then developed two alternative

models: Model B (factor loadings constrained to be invariant) and Model C (item intercepts constrained to be invariant). The chi-square difference between Model A and B (nested factorial invariance model) failed to reach significance ($\Delta\chi^2 [16df] = 22.79$, $p = ns$), providing strong support for invariance in factor loadings across T1 and T2. The chi-square difference between Model B and C (item intercepts constrained to be invariant) also failed to reach significance ($\Delta\chi^2 [14df] = 17.59$, $p = ns$), providing support for item intercept invariance.

Finally, we assessed the means for the four factors across time. Unlike personality characteristics that are relatively stable traits, Earley and Ang (2003) conceptualized CQ as a

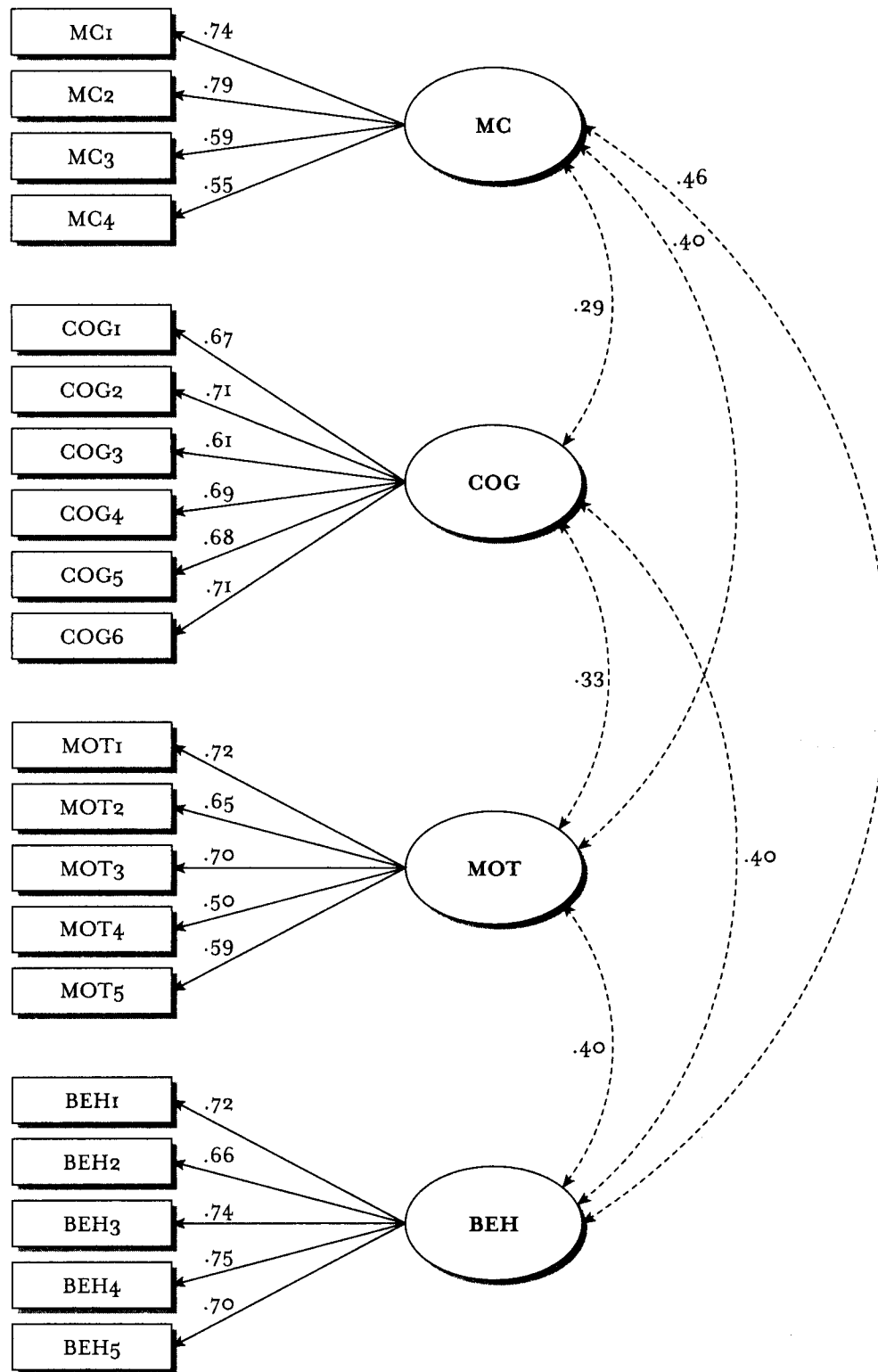
Figure 18.1 Confirmatory Factor Analysis of 20-Item CQ Model (Study 2)

Table 18.4 Multiple Group CFA Across Time: Comparing the Fit of Alternative Models (Study 2)*

	<i>Model</i>	χ^2	<i>df</i>	<i>NNFI</i>	<i>CFI</i>	<i>SRMR</i>	<i>RMSEA</i>	$\Delta\chi^2$	<i>p-value</i>
A	Four-factor model with factor loadings freely estimated across time	981.18	692	.94	.95	.06	.04		
B	Four-factor model with invariant factor loadings across time	1003.97	708	.94	.95	.07	.05	22.79	$p > .05$
C	Four-factor model with invariant item intercepts across time	1021.56	722	.94	.95	.07	.05	17.59	$p > .05$
D	Four-factor model with invariant means across time	1045.35	726	.94	.94	.07	.05	23.79	$p < .05$

* $n = 204$

malleable capability that may change based on cultural exposure, training, modeling, mentoring, socialization, and other experiences. Thus, we anticipated that some means for the four CQ factors could change across time, depending on experience and/or education. We compared Model C (item intercept invariance) with Model D (means invariance) that constrained means of the four factors to be invariant across time. Results showed a significant decrease in fit: Model C ($\chi^2 [722df] = 1021.56$) versus Model D ($\chi^2 [726df] = 1045.35$), with a significant change in χ^2 ($\Delta\chi^2 [4df] = 23.79, p < .05$). Closer examination of the individual means demonstrated significant changes in factor means for cognitive CQ, which increased .33 ($t = 4.87, p < .001$) and behavioral CQ which increased .21 ($t = 2.87, p < .01$). This makes sense because respondents studied cultural values and participated in experiential activities including role-play

exercises during the time interval that separated T1 and T2 assessment of CQ. Neither metacognitive CQ nor motivational CQ changed significantly. Thus, the results provide evidence of malleability as well as test-retest reliability.

STUDY 4: GENERALIZABILITY ACROSS COUNTRIES

A fourth sample of undergraduates ($n = 337$; 55% female; mean age 22; 1 year of work experience) at a large Midwestern school in the United States voluntarily completed the 20-item CQS for partial fulfillment of course requirements. Table 18.5 reports descriptive statistics, correlations, and reliabilities for this sample.

We assessed equivalence of the CQS across countries (Kirkman & Law, 2005) and compared the U.S. sample with the Singapore sample in Study 2 ($n = 447$),

Table 18.5 Means, Standard Deviations, Scale Reliabilities, and Intercorrelations (Study 4)^a

	<i>MN</i>	<i>SD</i>	1	2	3	4
1. Metacognitive CQ	4.98	0.95	(.78)			
2. Cognitive CQ	3.66	0.98	.38 ^b	(.81)		
3. Motivational CQ	5.34	0.94	.50 ^b	.36 ^b	(.80)	
4. Behavioral CQ	4.20	1.14	.37 ^b	.43 ^b	.31 ^b	(.81)

a. $n = 337$. Reliability coefficients are in parentheses along the diagonal.

b. $p < .01$

using sequential tests of model invariance (Byrne, 1998). Model A (four-factors with loadings freely estimated across samples) demonstrated a good fit: $\chi^2 (328df) = 723.23$, CFI = .97, RMSEA = .05, indicating equivalence in number of factors.

We tested two alternative models: Model B (four-factors with loadings forced to be invariant) to test if items were interpreted equivalently across settings and Model C (four-factors with factor covariances forced to be invariant) to test if covariances among factors were equivalent across settings. The chi-square difference between Model A and B (nested factorial invariance model) failed to reach significance ($\Delta\chi^2 [16df] = 13.74$, $p = ns$), providing strong support for invariance in factor loadings across settings. The chi-square difference between Model B and C (nested covariance invariance model) failed to reach significance ($\Delta\chi^2 [10df] = 17.96$, $p = ns$), supporting invariance in factor covariances. These multiple group tests of invariance demonstrated that the same four factor structure holds across the two countries (Singapore and U.S.).

STUDY 5: DISCRIMINANT AND INCREMENTAL VALIDITY

Extending the results of Studies 1–4, which assessed psychometric characteristics of the CQS and measurement invariance of the four

factors across time and across two countries, Study 5 focuses on discriminant and incremental validity of the CQS. To do this, we had respondents in Study 2 and Study 4 complete a second questionnaire, including measures of cognitive ability, emotional intelligence, cultural judgment and decision making (CJDM), interactional adjustment, and mental well-being. We obtained matched data for 251 respondents in Study 2 and 249 respondents in Study 4 (56% and 74% response rates, respectively). Using this data, we first examined the discriminant validity of the four factors of CQ relative to cognitive ability, emotional intelligence, CJDM, interactional adjustment, and mental well-being. Second, we assessed incremental validity of CQ over and above demographic characteristics, cognitive ability, and emotional intelligence in predicting CJDM, interactional adjustment, and mental well-being.

MEASURES

For CJDM, we adapted five scenarios from Cushner and Brislin (1996). Participants read scenarios describing cross-cultural interactions and indicated which response best explained the situation. We summed each participant's correct responses (range 0–5).

We measured *interactional adjustment* with three items from Black and Stephens

(1989): Rate how well you have adjusted to your current situation in terms of “socializing with people, interacting with people on a day-to-day basis, getting along with people” (1 = extremely unadjusted, 7 = extremely adjusted; $\alpha = .93$).

We measured mental *well-being* with four items (Goldberg & Williams, 1988): Rate your general well-being at this time in terms of “[being] able to concentrate on whatever you have been doing, feel[ing] that you are playing a useful part, feel[ing] capable of making decisions, and [being] able to face up to your responsibilities” (1 = not at all, 7 = to a very great extent; $\alpha = .82$).

We measured *cognitive ability* with the Wonderlic Personnel Test (1999) of problem-solving ability. This test has support in the literature as a reliable and valid measure of cognitive ability (e.g., see LePine, 2003). We assessed *emotional intelligence* with eight items from the Schutte et al. (1998) scale that is based on Salovey and Mayer’s (1990) model of emotional intelligence. Items include “I seek out activities that make me happy” and “I arrange events that others enjoy” ($\alpha = .80$).

Participants reported their age (years) and sex (0 = female, 1 = male), and we created dummy codes for each sample (0 = U.S., 1 = Singapore).

Since we previously demonstrated equivalence in number of factors, factor loadings, and structural relationships across countries (U.S. and Singapore), we combined Sample 2 ($n = 251$) and Sample 4 ($n = 249$) for these analyses ($n = 500$). Table 18.6 reports descriptive statistics, correlations, and reliabilities for the combined samples.

DISCRIMINANT VALIDITY

We assessed discriminant validity of the four factors of CQ relative to cognitive ability, emotional intelligence, CJDM, interactional adjustment, and mental well-being

using confirmatory factor analysis with Study 5 data. Results demonstrated a good fit for the nine-factor model ($\chi^2 [595df] = 1303.47$, CFI = .96, RMSEA = .05), supporting the distinctiveness of the four CQ factors, cognitive ability, emotional intelligence, CJDM, interactional adjustment, and mental well-being. All factor loadings were significant, with t -values ranging from 8.96 to 33.07.

INCREMENTAL VALIDITY

We tested the incremental validity of CQ with hierarchical regression. For controls, we entered age, sex (0 = female, 1 = male), and sample (0 = U.S., 1 = Singapore) in Step 1 and cognitive ability and emotional intelligence in Step 2. In Step 3, we added the four factors of CQ (metacognitive CQ, cognitive CQ, motivational CQ, and behavioral CQ). We used Change-F statistics to assess each regression step and t -values to assess significance of individual beta values. Table 18.7 reports results of the regression analyses for CJDM, interactional adjustment, and mental well-being.

PREDICTIVE VALIDITY

Results showed that age, sex, and sample explained 4% of the variance in CJDM, 4% in interactional adjustment, and 14% in mental well-being. The addition of cognitive ability and emotional intelligence in Step 2 increased the explained variance significantly for CJDM ($DF = 12.20$, $p < .001$), interactional adjustment ($DF = 13.67$, $p < .001$), and mental well-being ($DF = 41.83$, $p < .001$). Results in Step 3 demonstrate the incremental validity of the four factors of CQ, over and above demographic characteristics, cognitive ability, and emotional intelligence in predicting CJDM ($DF = 4.97$, $p < .01$), interactional adjustment ($DF = 3.73$, $p < .01$), and

Table 18.6 Means, Standard Deviations, Scale Reliabilities, and Intercorrelations (Study 5)^a

	MN	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Cultural Decision Making	3.23	1.11	–											
2. Interactional Adjustment	5.63	1.16	.03	(.93)										
3. Mental Well-Being	4.98	0.97	.01	.49 ^e	(.82)									
4. Metacognitive CQ	4.94	0.88	.17 ^e	.17 ^e	.24 ^e	(.74)								
5. Cognitive CQ	3.41	0.96	.11 ^d	.10 ^d	.26 ^e	.27 ^e	(.83)							
6. Motivational CQ	5.00	0.98	.03	.23 ^e	.41 ^e	.43 ^e	.34 ^e	(.81)						
7. Behavioral CQ	4.21	1.09	.09 ^d	.17 ^e	.25 ^e	.39 ^e	.32 ^e	.39 ^e	(.82)					
8. Cognitive Ability	27.59	5.58	.24 ^e	–.05	–.12 ^e	.06	–.10 ^d	.03	.03	–				
9. Emotional Intelligence	5.27	0.78	–.03	.26 ^e	.42 ^e	.33 ^e	.24 ^e	.33 ^e	.28 ^e	–.05	(.80)			
10. Age	21.14	2.88	.10 ^d	.07	.17 ^e	.05	.11 ^d	.14 ^e	.10 ^d	–.14 ^e	.05	–		
11. Sex ^b	0.46	0.50	.08	.02	.09 ^d	.02	.10 ^d	.15 ^e	.10 ^d	–.01	.03	.24 ^e	–	
12. Sample ^c	0.50	0.50	.11 ^d	–.19 ^e	–.37 ^e	–.01	–.25 ^e	–.29 ^e	.02	.42 ^e	–.19 ^e	–.29 ^e	–.22 ^e	–

a. $n = 500$. Reliability coefficients are in parentheses along the diagonal.

b. 0 = female, 1 = male

c. 0 = U.S., 1 = Singapore

d. $p < .05$

e. $p < .01$

Table 18.7 Hierarchical Regression Analysis (Study 5)^a

Variable	Cultural Decision Making			Interactional Adjustment			Mental Well-Being		
	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3
Age	.12 ^e	.13 ^e	.12 ^e	.02	.03	.01	.06	.07	.05
Sex ^b	.09	.07	.07	-.03	-.04	-.05	.00	.00	-.03
Sample ^c	.16 ^e	.06	.07	-.19 ^f	-.17 ^e	-.17 ^e	-.35 ^f	-.30 ^f	-.26 ^f
Cognitive Ability		.24 ^f	.22 ^f		.04	.04		.04	.03
Emotional Intelligence		-.02	-.08		.23 ^f	.16 ^e		.36 ^f	.26 ^f
Metacognitive CQ			.16 ^e			.05			.01
Cognitive CQ			.11 ^d			-.06			.02
Motivational CQ			-.04			.11 ^d			.21 ^f
Behavioral CQ			-.01			.10 ^d			.10 ^d
<i>F</i>	6.43 ^f	8.91 ^f	7.32 ^f	6.63 ^f	9.65 ^f	7.14 ^f	27.04 ^f	35.63 ^f	26.306 ^f
ΔF		12.20 ^f	4.97 ^e		13.67 ^f	3.73 ^e		41.83 ^f	10.64 ^f
<i>R</i> ²	.04	.08	.12	.04	.09	.12	.14	.26	.32
ΔR^2		.04	.04		.05	.03		.12	.06
Adjusted <i>R</i> ²	.03	.07	.10	.03	.08	.10	.14	.26	.31

a. *n* = 500

b. 0 = female, 1 = male

c. 0 = U.S., 1 = Singapore

d. *p* < .05e. *p* < .01f. *p* < .001

well-being ($DF = 10.64, p < .001$). Overall, the adjusted R^2 statistics explained 10% of the variance in CJDM, 10% of the variance in interactional adjustment, and 31% of the variance in mental well-being.

For CJDM, results demonstrate that metacognitive CQ ($\beta = .16, p < .01$) and cognitive CQ ($\beta = .11, p < .05$) increased explained variance, over and above the effects of demographic characteristics, cognitive ability, and emotional intelligence. Together, metacognitive CQ and cognitive CQ increased explained variance in CJDM by 4%. Overall, the adjusted R^2 was 10%. For interactional adjustment, results demonstrate that motivational CQ ($\beta = .11, p < .05$) and behavioral CQ ($\beta = .10, p < .05$) increased explained variance, above and beyond demographic characteristics, cognitive ability, and emotional intelligence by 3%. Overall, the adjusted R^2 was 10%. For mental well-being, motivational CQ ($\beta = .21, p < .001$) and behavioral CQ ($\beta = .10, p < .05$) increased explained variance, above and beyond demographic characteristics, cognitive ability, and emotional intelligence by 6%. Overall, the adjusted R^2 was 31%.

DISCUSSION

This chapter highlights the importance of using a theoretical approach to conceptualizing and measuring intercultural competencies. In addition, the chapter provides a detailed description of the rigorous process used to develop and validate the CQS: the Cultural Intelligence Scale. Early research results suggest that managers can apply the CQS with a high level of confidence based on empirical evidence, that the scale measures what it was designed to measure, and that results are stable across samples, across time, and across cultures. In addition, results demonstrate that the CQS has discriminant validity compared to other constructs

such as cognitive ability and emotional intelligence. Results also demonstrate that CQ increased explained variance in cultural judgment and decision making as well as mental well-being, over and above the effects of demographic characteristics, cognitive ability, and emotional intelligence.

Analysis of results from these five studies allows us to draw several important conclusions. First, the sequential and systematic scale development process described in the five studies provides strong evidence that the CQS has a clear, robust, and meaningful four-factor structure. In addition, results demonstrate that this structure is stable across samples (Study 2), across time (Study 3), and across countries (Study 4). More important, results in Study 5 support the discriminant validity of the CQS compared to cognitive ability, emotional intelligence, CJDM, interactional adjustment, and mental well-being.

Study 5 also demonstrates that the CQS has incremental validity in predicting CJDM, interactional adjustment, and mental well-being. Specifically, metacognitive CQ and cognitive CQ increased explained variance in cultural judgment and decision making by 4%. This makes sense since metacognitive CQ and cognitive CQ represent mental capabilities and since CJDM emphasizes analytic abilities such as deliberate reasoning and evaluation of alternatives. In addition, results demonstrate that motivational CQ and behavioral CQ increased explained variance in interactional adjustment by 3%, and motivational CQ and behavioral CQ increased explained variance in mental well-being by 6%. Since motivational CQ and behavioral CQ focus on drive and flexibility in culturally diverse situations, it also makes sense that they predicted both interactional adjustment and well-being.

From a theoretical perspective, the findings of these five studies ($n > 1,350$ respondents) indicate that the 20-item CQS holds promise as a reliable and valid measure of

cultural intelligence. Potential uses of the scale in substantive research include further exploration of the nature and dimensionality of cultural intelligence. For example, future research could examine sub-dimensions for each factor of CQ. Additional theoretical work is also needed on the nomological network of CQ, including predictors, consequences, mediators, and moderators. Future research should also assess additional outcomes as indicators of predictive validity. For example, it would be interesting and useful to examine cultural intelligence as a predictor of expatriate and global leader adjustment and well-being as well as different aspects of work performance. It also would be beneficial to examine CQ as a predictor of adjustment, well-being, and performance for those in domestic jobs who work in multicultural groups.

Cultural intelligence and the CQS also have promising practical application. For example, it can provide important insights and personal information to individuals on their own cultural intelligence. According to Paige and Martin (1996), feedback and self-awareness are key to enhancing intercultural effectiveness. Thus, the 20-item CQS can provide insights about specific personal capabilities for functioning effectively in situations characterized by cultural diversity. Knowledge of cultural intelligence could also provide a foundation for personal self-development.

Also, organizations could use the CQS to identify employees who would be particularly well suited for overseas assignments. It also could be used to screen out those who are proficient in domestic settings but unlikely to succeed in cross-cultural settings or in jobs that require frequent and ongoing interaction with those who have other cultural backgrounds. It also could be useful to predict reputations of global leaders (Van Dyne & Ang, 2006). Finally, CQ could be used to develop corporate training and self-awareness

programs or to identify employees who could serve as supportive mentors to those starting overseas assignments.

In conclusion, these five studies suggest both theoretical and practical implications for cultural intelligence and the CQS. We encourage others to use the CQS to enhance our understanding of ways in which the individual capability to function effectively in culturally diverse settings predicts important personal and work outcomes. For example, future research could consider ways in which use of the CQS enhances self-awareness and has application to corporate selection, training and development, and promotion decisions. Generally, we suggest that the CQS has exciting implications for domestic and international managers and leaders.

◆ *Discussion Questions*

1. Using your own words, how would you define cultural intelligence?
2. How is the development of the CQS (Cultural Intelligence Scale) different from prior work on other intercultural competency measures?
3. Why is it important to assess the construct validity of measures like the 20-item CQS before using scales in applied settings?
4. What is the difference between cultural intelligence and other constructs such as cognitive ability and emotional intelligence?
5. Explain the meaning of the following: "CQ increased explained variance in cultural judgment and decision making as well as mental well-being, over and above the effects of demographic characteristics, cognitive ability, and emotional intelligence." Why is it important to assess these relationships?

6. Rate your own cultural intelligence using the 20-item CQS. Then ask five people who know you well to answer the same questions about you, describing their views of your cultural intelligence. Reflect on this feedback and then prepare a personal development plan in which you set specific goals to enhance your metacognitive CQ, cognitive CQ, motivational CQ, and behavioral CQ.
7. How can you use your new knowledge of cultural intelligence as applied to your own life? Be sure to consider personal relationships you have with people who differ from you in age, sex, functional background, and ethnic/national culture.
8. Assume that you are planning a trip to a part of the world that you have never visited before. How could you use the four aspects of cultural intelligence to help prepare for that trip? What could you do before the trip to enhance your metacognitive CQ, cognitive CQ, motivational CQ, and behavioral CQ? What could you do during the trip to enhance each of the four aspects of CQ?
9. Think about two specific people who you know with contrasting levels of cultural intelligence. Describe these people and explain why you view one as low in CQ and the other as high in CQ. Based on your analysis, what action steps would you recommend that the person with lower cultural intelligence take to improve his/her cultural intelligence?

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