

A Cross-Cultural Test of the Association between Temperament and Communication Apprehension

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The research reported in his study was a cross-cultural test of the communibiological model of communication apprehension as temperamental expression. The study was designed to replicate the findings reported by Beatty, McCroskey, and Heisel (1998) in the U.S. and Japan. In this study participants from Japan and the U.S. completed measures of communication apprehension, neuroticism, and extraversion. The results indicated that, for both Japanese and U.S. college students, scores on the measure of communication apprehension were significantly correlated with measures of neuroticism and extraversion. Multiple regression analyses indicated that both neuroticism and extraversion predicted unique variance in communication in both cultures and that the multiple correlations for the two cultures did not differ significantly. It was concluded that the replication was successful and that temperament scores are substantially predictive of communication apprehension across the cultures tested.

In calling for a paradigm shift in the field of communication, Beatty and McCroskey (1998) have argued that "...no theory of human interaction can be taken seriously un-

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less it is informed by [the] massive body of research literature that has already established strong effects for inborn, individual differences in neurobiological processes that underlie major dimensions of social behavior" (p. 45). In their research, Beatty & McCroskey (1998) and others (Beatty, McCroskey, & Heisel, 1998; McCroskey, 1998; Valenic, Beatty, Rudd, Dobos, & Heisel, 1998) have proposed a fundamental paradigmatic switch from traditional learning-based theoretical approaches to communication to what they call a "communibiological perspective" for the study of human communication. The roots of the communibiological perspective are found in the research of psychobiologists studying temperament. According to Teglasi (1995), the study of temperament is associated with dimensions of personality whose origins are biological, generally stable, consistent across situations, and conspicuous throughout the life span of the individual and across cultures.

According to Beatty and McCroskey (1998), psychobiologists have been relatively successful at identifying the neurobiological structures that are associated with social behavior. For example, Steinmetz (1994) has argued that there are temperament-related brain structures that appear to be directly associated with temperament-related social behavior. According to Revelle (1995) the goal of psychobiologists is to identify the specific brain structure, neural pathway, neurotransmitter, or hormonal activity associated with specific cognitive, affective, or psycho-motor functioning. Revelle (1995) has maintained that, so far, psychobiologists have been successful at describing general behavioral regularities that are linked with identifiable physiological brain structures and neurotransmitters. Psychobiologists believe that individual differences in the operation of these brain structures are responsible for individual differences and sensitivities to environmental influences, thus leading to differential thought processes, approach-avoidance tendencies, and psycho-motor action. Revelle (1995) has been careful to point out that to the best of our knowledge, there is no single brain structure, lone neurotransmitter, or specific gene that controls the entire neurobiological-behavioral system, but that each individual system plays a supporting and limiting role.

Much of the theory regarding the biological substrates of temperament has evolved from the work of Eysenck (1947; 1967; 1986; 1990; 1991) and the subsequent modification of Eysenck's work by Gray (1990; 1991; 1994). Eysenck (1986) has argued that the truly scientific study of personality must include a descriptive and causal element. To this end, Eysenck (1986) has described what he calls the "meaningful foundation stones" (p. 9) of a descriptive taxonomy of personality. According to Eysenck (1986), the three "superfactors" (p. 11) of personality include introversion-extraversion, neuroticism-stability, and socialization-psychoticism. The traits whose correlations constitute the concept of socialization-psychoticism include aggressiveness, egocentrism, antisocialness, unempathicity, impulsiveness, and tough-mindedness among others. The traits that give rise to the introversion-extraversion concept include dominance, assertiveness, sociability, activity, sensation-seeking, etc. The traits that make up the concept of neuroticism-stability include anxiety, depression, guilt, irrationality, and tension among others. Revelle (1995) has contended that Eysenck's taxonomy of the three superfactors are analogous to approach-reward, inhibition-punishment, and aggression-flight.

Eysenck (1986; 1990) and Revelle (1995) have maintained that the three superfactors of personality (also referred to as the "Big Three" and simply as "temperament") are

governed antecedently by psychophysiological and biochemical factors. Over thirty years ago Eysenck (1967) identified cortical arousal, mediated by the reticular formation, as responsible for individual differences in introversion-extraversion. In addition, Eysenck (1967) pointed out that individual differences in limbic system arousal, mediated by the sympathetic nervous system, as responsible for the differences in neuroticism. Extant research has posited that hormonal differences may be responsible for individual differences in psychoticism (Eysenck & Eysenck, 1976).

In his pioneering work, Gray (1991; 1994) has maintained that Eysenck's three superfactors of personality are the psychological equivalents of three neurobiological systems, including the behavior activation system (BAS), the behavior inhibition system (BIS), and the fight or flight system (FFS). Revelle (1995) has labeled the BAS system "the engine of behavior" (p. 312). The BAS triggers approach behaviors as reactions to rewarding environmental stimuli. Gray (1994) and others (DePue, Luciana, Arbisi, Collins, & Leon, 1994) have presented persuasive evidence that the BAS system is associated neurophysiologically with the motor programming system and levels of dopamine in the brain. The BAS is thought to be closely allied with Eysenck's extraversion superfactor. Revelle (1995) has noted that if the BAS system is the engine of behavior, then the BIS "is the braking system." (p. 312). The BIS system is sensitive to environmental conditions of punishment and novel stimuli. The manifestation of an activated BIS is avoidant and inhibitory behaviors. Like the BAS system, Gray (1994), Spont (1992), and Kagan, Arcus, and Snidman (1993) have introduced evidence that the BIS has neurophysiological roots. The BIS is analogous to Eysenck's neuroticism superfactor. Finally, the FFS is associated with aggressive and hostile behaviors. Gray (1994) and Dabbs and Morris (1990) have documented that the FFS is associated with specific brain substrates and serotonin. The FFS is represented by Eysenck's psychoticism superfactor.

Communication Apprehension as Neurotic Introversion

In their initial explication of the communibiological approach, Beatty et al. (1998) presented a reconceptualization of communication apprehension based on much of the research cited above. Specifically, Beatty et al. (1998) argued that Eysenck's neuroticism and introversion superfactors were conceptually linked with past and current conceptualizations of communication apprehension; that is, the high communication apprehensive is a neurotic introvert. Originally, McCroskey (1977) defined communication apprehension as "the fear or anxiety associated with either real or anticipated communication with another person or persons" (p. 78). The fear and anxiety component of communication apprehension is conceptually equivalent to Eysenck's neuroticism superfactor. Biologically, neuroticism is governed antecedently by the BIS. McCroskey and others have presented substantial documentation that a significant manifestation of communication apprehension is communication avoidance and withdrawal. Such responses seemed directly linked to Eysenck's notion of introversion, which is governed by the BAS. The BAS of the high communication apprehensive activates avoidance behaviors while the BIS activates fear and inhibition. In an initial test of the communibiological approach, Beatty et al. (1998) reported substantial correlations and explained variance among measures of neuroticism, introversion, and communication apprehension. In addition, they moved away from the conceptualization

of communication apprehensive as a learned trait in favor of a temperament-based conceptualization of trait communication apprehension.

The Importance of Replication

Whenever new theoretical propositions are forwarded, replication is paramount. In the present instance, a new theoretical position was advanced based on a new scholarly paradigm. Hence, replication was even more important than in some other circumstances. In particular, replication with extension to a very different culture was appropriate, since the new paradigm and the theory it generated suggests genetic factors as the cause for communication apprehension. If this is true, it should not be culture-dependent. The genetic factors should be expected to produce similar results in replications conducted in widely different cultures.

Communibiology Across Cultures: The Case of Japan and the United States

The communibiological approach to communication apprehension considers the role of environment as a less meaningful factor in the development of communication apprehension than genetic factors. In fact, Beatty, et al. (1998) have estimated that the ratio of genetic inheritance to environmental contribution may be somewhere in the vicinity of 80/20. While this is a "guesstimate" by Beatty, et al., it does suggest particularly strong genetic impact, but does not totally exclude learning as a factor in the development of communication apprehension. Also, this projection only involves actual variability which is predictable, with other variance stemming from error. Hence, if genetic factors account for 50 percent of the variability, learning factors account for 10 percent of the variability, and 40 percent is not predictable (is error in the research context), the Beatty, et al. projection would be right on target.

Culture can and does make a difference. For example, culture determines how much communication is expected from people and how communication is valued by people. In addition, as Revelle (1995) has pointed out, genes do not act directly on behavior, nor are traits behavior. Revelle (1995) has noted that traits "are summary statements describing the likelihood of and rates of change in behavior in response to particular situational cues...intervening among traits, situations, and responses are momentary affective and cognitive states" (p. 315).

Martin (1994) has pointed out that some aspects of the environment actually strengthen temperamental dispositions. Martin (1994) has noted that children share 50% of their genes from each of their parents' ancestors. Parents foster environments that are affected by their own genetic makeup. Hence, they may be expected to support environments which are supportive of genetic orientations that they share with their children, but not support those that they do not share. Furthermore, Martin (1994) has stressed that an individual's behavior elicits reactions from salient others in the environment in ways that reinforce the disposition. For example, a person who suffers from extreme communication apprehension might present a low quality speech which evokes a negative response from the audience, thereby strengthening that person's communication apprehension. Finally, Martin (1994) has also suggested that most people consciously pursue environments that are consistent with their temperamental dispositions. When culture is highly supportive of communication (as in the case of the U. S.) an apprehensive person may have great difficulty finding situations where they can

avoid communication. On the other hand, when a culture is not supportive of communication, particular of younger people (as is the case in Japan), avoiding communication may be quite easy and the apprehensive person can easily find situations which are comfortable. At the same time, however, an apprehensive person in a culture which does not support and reward a lot of communication may get very little opportunity to improve her/his communication skills, hence might be even more apprehensive when they are confronted with a demanding communication situation.

To be sure, some environmental features, such as culture, may play a more significant role in the conditioning of cognitions, affect, and behaviors than others. Keesing (1974) has argued that culture provides people with an implicit theory about how to behave and interpret the behavior of others. People in different cultures learn different implicit theories. Gudykunst (1997) has argued that native culture has a strong influence on a population's communication pattern. In his seminal work, Hall (1959) asserted that communication and culture are indistinguishable. In the communication apprehension literature, culture has been used to explain group differences. Such differences have been found across many cultures (McCroskey & Richmond, 1990). One of the cultures that has been a focal point of communication apprehension research is Japan. Several studies have reported that Japanese score higher on measures of communication apprehension than people from the U.S. (cf. Klopff, 1984; Klopff & Cambra, 1979; McCroskey, Gudykunst, & Nishida, 1985; Neuliep & Hutchinson, 1997; Pribyl, Keaten, Sakamoto, & Koshikawa, 1997). Only one study of Japanese and U.S. communication apprehension found no significant differences in scores across cultures (Keaten, Kelly, & Pribyl, 1997). That study involved children as opposed to college students or other adults. Hence, culture may not have had time to produce the adult differences yet, and only genetic factors may have been influencing the children's responses.

Based on the suppositions of the communibiological approach, mean differences in communication apprehensive scores across the Japanese and U.S. people might not reflect neurobiological differences between Japanese and U.S. citizens. From a communibiological approach, variance in individuals' scores within any culture is expected to be a function of genetically based factors but mean variation between cultures can be produced by cultural differences. That is, while mean differences in communication apprehensive scores across cultures are to be expected, significant correlations of neuroticism and introversion with communication apprehension would be expected to be similar in each culture. The theory argues that regardless of the culture and cultural differences in communication apprehensive levels, neuroticism and introversion are the genetic predictors which produce difference in communication apprehension within the culture. Hence, the general hypotheses guiding this study were:

- H1:** Scores on extraversion and communication apprehension will be negatively correlated for both and Japanese participants.
- H2:** Scores on neuroticism and communication apprehension will be positively correlated for both and Japanese participants.
- H3:** Scores on extraversion and neuroticism will predict substantial and unique variance for communication apprehension scores in both U.S. and Japanese participants.

While no hypothesis was generated to predict mean differences in communication apprehension across cultures, previous research has found higher communication apprehension scores in Japan than in the U.S. Hence, that was expected in the present research as well. These differences are seen as functions of culture rather than genetics. No genetic differences related to the people of Japan and the people of the U.S. have been identified which could explain such findings.

METHOD

Participants

Participants in this study were 373 Japanese students (222 female, 134 male, 17 failed to report sex) enrolled in courses in a large, major university near Tokyo and 173 students (109 female, 64 male) enrolled in service courses at a four year liberal arts college in the Midwestern U.S.: Participants completed the Personal Report of Communication Apprehension (PRCA-24) and measures of extraversion (E) and neuroticism (N) developed by Eysenck and Eysenck (1985). For the Japanese participants, the instruments were translated to Japanese by employing the translation/back translation method. While this method has been demonstrated to produce instruments which are highly similar to the original ones, typically the new versions have somewhat lower or higher alpha reliabilities than the originals. For this reason, results will be reported in both raw and disattenuated correlations. Simple correlations were computed to test the first two hypotheses. Multiple correlations were computed to test the third hypothesis.

Reliability Estimates

Alpha reliability estimates for the Japanese participants were: PRCA .91, extraversion .77, and neuroticism .75. Alpha reliability estimates for the U.S. participants were: PRCA .94; extraversion .73, and neuroticism .74. These are similar to estimates reported in previous research.

RESULTS

Correlational Analysis

The raw and disattenuated correlations of communication apprehension with neuroticism and extraversion for both the Japanese and U.S. participants are presented in Table 1. All of the correlations between communication apprehension and extraversion were statistically significant and in the predicted direction of Hypothesis #1. Communication apprehension was negatively and significantly correlated with extraversion with both the U.S., $r(173) = -.57, p < .01$, and Japanese $r(371) = -.44, p < .01$, participants. All of the correlations between communication apprehension and neuroticism were statistically significant and in the predicted direction of Hypothesis #2. Communication apprehension was positively and significantly correlated with neuroticism with both the U.S., $r(173) = .41, p < .01$, and Japanese, $r(371) = .33, p < .01$, participants.

Multiple Regression Analysis

Because all of the bivariate correlations were in the predicted directions, two multiple regression analyses were conducted to explore the weighted linear combination of extraversion and neuroticism on communication apprehension. To address the issue

of multi-colinearity, prior to conducting the regression analyses, correlation coefficients between extraversion and neuroticism were calculated for each participant group. For the U.S. participants $r(173) = -.30, p < .01$, the two predictor variables were significantly correlated. For the Japanese participants, $r(371) = -.06, p = .22$, the two predictors were negatively correlated, but not significantly.

TABLE 1
Pearson Correlation Coefficients between Communication Apprehension and Temperament*

Culture	Temperament	Raw r	Disattenuated r
United States	Extraversion	-.47	-.57
	Neuroticism	.34	.41
Japan	Extraversion	-.37	-.44
	Neuroticism	.27	.33

*All correlations reported are significant at the $p < .01$ level.

For the multiple regression analyses, raw correlation coefficients were used. In this analysis extraversion and neuroticism were the predictor variables and communication apprehension was the criterion variable. With both the U.S. participants, $R = .51, F(2, 170) = 30.6, p < .001$, and the Japanese participants, $R = .45, F(2, 368) = 45.5, p < .001$, the combination of predictor variables produced a significant model. The regression models are presented in Table 2. A test of the difference between the multiple correlations of the two groups of participants indicated they were not significantly different ($z = 1.18, p > .05$). As indicated in the tables for both groups, both extraversion and neuroticism were statistically significant predictors of unique variance.

TABLE 2
Multiple Regression Analyses for Communication Apprehension

Culture/Predictor	B	SE B	β	t	p
United States					
Extraversion	-1.23	.21	-.41	-5.88	.001
Neuroticism	.56	.18	.22	3.19	.002
Japan					
Extraversion	-.78	.10	-.35	-7.54	.001
Neuroticism	.47	.09	.25	5.37	.001

DISCUSSION

The results presented here provide cross-cultural support for the theory of the etiology of communication apprehension which was advanced by Beatty et al. (1998). That is, all of the correlational and regression results are consistent with what has been reported in earlier studies reported by communibiological researchers (Beatty, et al., 1998; McCroskey, Heisel, & Richmond, 2001). Temperament scores are substantially predictive of communication apprehension scores. Multiple correlations ranged from .45 to .51 suggesting the existence of a moderate to moderately high association between genetically based temperament scores and scores on communication apprehension.

While the association is slightly higher within data drawn from U.S. participants, it is also substantial for the Japanese participants. The case for a cross-cultural genetic link between temperament and communication apprehension is substantial.

To be sure, this does not mean that communication apprehension norms in the U.S. and Japan are the same. The norm drawn from over 40,000 scores collected with U.S. students (Berger, Baldwin, McCroskey, & Richmond, 1983; Fayer, McCroskey, & Richmond, 1984), and several thousand scores obtained from adult non-students in all parts of the U.S. and Canada (Allen, Richmond, & McCroskey, 1984) on the PRCA-24, is 65.5 with a standard deviation of approximately 15. The mean obtained in the Japanese participants reported here was 87.1 ($SD=12.3$). This is about one and a half standard deviations above the U.S. norms. However, these results are consistent with other adult data obtained in Japan, noted above. Thus, it appears that although communication apprehension has a strong genetic base, culture has the potential to mediate the effect which may lead to higher or lower communication apprehension in a particular population. This argument is similar to Ekman's (1972; 1992; 1997) assertion regarding the universality of facial expressions of emotion. Essentially, Ekman has argued that the expression of about seven human emotions is universal across cultures; that is, it is a part of the human genetic constitution. When people are happy, sad, angered, or frightened, regardless of culture, they display the very same facial expression. In his research, however, Ekman has also found that culture mediates the intensity of the expression and the contextual components that elicit the emotion. Given the collectivistic nature of the Japanese culture and the cultural preference for silence over offensiveness, to find more communication apprehension in that culture is not surprising. However, the meaning and impact of such high apprehension about communication cannot be determined with the limited data obtained in this study and similar studies reported previously. While being quiet is considered negative in many instances within the U.S. culture, such is the case much less often in the Japanese culture. Hence, what would be considered a problem level of communication apprehension in the U.S. may even be an asset within the Japanese culture.

The communibiological perspective argues that genetic elements produce individual difference variations in communication apprehension within all cultures—a perspective which is supported in the present investigation. The communibiological approach does not ascertain that the effects of communication apprehension will be the same in all cultures. Genetic elements are the most likely cause of variations in communication apprehension within a culture, but differences in cultural practices and norms are the most likely cause of variations between cultures in average levels of communication apprehension.

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