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An Empirical Assessment of the Communication Components Inventory

Shaughan A. Keaton[1] and Graham D. Bodie[1]

Abstract

This article attempts to demonstrate the psychometric properties and evidence of validity for a measure recently proposed in this journal, the Communication Components Inventory (CCI). Across two studies, a total of 903 undergraduate students completed one of the two response formats—dichotomous and scaled—of the CCI and the Multiple Intelligence scale. The dichotomous response format poorly represented the data, as did the scaled response format. However, because of the latter's superior reliability estimates it was chosen for refinement. Through the use of confirmatory factor analysis, the revised CCI replicated the data accurately. In both data samples, bivariate correlations between the Revised-Communication Components Inventory and a measure of learning styles were moderate to large, providing initial validity evidence for an important construct to counselors and their clients.

Keywords

communication components inventory, multiple intelligence, learning style, communication style, scale development

In a previous issue of this journal, Keteyian (2011) asserts that awareness of a client's communication style, which is a blend of multiple components, could offer counselors a tool through which to enhance several skills such as guiding interventions, offering natural validation, and developing opportunities to enhance creativity. In particular, Keteyian proposes a typology that includes "seven components present and active in any verbal exchange" (p. 90) derived from the theory of multiple intelligences (see MIs; Gardner, 1983). The initial components are described as linguistic (words), logical (reasoning), visual–spatial (images and pictures), auditory (sound), kinesthetic (experience and feeling), interpersonal (people-oriented), and intrapersonal (self-knowledge). To counselors, the significance of these components lies in their potential ability to aid in diagnosing and solving problems through making more apt language choices per individual client.

For counselors to assess components primarily represented in a client's communication style, Keteyian created the Communication Components Inventory (CCI). This scale proposes to inform counselors of the proper "natural language" through which to deal with the client (Keteyian, 2011, p. 90). Currently, however, there are no data demonstrating the psychometric properties of the scale or lending empirical credence of its association with the MI framework from which it was derived. This article attempts to provide such evidence with a careful statistical analysis of the CCI. In general, this article attempts to provide evidence of construct validity for a multidimensional scale that measures communication styles. Construct validity refers to the degree to which inferences made about a construct can be legitimately made from the operationalization of that construct. Several pieces of evidence can be used to make a case for construct validity (Carmines & Zeller, 1979; Cronbach & Meehl, 1959; DeVellis, 2003; Trochim, 1985), and in the studies that follow would focus primarily on two. First, confirmatory factor analysis (CFA) is employed to investigate the dimensionality of the CCI. Second, a measure of related constructs is employed concurrently with the CCI to assess convergent validity. A companion measure adapted from Gardner's (1983) theory of MIs is used because these concepts are thought to comprise the nomological network of the CCI (Cronbach & Meehl, 1959).

Study 1

The purpose of Study 1 is twofold: First, we assess whether responses to the CCI conform to the theoretical measurement model proposed by Keteyian. Because Keteyian suggested two possible versions of the questionnaire, we also gauge whether variation in the response format of the CCI influences the measurement model for the scale. By demonstrating whether scale items hang together in line with theoretical predictions and assessing which response format produces the most stable factor structure, this study should provide practitioners and researchers alike with empirical warrant for utilizing the CCI. Second, because Keteyian himself posits the question, "how

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are learning styles reflected in interpersonal communication?" (Keteyian, 2011, p. 90), we empirically examine it here. Specifically, we assess the degree to which factors measured by the CCI are associated with analogous learning styles.

Method

Participants

A total of 611 (192 males, 419 females) undergraduate students attending The Louisiana State University were the participants for Study 1. Students ranged from 18 to 56 years of age ($M = 20.00$, $SD = 2.66$) and represented the Freshman ($n = 196$), Sophomore ($n = 185$), Junior ($n = 128$), and Senior ($n = 98$) classes; three respondents indicated graduate student status, and one indicated "other." Although recruited through Communication Studies courses, only 102 specified that they were communication majors or minors; 519 individuals listed "CMST [Communication Studies] is neither my major nor my minor."

Procedures

Participants were recruited through an online reservation system where a variety of studies were posted that students could complete for course research or extra credit. Those who selected to participate in this study were directed to an external and secure uniform resource locator where they completed, in a random order, one of the two versions of the CCI and the Multiple Intelligence scale (MIS; see below). The appropriate Institutional Review Board approved all procedures.

Instruments

Communication styles. Participants' communication styles were evaluated using the 63-item CCI (Keteyian, 2011). The CCI attempts to measure seven communication style components: interpersonal (e.g., When I have a problem, talking things out is necessary and effective), intrapersonal (e.g., I need a lot of time to reflect and/or meditate), linguistic (e.g., I pay careful attention to the meaning of words), logical (e.g., I reason things through step-by-step when thinking and talking), visual–spatial (e.g., I easily perceive clear visual images when talking or listening), kinesthetic (e.g., Demonstrations really help me understand and express myself), and auditory (e.g., I really notice tone of voice when someone is speaking). Participants either completed the items using a 6-point scale ranging from *This statement is not like me at all* to *I am always like this* ($n = 307$) or were forced to choose "yes" or "no" ($n = 304$). Keteyian claims scaled and forced-choice are equivalent formats for the CCI; that claim is put to an empirical test here.

Learning styles. Learning styles were assessed utilizing the 70-item MIS (Chapman & Chislett, 2005). The MIS was created to measure the strength of an individual's particular learning styles. The scale includes 7 components with 10 items each—interpersonal (e.g., I care about how those around me feel; $\alpha = .54$), intrapersonal (e.g., I can predict my feelings and behaviours in certain situations fairly accurately; $\alpha = .73$), linguistic (e.g., I find it easy to make up stories; $\alpha = .63$), logical–mathematical (e.g., I find budgeting and managing my money easy; $\alpha = .63$), spatial–visual (e.g., I find graphs and charts easy to understand; $\alpha = .62$), bodily–kinesthetic (e.g., I have always been physically well-coordinated; $\alpha = .72$), and musical (e.g., I can play a musical instrument; $\alpha = .81$).

Results

Prior to running the primary analyses, data were inspected for adherence to statistical assumptions (Tabachnick & Fidell, 2007). CFA was utilized to estimate the CCI's ability to represent a data sample. Commonly used fit indexes and comparison thresholds were utilized: The comparative fit index (CFI) above .90, the standardized root mean square residual (SRMR) below .10, and the root mean square error of approximation (RMSEA) below .08. Finally, to assess the degree that the proposed model is accurately representing the bivariate relationships between items, the standardized residual covariance matrix was inspected for values over two in absolute value. Specifics related to these statistics can be found in a variety of sources (e.g., Byrne, 2010; Hoyle, 2000; Hu & Bentler, 1999; Kline, 2005; Raykov & Marcoulides, 2006).

Dichotomous Response Format

Inspection of fit statistics indicated poor representation of the data, $\chi^2(1,869) = 2,885.61$, $p < .001$, CFI = .52, SRMR = .07, RMSEA = .04, 90% confidence interval (CI) [.04, .05]. There were also several parameter estimates that, although statistically significant, were low (i.e., $\lambda < .50$). Further indicating the items comprising each subscale did not correlate highly, reliability estimates were all below acceptable levels: auditory ($\alpha = .43$), visual–spatial ($\alpha = .43$), intrapersonal ($\alpha = .50$), logical–mathematical ($\alpha = .50$), kinesthetic ($\alpha = .53$), linguistic ($\alpha = .57$), and interpersonal ($\alpha = .61$).

Scaled Response Format

Inspection of fit statistics indicated poor representation of the data, $\chi^2(1,869) = 3,709.269$, $p < .001$, CFI = .64, SRMR = .07, RMSEA = .06, 90% CI [.05, .06]. Additionally, there were 36 parameter estimates that, although statistically significant, were low (i.e., $\lambda < .50$). From weakest to strongest, reliability estimates for the subscales were logical–mathematical ($\alpha = .60$), visual–spatial ($\alpha = .65$), intrapersonal ($\alpha = .66$), kinesthetic ($\alpha = .71$), auditory ($\alpha = .72$), interpersonal ($\alpha = .72$), and linguistic ($\alpha = .76$).

Scale Refinement

Because the scaled response format represented the data more accurately and demonstrated stronger reliability estimates, it was chosen for refinement. Based on deleting (a) low loading items, (b) items representing more than one latent construct,

Table 1. CCI-R Items, Standardized Factor Loadings, and Internal Consistency Reliability

Construct	Item	Standardized Loadings		Cronbach's α	
		Study 1	Study 2	Study 1	Study 2
Interpersonal				.55	.66
	It is important for me to get my thoughts and feelings out in the open.	.52	.59		
	Others seek me out for counsel or advice.	.51	.64		
	I am intrigued by emotional dynamics in interpersonal relationships.	.60	.65		
Intrapersonal				.62	.60
	Learning about myself is central to my understanding of others.	.68	.61		
	To achieve clarity, I first need to be aware of my feelings, intentions, motivations, and goals.	.66	.61		
	I have a good sense of self-direction and think independently.	.47	.54		
Linguistic				.62	.71
	I like to use words.	.57	.67		
	I pay careful attention to the meaning of words.	.59	.67		
	I like explaining, teaching, or persuading others.	.63	.68		
Logical				.56	.65
	I reason things through step-by-step when thinking and talking.	.61	.69		
	I prefer to follow a train of thought through to its logical conclusion without interruption.	.53	.59		
	I like to find rational explanations for almost everything.	.51	.57		
Visual–spatial				.59	.64
	I can see things from different angles when I hear a description.	.48	.66		
	I can easily conceptualize the relationship between objects.	.63	.68		
	I often use metaphor to explain something to others.	.62	.52		
Kinesthetic				.56	.56
	My sensory experience is very strong.	.58	.56		
	I sense others feelings and easily absorb their energy.	.60	.60		
	Physical movement helps me process information.	.47	.46		
Auditory				.61	.69
	I really notice tone of voice when someone is speaking.	.64	.74		
	I can tell how someone feels by the sound of their voice.	.77	.84		
	Music helps me think things through.	.47	.46		

Note. CCI-R = Revised-Communication Components Inventory.

and (c) items whose error component systematically varied with other error components, a final model was fit that included 21 items and seven latent constructs that were allowed to freely vary (see Table 1). This model replicated the data covariance matrix accurately, $\chi^2(168) = 284.14$, $p < .001$, CFI = .93, SRMR = .05, RMSEA = .05, 90% CI [.04, .06], and all factor loadings were adequate. As seen in Table 1, however, internal consistency was not particularly strong. Correlations between the new subscales and the original ones were all high (see Table 2) indicating that while some items were deleted, the integrity of the scale was not compromised.

Associations Among CCI and MIS Components

Table 3 presents the bivariate correlations between each CCI factor from the revised scale and each factor measured by the MIS. These correlations indicate that communication styles—as measured by the Revised-Communication Components Inventory (CCI-R)—and learning styles—as measured by the MIS—are moderately to strongly related with one another (Cohen & Cohen, 1983).

Brief Discussion

Study 1 sought to empirically evaluate the CCI by testing the theoretical measurement model against sample data and assessing the relations among factors measured by the CCI and those measured by an analogous scale for learning styles. As to the first goal, although the original 63-item scale was not supported, a revised version of the scale was advanced. The CCI-R consists of 21 items that constitute seven components of one's communication style. Judging by the correlations in

Table 2. Correlations Between the Subscales of the CCI and CCI-R

Factor	*r*
Interpersonal	.80
Intrapersonal	.81
Linguistic	.80
Logical–mathematical	.80
Visual–spatial	.80
Kinesthetic	.82
Auditory	.80

Note. CCI = Communication Components Inventory. CCI-R = Revised-Communication Components Inventory.

Table 3. Correlations Between Subscales of the CCI-R and MIS

Factor	Study 1	Study 2
Linguistic	.54	.56
Logical–mathematical	.28	.39
Musical/auditory	.53	.53
Bodily–kinesthetic	.36	.28
Spatial–visual	.36	.38
Interpersonal	.60	.58
Intrapersonal	.52	.57

Note. CCI-R = Revised-Communication Components Inventory; MIS = Multiple Intelligence scale.

Table 2, it appears that this new version represents the original intent of the scale while conforming to measurement standards. As to the second goal, the CCI-R and the MIS have some similarities—particularly among interpersonal (r = .60), linguistic (r = .54), musical/auditory (r = .53), and intrapersonal (r = .52). Three of the subscales—Bodily–Kinesthetic (r = .36), Spatial–Visual (r = .36), and Logical–Mathematical (r = .28) —are only correlated moderately. These estimates signify that the scales measure different self-reported behaviors. This result is not fundamentally an undesirable outcome, as communication and learning styles are not inevitably the same phenomena even though both scales are derivative of the same theory. At this point, it is appropriate to say that there is modest support for the validity of the CCI-R.

Study 2

Study 2 had two primary purposes: First, to replicate the CCI-R across an independent sample of data. The second purpose was to provide additional data to support the relations among factors measured by the CCI-R and those measured by the MIS.

Method

Participants

Undergraduates (138 males, 154 females) from the same U.S. institution were the participants for Study 2. Students ranged from 18 to 42 years of age (M = 19.90, SD = 1.86) and represented the Freshman (n = 76), Sophomore (n = 119), Junior (n = 55), and Senior (n = 42) classes; one respondent indicated graduate student status. Although recruited through Communication Studies courses, only 42 specified that they were communication majors or minors; 251 individuals listed "CMST [Communication Studies] is neither my major nor my minor."

Instruments and Procedures

Procedures similar to those used in Study 1 were employed for Study 2. Participants' communication styles were assessed using 21-item CCI-R. Learning styles were assessed utilizing the 70-item MIS. Alpha reliability estimates for the MIS subscales were as follows: interpersonal (α = .75), intrapersonal (α = .50), linguistic (α = .65), logical–mathematical (α = .67), spatial–visual (α = .64), bodily–kinesthetic (α = .73), and musical (α = .79).

Results

Before fitting the measurement model, data were inspected for violations of multivariate assumptions (Tabachnick & Fidell, 2007). Fourteen observations qualified as multivariate outliers for the four-factor structure (Mahalanobis distance >103.44, $p < .001$) and were deleted. Additionally, 14 observations were removed that contained no data.

The same fit statistics were utilized to examine model representation of the data. The CCI-R replicated the data covariance matrix accurately, $\chi^2(168) = 264.26$, $p < .001$, CFI = .95, SRMR = .05, RMSEA = .05, 90% CI [.03, .06], and all factor loadings were acceptable (see Table 1). Bivariate correlations between the CCI-R components and the MIS components were again moderate to large (see Table 3).

Brief Discussion

Study 2 was designed to assess additional evidence of construct validity for the CCI-R. In particular, this examination had an aim to test the ability of the CCI-R model to consistently represent independent data. Although reliability estimates were again moderate, suggesting that the items within each construct were not exemplary of internal consistency, the CCI-R was able to replicate a covariance matrix very well. Evidence of concurrent validity was similar to that found in Study 1. These results affirm that the CCI-R measures styles that are in line with Gardner's MI theory.

General Discussion

Keteyian originally proposed the CCI as a measure of seven components of communication and derived the measure from Gardner's MI theory. The scale seems primarily useful as a counseling tool for two reasons: First, it should help counselors "create opportunities to be naturally validating and creative" (p. 93) by promoting recognition that individuals vary in their preferences for communicating and disclosing in the counseling context. Second, the scale has the potential to move counselors toward making "fewer assumptions about others" and

"to use interventions that are more individually focused" (p. 93). We concur with these as potential advantages of the scale but stress *potential* because the scale was only recently developed, and our two studies seem to report the only data bearing on its validity. Although Keteyian warns against using the CCI "as a definitive tool," even a measure that is primarily used to "stimulate awareness" should conform to basic psychometric principles and generate evidence of its relations with theoretically relevant constructs. The two studies we report above seek to offer initial evidence for both of these components of construct validity for this scale.

It is important to note that results from our two studies are generally supportive of the CCI. In particular, across both studies, we found support for a 21-item scale that measures seven components of communication. Moreover, the factors measured by the CCI moderately to strongly relate to an analogous measure of learning styles. CCI items, contrary to the claim by Keteyian, however, are best measured using a scaled response format. The forced-choice format generated poor model fit statistics, and internal consistency was more problematic. Of course, this latter result should be expected—that is, forced-choice scales will, on average, produce lower internal consistency estimates than scaled response formats. Thus, to reduce the number of CCI items and, in turn, respondent fatigue, we recommend future research maintain the 6-point response format used in these two studies.

Of course, any study is not without its limitations. The most notable limitation of our two studies is that both utilized college student participants as a sample of convenience. Although not agreeing with all of his conclusions, Sears (1986) pointed out the possibility of bias in using college student samples and noted that claims to external validity are problematic when using them. Nevertheless, our use of college students should not be dismissed outright. Not only is this population useful for gathering data that bear on issues of validity without being a drain on resources necessary to collect data from other populations, but college students are certainly candidates for counseling and utilize these services often. Of course, future research should employ the revised version of the CCI with actual clients of various life experiences and stages who are engaged in actual counseling sessions to test the claims we forward here and to provide further evidence of validity for a scale that is meant to make counseling more tailored to the client. In addition, future research should be aware that the reliability estimates found with our data were not in line with recommendations by Nunnally (1978) for use in practical settings. Although reliability is a function of data and not a property of scales, the CCI-R could be improved by adding similarly worded items with the intent of increasing the chances for future administrations to achieve adequate internal consistency (DeVellis, 2003).

In general, we are in agreement with Keteyian that advancing a scale to measure the components of individual communication styles is worthy. The relationship between learning styles and communication styles has been supported by our data samples, lending credence to the proposed underlying theory advanced by Keteyian. However, this study cautions against recommending the scaled and forced choice response formats equivalently because data have displayed that the forced choice responses fit the data more poorly than the scaled model. On the other hand, the scaled response format was revised and tested, exhibiting a good fit for two independent data samples. These results support the theoretical notion of the CCI. Ultimately, further refinement could result in the scale theoretically envisioned by Keteyian. Accordingly, future versions of the CCI or similar measures could be useful in settings involving both learning and communication such as counseling and education.

Declaration of Conflicting Interests

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