Cross-level measurement of cross-cultural competence: Using the Cultural Intelligence Scale as an example

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Abstract

The present research endeavor was designed to assess the utility of cultural intelligence (CQ) as an emergent organizational level construct using samples of military organizations. CQ has predominantly been discussed as an individual level construct, but has never been assessed empirically as an organizational level phenomenon. Similarly, intelligence as exhibited by organizations has received substantial discussion in the literature. No empirical assessments of organizational intelligence, however, have been published to date. To develop a theoretical basis for organizational CQ, the CQ and organizational intelligence literatures were synthesized. As a result, a study was performed with the aim of examining the cultural intelligence scale (CQS) at the organizational level of analysis. This study examined the possibility of determining similarities in the factor structure of the CQS at the individual as well as the organizational level of analysis. It was hypothesized that the individual level component structure would be replicated at the organizational level of analysis: metacognition, cognition, motivation, and behavior. Data were collected by attaching the CQS to the Defense Equal Opportunity Climate Survey (DEOCS), which is a widely distributed measurement instrument used to assess Equal Opportunity (EO) climate in military and civilian organizations. Support was found for the similarity in structure of the CQS at the individual and organizational level of analysis, with the cognition, motivation, and behavior components attaining the best evidence for use at the organizational level of analysis. A secondary study was performed to validate the use of the CQS at the organizational level of analysis. Equal Opportunity (EO) climate factors and Organizational Effectiveness (OE) outcomes, as measured by the DEOCS, as well as objective performance indicators were used as criteria for judging the predictive utility of the CQS at the organizational level of analysis. It was hypothesized that organizational CQ should have a negative relationship with all EO climate constructs other than Positive EO Behaviors. It was also hypothesized that organizational CQ should have a positive relationship with Positive EO behaviors, OE, and organizational performance. Support was attained for the use of the CQS at the organizational level of analysis with components of the measure significantly predicting the criterion measures in the hypothesized directions.

Cross-level measurement of cross-cultural competence: Using the Cultural Intelligence Scale as an example

In recent years a growing emphasis has been placed on the development of cross-cultural competencies (3C) within the United States Military. In fact, cross-cultural competencies have been identified as one of the most critical determinants of success in the military missions of today (McGinn, Weaver, McDonald, Van Driel, & Hancock, 2008). The growing concern with cross-cultural competency stems from the increasing need to ensure stability in conflict regions rather than achieving kinetic domination followed by traditional occupation. Consequently, it is likely that the most critical antecedents of military success will be found in the mental capabilities of front line personnel rather than military materiel (McGinn et al, 2008).

To foster these capabilities many initiatives have been put in place, the most comprehensive of which are described in the Defense Language Transformation Roadmap. The strategy defined within the Roadmap emphasizes the importance of developing and sustaining strong language and cultural foundational capabilities within the entire DOD as well as the capability to meet any and all global needs as they arise (McGinn et al., 2008).

A close reading of this strategic outlook reveals a desire to not only develop 3C capabilities within individual service members, but also to foster these capabilities within the DOD as an organization. Inherently, therefore, the development of 3C within the DOD is a multi-level endeavor with foci at both the individual and organizational levels.

To date, much progress has been made to improve the 3C capability within individual service members. Progress at the organizational level, however, is difficult to gauge largely due to a lack of theoretical and empirical understanding of 3C at the organizational level. At the individual level, there are a myriad of available frameworks available to describe 3C (e.g.

Thomas and Fitzsimmons, 2008). Comparatively, there is little theoretical or empirical work has been performed to explicitly address the 3C of organizations. The goal of this paper is to provide a brief conceptual overview of the conceptual nature and discuss one methodology borrowed from the realm of cross-cultural psychology to empirically assess the 3C of organizations.

Study 1: A Multi Level Exploration of 3C

To conceptualize 3C as an organizational level phenomenon it is necessary to surmount what is known as the levels of analysis problem. This problem can be conceptualized as a potential shift in meaning of phenomena at different levels of analysis. In terms of 3C this problem implies that while referencing similar concepts at the individual and organizational levels, 3C may have completely different meanings for individuals as compared to organizations.

The levels of analysis problem, is rooted in a theoretical concept known as *emergence*. Emergent phenomena can be described as the collective level phenomena that emerge from and transcend the interactions of lower level phenomena (Goldstone, Roberts, & Gureckis, 2008). For instance, thoughts are the higher level product of the interaction of networks of neurons. When considered together, neurons are capable of generating thoughts, while single they are only capable of creating action potentials and relaying electrochemical signals (Goldstone & Janssens, 2005). Similarly, people can create groups or emergent organizations that may beyond the intention, comprehension, or even perception of contributing individuals (Goldstone & Johnson, 2005). This logic can also be applied in the business context. For instance, Goldstone et al. (2008) note that any “business has a style and ethos that transcends its employees” (p. 10). Therefore, even though rooted in the interactions of individuals, higher level phenomena transcend the contributions and characteristics individuals (Atran, Medin, & Ross, 2005). In

terms of 3C, these observations imply that even though dependent on the 3C of individuals, organizational 3C may potentially differ qualitatively from the 3C of their members.

3C as an organizational level phenomenon

Even though 3C has been treated as predominantly as applicable to individuals, it is plausible to argue that 3C may potentially extend to all parts of organizations. For instance, 3C may involve the marketing and selling of products as well as the managing of people and business processes in different cultural contexts (Civelli, 1997; Canen & Canen, 1999; Canen & Canen 2002). Reflecting this view, a number of definitions of organizational 3C have been offered, including:

- "A set of congruent behaviors, attitudes, and policies that come together in a system, agency, or amongst professionals that system, agency, or those professionals to work effectively in cross-cultural situations" (Cross et al., 1989).
- "The integration and transformation of knowledge about individuals and group of people into specific standards, policies, practices, and attitudes used in appropriate cultural settings to increase the quality of services, thereby producing better outcomes" (Pope-Davis & Coleman, 1997).

Given these perspectives, it seems plausible from a theoretical perspective to conceptualize 3C as an organizational level construct, particularly when conceptualized as a characteristic of an organizational system. Although intriguing, the aim of the current endeavor is not to illustrate which organizational policies and structures are indicative of 3C. Rather, the

goal of the current study is to assess whether 3C as an attribute of individual organizational members may impart cross-cultural capability to their employing organizations.

3C and CQ

Many approaches have been advocated to assess 3C at the individual level of analysis (for a recent review of these typologies see Thomas and Fitzsimmons (2008). One of these approaches, namely cultural intelligence or CQ, advocated by numerous researchers (e.g. Early & Ang, 2003, Early, Ang, & Tan, 2006; Thomas, 2006; Thomas & Fitzsimmons, 2008) approaches 3C from a competency based perspective that is focused on individuals' abilities to solve the complex problems associated with cross-cultural interactions. As such, CQ can be broadly defined as "an individual's capability to adapt effectively to new cultural contexts" (Early & Ang, 2003, p 59) or the ability to generate appropriate behavior in new cultural settings (Early, 2002). Considering these definitions, CQ can be seen as distinct, yet complementary to other forms of intelligence (Selmeski, 2007). Recently, Early and his colleagues have described CQ in terms of 4 components including knowledge and cognition, meta-cognition, motivation, and behavior (Early & Ang, 2003; Ng & Early, 2006).

The *cognitive* component of CQ is most closely aligned with traditional conceptions of intelligence and can be defined as "specific knowledge that people are able to gain and comprehend about a new culture based on various cues provided" (Early & Ang, 2003, p 91). The *meta-cognitive* component of CQ involves the strategies of awareness, planning, checking knowledge, and development of coping strategies to cope with cultural challenges (Ng & Early, 2006; Selmeski, 2007). Conversely, Early and Ang define the *motivation* component of CQ as "one's propensity and commitment to act on the cognitive facet [of CQ] as well as persevere acquiring knowledge and understanding a new culture and overcome stumbling blocks or

failure" (Early & Ang, 2003, p 91). The *behavioral* facet can be defined as "the capability of a person to enact his or her desired intended actions to a given cultural situation" (Early & Ang, 2003, p 91).

Organizational level CQ

Even though there are numerous questions surrounding the utility of CQ (e.g. Berry & Ward, 2006; Ward & Fischer, 2008 ; Ward, Fischer, Lam & Hall, 2008) it has been argued that it may have some utility at the organizational level of analysis. For instance, Janssens and Brett (2006), make the argument that CQ could be identified at the team level as a strategy assumed by culturally diverse teams. By recognizing and fusing together different perspectives and enhancing team member participation, potential sources of intra-team problems can be avoided and the teams will be more capable of arriving at original, novel, and imaginative solutions that are connected to current knowledge and structures that exist within a team.

These observations are highly conceptual, but they do make the empirical assessment of CQ as an organizational level phenomenon a highly attractive proposition, especially when placed within the context of observations made in regards to applying intelligence as an organizational level concept (e.g. Akgün et al, 2007; Albrecht, 2003; Glynn, 1996; Huy, 1999; Mayer, Caruso, & Salowey, 2000; McMaster, 1996; Stalinksi, 2004; Weber, Liou, Chen, & Numaker, 1996).

The perspectives offered in regards to organizational intelligence are largely fragmented due to researchers from various epistemological perspectives providing their insights (Glynn, 1996). However, all of these perspectives do converge in the sense that they postulate about the existence of intelligence as an organizational, rather than solely an individual level phenomenon. Despite being of great promise, the greatest challenge to all of these perspectives is avoiding the

anthropomorphism of organizational intelligence by assuming that organizational intelligence is a human characteristic reflected by an organization (Glynn, 1996). Therefore, great care should be taken in conceptualizing intelligence, and by extension, CQ, at the organizational level of analysis.

Composition models

Fortunately, many advances have been made in regards to multi-level exploration of psychological constructs. One of the most notable of these advances is that of composition models as proposed by Chan (1998). Chan points out that constructs can be similar, yet different at different levels of analysis, and states that composition models can help "specify the functional relationship among phenomena or constructs at different levels of analysis…that reference essentially the same content but that are qualitatively different at different levels" (Chan, 1998, p. 234). Composition models are therefore helpful aids for "conceptual precision in construct development and measurement" (Van de Vijver & Fischer, 2008, p. 19).

One of the most basic of Chan's models, as displayed in Table 1, is the *direct consensus model* which dictates that the meaning of a higher level construct can be derived from the consensus among lower level units. By utilizing this model it may be argued that organizational CQ may be assessed as a product of the extent to which individuals within organizations are similar in terms of their own levels of CQ. Therefore, by assessing the levels of CQ of individuals who are situated within organizations, it may be possible to infer whether organizational CQ is a plausible concept.

A high rate of similarity in terms of CQ between individuals within an organization does not preclude a potential shift in meaning of CQ as a concept from the individual level to the organizational level of analysis. As pointed out earlier, phenomena may have different meanings

at different levels of analysis. An example of such a shift in meaning is the conceptual difference in pregnancy rates as compared to individual pregnancies. It is possible to determine pregnancy rates at the population via attaining a consensus among women regarding their individual pregnancy status. However, individual women can only be pregnant or not, thereby making it impossible to apply a 20% pregnancy rate meaningfully to any individual woman within a population or an individual woman's pregnancy status meaningfully to a population as a whole (Marsella, Dubanowski, Hamada, Morse,2000). Due to this potential shift in meaning, it is imperative to assess the shift in meaning of constructs when they are applied across multiple levels of analysis.

Assessing shifts in meaning across levels of analysis

With a construct like CQ, especially when conceptualized in terms of Chan's direct consensus model, it is likely that it may have a similar meaning at both the individual and organizational level of analysis. However, it is also likely that the meaning may shift, or that there is a potential factor beyond group membership that may affect the meaning of CQ across levels of analysis. According to Van de Vijver and Fischer (2008) these three contingencies are known respectively as *isomorphism*, *non-isomorphism*, or *interactions* across levels of analysis.

From a practical standpoint, this type of meaning shift may be avoided by conceptualizing CQ as a purely individual or a purely organizational level phenomenon. However, due to the elegance and parsimony of utilizing individual level data to infer phenomena at higher levels of analysis, it is attractive to use CQ as conceptualized at the individual level of analysis to help determine organizational CQ.

Furthermore, not only has CQ been discussed as a scalar construct at the individual level of analysis, but an accompanying 20 item psychometric instrument, the Cultural Intelligence

Scale (CQS), has been constructed to reflect this conceptualization (Ang, Van Dyne, Koh, & Ng, 2004). This scale offers a convenient method for attaining self-report data that is indicative of individuals' CQ.

If this scale can be illustrated to have meaning at the organizational level of analysis, there would be compelling evidence to use it to assess organizational CQ, and potentially use the information gained in such an initiative as an indicator of organizational 3C. The examination of these issues is the aim of Study 1, and can be stated formally as a hypothesis:

Hypothesis 1: CQ as measured by the CQS will have a stable structure with an interpretable meaning at the organizational level of analysis similar to that obtained at the individual level of analysis.

Study 2: Organizational Level Construct Validation of the CQS

If the CQS can be shown to have a meaningful interpretation at the organizational level of analysis, determining whether it has meaningful relationships with established organizational level constructs will further extend its utility. Study 2 was therefore conducted to determine whether evidence for the construct validity of the CQS could be found. An attractive set of constructs for attaining such evidence are those related to organizational diversity management.

CQ as predictor of diversity related organizational outcomes

When managed poorly, diversity-related problems can crop up and cause a wide variety of organizational problems at both the individual as well as the organizational level of analysis. Therefore, if the measures of organizational CQ could be linked empirically to the outcomes of diversity management practice, compelling evidence will be available for the association of CQ with successful diversity management practices.

From a theoretical perspective, support can be found for linking CQ to diversity related outcomes. It has been argued, for instance, that CQ constitutes an important organizational asset in terms of the successful management of diversity. Early, et al. (2006) as well as Bucher (2008) noted that CQ can be utilized to harness diversity and build successful international teams and organizations. Bucher (2008) notes that cultural diversity as well as cultural context has a tremendous impact on the functioning of organizations and teams. Cultural diversity, defined by Bucher (2008) in terms of cultural, religious and ethnic background, may even impact workplace issues such as scheduling meeting times, the type of food to serve at meetings, and what to wear. Similarly, the cultural context, defined as the ideas, values, beliefs of individuals which interact with a particular setting, may have a profound impact on interactions among individuals (Bucher, 2008).

To successfully navigate cultural tensions as well as facilitate the development of a healthy diversity climate within an organization, Bucher (2008) notes that it is imperative for organizations to recognize cultural diversity. Without this recognition, an organization may be completely blind to the impact of cultural diversity and the cultural context in which it functions. Therefore, an organization that does not recognize the operational impact of cultural diversity will not be able to successfully harness the capabilities of its workforce, and will likely encounter other problems. He claims that organizations should also be able to understand how behaviors related to accomplishing tasks interconnect with relationship-building behaviors (e.g. understanding, motivating, and communicating) in different cultural contexts. To gain this type of understanding, he suggests that organizations should seek to balance accomplishing their tasks with attempts to show appreciation of differences, setting ground rules for facilitating inclusive discussions of diverse viewpoints, examining culturally derived assumptions, as well as

collaborating, and compromising when necessary to resolve conflicts (Bucher, 2008). Bucher (2008) argues further that when organizations recognize intra-organizational cultural fault lines, they are likely to be motivated to prevent problems arising from those fault lines.

Bucher's theorizing suggests that organizational CQ may enable organizations to manage diversity related issues more effectively. No existing empirical evidence is available to support this contention. However, this assertion can be tested by measuring CQ and the outcomes of diversity management practices.

Linking organizational CQ to equal opportunity climate

The outcomes of diversity management practices have long been of interest to the United States DOD. Evidence of this interest can be found in the establishment of the Defense Equal Opportunity Management Institute (DEOMI) and the wide use of the Defense Equal Opportunity Climate Survey (DEOCS).

This interest was spurred initially by both the civil rights movement and the realization that diversity was an operational reality in the Armed Services (Estrada Stez, & Harbke, 2007). The equal opportunity and diversity initiatives enacted within the Department of Defense eventually led to stable research programs (e.g., Dansby & Landis, 1998; Knouse & Dansby, 1999; Rosenfeld, Thomas, Edwards, Thomas, & Thomas, 1991) aimed at assessing equal opportunity (EO) climate in military organizations through assessment devices such as the Military Equal Opportunity Climate Survey (MEOCS) and its successor the DEOCS.

EO climate overlaps considerably with notable definitions of diversity climate (e.g. Cox, 1993; Van Knippenberg, & Schippers, 2007; Kossek, & Zonia, 1993) as reflected in the following definition:

> "The expectation by individuals that opportunities, responsibilities, and rewards will be accorded on the basis of a person's abilities, efforts and contributions, and not on race, color, sex, religion, or national origin. It is to be emphasized that this definition involves the individual's perceptions and may or may not be based on the actual witnessing of behaviors" (Dansby & Landis, 1991, p. 392).

Diversity climate, as traditionally defined, is typically assessed in terms of individuals' evaluations of and methods for dealing with workplace diversity (Van Knippenberg & Schippers, 2007), whereas EO climate focuses more specifically on perceptions of the opportunities and potential favoritism afforded to groups of employees which are defined in terms of race, color, sex, religion, or national origin (Dansby & Landis, 1991). In other words, EO climate can be described as the perceptions of outcomes of diversity management practices within organizations in the tradition of the referent shift/cross-level effects strategy (as described by Chan, 1998) for assessing organization level characteristics. Consequently, EO climate may be used to obtain meaningful evidence for the construct validity of CQ as assessed by the CQS at the organizational level of analysis.

Components of EO climate that are of particular utility to this endeavor are those related to Sexual Harassment and Sex Discrimination, Differential Command Behavior, Positive Equal Opportunity Behaviors, Racist Behaviors, and Religious Discrimination. Based on observations such as those by Bucher (2008), it is possible to argue that greater organizational CQ will increase positive EO related outcomes and decrease negative EO related outcomes. These are

the propositions that were assessed in Study 2, and as such as formally articulated in the following hypotheses:

Hypothesis 2: Organizational CQ will be negatively related to perceptions of sexual harassment and sex discrimination.

Hypothesis 3: Organizational CQ will be negatively related to perceptions of differential command behavior toward minorities.

Hypothesis 4: Organizational CQ will be negatively related to perceptions of racist behaviors

Hypothesis 5: Organizational CQ will be negatively related to perceptions of religious discrimination.

Hypothesis 6: Organizational CQ will be positively related to perceptions of positive equal opportunity behaviors.

CQ as Predictor of Organizational Performance

Beyond CQ's contribution to positive diversity related organizational outcomes, Early et al. (2006) as well as Bucher (2008) make extensive arguments for the impact of CQ on organizational performance. These authors view CQ, at the individual level of analysis, as a critical component to long term organizational performance in different cultural settings. Earley et al. (2006) point out that CQ is the cornerstone of the international success of any organization. According to Early et al. (2006) CQ can lead to sound global leadership practices, which ultimately may result in the success of any international organization. These authors note that global leadership involves *formulating a global vision* (setting the future direction of international units of an organization), *communicating that vision across cultures* (communicating with international employees to foster as sense of shared destiny and identity*),*

planning, budgeting and scheduling of goals in accordance with the vision (establish the means by which the vision should be accomplished*), designing local organizational structures* (building an appropriate structure for international organizational units and staffing those units appropriately*), influencing and motivating international employees* (developing business processes, delegating authority and responsibilities, and streamlining workflow), as well *as monitoring and controlling the performance of international employees* (monitoring results, solving deviations from prior plans, and delivering adequate feedback) (Earley et al., 2006).

At each of the steps involved in global leadership, individual level CQ may enable global managers to help facilitate the long term success of an organization. Similarly, it can be expected that organizational level CQ would also have a positive impact on long term organization performance. Currently, no empirical evidence is available to link individual CQ to organizational level performance, as CQ has never been measured at the organizational level of analysis. If organizational CQ can be shown empirically to be an antecedent of organizational performance, the utility of organizational CQ as a concept would be greatly enhanced.

Beyond EO climate, the DEOCS also conveniently assesses perceptions of a number of organizational effectiveness (OE) outcomes including perceptions of Work Group Cohesion and Work Group Effectiveness. Therefore, the impact of a construct such organizational CQ on performance related work group outcomes may be assessed by using the DEOCS as a data collection tool. It is likely that organizational CQ will have a positive impact on OE related outcomes. Consequently, the following hypotheses can also be examined:

Hypothesis 7: Organizational CQ will be positively related to perceptions of work group cohesion.

Hypothesis 8: Organizational CQ will be positively related to perceptions of work group effectiveness.

Method

Participants

Data were obtained from DOD employees (N = 5457) representing 76 organizations with a minimum membership of 20 members. Average organization membership was 71.78, ranging from 20 to 204 members. A summary of the descriptive statistics of the sample included is provided in Table 2.

Measures

The 20 item CQS (Ang et al, 2004) was attached to the DEOCS to assess CQ. The DEOCS is a management tool that allows for the proactive measurement of critical organizational climate dimensions that can affect organizational effectiveness in both military and civilian contexts. More specifically, the DEOCS is a self-report measurement instrument that assesses EO and organizational effectiveness (OE), as specified in Table X.

Procedure

The DEOCS is managed by the Defense Equal Opportunity Management Institute (DEOMI). DEOMI deploys the DEOCS as both an online and pen and paper based instrument at the request of a military commander or at the request of leaders of civilian federal organizations. When requested, all members of organizations are asked to complete the DEOCS. Consequently, organizational groups were conceptualized as all of the respondents that provided responses at the request of a single commanding officer or civilian organizational leader. Through the online administration procedure, an invitation to complete the DEOCS containing a web link to the online instrument is distributed to all organizational members. In this invitation organizational

members receive instruction regarding the purpose of the DEOCS and are assured that all of the data they provide will be treated as strictly confidential.

Study 1 Results

Preparation of Data

Prior to analysis of the data, a preliminary data screening procedure was followed. This procedure involved removing all missing data from the dataset as well as deleting cases in which evident response pattern could be detected. Even though it was certainly plausible that an individual respondent could accurately and honestly provide 20 uniform responses at the low or the high end of the CQS, it was deemed more probable that such responses patterns were indicative of aberrant rather than truthful responses. Therefore, all cases were deleted in which uniform values of either 1 or 5 were detected for all 20 items of the CQS.

Justification for Aggregation

To explore the CQS data, a data analytical methodology promoted by noted cross-cultural psychology methodologists Fons van de Vijver and Ronald Fischer (2008) was utilized. This methodology is outlined in greater detail in Table 3.

To infer the individual level meaning of the CQS, an individual level principal components analysis (PCA) with Varimax rotation was performed. The results, provided in Table 4, confirmed the proposed 4 factor structure of the CQS at the individual level of analysis. Subsequently, descriptive and reliability statistics along with ICC(1), ICC(2), a_{wg}, and scale inter-correlations (displayed in Table 5) were calculated for each of the CQS sub-scales.

All of the CQS sub-scales exhibited high reliability, reflected by the alpha values in excess of .90. Additionally, all of the CQS subscales exhibited inter-correlations that were

congruent with previous findings such as those of Ang et al. (in press). From these results it is evident that the CQS functioned as it was designed to at the individual level of analysis.

Limited support, however, was available for aggregating the CQS subscales to the organizational level. The ICC(1) values obtained for the CQS subscales ranged from .02 to .04. Furthermore, the a_{wg} values obtained for each of the CQS subscales were below .70 as specified by Brown and Hauenstein (2005). Taken together, the ICC(1) and a_{wg} values do however suggest that there is some group level dependence within the data. ICC(2) values, ranging from .54 to .76, while not exceptionally high, were substantially different from zero, indicated that there may be some type of emergent property to the CQS data at the organizational level of analysis. In other words, the high ICC(2) values may be taken to suggest that aggregation of the CQS subscales may be useful to measure constructs somewhat different than those measured at the individual level of analysis by the CQS.

Multi-level Analyses

Taken together, the initial analyses indicate that the CQS certainly functions better as an individual level assessment, however, that there may be able to offer some insights at the organizational level of analysis. Therefore, in the spirit of further exploration and to clarify the meaning of the CQS at the organizational level of analysis, an examination of the CQS factor structure at a higher level of analysis was performed. This analysis was also performed according to the steps advocated by Van de Vijver and Fischer (2008). Firstly, the pooled within-matrix of all of the CQS items, provided in Table 6, was computed and subjected to a PCA with Varimax rotation. The results of this analysis, displayed in Table 7, revealed that all items had item loadings that were completely congruent with the proposed structure of the CQS. Subsequently, all items were aggregated to the organizational level of analysis. A correlation

matrix of these items is provided in Table 8. A PCA with Varimax rotation was performed using these items without specifying a desired factor solution. The results of this analysis, provided under the heading "Analysis 1" in Table 9, indicated that the CQS did not maintain its 4 component structure at the organizational level of analysis. Rather, the CQS exhibited a 3 component structure at this level of analysis, as evidenced by the three obtained eigenvalues in excess of 1.00. This solution allowed for the identification of 3 factors that were congruent with the individual level CQS motivational, behavioral, and cognitive components.

The items associated with the individual level meta-cognitive component did not exhibit factor loadings that allowed for the identification of a congruent meta-cognitive component at the organizational level of analysis. Because only 3 components were found at the organizational level of analysis, it was not possible to perform a Procrustean target rotation as specified by Van de Vijver and Fischer (2008) for lack of an a priori way to match up the items. These preliminary results indicated that the CQS does not have an isomorphic structure at the individual and organizational level of analysis.

To verify these results, another PCA was performed on the aggregated CQS items. In this analysis a 4 component solution was specified a priori. The results obtained from this analysis, displayed under the heading "Analysis 2" in Table 9, were supportive of the conclusions drawn from the previous PCA. Only 3 components, reflecting the individual level motivational, behavioral, and cognitive components of the CQS, had eigenvalues in excess of 1.00. The ultimate goal of this factor analysis was not only to reassess the structure of the CQS at the organizational level of analysis, but also to compare this factor structure to the one obtained at the individual level of analysis. By specifying a 4 component solution a priori, it was possible to derive rotated items loadings that could be subjected to a Procrustean rotation.

The Procrustean target rotation was performed with the rotated item loadings from the second PCA performed at the organizational level of analysis rotated to fit the target as specified by the PCA rotated loading obtained at the individual level of analysis. The results of this analysis indicated that all 4 of the components exhibited perfect isomorphism at the individual and organizational levels of analysis, with Tucker's Phi values for each of the 4 components equaling 1.00, indicating perfect isomorphism. Considering the rule of thumb which dictates that values in excess of .95 indicate invariance or isomorphism, this exceptionally high value is not entirely aberrant. In fact, values in excess of .99 are commonly found (e.g. Vedder & Van de Vijver, 2006). These results contradicted the results of the previous organizational level PCAs which did not provide support for the isomorphic factor structure of the CQS at the individual and organizational levels of analysis.

To reconcile these results, it was noted that both PCAs performed on the aggregated CQS items, as well as the Procrustean target rotation, provided support for the isomorphism of cognitive, motivational and behavioral components, but not the meta-cognitive component of the CQS. Only the Procrustean target rotation provided support for the use of the meta-cognitive component at the organizational level of analysis. It should be noted that this study was intended as an exploratory exploration, and should serve as the basis for further inquiry rather than provide definitive evidence for the multilevel use of the CQS.

CQS Subscale Inter-Correlations

Correlations were computed between the 4 components of the CQS at the organizational level of analysis. These correlations along with organizational level descriptive statistics of the scales are provided in Table 10. The correlation table revealed substantial inter-correlations

between all of the CQS subscales except for those representing the cognitive and the motivational components of the CQS.

Discussion

The results of this inquiry provide clear support for the 4 component structure of the CQS at the individual level of analysis. However, when aggregated, initial exploration revealed only limited evidence is available for the 4 component structure of the CQS with the majority of the evidence suggesting that the CQS does not have an isomorphic structure at the individual and organizational levels of analysis.

Despite the limited amount of evidence for equivalence across levels of analysis, further exploration did reveal evidence for an interpretable 3 component structure did emerge at the organizational level of analysis. The 3 components that were observed at the organizational level of analysis, behavioral, cognitive, and motivational, were identical to their counterparts at the individual level in item assignment, indicating isomorphism. These results were, however, tempered by the aggregability statistics that were observed. The ICC(1) and a_{wg} values suggested limited between group differences and within group agreement for all three of the CQS components identified at a higher level of analysis while the ICC(2) values suggested that all four of the CQS components did measure an emergent quality of the groups assessed. As pointed out before, ICC(2) values that are substantially different from zero are one of the best indicators of emergent properties in data (Bliese & Jex, 2002). Additionally, Van de Vijver and Fischer (2008) point out that while ICC(1) values larger than 0.05 are needed to justify aggregation, values as small as .001 indicate *some* degree of non-independence, or grouping effect in the data, and may therefore also be used as justification for aggregation.

Considering the observations of Van de Vijver and Fischer (2008) as well as the those of Bliese and Jex (2002), there may be value in considering the CQS at a higher level of analysis, particularly the motivational and behavioral components of the scale which were found to have the highest aggregability statistics and stable factor structures at both the individual and organizational level of analysis.

Even though the CQS may have utility at the organizational level of analysis, it is necessary to explore the reasons why its meta-cognitive component did not receive definitive support for use at the organizational level of analysis. One reason was alluded to by the aggregability statistics displayed in Table 6. Upon first glance, judging by the low ICC(1) value for this scale, it is evident that there are relatively few differences between the groups in the sample on Meta-cognitive CQ. From a statistical perspective therefore, Meta-cognitive CQ may inherently be more of an individual level construct rather than an organizational level construct as it varies more at the individual level of analysis than at the organizational level of analysis.

Another possibility for the limited support for Meta-cognitive CQ at the organizational level of analysis is that it is arguably the most abstract of all of the CQS components. Respondents may have more difficulty grasping the questions associated with this construct than the other constructs assessed by the CQS, which may cause them to provide answers that are less accurate compared to the answers provided for the questions assessing the other components of the CQS. This type of responding may, theoretically, contribute to the low between group differences and within group agreement indices that were observed.

Beyond statistical findings, the non-isomorphism of the meta-cognitive component may be attributed to conceptual or method related problems as well. It is possible that the conceptualization of the meta-cognitive component of the CQS does not allow for the

measurement of emergent properties of organizations while the conceptualization of the other components do allow for isomorphic measurement. Therefore, a different conceptualization of meta-cognition at the organizational level of analysis may be warranted. Furthermore, it is also possible that the method of data collection had an impact on finding non-isomorphism of the meta-cognitive component. By asking respondents different questions, or using a completely different assessment methodology, an isomorphic measure of organizational meta-cognition may be obtained at both the individual and organizational levels of analysis.

Study 2 Results

Data Preparation

Several demographic variables that might explain variability in EO behaviors and organizational performance were assessed by the DEOCS: respondents' service membership, age, gender, and deployment status. To allow use of these data at the aggregate level of analysis, units were assigned values on these variables when possible. Service membership, age, gender, and deployment status were assigned values based on the majority of individual unit members' reported status on these items. When the unit was nearly evenly split on a variable, it was given a missing value. This type of assignment is not altogether satisfactory because, at a simple statistical level, it fails to take account of heterogeneity of the units and, at a more complex theoretical level, the implications of a mixed group (even when a clear majority was present) for emergent group characteristics. Therefore, to the extent any effects were found for these imperfect unit level demographic assignments, it could be argued that they constitute a strong test.

Data Aggregation

Descriptive, reliability, and aggregability statistics were computed for each of the DEOCS criterion measures (see Table 11). Table 12 displays all of the correlations among the scales considered in

Study 3. All of the DEOCS scales except *Religious Discrimination* and *Positive EO Behaviors* had ICC(1) values in excess of .05. Furthermore, all of the DEOCS scales other than *Positive EO Behaviors* had ICC(2) values in excess of .70. Even though the ICC(2) value for Positive EO Behaviors was below .70, it was still high enough to warrant further investigation of this scale at the organizational level of analysis. Collectively, these results indicate that there is dependency within the data and that most of the group means are reliable and therefore indicative of assessing emergent properties of the units within the sample. Considering these results, the aggregation of the DEOCS scales to the unit level of analysis was deemed to be acceptable.

In contrast to the ICC values, the a_{wg} values for all of the DEOCS scales were low, indicating that group members did not agree about the issues assessed by the DEOCS. Even though this finding was not ideal in terms of justifying the aggregation of DEOCS data to the organizational level of analysis, it was not considered inherently problematic as the DEOCS is designed to assess the differences in perception among different groups of employees within units.

MANOVAs

A MANOVAs were computed in which the dependent variables included sexual harassment, differential command behaviors toward minorities, racist behaviors, religious discrimination, positive EO behaviors, work group effectiveness, and work group cohesion. The results of these MANOVAs are displayed in Table 13.

In the first MANOVA, the four aggregated CQS measures were entered as predictors. The strongest predictor was Motivational CQ, $F = 4.32$, $p \leq .001$, partial $\eta^2 = .41$. Cognitive CQ was also significant, $F = 1.96$, $p \leq .05$, partial $\eta^2 = .41$, but Meta-cognitive CQ ($F = 1.50$, $p > .05$, partial $\eta^2 = .20$) and Behavioral CQ ($F = .83$, $p > .05$, partial $\eta^2 = .12$) did not approach significance. Results for individual dependent variables are presented in a later section.

In the second MANOVA, the demographic variables, service branch, age, gender, deployment status, and employee type were added as control variables to determine if the CQS-DEOCS relationships found in the first MANOVA were confounded by these variables. Results were consistent with the first

MANOVA, with Motivational CQ remaining significant (F = 2.59, $p \leq .05$, partial η^2 = .45). However, Cognitive CQ only approached significance in this analysis (F =1.81, p = .10, partial η^2 = .36). These results indicate that relationships between the cognitive CQS component and the criterion measures may be confounded by the control variables while the relationships between the other CQS components and the criterion variables are not confounded. The only significant demographic effect was branch membership (F = 1.98, p< .05, partial η^2 = .37), such that the Navy evidenced the best EO and performance behaviors. The remaining demographic effects were not significant: gender (F = 1.77, p> .05, partial η^2 = .36), age (F = 1.04, p> .05, partial η^2 = .25), deployment status (F = .88, p> .05, partial η^2 = .21). These control variables were entered in order of the magnitude of their effect sizes into the individual regression equations associated with the assessment of the hypotheses, reported below

Hypothesis Testing

Hypothesis 2 concerned sexual harassment and sex discrimination. The aggregated CQS variables, when considered in combination, yielded a significant change in R^2 over the control variables (ΔR^2 =.22 , ΔF =3.80 , p<.05) and therefore predicted aggregated sexual harassment significantly. However, the only aggregated CQS component that had a significant beta weight in the direction specified was Motivational CQ. The same results were obtained for *Hypothesis 3* (ΔR^2 =.23 , ΔF =3.83 , p<.05), *Hypothesis 4* (ΔR^2 = .17 , ΔF =3.09 , p<.05), and *Hypothesis8* (ΔR^2 = .32, ΔF =5.85 , p<.05), indicating that the CQS components were significant predictors of differential command behaviors, racist behaviors and work group cohesion, respectively, and that only the motivational CQ component contributed uniquely to the models, The pattern of relationships between Motivational CQ and the criterion measures was consistent with the hypotheses, that is, higher unit-level cultural intelligence was related to better unit level performance.

In assessing *Hypothesis 5* (religious discrimination), it was discovered that the CQS components produced a significant change in R^2 (ΔR^2 =.37, ΔF =7.83, p<.05), however, diverging from the pattern discussed above, both the cognitive and motivational components of the CQS were found to have significant beta weights. The assessment of *Hypothesis 6* (work group cohesion) also revealed a deviation

from the previous pattern *(ΔR^2 =.33, ΔF = 6.98, p<.05)*, such that the meta-cognitive component of the CQS exhibited a significant beta weight. The assessment of *Hypothesis 7* (work group effectiveness) deviated from the previous pattern as well (ΔR^2 =.24, ΔF =4.12, *p<.05*), such that the cognitive component of the CQS, and not the motivational component, exhibited a significant beta weight. Furthermore, the beta weight attained for the cognitive component ran contrary to the direction specified in the hypothesis. The MANOVA results reported previously suggest that Meta-cognitive CQ findings should be interpreted with caution.

These results, as displayed in Table 14, are largely consistent with the correlations displayed in Table 12. The motivational CQ component exhibited significant negative correlations with all of the Equal Opportunity DEOCS scales (except Positive EO Behaviors) and positive correlations with both of the Organizational Effectiveness DEOCS scales that were considered. However, the correlations obtained between the Cognitive CQS component and the other scales considered are all non-significant, which undermines the results obtained in the hierarchical regression assessment of *Hypotheses 4* and 7.

Discussion

Considering the results of this inquiry, which focused on unit-level aggregation of the original CQS scales, MANOVAs revealed that the CQS scales accounted reliably for the DEOCS measures when considered together. Motivational CQ was the strongest and most reliable predictor. Partial support was found for all of the hypotheses. In none of the regression analyses did all of the CQS components attain significant beta weights. The motivational component of the CQS emerged as the best predictor of all of the dependent variables except positive EO behaviors and work group effectiveness. These results indicated that the motivational component of the CQS, when aggregated to the organizational level of analysis, may be a good indicator of organizations' diversity climate, but not their performance abroad or at home, as assessed by unit level commendations.

It was noted that the strongest demographic variable predictor that emerged in Inquiry 1 was respondents' service branch. In this inquiry, the service branch effect was almost as large as the strongest CQ predictor. This was an unexpected result, and one that would require further investigation. It indicates that the branches may differ systematically on EO and performance measures. However, despite the large sample size employed in this study, it cannot be ruled out that the sampled units were idiosyncratic, suggesting the need for additional research.

In Inquiry 1, the motivational component of the CQ emerged as the predictor that consistently and significantly predicted the criterion variables in the hypothesized directions. This was not an entirely surprising result as the motivational component of CQ has been noted to be one of the strongest components of the CQS as assessed at the individual level of analysis (e.g. Van Dyne, Ang, & Koh, 2008). In some sense, the results obtained in this inquiry replicated results attained at the individual level indicating Motivational CQ to be superior compared to other components of the CQS in predicting criterion variables such as individual's self reported adjustment in other cultures and mental well-being while in another culture (Van Dyne, Ang, & Koh, 2008, Ward, Fischer, Lam, & Hall, 2008). The strong relationships observed between this variable and the criterion measures may be ascribed to a number of things, the least ideal of which is common method bias, including socially desirable responding,. However, it is also likely that this component of the CQS is the most viable as an emergent measure of organizational CQ given the similarity of the present results to earlier individual level studies.

Another critical point to note is that the results of this inquiry are likely not artifacts of a large sample. In Study 1 the inordinately large individual level sample made for difficult interpretation of comparisons between groups as well as other results. In Study 2, however, this large sample was aggregated to produce a smaller unit-level sample size. Due to this smaller

sample size, however, the difficulty coding the demographics of organizations, as discussed previously, constituted a substantial problem. With ambiguity in terms of demographic make-up, some organizations were not classified as belonging to one demographic category or another, and were therefore omitted from the analyses performed in Study 2.

Despite these shortcomings, Study 2 demonstrated that organizational CQ may provide some predictive utility for other organizational phenomena. In particular, the motivational component of the CQS and the knowledge component of the OCQ measure may prove to be valuable assessment instruments.

General Discussion

The focus of the study was to examine the viability of two competing approaches of assessing CQ at the organizational level of analysis. Both approaches received some support, as evidenced by the results of Studies 1, 2, and 3.

In Study 1, *Hypothesis 1* was partially supported providing evidence for the application of the CQS at the organizational level. Moreover in Study 2, *Hypotheses 2* to 8 also received partial support, thereby providing evidence for the use of the CQS at the organizational level of analysis as a viable predictor of organizational EO climate and organizational OE outcomes.

These results are compelling as they illustrate that CQ does have potential application at the organizational level of analysis. However, beyond providing support for the hypotheses, the results obtained in both studies illustrated how multilevel data analytic approaches that are prevalent in cross-cultural psychology may be applied to organizational contexts.

The results indicated that it is possible to blend conceptualizations of group level phenomena that are derived from organizational theory (e.g. Chan's Composition models discussed in Table 1) with multi-level research methodologies that are strongly rooted in cross-

cultural psychological theory. Through using Chan's composition models (1998), it was possible to conceptualize the organizational phenomena of interest in terms of the processes that would be used to aggregate individual level data to the organizational level of analysis. By employing cross-cultural multi-level data analytic techniques, it was possible to empirically verify the soundness of the data aggregation techniques that were utilized. This approach is supported in a recent article by Fischer (in press) that stresses the importance of applying innovations stemming from organizational theory, such as Chan's conceptualization of composition models, to more traditional cross-cultural research endeavors. Fischer (in press) noted that by using this type of approach it is not only possible to more accurately conceptualize phenomena at aggregated levels of analysis, but also to verify the viability of phenomena at higher levels of analysis.

One issue that is central to both Fischer's observations as well as the current study is that of emergence. Fundamentally, this study was aimed at assessing emergent properties of organizations by taking individual level data into account. When addressing emergent properties of collectives, such as organizations or cultures, in this manner, it is possible that shifts in meaning may occur in the data. This type of shift in meaning was detected in Study 1 as evidence was found that the CQS, which is a 4 component measure at the individual level of analysis, may be more viable as a 3 component measure at the organizational level of analysis with the omission of one of its individual level components, namely Meta-cognitive CQ.

Limitations

Even though this inquiry suggests some potential for expanding the understanding of CQ at the organizational level of analysis as well as the use of multi-level statistics to assess emergence of organizational level phenomena from individual level data, it is not without

limitations. Therefore, limitations associated with method bias and the psychometric procedures that were utilized should be discussed.

Method bias is an inherent limitation to all large scale psychometric inquiries due to the difficulty associated with obtaining varied types of data for large samples of respondents. Ideally, various sources of data should be assessed. Obtaining such varied data sources, however, is rarely practical. Therefore, the risk of exposure to method bias is always present in large scale psychometric research endeavors and therefore constitutes the opportunity cost for attempting to conduct large scale psychometric research endeavors.

In terms of the statistical procedures that were used, it should be noted that Procrustean rotation as a technique has received some critical scrutiny. McCrae et al. (1996) point out that the practice of imposing a pre-determined factor structure on data has caused Procrustean rotations to be treated with a level of suspicion by theoreticians. This criticism is derived from an article by Horn (1967) which argued that random variables could be forced into factor solutions that were interpretable. However, Procrustean rotation has been used with great effect by researchers such as Paunonen, Jackson, Trzebinksi, and Fosterling (1992) and McCrae et al. (1996). Procrustean rotation, as it was used in this study was a useful tool to examine the factor structure of the CQS at multiple levels of analysis.

Despite offering this type of utility, the exploratory nature of Procrustean rotation used within a PCA framework has a substantial limitation: All results obtained from this type of methodology results are largely data driven rather than theory driven. An alternate approach to the exploratory approach that was utilized is the more theory driven confirmatory approach. This approach allows for the assessment of theoretically informed multi-level models (Fontaine & Fischer, in press). However, this approach requires assumptions beyond those needed within

the exploratory framework such as multivariate normality (Fontaine & Fischer, in press). The confirmatory approach therefore places more constraints on data, thereby increasing the difficulty to find regularities in data at the individual and organizational levels of analysis compared to an exploratory approach (Fontaine & Fischer, in press).

This consideration, made the use of exploratory techniques not only acceptable, but also advisable in this inquiry. The foundation provided by this study can, and should be used in future research as the justification for conducting inquires utilizing more rigorous confirmatory analytic techniques. By conducting such studies, theoretical and measurement refinements will likely result.

Another concern may be noted in terms of the data analytic procedures prescribed in Study 2. By performing a large number of regression analyses to assess the criterion validity of organizational CQ, there was a heightened risk of finding chance results, that is, making a Type I error. Given that the current inquiry is largely exploratory in nature, perhaps this risk is acceptable. Furthermore, by performing a MANOVA, and using its results to corroborate those of the regression analyses, the likelihood of finding chance results was substantially reduced.

Future Research

It is imperative that more studies using CQ at the organizational level should be performed. To this aim, the current study can be replicated with a civilian sample or other measures of organizational CQ can be developed and assessed with the methodology utilized in this inquiry. Beyond these initial studies, it will be necessary to perform studies in which a

confirmatory factor analytic (CFA) approach will be used rather than the exploratory approach used in this inquiry.

Such studies will be able to utilize the results obtained in the current study to assess the differences within and between organizational groups in greater depth and possibly with greater accuracy (Fontaine & Fisher, in press). Ultimately, research conducted in this vein will help establish a well integrated theoretical and analytical framework in which CQ may be assessed at both the individual and the organizational levels of analysis. Furthermore, by utilizing a confirmatory approach incorporating marker variables as discussed by Lindell and Whitney (2001) as well as Malhotra, Kim,and Patil (2006), it will be possible to assess the potential impact of suspected common method bias associated with the use of the DEOCS from a theoretically sound perspective.

Conclusion

The methods and results of the current inquiry constitute advancements in terms f the understanding and assessment of CQ as an organizational level construct. However, the results obtained should serve only as incentive for further inquiry. It is, therefore, the author's hope that the initial exploration and the methodology employed in this inquiry will serve to inspire other organizational researchers to seek and employ novel methodologies to further assess the utility of constructs like CQ as indicators of organizational 3C.

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Table 1. Chan's (1998) Typology of Composition Models

Functional relationships	**Typical operational combination**	**Empirical support**	**Example from climate research**
Additive model Higher level unit is a summation of the lower level units regardless of the variance among these units	Summing or averaging lower level scores	Validity of additive index (e.g., mean of lower level units)	From *psychological climate* to *organizational climate* (Glick's [1985] conceptualization)
Direct consensus model Meaning of higher level construct is in the consensus among lower level units	Within-group agreement to index consensus and justify aggregation	Value of within-group agreement index (e.g., r_{wg}); validity of aggregated scores	From *psychological climate* to *organizational climate* (Jarnes et al.'s [1984] conceptualization)
Referent-shift consensus model Lower level units being composed by consensus are conceptually distinct though derived from the original individual-level units	Within-group agreement of new referent lower level units to index consensus and justify aggregation	Value of within-group agreement index (e.g., r_{wg}); validity of aggregated scores	From *psychological climate* to *organizational collective climate*

Table 1 (Continued)

Functional relationships	Typical operational combination	Empirical support	Example from climate research
Dispersion model Meaning of higher level construct is in the dispersion or variance among lower level units	Within-group variance (or its derivative) as operationalization of the higher level construct	Absence of multimodality in within-group distributions of lower level scores; validity of dispersion index	From *psychological climate* to *climate strength*
Process model Process parameters at higher level are analogues of process parameters at lower level	No simple algorithm; ensure analogues exist for all critical parameters	Nomological validity for source and target constructs at their respective levels to distinguish shared core content from level-specific aspects	From *psychological climate development* to *organizational climate emergence*

Table 2. Scales Contained within the DEOCS

Scale	Description	Response format
EO/ EEO Related Scales Sexual Harassment and Sex Discrimination	Assesses perceptions of how extensively sexual harassment and discrimination (such as gender insensitive language, sexist jokes, or sexually suggestive language) are thought to occur within the respondent's unit. A typical item is, "Sexist jokes were frequently heard."	Within the last 30 days: 1) There is a *very high* chance that the action occurred. 2) There is a *reasonably high* chance that the action occurred. 3) There is a *moderate* chance that the action occurred. 4) There is a *small* chance that the action occurred. 5) There is *almost no* chance that the action occurred.
Differential Command Behavior	Assesses perceptions of differential treatment on the basis of race/ethnicity.	Same as above
Positive Equal Opportunity Behaviors	Estimates how well majority and minority members get along in the unit and are integrated in the unit's functioning. This scale addresses how frequently positive actions occur.	Same as above
Racist Behaviors	Assesses perceptions of traditional overt racist behaviors, such as name calling and telling racist jokes.	Same as above
Age Discrimination	Assesses the perceptions of whether people are discriminated against because of their age. (Only administered to civilians)	Same as above
Religious Discrimination	Addresses perceptions of discrimination based upon religion.	Same as above
Disability Discrimination	Addresses perceptions of instances of discrimination due to disabilities or handicaps. (Only administered to civilians)	Same as above

Table 2 (Continued)

Scale	Description	Response format
OE Related Scales		
Organizational Commitment	Measures “bonding” to the organization	1) Totally agree with the statement. 2) Moderately agree with the statement. 3) Neither agree nor disagree with the statement. 4) Moderately disagree with the statement. 5) Totally disagree with the statement.
Trust in the Organization	Indicator of how people perceive the organization as a place where people trust and care for each other.	Same as above
Perceived Work Group Effectiveness	Reflects the degree to which the respondent's unit is perceived to be productive and effective in accomplishing its mission.	Same as above
Work Group Cohesion	Measure of how well work groups work together, cooperate on projects, and care for and trust each other.	Same as above
Leadership Cohesion	Measure is similar to Work Group Cohesion, but focused on how members perceive leaders above them working well together.	Same as above
Job Satisfaction	Indicates the degree of satisfaction the respondent has with his or her current job.	1) Very satisfied. 2) Moderately satisfied. 3) Neither satisfied nor dissatisfied. 4) Moderately dissatisfied. 5) Very dissatisfied

Table 3 - Sample Demographics

		Air Force	Army	Navy	Marine Corps	Coast Guard	Other
Units Represented in Sample		1	21	1	13	38	2
Gender	Males	47	1078	17	1128	2112	154
	Females	10	286	10	111	344	160
Age	20-25	5	244	0	512	412	6
	26-30	24	671	8	545	1207	34
	31-39	22	316	10	152	644	67
	31-39	5	114	8	29	176	94
	40-50	1	19	1	1	17	113
Employee Type	Military Officer	18	152	15	81	276	1
	Warrant Officer	0	24	0	12	10	0
	Enlisted Member	39	1188	12	1146	2170	1
	Federal DoD civilian Employee	0	0	0	0	0	218
	Federal non-DoD civilian employee	0	0	0	0	0	16
	Other (e.g. contractor, private civilian)	0	0	0	0	0	78
Deployment Status	More than 6 months since last deployment	51	719	17	656	1459	270
	Returned from combat zone in past 6 months	5	34	0	158	330	0
	Returned from non-combat zone in past 6 months	1	16	2	169	141	5
	Deployed - CONUS	0	49	1	102	150	12
	Deployed - OCONUS, in combat zone	0	348	1	5	33	0
	Deployed - OCONUS, in a non-combat zone	0	198	6	149	343	27
Total Number of Representatives of Each Service		42	867	99	2354	3066	2307

Table 4 - Van de Vijver and Fischer (2008) Methdology

Step	Interpretation of Results
1. Calculate within-group agreement using the a_{wg} index (Brown & Hauenstein, 2005)	• Hauenstein (2005) states that .70 should be considered the lower bound for a_{wg} values.
2. Calculate the amount of variance that can be attributed to group membership using intra-class correlation (1), otherwise known as ICC(1)	• Van de Vijver and Poortinga (2002) indicate that if ICC(1) values equal .05, this indicates that group membership contributes to 5% or more of variance of a measure, which is sufficient for there to be utility in assessing group level differences of that measure.
3. Calculate the reliability of group means by using intra-class correlation (2), otherwise known as ICC(2). ICC(2) is also indicative of the extent to which group means reflect constructs in a qualitatively different manner than individual level means.	• ICC(2) values should be substantially different than zero to indicate stable group means. Values of magnitudes of .70 and higher are commonly accepted as good ICC(2) values.
4. Obtain individual level structure using principal components analysis (PCA).	• Eigenvalues in excess of 1.00 are indicative of items reflecting coherent latent components (Tabachnick & Fidell, 2006)
5. Calculate within-pooled correlation matrix.	• This can be accomplished using the discriminant analysis function in SPSS.
6. Calculate organizational level structure from within-pooled matrix using PCA.	• Eigenvalues larger than 1.00 can be used again as indicators of items reflecting coherent latent components.
7. Perform Procrustean rotation to assess the congruence of the individual and organizational level structures of the items in question.	• Tucker's Phi values in of .95 and lower are commonly used to indicate a lack of factor congruence whereas coefficients in excess of .95 as generally used to indicate close congruence (Van de Vijver & Fischer, 2008).

Table 5. Individual Level PCA Varimax Results

Items	Component Loadings			
	Cognitive CQ 1	Behavioral CQ 2	Motivational CQ 3	Metacognitive CQ 4
Q1	0.14	0.16	0.26	0.80
Q2	0.12	0.25	0.26	0.81
Q3	0.18	0.23	0.27	0.83
Q4	0.25	0.24	0.24	0.75
Q5	0.72	0.10	0.09	0.27
Q6	0.79	0.09	0.07	0.08
Q7	0.78	0.15	0.19	0.21
Q8	0.84	0.07	0.12	0.06
Q9	0.79	0.13	0.17	0.05
Q10	0.76	0.17	0.17	0.09
Q11	0.11	0.19	0.73	0.32
Q12	0.19	0.17	0.74	0.30
Q13	0.11	0.18	0.78	0.30
Q14	0.24	0.17	0.75	0.06
Q15	0.17	0.19	0.78	0.17
Q16	0.09	0.79	0.16	0.20
Q17	0.16	0.83	0.17	0.17
Q18	0.11	0.82	0.22	0.20
Q19	0.13	0.84	0.20	0.17
Q20	0.16	0.80	0.12	0.12
Eigen-value	8.39	2.63	1.96	1.32
% of Variance	41.95	13.17	9.80	6.62

Note: KMO = .94, Bartlett's Test of Sphericity: χ^2 = 71472.70, Df = 190, p<.001

Table 6. CQS Descriptive Statistics

	N	$\bar{X}$	σ	ICC (1)	ICC (2)	Mean a_{wg}	α	Individual Level Correlations		
								2	3	4
1.Metacognitive CQ	5456	3.98	.83	.03	.69	.55	.91	.41**	.61**	.51**
2.Cognitive CQ	5456	3.21	.82	.02	.54	.68	.90	-	.41**	.35**
3.Motivational CQ	5456	3.94	.80	.04	.76	.61	.89		-	.48**
4.Behavioral CQ	5433	3.53	.85	.03	.68	.62	.91			-

Note: ICC(1) and ICC(2) values were calculated for groups with 20 or more members. ** indicates $p \leq .01$

Table 7. Pooled-Within Matrix for CQS Items

Items	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
1.	1.00																			
2.	0.69	1.00																		
3.	0.74	0.78	1.00																	
4.	0.63	0.69	0.73	1.00																
5.	0.31	0.30	0.37	0.42	1.00															
6.	0.20	0.20	0.25	0.29	0.56	1.00														
7.	0.34	0.34	0.39	0.42	0.59	0.59	1.00													
8.	0.22	0.21	0.26	0.30	0.57	0.60	0.67	1.00												
9.	0.22	0.23	0.28	0.32	0.51	0.56	0.61	0.67	1.00											
10.	0.26	0.26	0.31	0.33	0.52	0.55	0.61	0.62	0.62	1.00										
11.	0.48	0.49	0.50	0.48	0.24	0.19	0.33	0.22	0.26	0.27	1.00									
12.	0.46	0.47	0.50	0.47	0.31	0.25	0.38	0.28	0.29	0.33	0.67	1.00								
13.	0.48	0.47	0.50	0.46	0.25	0.18	0.34	0.22	0.24	0.27	0.62	0.71	1.00							
14.	0.32	0.34	0.35	0.36	0.29	0.27	0.33	0.29	0.32	0.29	0.54	0.52	0.53	1.00						
15.	0.40	0.43	0.44	0.41	0.26	0.22	0.33	0.26	0.29	0.30	0.58	0.57	0.65	0.63	1.00					
16.	0.32	0.41	0.40	0.38	0.21	0.18	0.26	0.17	0.21	0.24	0.34	0.33	0.34	0.29	0.32	1.00				
17.	0.34	0.40	0.40	0.40	0.26	0.24	0.31	0.24	0.27	0.28	0.36	0.35	0.35	0.32	0.34	0.73	1.00			
18.	0.36	0.42	0.42	0.41	0.23	0.18	0.30	0.20	0.24	0.27	0.38	0.38	0.39	0.32	0.38	0.65	0.73	1.00		
19.	0.35	0.40	0.40	0.41	0.24	0.19	0.31	0.21	0.25	0.30	0.38	0.37	0.38	0.32	0.36	0.65	0.70	0.75	1.00	
20.	0.27	0.35	0.34	0.36	0.24	0.21	0.28	0.22	0.25	0.28	0.30	0.29	0.28	0.29	0.29	0.58	0.64	0.63	0.72	1.00

Table 8. Aggregated CQS Item Correlation Matrix

Items	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
1.	1.00																			
2.	0.82	1.00																		
3.	0.86	0.89	1.00																	
4.	0.83	0.85	0.92	1.00																
5.	0.31	0.25	0.27	0.37	1.00															
6.	0.18	0.22	0.22	0.29	0.65	1.00														
7.	0.44	0.49	0.52	0.57	0.65	0.71	1.00													
8.	0.21	0.26	0.22	0.29	0.63	0.75	0.69	1.00												
9.	0.33	0.30	0.34	0.43	0.54	0.73	0.71	0.71	1.00											
10.	0.29	0.31	0.32	0.40	0.76	0.77	0.73	0.74	0.70	1.00										
11.	0.68	0.69	0.74	0.71	-0.05	-0.09	0.34	0.03	0.20	-0.01	1.00									
12.	0.69	0.61	0.68	0.68	0.22	0.17	0.48	0.26	0.34	0.23	0.82	1.00								
13.	0.71	0.65	0.74	0.69	0.10	0.04	0.46	0.14	0.28	0.11	0.85	0.89	1.00							
14.	0.51	0.57	0.57	0.59	0.14	0.11	0.36	0.07	0.32	0.12	0.75	0.70	0.73	1.00						
15.	0.61	0.62	0.67	0.65	0.09	0.07	0.40	0.09	0.22	0.13	0.86	0.78	0.83	0.78	1.00					
16.	0.56	0.70	0.67	0.68	0.38	0.32	0.52	0.28	0.44	0.40	0.55	0.53	0.53	0.52	0.56	1.00				
17.	0.57	0.71	0.68	0.68	0.39	0.45	0.56	0.35	0.47	0.54	0.48	0.53	0.50	0.54	0.55	0.87	1.00			
18.	0.61	0.77	0.72	0.70	0.26	0.27	0.52	0.26	0.37	0.36	0.61	0.58	0.61	0.58	0.65	0.88	0.86	1.00		
19.	0.65	0.79	0.76	0.73	0.36	0.32	0.55	0.28	0.40	0.41	0.62	0.65	0.64	0.61	0.65	0.86	0.88	0.91	1.00	
20.	0.56	0.69	0.63	0.64	0.37	0.38	0.45	0.28	0.41	0.42	0.43	0.45	0.42	0.48	0.43	0.81	0.86	0.76	0.85	1.00

Table 9. PCA Varimax Results Based on Pooled Within Matrix

Items	Component Loadings			
	Cognitive CQ 1	Behavioral CQ 2	Motivational CQ 3	Metacognitive CQ 4
Q1	0.13	0.15	0.26	0.80
Q2	0.12	0.25	0.25	0.81
Q3	0.19	0.22	0.26	0.83
Q4	0.26	0.24	0.24	0.75
Q5	0.72	0.09	0.09	0.26
Q6	0.79	0.08	0.08	0.08
Q7	0.77	0.15	0.19	0.21
Q8	0.85	0.08	0.12	0.06
Q9	0.79	0.13	0.17	0.05
Q10	0.76	0.17	0.16	0.10
Q11	0.11	0.19	0.73	0.32
Q12	0.19	0.17	0.74	0.30
Q13	0.10	0.18	0.77	0.30
Q14	0.23	0.17	0.75	0.06
Q15	0.16	0.19	0.78	0.18
Q16	0.09	0.79	0.16	0.20
Q17	0.16	0.83	0.17	0.17
Q18	0.11	0.82	0.22	0.19
Q19	0.13	0.84	0.20	0.17
Q20	0.16	0.80	0.12	0.12
Eigen-value	4.03	3.78	3.38	3.14
% of Variance	20.15	18.88	16.92	15.71

Note: KMO = .94, Bartlett's Test of Sphericity: χ^2 = 72082.76, Df = 190, p<.001

Table 10 - PCA Varimax Results Based on Aggregated Organizational Level Items

Items	Component Loadings						
	Analysis 1			Analysis 2			
	Motivational CQ	Behavioral CQ	Cognitive CQ	Motivational CQ	Cognitive CQ	Behavioral CQ	Meta-cognitive CQ
Q1	0.69	0.43	0.18	0.43	0.16	0.28	0.77
Q2	0.60	0.64	0.16	0.38	0.14	0.52	0.66
Q3	0.69	0.55	0.18	0.46	0.16	0.42	0.72
Q4	0.67	0.52	0.28	0.45	0.26	0.40	0.67
Q5	0.01	0.21	0.79	-0.07	0.78	0.16	0.22
Q6	-0.05	0.18	0.88	-0.04	0.88	0.19	-0.02
Q7	0.37	0.23	0.79	0.32	0.79	0.22	0.20
Q8	0.08	0.04	0.88	0.06	0.88	0.04	0.06
Q9	0.21	0.16	0.81	0.24	0.81	0.19	0.00
Q10	0.00	0.27	0.88	-0.05	0.87	0.24	0.14
Q11	0.91	0.27	-0.09	0.84	-0.09	0.26	0.36
Q12	0.87	0.19	0.20	0.82	0.20	0.19	0.31
Q13	0.92	0.21	0.07	0.85	0.07	0.20	0.35
Q14	0.76	0.28	0.06	0.81	0.07	0.35	0.05
Q15	0.85	0.28	0.03	0.85	0.03	0.31	0.20
Q16	0.34	0.83	0.24	0.31	0.24	0.83	0.21
Q17	0.31	0.83	0.33	0.28	0.33	0.83	0.20
Q18	0.44	0.80	0.17	0.40	0.17	0.80	0.25
Q19	0.47	0.80	0.23	0.40	0.22	0.79	0.30
Q20	0.23	0.86	0.25	0.16	0.24	0.84	0.24
Eigenvalue	4.03	3.78	3.38	4.93	4.73	4.61	2.81
% of Variance	20.15	18.88	16.92	24.63	23.65	23.07	14.04

Note: KMO = .94, Bartlett's Test of Sphericity: χ^2 = 72082.76, Df = 190, p<.001

Table 11. Study 2 - DEOCS Aggregability and Descriptive Statistics at the Organizational Level of Analysis

		N	$\bar{X}$	σ	ICC (1)	ICC (2)	Mean a_{wg}
1.	Metacognitive CQ	76	3.97	0.18	0.03	0.69	0.55
2.	Cognitive CQ	76	3.20	0.16	0.02	0.54	0.68
3.	Motivational CQ	76	3.94	0.20	0.04	0.76	0.61
4.	Behavioral CQ	76	3.53	0.19	0.03	0.68	0.62
5.	Sexual Harassment	76	2.00	0.33	0.08	0.86	0.46
6.	Differential Command Beh.	76	1.57	0.27	0.08	0.86	0.41
7.	Racist Behaviors	76	2.31	0.45	0.12	0.91	0.36
8.	Religious Discrimination	76	1.62	0.23	0.04	0.76	0.40
8.	Positive EO Behaviors	76	1.94	0.20	0.02	0.64	0.37
9.	Work Group Effectiveness	76	3.83	0.29	0.06	0.82	0.54
10.	Work Group Cohesion	76	4.05	0.25	0.06	0.82	0.50

Table 12. Study 2 - Correlations

Scales		1	2	3	4	5	6	7	8	9	10	11
Inquiry 1												
1.	Metacognitive CQ	1.00										
2.	Cognitive CQ	0.39**	1.00									
3.	Motivational CQ	0.75**	0.22	1.00								
4.	Behavioral CQ	0.76**	0.48**	0.64**	1.00							
5.	Sexual Harassment	-0.36**	0.02	-0.46**	-0.26*	1.00						
6.	Differential Command Beh.	-0.36**	0.08	-0.45**	-0.22	0.88**	1.00					
7.	Racist Behaviors	-0.40**	0.06	-0.51**	-0.32**	0.91**	0.80**	1.00				
8.	Religious Discrimination	-0.40**	0.07	-0.58**	-0.26*	0.87**	0.86**	0.77**	1.00			
9.	Positive EO Behaviors	-0.52**	-0.06	-0.54**	-0.40**	0.22	0.44**	0.20**	0.36**	1.00		
10.	Work Group Effectiveness	0.35**	-0.01	0.51**	0.35**	-0.72**	-0.67**	-0.71**	-0.68**	-0.32**	1.00	
11.	Work Group Cohesion	0.32**	-0.16	0.40**	0.29**	-0.64**	-0.62**	-0.66**	-0.62**	-0.37**	0.85**	1.00

Table 13. Multivariate Tests of Control Variable Impact

Independent Variables	Multivariate Tests (Wilks' Lambda)				
	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Analysis A					
Meta Cognitive CQ	1.50	10	62	0.16	0.19
Cognitive CQ	1.96	10	62	0.05	0.24
Motivational CQ	4.32	10	62	0.00	0.41
Behavioral CQ	0.83	10	62	0.60	0.12
Analysis B					
Branch	1.98	40.00	123.20	0.00	0.37
Age	1.04	20.00	64	0.43	0.25
Gender	1.77	10.00	32	0.11	0.36
Deployment	0.88	40.00	123.20	0.67	0.21
Meta Cognitive CQ	1.01	10.00	32	0.45	0.24
Cognitive CQ	1.81	10.00	32	0.10	0.36
Motivational CQ	2.59	10.00	32	0.02	0.45
Behavioral CQ	1.22	10.00	32	0.31	0.28

Table 14. Study 2 – Regressions

Models	Independent Variables	R Square Change	F Change	Sig.	Std. Beta	t	Sig.
Hypothesis 2 (dv = Sexual Harassment)							
Control Variables only		0.08	1.14	0.35			
Control & CQS Variables		0.22	3.80	0.01			
	Meta-Cog.CQ				0.22	0.85	0.40
	Cog. CQ				0.19	1.23	0.22
	Mot CQ				-0.67	-3.21	0.00
	Behav. CQ				-0.02	-0.10	0.92
Hypothesis 3(dv = Diff. Com. Behav.)							
Control Variables only		0.05	0.65	0.63			
Control & CQS Variables		0.23	3.83	0.01			
	Meta-Cog.CQ				-0.02	-0.06	0.95
	Cog. CQ				0.25	1.59	0.12
	Mot CQ				-0.55	-2.61	0.01
	Behav. CQ				0.01	0.07	0.95
Hypothesis 4 (dv =Racist Beh.)							
Control Variables only		0.16	2.42	0.06			
Control & CQS Variables		0.17	3.09	0.02			
	Meta-Cog.CQ				0.18	0.70	0.49
	Cog. CQ				0.16	1.09	0.28
	Mot CQ				-0.55	-2.71	0.01
	Behav. CQ				-0.09	-0.45	0.66
Hypothesis 5 (dv =Religious Disc.)							
Control Variables only		0.07	1.03	0.40			
Control & CQS Variables		0.37	7.83	0.00			
	Meta-Cog.CQ				-0.08	-0.34	0.73
	Cog. CQ				0.29	2.13	0.04
	Mot CQ				-0.68	-3.61	0.00
	Behav. CQ				0.05	0.29	0.77

Table 14. (Continued)

Models	Independent Variables	R Square Change	F Change	Sig.	Std. Beta	t	Sig.
Hypothesis 6(dv = Pos. EO Behav.)							
Control Variables only		0.10	1.37	0.26			
Control & CQS Variables		0.33	6.98	0.00			
	Meta-Cog.CQ				-0.47	-2.02	0.05
	Cog. CQ				0.13	0.95	0.35
	Mot CQ				-0.23	-1.24	0.22
	Behav. CQ				-0.06	-0.30	0.76
Hypothesis 7 (dv = Work Grp. Eff.)							
Control Variables only		0.04	0.58	0.68			
Control & CQS Variables		0.24	4.12	0.01			
	Meta-Cog.CQ				0.15	0.58	0.56
	Cog. CQ				-0.43	-2.75	0.01
	Mot CQ				0.20	0.95	0.35
	Behav. CQ				0.37	1.78	0.08
Hypothesis 8(dv = Work Grp Coh.)							
Control Variables only		0.02	0.25	0.91			
Control & CQS Variables		0.32	5.85	0.00			
	Meta-Cog.CQ				-0.06	-0.23	0.82
	Cog. CQ				-0.27	-1.77	0.08
	Mot CQ				0.51	2.50	0.02
	Behav. CQ				0.33	1.67	0.10