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"Cross-Cultural Generalizability
of the Five-Factor Model of Personality
Development and Validation of the
NEO PI-R for Koreans"

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Increasing interest is being directed toward demonstrating the cross-cultural generalizability of the five-factor model of personality. This report outlines the development and initial validation of a Korean version of the NEO Personality Inventory—Revised (NEO PI-R), a commercially available instrument designed to capture these five major dimensions. Study 1 involved Korean nationals (320 men and 334 women) and documented the reliability and structural validity of the new translation. Correlations with the Korean version of the MBTI and Impostor Phenomenon Scale provided preliminary validity evidence. Study 2 included 57 men and 59 women who were bilingual Korean expatriates living in the United States. These individuals took both the Korean and English versions of the NEO PI-R. Results indicated that the Korean version can be considered a parallel form to its English counterpart. The etic and emic implications of these results are discussed.

CROSS-CULTURAL GENERALIZABILITY OF THE FIVE-FACTOR MODEL OF PERSONALITY
Development and Validation of the NEO PI-R for Koreans

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The five-factor model of personality continues to be a useful tool in the area of personality assessment and prediction (Costa, McCrae, & Kay, 1995; Goldberg, 1993; McCrae, 1991; Piedmont, 1995). The dimensions of neuroticism (N; the tendency to experience negative affect, such as anxiety, depression, and hostility), extraversion (E; the quantity and intensity of interpersonal interaction), openness (O; the proactive seeking and appreciation of new experiences), agreeableness (A; the quality of one's interpersonal interactions along a continuum from compassion to antagonism), and conscientiousness (C; the amount of persistence, organization, and motivation in goal-directed behaviors) provide a useful set of constructs for evaluating the personological significance of any psychological variable and are predictors for a wide variety of outcomes (e.g., Magnus, Diener, Fujita, & Pavot, 1993;

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McCrae, Costa, & Piedmont, 1993; Piedmont, McCrae, & Costa, 1991). The significance of this model is becoming increasingly recognized by the international community as well (e.g., Narayanan, Menon, & Levine, 1995). The dimensions of the five-factor model represent discernible constructs in a variety of societies that can be useful for understanding culture-specific phenomena (Caprara, Barbaranelli, Borgogni, & Perugini, 1993; John, Goldberg, & Angleitner, 1984; Paunonen, Jackson, Trzebinski, & Forsterling, 1992). The purpose of this study is to add to the expanding evidence for the cross-cultural generalizability of the five-factor model by demonstrating its validity in a Korean population.

CROSS-CULTURAL GENERALIZABILITY OF THE FIVE-FACTOR MODEL

Within the English language, the five-factor model has become established as an empirically robust psychological phenomenon (Digman, 1990). These five personality dimensions have emerged over information sources (e.g., self vs. rater), methods (e.g., different personality questionnaires), factoring procedures, and populations (Costa & McCrae, 1988; McCrae & Costa, 1987; McCrae & John, 1992; Noller, Law, & Comrey, 1987). The constructs have been shown to be very stable over time and even possess some genetic heritability (Bergeman et al., 1993; Costa & McCrae, 1993; Heath, Neale, Kessler, Eaves, & Kendler, 1992). Yet the exclusive reliance on Western culture has raised the question of their cross-cultural relevance (e.g., Cheung, Conger, Hau, Lew, & Lau, 1992). Are these dimensions an idiosyncrasy of the English language, or do they represent a more fundamental aspect of the human experience? This question crystallizes the two major types of cross-cultural research: emic and etic.

Emic research refers to attempts at identifying culturally specific constructs. The focus of this process is to identify the psychological nuances of a society and incorporate that unique variance into scales that will maximally predict outcomes in that culture. This approach is the most useful for identifying and explaining cultural differences. *Etic* research, on the other hand, is concerned with identifying similarities among cultures. This process highlights the ability of a particular construct to operate in a consistent way across cultures. The etic approach identifies the universal aspects of human experiences and provides an opportunity for creating a cohesive understanding of the structure and process of psychological functioning. Both approaches have shown the relevance of the five-factor model in a number of different cultural contexts (Isaka, 1990; Narayanan et al., 1995; Paunonen et al., 1992).

Numerous researchers have evaluated the cross-cultural generalizability of the five-factor model. Whether dealing with European (e.g., Borkenau & Ostendorf, 1990; Paunonen et al., 1992), Indian (Narayanan et al., 1995), or Asian (Bond, 1979; Bond, Nakazato, & Shiraishi, 1975; Isaka, 1990) languages, researchers continue to find the five factors in both self-report and rater data. It is of particular interest to find evidence supporting the five-factor model in languages that do not share a common derivational or experiential history with English. That such cultures would develop and apply constructs identical to Western-based ones provides exciting evidence of the unity of human psychosocial functioning. Of course this does not deny or negate any cultural differences; it only reinforces the belief that human endeavors, wherever they may originate, can be explained by a finite set of dispositions. Such a revelation sets the stage for the development of a more parsimonious and complete understanding of personality.

The aim of this study is twofold. First, it demonstrates the utility of the five-factor model of personality in the Korean culture. Such documentation will continue to expand the range of explanatory convenience for this model of personality. Second, this study will use a translated version of the NEO Personality Inventory—Revised (NEO PI-R) as the measurement medium. The NEO PI-R is the only commercially available instrument explicitly designed to measure the five factors (although other instruments can be interpreted within this framework). It is a psychometrically well-developed instrument (see Widiger, 1992) that brings much more interpretive and predictive power to research on the five-factor model than any of the rating scales that are used as markers of the Big Five. Thus successfully translating the NEO PI-R into Korean is not only theoretically significant but also creates a powerful tool for cross-cultural researchers to use in a wide variety of future endeavors.

PSYCHOMETRIC CONSIDERATIONS

To demonstrate the measurement utility of the Korean version of the NEO PI-R, several psychometric criteria need to be met. First, each scale should be internally consistent. Second, the factor structure of the scale should reveal the five major dimensions of personality. Further, the pattern of factor loadings for the facet scales should be consistent with both their rational placement and the factor structure obtained in the original normative data. To determine the true generalizability of the five-factor model would require both emic- and etic-based analyses of the data.

The emic perspective includes an exploratory factor analysis of the data to determine if the NEO PI-R scales evidence the five-factor structure in this

population. If the indigenous factors that emerge are indeed comparable to those obtained in normative data, then a strong case for universality can be made. If not, then an opportunity exists for evaluating the presence of culture-specific factors. The etic approach would evaluate the extent to which the original factor structure can be recovered from the imported culture. Accomplishing this requires a confirmatory factor-analytic (CFA) approach to the data rather than an exploratory analysis. However, there are some difficulties in using CFA with personality type data in general (Borkenau & Ostendorf, 1990; Church & Burke, 1994) and with the NEO PI-R in particular (McCrae, Zonderman, Costa, Bond, & Paunonen, 1996). A more efficacious way to determine whether an obtained NEO PI-R factor solution is similar to normative values is postulated by McCrae et al. (1996). They suggest performing a conventional principal components analysis and then submitting the data to an orthogonal procrustes rotation (Schönemann, 1966) that uses NEO PI-R normative values as the target matrix. Then congruence coefficients (Gorsuch, 1983) can be calculated to assess the degree of fit. McCrae et al. (199) provide critical values for evaluating the significance of these coefficients. Both of these paradigms will be used in Study 1.

Third, some evidence of construct validity needs to be documented. This can be a difficult task for cross-cultural research. Often, no established psychological measures in the new culture parallel constructs in the original society. Thus there is no meaningful context for evaluating validity coefficients. Such is not the case here. A Korean version of the Myers-Briggs Type Indicator (MBTI) has been created (Sim & Kim, 1993), and previous research in America already has evaluated the relations between the MBTI and the NEO PI-R (McCrae & Costa, 1989a). The pattern of correlations between the two English versions of these instruments can serve as a benchmark for evaluating the intercorrelations among the Korean versions. A similar pattern of correlates would be evidence that the Korean version of the NEO PI-R has substantively operationalized its constructs in a manner similar to its English version.

Finally, it is the ideal intention of any translation process to create an instrument that is identical to its original in all ways except language. If the constructs being assessed are truly cross-culturally generalizable, then an individual's score should be the same on any version of the measure. Only then can the translated scales be considered parallel forms of their English counterparts. If the translated version generates different means and standard deviations from the original norms, then this would be evidence of important cultural differences in how the constructs are distributed in

the two societies. Study 2 will evaluate this issue by giving *both* the Korean and English versions of the NEO PI-R to a sample of bilingual Korean expatriates.

STUDY 1

The purpose of this study is to evaluate the psychometric integrity of the Korean translation of the NEO PI-R. Issues of reliability and structural validity were discussed earlier. The construct validity of the translated NEO PI-R will be evaluated by correlating it with two measures: the Korean versions of the MBTI and the Impostor Phenomenon Scale (IPS).

Previous research already has evaluated the relations between the English versions of the NEO PI-R and MBTI. McCrae and Costa (1989a) have shown that the MBTI captures four of the five major personality dimensions: Neuroticism is not represented. To provide some validation to this dimension, IPS was included in this study. The IPS represents an internal experience of fraudulence regarding one's success (Clance & Imes, 1978). Impostors believe that their successes are not the result of their own ability but rather due to luck or personal charms. Because impostors believe that others have overestimated their abilities, they constantly worry that they will be exposed as frauds. Impostors experience a constant stream of anxiety and self-doubt because they are unable to internalize their success as legitimate. The high level of negative affect that appears to underlie this construct suggests that scores on this scale should have a significant association with neuroticism, itself an index of negative emotionality.

METHOD

SUBJECTS

Participants of this study were 654 Korean Catholics: 320 men and 334 women (270 laity and 384 religious) with a mean age of 34 years ($SD = 10.7$). These samples were obtained from four cities spread over the South Korean peninsula (Seoul, Pusan, Daegu, and ChunJu). The education level was high school or above. Subjects were part of a larger study evaluating psychosocial dynamics in religious versus nonreligious vocations.

MEASURES

Impostor Phenomenon Scale (IPS). Developed by Clance and Imes (1978), this 20-item questionnaire presents items that capture various feelings of emptiness and conflict around success, such as, "Sometimes I'm afraid others will discover how much knowledge or ability I really lack," and "Sometimes I feel or believe that my success in life or in my job has been the result of some kind of error." Items are responded to on a "not at all true" (1) to "very true" (5) Likert scale.

This scale has a high level of internal consistency (coefficient alpha = .96) and has been shown to be relatively effective in differentiating impostors from nonimpostors in the general population (Holmes, Kertay, Adamson, Holland, & Clance, 1993). For the purposes of this study, this instrument was translated into Korean.

NEO Personality Inventory—Revised (NEO PI-R). Developed by Costa and McCrae (1992), this 240-item questionnaire was developed through rational and factor-analytic methods to measure the five major factors of personality: N, E, O, A, and C. For each factor, six facet scales are designed to capture more specific traits. Items are answered on a 5-point scale, ranging from "strongly agree" (1) to "strongly disagree" (5), and scales are balanced to control for the effects of acquiescence. Normative internal consistency estimates for the self-report version of the instrument for adults range from .59 to .92 (Costa & McCrae, 1992). Six-year stability coefficients range from .68 to .83 for the N, E, and O domains, and 3-year retest coefficients are from .63 to .79 for brief versions of the A and C domains (Costa & McCrae, 1988).

The NEO PI-R has been validated in studies using other self-reports (Costa, McCrae & Dye, 1991; McCrae & Costa, 1992; Piedmont & Weinstein, 1993). Scales have shown evidence of convergent and discriminant validity across instruments, methods, and observers and have been related to a number of life outcomes, including frequency of somatic complaints and the ability to cope with stress, burnout, and occupational success (Costa & McCrae, 1989; McCrae & Costa, 1987; Piedmont, 1993, 1994; Piedmont & Weinstein, 1994).

Myers-Briggs Type Indicator (MBTI). Form G (Myers & McCaulley, 1985) was used in this study and already has been translated, normed, and validated in Korean (Sim, 1990; Sim & Kim, 1991, 1993). This form consists of 126 items, of which 94 are scored. Only these items are included in the Korean version. Most items offer a forced choice between two responses, although some have more response options, and respondents occasionally are

allowed to endorse two or more responses. Separate scoring keys are provided for each preference. Because the opposing preference scores are almost completely ipsative, they were not used in this study. Instead, the four continuous scores were employed. These scores correspond to the difference between opposing preferences and have a theoretical neutral point of 100.

Sim and Kim (1993) present split-half reliability coefficients for a sample of 201 Koreans ranging from .72 for extraversion/introversion to .82 for judging/perceiving. Test-retest correlations of continuous scores between the English and Korean versions were all above .90. The pattern of interscale correlations was also comparable to American normative data (Myers & McCaulley, 1985). The MBTI has demonstrated reasonable construct validity through theoretically expected correlations with other instruments, such as the Jungian Type Survey (JTS) (Wheelwright, Wheelwright, & Buehler, 1964), the Barratt Impulsiveness Scale (Sipps & Dicaudo, 1988), the Strong Vocational Interest Blank and the Edwards Personal Preference Schedule (Myers & McCaulley, 1985), and by comparing the MBTI results with the self-assessment of type preferences (Carskadon, 1975, 1982). Finally, Sim and Kim (1993) have shown the Korean version to have strong discriminant validity and concluded that this version is an adequate representation of the constructs represented in the English version.

PROCEDURE

Translation process. Both the NEO PI-R and IPS needed to be translated into Korean. A multistep process was implemented. Initially, the second author translated the instruments from English into Korean. These versions were then sent to two bilingual individuals unfamiliar with psychological constructs, who translated these instruments back into English. Then the first author compared the back-translated versions with the original English. Items that were not clear or did not satisfactorily capture the constructs being assessed were identified, and, in discussions with the second author, new translations were made. These changes were sent to another two bilingual individuals. They retranslated the second Korean versions into English.

At this point, the translations were deemed appropriate and were then forwarded to the authors of the instruments for their approval and permission to use the new documents. The authors of NEO PI-R identified some items they believed unclear. Those items were again retranslated and sent to a third set of bilingual people for back-translation. Finally, this translated revision of NEO PI-R was sent to the authors, and final approval was received. Therefore, the Korean instruments have solid face validity as being appropriate translations.

Research procedure. The second author contacted the superiors, rectors, pastors, or appropriate representatives of religious orders, congregations, and parishes in several Korean cities. The purpose of the research was explained, and permission was given to solicit subjects. Three female religious congregations, seven male religious congregations, eight parishes, one university pastoral care center, and one Catholic-run hospital gave permission to collect data. The first author visited each site and handed the questionnaires to the appropriate representative(s) of each institution. These representatives gathered volunteers who were willing to participate in this study, distributed the questionnaires in person, and asked them to answer the questionnaires either at the site or at home. When finished, subjects returned the completed questionnaires to their representative. After collecting all questionnaires, the representatives delivered the materials to the second author.

Through this procedure, 800 questionnaires were distributed, and 654 were completed and collected for an 82% response rate.

RESULTS

The overall alpha reliability of the IPS was .84, indicating the scale to be reliable in this sample. The overall mean was 56.2, with a standard deviation of 9.7. No gender differences were noted. According to Holmes et al. (1993), this value is slightly higher than two samples of identified nonimpostors (*M*s = 46 and 50) and much lower than two samples of identified impostors (*M*s = 70 and 87).

Table 1 presents descriptive statistics and alpha reliabilities, separately by gender, for the Korean version of the NEO PI-R.

The overall alpha reliability of the NEO PI-R domain scales were .92, .84, .83, .80, and .89 for N, E, O, A, and C, respectively. These results are consistent with American normative data (Costa & McCrae, 1992).

In terms of gender differences, Korean women scored higher than Korean men on the A ($t(654) = 1.98$, $p < .05$) and C ($t(654) = 3.25$, $p < .01$) domains and lower on the E domain ($t(654) = -1.94$, $p < .05$). This result differs from the American normative data, where American women scored higher than men on N and on A. In the American normative sample, Costa and McCrae (1992) did not find any gender differences on the E, O, and C domains.

When the means of each NEO PI-R scale were compared with the American normative sample, Koreans, both men and women, scored higher on the N domain and lower on the E, O, and C domains than Americans. For the A domain, the mean scores were slightly higher for Korean men and lower

TABLE 1
Descriptive Statistics and Alpha Reliabilities for the NEO PI-R Domains and Facet Scales in a Korean Sample

	Men (N = 319)		*Women (N = 334)*		*Alpha Reliability*
NEO PI-R Scales	*Mean*	SD	*Mean*	SD	*(N = 653)*
Domains					
(N) Neuroticism	93.41	20.49	92.72	21.34	.92
(E) Extraversion	96.83	15.80	94.46	15.47	.84
(O) Openness	104.85	15.05	107.09	15.41	.83
(A) Agreeableness	121.24	12.77	123.31	13.72	.80
(C) Conscientiousness	110.39	17.99	114.91	17.59	.89
N1: Anxiety	16.03	4.83	17.23	5.19	.78
N2: Angry hostility	13.83	3.78	13.96	3.91	.62
N3: Depression	16.63	4.47	17.48	4.89	.75
N4: Self-consciousness	17.55	4.15	17.68	4.39	.66
N5: Impulsiveness	15.24	4.44	14.32	4.56	.74
N6: Vulnerability	14.13	4.20	14.04	4.43	.73
E1: Warmth	18.54	3.69	18.41	3.97	.65
E2: Gregariousness	16.76	4.43	16.01	4.43	.67
E3: Assertiveness	14.14	4.05	13.96	3.98	.63
E4: Activity	15.38	3.58	15.94	4.25	.59
E5: Excitement seeking	14.60	3.70	12.90	3.53	.50
E6: Positive emotions	17.41	4.29	17.24	4.27	.68
O1: Fantasy	16.15	3.77	15.91	3.91	.55
O2: Aesthetics	18.70	5.00	20.34	4.58	.75
O3: Feelings	18.28	3.32	18.96	3.61	.53
O4: Actions	14.79	3.41	14.44	3.40	.46
O5: Ideas	17.35	4.90	17.34	4.97	.77
O6: Values	19.59	3.36	20.10	3.17	.40
A1: Trust	21.09	3.31	21.55	3.46	.61
A2: Straightforwardness	21.62	3.77	22.80	4.09	.61
A3: Altruism	21.24	3.35	20.97	3.51	.61
A4: Compliance	17.55	3.70	18.03	3.93	.56
A5: Modesty	17.87	3.34	17.92	3.26	.50
A6: Tendermindedness	21.87	3.36	22.03	3.36	.50
C1: Competence	17.40	3.43	17.73	3.24	.50
C2: Order	17.94	4.21	18.40	4.70	.70
C3: Dutifulness	22.46	3.97	23.74	3.83	.70
C4: Achievement striving	17.30	4.28	17.58	3.83	.69
C5: Self-discipline	17.46	4.25	19.06	4.20	.72
C6: Deliberation	17.83	4.06	18.42	4.16	.68

NOTE: NEO PI-R = Neuroticism, Extaversion, Openness Personality Inventory—Revised.

for Korean women than their American counterparts. It needs to be determined whether these differences reflect properties of the translated scale or

signal actual cultural differences. Nonetheless, the NEO PI-R domain scales have sufficient reliability to warrant their use in this sample.

EXPLORATORY FACTOR ANALYSES

To determine if the five factors could be recovered in this data set, an exploratory factor analysis was conducted. Six factors emerged with eigenvalues greater than 1, but the scree test clearly indicated that only five factors should be extracted. The results of the five-factor analysis are presented in Table 2.[1]

Congruence coefficients were calculated for both the factors and the facet scales by comparing the obtained solution to normative values (Costa & McCrae, 1992). Two important results emerge from Table 2. First, the N, O, and C domains emerged quite clearly, with congruence coefficients all greater than .93. The facet scales for these domains also appear quite similar to their normative cousins. The second result is that the dimensions of E and A are not as clearly represented in the data, even though their congruence coefficients would be considered significant (see McCrae et al., 1996). The facets for these scales do not match their normative counterparts. Factor 2, representing assertiveness, activity, excitement seeking, (low) straightforwardness, (low) compliance, and (low) modesty, seems to represent a surgency-type factor. Factor 4, with loadings by warmth, gregariousness, positive emotions, trust, altruism, and tendermindedness, represents a benevolence-type factor. Interestingly, this pattern of loadings also was found to emerge in a sample of Filipino students (Katigbak, Church, & Akamine, 1996).

Two possible interpretations emerge. First, the commingling of the E and A facets may represent a culture-specific phenomenon. That this pattern also was retrieved in a Filipino sample may argue for the presence of an Asian-specific structure. A second interpretation would be to see this varying structure as merely representing a rotational shift in the data due to sample-specific error. To evaluate this latter perspective, the sample was randomly divided into two halves and factor analyzed. Five factors were orthogonally extracted in each sample, and the resulting factors were compared. Congruence coefficients for N, O, and C were all above .96, showing that the two solutions provided identical dimensions. The congruence coefficients for the surgency and benevolence dimensions were noticeably smaller (.74 and .58, respectively), indicating that *within* this sample, some rotational distortion was occurring on these factors. In one subsample, some commingling of the E and A as facets in the total sample was noticed, but in the other subsample, these facets loaded as intended. Because these

TABLE 2
Principal Components Analysis Using a Varimax Rotation of the Korean NEO PI-R Facet Scales

Korean NEO PI-R Facets	*Varimax Factor Loadings*					*Facet Congruence*
	Factor 1	*Factor 2*	*Factor 3*	*Factor 4*	*Factor 5*	
N1: Anxiety	**.81**	.02	.02	−.02	−.14	.99[b]
N2: Angry hostility	**.65**	.35	.05	−.25	−.16	.84
N3: Depression	**.82**	−.07	.09	−.11	−.19	.99[b]
N4: Self-consciousness	**.81**	−.06	−.03	−.10	−.06	.96[b]
N5: Impulsiveness	**.52**	.36	.15	−.05	**−.49**	.95[b]
N6: Vulnerability	**.71**	−.11	−.12	−.02	**−.42**	.99[b]
E1: Warmth	−.05	.20	.19	**.79**	−.08	.68
E2: Gregariousness	−.15	**.40**	−.14	**.63**	−.12	.62
E3: Assertiveness	−.31	**.63**	.08	.09	.22	.79
E4: Activity	.13	**.63**	.08	.20	.23	.74
E5: Excitement seeking	.09	**.61**	.18	.19	−.18	.64
E6: Positive emotions	−.26	.35	**.41**	**.44**	−.08	.66
O1: Fantasy	.21	.10	**.53**	.01	−.32	.97[b]
O2: Aesthetics	.09	.00	**.72**	.19	.01	.98[b]
O3: Feelings	.17	.24	**.70**	.13	.11	.89[a]
O4: Actions	−.27	.31	.37	.08	−.24	.88[a]
O5: Ideas	−.10	.21	**.72**	−.05	.14	.96[b]
O6: Values	−.27	−.18	**.51**	.10	−.09	.83
A1: Trust	−.32	−.21	.09	**.60**	.24	.78
A2: Straightforwardness	−.16	**−.52**	.07	.19	.33	.57
A3: Altruism	−.08	.34	.14	**.68**	.22	.39
A4: Compliance	−.09	**−.71**	−.03	.21	−.04	.39
A5: Modesty	.23	**−.46**	−.25	.15	−.01	.60
A6: Tendermindedness	.11	−.29	.36	**.48**	.17	.56
C1: Competence	**−.48**	.18	.13	.07	**.54**	.99[b]
C2: Order	−.09	.06	−.13	−.02	**.70**	.99[b]
C3: Dutifulness	−.04	−.12	−.03	.23	**.80**	.96[b]
C4: Achievement	−.07	**.42**	.07	−.02	**.67**	.95[b]
C5: Self-discipline	**−.43**	.04	.01	.04	**.71**	.97[b]
C6: Deliberation	−.25	−.23	.05	−.04	**.64**	.92[b]
Factor congruence	.97[b]	.60[a]	.93[b]	.61[a]	.95[b]	.82[b]

NOTE: NEO PI-R = Neuroticism, Extaversion, Openness Personality Inventory—Revised; $N = 653$. Loadings above |.40| are in bold.
a. Congruence higher than that of 95% or rotations from random data.
b. Congruence higher than that of 99% of rotations from random data (McCrae et al., 1996).

two factor analyses provided different variants of the E and A dimensions, it cannot be concluded that the interpersonal dimensions operate differently in Korean.

TABLE 3
Principal Components Analysis Using an Orthogonal Procrustes Rotation of the Korean NEO PI-R Facet Scales

Korean NEO PI-R Facets	*Procrustean Factor Loadings*					*Facet Congruence*
	Factor 1	*Factor 2*	*Factor 3*	*Factor 4*	*Factor 5*	
N1: Anxiety	**.81**	.01	−.06	−.03	−.15	.99[b]
N2: Angry hostility	**.66**	.03	.03	**−.43**	−.10	.99[b]
N3: Depression	**.82**	−.11	.02	−.02	−.21	.99[b]
N4: Self-consciousness	**.80**	−.11	−.11	−.01	−.09	.99[b]
N5: Impulsiveness	**.54**	.23	.15	−.36	**−.42**	.95[b]
N6: Vulnerability	**.69**	−.05	−.17	.01	**−.45**	.98[b]
E1: Warmth	−.04	**.76**	.14	.33	−.04	.96[b]
E2: Gregariousness	−.17	**.75**	−.15	.03	−.06	.96[b]
E3: Assertiveness	−.28	**.43**	.12	**−.40**	.34	.98[b]
E4: Activity	.15	**.51**	.06	−.33	.34	.97[b]
E5: Excitement seeking	.12	**.54**	.19	−.37	−.06	.98[b]
E6: Positive emotions	−.21	**.58**	**.41**	.02	.01	.90[a]
O1: Fantasy	.26	.12	**.53**	−.06	−.27	.98[b]
O2: Aesthetics	.16	.18	**.68**	.19	.05	.97[b]
O3: Feelings	.25	.26	**.66**	−.02	.19	.94[b]
O4: Actions	−.23	.29	**.42**	−.19	−.15	.88[a]
O5: Ideas	−.02	.10	**.73**	−.10	.22	.97[b]
O6: Values	−.22	.00	**.52**	.24	−.08	.84
A1: Trust	−.32	.33	.04	**.56**	.21	.95[a]
A2: Straightforwardness	−.16	−.19	.02	**.57**	.24	.96[b]
A3: Altruism	−.08	.32	.05	**.72**	.16	.93[a]
A4: Compliance	−.11	−.25	−.07	**.67**	−.17	.94[a]
A5: Modesty	.19	−.16	−.31	**.43**	−.11	.95[b]
A6: Tendermindedness	.14	.20	.27	**.58**	.13	.94[b]
C1: Competence	**−.46**	.12	.14	−.02	**.58**	.99[b]
C2: Order	−.10	−.06	−.16	.02	**.69**	.98[b]
C3: Dutifulness	−.04	.03	−.11	.34	**.76**	.96[b]
C4: Achievement	−.05	.17	.05	−.24	**.74**	.98[b]
C5: Self-discipline	**−.42**	−.01	.00	.09	**.71**	.96[b]
C6: Deliberation	−.24	−.23	.02	.25	**.60**	.99[b]
Factor congruence	.98[b]	.95[b]	.94[b]	.95[b]	.97[b]	.96[b]

NOTE: NEO PI-R = Neuroticism, Extaversion, Openness Personality Inventory—Revised; N = 653. Loadings above |.40| are in bold.
a. Congruence higher than that of 95% or rotations from random data.
b. Congruence higher than that of 99% of rotations from random data (McCrae et al.,1996).

PROCRUSTES FACTOR ANALYSES

To determine if the five-factor structure was recoverable in this data set, scores were factor analyzed using a principal components analysis, extracting

five orthogonal factors. These factors were then subjected to an orthogonal procrustes rotation (Schönemann, 1966), using the normative data presented by Costa and McCrae (1992) as the target. The results of this analysis are presented in Table 3.

Congruence coefficients were calculated for each factor and facet scale. These values determine the degree to which the rotated solution matches the target matrix. McCrae et al. (1996) present values for determining the significance of these coefficients. As can be seen in Table 3, the expected five-factor solution is adequately captured in the Korean data. Scale congruence coefficients indicate that 29 of the 30 facets significantly replicate patterns found in the normative data. The exception was the openness to values facet scale. The last value in the scale congruence column is an overall index of fit that is quite high, suggesting that overall, the Korean version of the NEO PI-R is quite similar factorially to its English parent.[2]

CONSTRUCT VALIDITY

To demonstrate some evidence of construct validity for the NEO PI-R, domain scores were correlated with the four MBTI continuous scores, and the results are presented in Table 4. McCrae and Costa (1989a) conducted a similar analysis with an American sample. The data for both samples are presented in Table 4.

As can be seen, both the pattern and magnitude of the two matrices are very similar. For both data sets, N does not correlate very highly with any of the MBTI continuous scores. Extraversion/introversion is highly associated, negatively, with E; sensing/intuiting is correlated with O. Thinking/feeling is related to high A and low C, although in the American data, C does not have any correlation with this dimension. In fact, A does not correlate as high as in the American data, and this is particularly true for males. Although these data do provide evidence that these two Korean instruments yield scores that are highly analogous to those produced by their American versions, support is less clear for the A scale.

Finally, also presented in Table 4 are the correlations between the IPS and the Korean NEO PI-R domain scores. The anticipated correlation with neuroticism was found for both men (r (317) = .60, $p < .001$) and women (r (332) = .63, $p < .001$). Correlations with the IPS provides a level of construct validation to the neuroticism domain.

TABLE 4
Correlations Between the NEO PI-R and MBTI in Korean and American Samples

	NEO PI-R Domains									
	American Data[a]					*Korean Data*[b]				
MBTI Scores	*N*	*E*	*O*	*A*	*C*	*N*	*E*	*O*	*A*	*C*
Males										
EI	.16**	−.74**	.03	−.03	.08	.22**	−.71**	−.25**	.02	−.15**
SN	−.06	.10	.72**	.04	−.15*	.10	.14*	.49**	−.12*	−.15**
TF	.06	.19**	.02	.44**	−.15*	.12*	−.08	.11*	.30**	−.34**
JP	.11	.15*	.30**	−.06	−.49**	.21**	.04	.16**	−.10	−.56**
Impostor Scale						.60**	.13*	−.03	−.14*	−.36**
Females										
EI	.17*	−.69**	−.03	−.08	.08	.18**	−.73**	−.18**	.04	−.05
SN	.01	.22**	.69**	.03	−.10	.13*	.13*	.56**	−.02	−.20**
TF	.28**	.10	−.02	.46**	−.22**	.08	−.01	.12*	.20**	−.29**
JP	.04	.20**	.26**	.05	−.46**	.20**	.07	.24**	−.08	−.53**
Impostor Scale						.63**	−.15**	−.01	−.18**	−.29**

SOURCE: Adapted from Chae, Piedmont, Estadt, and Wicks (1995).
NOTE: NEO PI-R = Neuroticism, Extaversion, Openness Personality Inventory—Revised;
a. Adapted from McCrae and Costa (1989, p. 30); $N = 267$ for men, 201 for women.
b. From current data set; $N = 319$ for men, 334 for women.
*$p < .05$; **$p < .01$, two-tailed.

DISCUSSION

Overall, the pattern of results clearly document the reliability and validity of the Korean version of the NEO PI-R. Internal consistency values found here are consistent with normative values. Structurally, the Korean version can be considered identical to its English counterpart. More attention needs to be given to the values facet because its congruence coefficients was not significant. This may be due to the translation needing further refinement or because the constructs operate differently in this new culture. Study 2 will provide more information regarding this question.

Scores on the scales for the current sample do appear to differ from American normative data. However, at this point there is no way to determine whether such differences are due to cultural factors or are a product of the scale itself. Some of these differences may be due to the very specific nature of this sample (i.e., many are clergy). Again, Study 2 will be able to shed more light on this issue by having a sample complete both versions of the instrument. Correlations with the Korean version of the MBTI were very similar to findings with American subjects, providing an initial demonstration of the construct validity of these scales. Correlations with the IPS provided additional validity evidence for the neuroticism domain.

STUDY 2

The previous study demonstrated that the Korean version of the NEO PI-R maintains a factor structure that is both theoretically consistent and empirically veridical with American normative data. Correlations with the MBTI were also consistent with data obtained by McCrae and Costa (1989a) in American samples and lend validity to the measure with use in a Korean sample. It still remains to be determined whether the Korean version can be considered a parallel form of the original measure. To demonstrate this would require a single group of individuals taking *both* versions of the instrument. If the same individual generates different scores on the Korean and English versions of the NEO PI-R, then the observed differences between our sample and the normative data can be attributed to idiosyncratic qualities of the translated scale. However, if an individual scores similarly on the different versions, then the observed differences can be attributed to cultural variability. Two other groups are also necessary. One group would complete only the Korean version twice and the other only the American version. The former would help demonstrate some preliminary retest reliability information, and the latter would serve as an appropriate comparison group.

Although most of the NEO PI-R scales maintained adequate homogeneity in Study 1, one facet scale was quite low (openness to values). This may be a result of the translation not presenting the construct in a way appropriate for a Korean audience, or the construct may be more complex in this culture, and the obtained alpha is underestimating the true reliability of the scales. Test-retest reliability coefficients will provide a new source of information for evaluating this issue. High retest correlations for the scale would suggest that some of the NEO PI-R facet scales are more factorially diverse than their English counterparts. Low values would suggest the translation was inadequate in capturing the constructs in a way appropriate for Koreans.

METHOD

SUBJECTS

Participants in this study consisted of 116 Korean Americans (57 men, 59 women) living in the San Francisco, Washington, D.C., and Baltimore areas. Individuals were aged from 17 to 61 ($M = 33$, $SD = 10.8$) and have lived in America from 1 to 26 years ($M = 11$, $SD = 5.5$). All were fluent in Korean. Subjects rated themselves in terms of English fluency on a 7-point Likert scale ($M = 4.2$, $SD = 1.6$). This sample can be considered to be adequately bilingual.

MEASURES

NEO Personality Inventory—Revised (NEO PI-R). Both the English version developed by Costa and McCrae (1992) and the Korean version described earlier were used in this study.

PROCEDURE

All subjects volunteered to participate in this study. Each was provided two packets containing various versions of the NEO PI-Rs and were instructed to complete the packet marked "#1" immediately and the packet marked "#2" in 7 days. Each packet contained either an English or Korean version of the NEO PI-R. When materials were completed, they were returned.

Individuals were assigned[3] to one of four groups: a Korean-Korean group, a Korean-English group, an English-Korean group, and an English-English group. The average interval between completion of the two packets was 7 days (range: 1 to 17).

TABLE 5

Descriptive Statistics and Reliability Estimates for the Four Testing Groups

	Time 1			*Time 2*				
Condition	M	SD	α	M	SD	α	*Retest r*[a]	*t-Differential*
Korean-Korean ($N = 32$)								
Neuroticism	93.59	22.5	.92	91.38	23.5	.93	.95**	1.64
Extraversion	100.91	19.2	.87	99.66	20.9	.90	.95**	1.05
Openness	102.72	17.3	.82	102.03	16.9	.83	.91**	.54
Agreeableness	123.53	16.1	.82	122.47	14.3	.81	.91**	.89
Conscientiousness	110.47	23.8	.92	109.34	21.0	.92	.93**	.71
Korean-English ($N = 29$)								
Neuroticism	97.55	20.2	.89	96.03	19.2	.88	.65**	.50
Extraversion	96.34	19.8	.87	96.90	18.3	.85	.94**	−.43
Openness	108.79	17.7	.84	109.48	15.6	.81	.81**	−.36
Agreeableness	114.66	13.5	.73	116.86	14.7	.79	.80**	−1.31
Conscientiousness	115.31	19.9	.89	117.93	18.9	.89	.64**	−.85
English-Korean ($N = 29$)								
Neuroticism	101.31	26.8	.93	102.90	25.3	.93	.86**	−.62
Extraversion	96.59	21.7	.88	95.82	18.2	.85	.92**	.47
Openness	107.14	18.4	.82	103.48	17.2	.82	.86**	2.08*
Agreeableness	118.14	16.2	.81	118.41	13.6	.78	.89**	−.20
Conscientiousness	108.97	20.1	.87	106.31	18.5	.88	.68**	.91
English-English ($N = 26$)								
Neuroticism	105.58	20.0	.88	102.73	20.6	.90	.96**	2.43*
Extraversion	99.38	24.2	.91	98.96	24.0	.93	.98**	.46
Openness	108.50	18.3	.85	107.23	18.2	.88	.92**	.91
Agreeableness	115.62	18.5	.86	113.58	19.9	.91	.93**	1.42
Conscientiousness	112.35	21.4	.89	109.35	21.6	.92	.93**	1.91

a. The average time interval between tests was approximately 7 days.

*$p < .05$; **$p < .01$, two-tailed.

RESULTS AND DISCUSSION

Table 5 presents the descriptive statistics, alphas, and retest coefficients for each of the four testing groups.

As can be seen in Table 5, the alpha reliabilities for each domain score were all quite high. Retest correlations showed very high rank order stability in domain scores. As expected, the same language versions evidenced higher correlations than the mixed language groups, although all groups were above .64.

To determine if there were any mean level changes over the two time periods among the four different groups, a repeated measures multivariate analysis of variance was performed; the interaction between the administration group (e.g., Korean-Korean, Korean-English, etc.) and the time of administration (Time 1 vs. Time 2) was nonsignificant (multivariate $F(15,330) = 1.066$, p = n.s.; Wilks's $\lambda = .87$). This indicates that there were no overall changes in mean level over the NEO PI-R domains for the different groups over the two time periods. Therefore, it can be concluded that the two instances where the univariate analyses indicated that scores did change can be considered Type I errors. It is interesting to note that in the mixed language groups, the means and standard deviations are quite comparable, suggesting both forms provide similar scores in similar individuals.

Because the facet scales will likely be scored and interpreted in this new population, Table 6 evaluates the equivalence of the Korean and English versions of the facet scales for the combined Korean-English groups.

As can be seen in Table 6, the retest coefficients are all quite high, ranging from .43 for competence to .89 for positive emotions ($M = .74$). Again, to evaluate whether there are any overall significant differences between the two versions of the test, a repeated measures MANOVA was performed. A multivariate $F(30,28) = 1.82$, p = n.s. (Wilks's $\lambda = .34$) indicated that there were no systematic differences between the two versions in mean level over the 30 facets. Thus the three univariate t-tests that emerged significant represent chance effects; individuals scored similarly on the two versions of the instrument. This provides additional evidence that the Korean version operates comparably to the American form.

Retest correlations for the facet scales also were examined for the group that received the Korean version on both occasions, and values were found to range from a low of .63 (for openness to values) to a high of .93 (for openness to aesthetics), with an average value of .84. Of particular interest is the openness to values facet that showed a very low alpha in Table 1. In this second sample, a similar low alpha was noted, but the retest value was .63.

TABLE 6
Descriptive Statistics and Reliability Estimates for the NEO PI-R Facet Scales for Those Who Took the English and Korean Versions

	Korean		*English*			
NEO PI-R Facet	M	SD	M	SD	*Retest r*[a]	*t-Differential*
N1: Anxiety	17.71	5.2	17.43	5.1	.77**	.61
N2: Angry hostility	15.16	3.9	15.78	5.1	.71**	−1.32
N3: Depression	18.28	5.5	17.79	4.9	.83**	1.21
N4: Self-consciousness	18.38	4.5	17.97	4.5	.80**	1.11
N5: Impulsiveness	16.62	5.3	16.03	4.8	.70**	1.14
N6: Vulnerability	14.09	5.2	13.67	5.3	.68**	.76
E1: Warmth	17.07	4.9	17.43	5.3	.84**	−.95
E2: Gregariousness	16.17	5.6	15.79	5.5	.85**	.94
E3: Assertiveness	14.24	5.5	14.45	5.4	.87**	−.56
E4: Activity	16.53	4.2	16.71	4.2	.65**	−.38
E5: Excitement seeking	14.91	4.2	14.64	4.7	.74**	.64
E6: Positive emotions	17.16	4.5	17.72	4.4	.89**	−2.04*
O1: Fantasy	16.81	4.4	15.98	4.9	.70**	1.73
O2: Aesthetics	20.31	5.9	20.69	5.9	.83**	−.83
O3: Feelings	18.53	4.2	19.52	4.6	.77**	−2.51*
O4: Actions	14.24	3.5	14.60	3.3	.69**	−1.04
O5: Ideas	17.43	5.8	17.98	5.8	.81**	−1.18
O6: Values	18.81	3.8	19.53	3.6	.67**	−1.83
A1: Trust	19.98	3.6	19.59	3.9	.57**	.86
A2: Straightforwardness	20.69	5.3	20.07	5.1	.81**	1.46
A3: Altruism	20.72	3.9	21.83	4.0	.74**	−2.95**
A4: Compliance	16.86	4.4	17.14	4.6	.81**	−.76
A5: Modesty	17.26	4.1	17.19	3.9	.74**	.18
A6: Tendermindedness	21.02	3.3	21.69	4.2	.63**	−1.56
C1: Competence	17.69	3.9	18.24	3.7	.43**	−1.03
C2: Order	17.79	3.9	18.38	4.5	.80**	−1.67
C3: Dutifulness	22.78	4.2	22.84	3.9	.55**	−.13
C4: Achievement	18.05	4.5	17.84	4.6	.78**	.52
C5: Self-discipline	17.17	5.3	18.02	5.5	.75**	−1.67
C6: Deliberation	17.33	4.3	18.12	4.7	.74**	−1.85

NOTE: NEO PI-R = Neuroticism, Extaversion, Openness Personality Inventory—Revised; $N = 58$.
a. The average time interval between tests was approximately 7 days.
*$p < .05$; **$p < .01$.

This suggests that rather than being unreliable, this facet may represent a construct that is factorially complex in the Korean culture. Future research may wish to evaluate the emic consequences of all these scales.

OVERALL DISCUSSION

The pattern of results for this study offer some emic and etic implications. From an etic perspective, it is clear that the five-factor model of personality can generalize well to the Korean culture. It is both interesting and exciting to note that constructs originally derived from the English language can be applied to a culture that shares neither a common language nor history. This is further evidence that the five-factor model represents psychological constructs that are fundamental to human experience. The five-factor model has been very useful for integrating personality-related information from diverse topics into a cohesive framework (e.g., McCrae & Costa, 1989b; Piedmont, 1995), and demonstrating its cross-cultural applicability creates the potential for integrating research from diverse cultures as well. Although the five-factor model is not without its critics (Block, 1995; Loevinger, 1994; McAdams, 1992), it may be able to provide a real, common language for discussing personality phenomena.

The findings of this study also have implications for those interested in culture-specific issues. As noted in Study 1, scores on the NEO PI-R differed significantly from normative data on four of the five factors. Because Study 2 showed that the same people score similarly on both versions of the instrument, these mean level differences may represent real cultural differences rather than method error. It is interesting to note that a similar pattern of responses has been found when comparing the normative data for the Chinese version of the NEO PI-R with American norms (McCrae, Costa, & Yik, 1996). Some general self-presentation style common among Asian cultures may account for these differences. However, given the rather special nature of the sample used in Study 1, some of the cross-cultural differences noted may be due to unique characteristics of the Korean sample. Future research needs to corroborate these findings, so caution needs to be used in interpreting any cultural differences. Nonetheless, these data serve as a set of hypotheses and point of departure for understanding the cultural forces that shape the development and expression of these personality characteristics. The door has been opened for expanding our knowledge of the role of the environment in forming personality.

Attention needs to be given to the role of extraversion and agreeableness in Asian samples. As found in Study 1, the facet scales to these dimensions appeared to commingle. Although this pattern was noted in a sample of Filipino students, suggesting the possibility of an Asian-specific phenomenon (Katigbak et al., 1996), additional analyses suggested that this pattern represented rotational distortion. Extraversion and agreeableness are part of the interpersonal circumplex (McCrae & Costa, 1989b); thus it is possible that

in cultures where social behavior operates under very different assumptions than in the West, a realignment of these facets could occur. Future research with Asians may wish to pay particular attention to variables related to social status (e.g., education level, socioeconomic level).

Also of interest is the domain of openness to experience. It appears from our data that some facets of this dimension may be different from their English equivalents. For example, the lower alphas for the openness to actions and values facets suggest them to be more factorially complex in Korean. Or it certainly could be the case that some of the items or behavioral exemplars used to reflect the presence of these traits may not be as appropriate in this cultural setting. This latter possibility would suggest that the mean level differences observed between the Korean and American samples can be attributed to a lack of metric equivalence for some items across cultures, rather than being an indication of substantive differences in the trait itself. More fine-grained item analyses may be able to identify differences in response patterns that are themselves culturally telling.

Finally, many of the cross-cultural studies using the five-factor model in Asian cultures have relied on general marker scales of the dimensions (e.g., Bond, 1979; Bond et al., 1975). Demonstrating the appropriateness of the NEO PI-R in this cultural context introduces a more sophisticated tool for capturing these constructs. Not only does the NEO PI-R assess the five factors, but it also provides 6 facet scales for each dimension. These 30 scales in turn provide a greater level of interpretive precision and predictive power to personality researchers. With the dramatic changes industrialization is bringing throughout the Pacific Rim, many new pressures are being experienced by these cultures (Bond, 1991). Traditional ideologies and practices are being challenged as former agrarian societies are being transformed into populous, urban, industrial nations. The pressures these changes bring and the ways these people respond to them are of interest to numerous researchers in diverse disciplines. The NEO PI-R can be an extremely useful tool for helping to empirically document the psychosocial impact of these processes.

NOTES

1. When six factors were extracted, the expected five-factor solution emerged, with the sixth factor being a triplet containing assertiveness, activity, and (low) compliance. Interestingly, the E and A factors were not commingled, as found in the five-factor solution.

2. When the two subsamples derived previously were subjected to orthogonal procrustes rotations, similarly high congruence coefficients were obtained. In the first subsample, all coefficients were significant, both for the domains and facets. In the second subsample, only the congruence coefficient for the openness to values facet was not significant. Although there may

be some arbitrary rotational distortions that emerge in the exploratory analyses, the targeted analyses clearly and reliably recapture the normative structure.

3. Although an effort was made to randomly assign subjects to the different groups, there was a tendency for those with poorer English language skills to be assigned to the Korean-Korean group.

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