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> "In contrast to previous correlational studies, we have shown by Confirmatory Factor Analysis (CFA) that the MBTI measures aspects of individual differences which are distinct from the Big Five factors of personality. Thus, the MBTI has been found to add information to measures of the Big Five, like the NEO-FFI."

Does the Myers-Briggs Type Indicator Measure Anything Beyond the NEO Five Factor Inventory?

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ABSTRACT

As previous studies had found moderate correlations between the Myers-Briggs Type Indicator® (MBTI®) instrument and the NEO-Five Factor Inventory (NEO-FFI), we expected the two instruments to measure related but distinct constructs. In $N = 435$ adult Austrians (255 female), we tested three concurrent models by Confirmatory Factor Analysis. Four pairs of two factors, one from each measure, correlated clearly and uniquely with each other: MBTI Extraversion with NEO-FFI Extraversion, MBTI Judging–Perceiving with NEO-FFI Conscientiousness, MBTI Thinking–Feeling with NEO-FFI Agreeableness, and MBTI Intuition–Sensing with NEO-FFI Openness to Experience. Unidimensional models and models with two uncorrelated factors fitted significantly worse. Thus, as expected, MBTI and NEO-FFI scales add information to each other.

Note: For the Myers-Briggs Type Indicator® (MBTI®) instrument, the eight preference categories are the following: Extraversion (E) versus Introversion (I), Sensing (S) versus Intuition (N), Thinking (T) versus Feeling (F), Judging (J) versus Perceiving (P).

INTRODUCTION

On the basis of introspection, clinical experience, and philosophical considerations, Carl Jung (1921/1971) introduced his framework of basic "PsychologicalTypes" of personality: (1) Whereas *Introverts* (I) are guided by their inner focus, *Extraverts* (E) orient by their experiences in the outer world. (2) The *Sensing* (S) type perceives the world by his or her immediate sensory perceptions,

as opposed to the *Intuitive* (N) one, who is guided by more abstract meanings inherent to a situation and by the patterns that underlie observable data. (3) Whereas the *Thinking* (T) type chooses a logical, analytical approach to life, the *Feeling* (F) type is rather guided by empathy and his or her value orientations and ethical considerations. Isabel Briggs Myers and Katharine Cook Briggs (see the MBTI manuals: Myers, 1962; Myers & McCaulley, 1985; and Myers, McCaulley, Quenk, & Hammer, 1998/2003) developed the Myers-Briggs Type Indicator (MBTI) assessment, a self-report assessment which introduced a fourth pair of opposites, namely *Judging* (J) vs. *Perceiving* (P). Whereas the Judging type plans his or her life systematically and in a highly structured way, in contrast, the Perceiving type favors action on the spur of the moment and without too much scheduling, adapting to the requirements of the immediate situation spontaneously. The MBTI instrument assesses Extraversion vs. Introversion, Sensing vs. Intuition, Thinking vs. Feeling and Judging vs. Perceiving on four bipolar scales.

Carl Jung was extremely familiar with the humanities, and thus he derived his typology not only from ancient Greek philosophy but also from the work of his contemporaries, e.g., by William James. Although rooted in Carl Jung's visionary work, the MBTI assessment's practical use reaches far beyond these fields and is not limited to psychotherapy and counselling, as one might expect from Jung's professional work as a psychiatrist. For example, the MBTI instrument is one of the most widely employed international measures in scholastic and educational counselling. Hammer (1996) summarized research on applying the MBTI assessment in the fields of career assessment, management and leadership, on coping with stress, cooperating in teams, multicultural issues, and other fields of applied psychology. More specifically, Hirsh and Kummerow (1998) and Kummerow and Quenk (2003) dealt with applying the MBTI instrument within the context of organizational psychology and management. Thompson and Ackerman (1994) reviewed results on MBTI applications in vocational contexts, and Vacha-Haase and Thompson (2002) summarized that its popularity in business and education may be explained first of all by the fact that the MBTI addresses personality

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characteristics in psychologically healthy individuals; second, that its results possess a high degree of face validity (i.e., most participants tend to recognize themselves in MBTI results); and finally, that its outcome adopts a nonjudgmental perspective, in the sense that no possible results can be viewed as more or less desirable. In spite of some psychometric criticism, especially with respect to the MBTI forced-choice response format (cf., Vacha-Haase & Thompson, 2002, for a summary), its manifold successful applications point to the questionnaire's practical diagnostic value, also implying its prognostic validity. With regard to incremental validity, Pulver and Kelly (2008) for example have shown that the MBTI assessment added predictive power to the Strong Interest Inventory® assessment's ability to ascertain students selection of study majors.

Accordingly, various research conducted during the past decade has suggested that the MBTI scales measure constructs distinct from other scales, adding information to them (cf., Furnham & Crump, 2005, with regard to personality traits and disorders; Furnham, Jackson, Forde, & Cotter, 2001, with respect to the Eysenck Personality Profiler; Ross & Francis, 2010, regarding intrinsic, extrinsic, and quest forms of religiosity, and Sjöberg, 2001, with respect to emotional intelligence, to name only a few examples).

On a larger scale the relationship between the MBTI instrument and the Five Factor model of personality (FFM; Tupes & Christal, 1961; see de Raad, 2000, for an overview of its lexical development in various languages) has been examined. Using the MBTI scoring rules, McCrae and Costa (1989) analyzed MBTI data by aggregating E and I, S and N, T and F as well as J and P items to continuous scales and examined their relationship to the NEO-PI-R (Costa & McCrae, 1992) scores obtained by self and peer ratings separately in men and women. MBTI scoring conventions dictate that scales are scored in the direction of the second letter: e.g., a highly extraverted individual will score low on "EI." Thus, Costa and McCrae (1992) found substantial negative correlations between EI from the MBTI assessment (reverse scaled compared to the NEO-PI-R) and Extraversion (E) from the NEO-PI-R (r = - .34 to - .74). SN (high scores = Intuition) aligned positively with

Openness to Experience (O) (*r* = .41 to .72) and TF (high scores = Feeling) with Agreeableness (A) (*r* = .25 to .46). Perceiving (high scores for the JP scale) was correlated negatively with Conscientiousness (C) (*r* = - .34 to - .49), which can be understood by the fact that the Perceiving type tends to act spontaneously whereas individuals scoring high on Conscientiousness prefer to plan their lives, adhere to deadlines, and so forth. Correlations did not differ significantly for men and women, but were higher for self-reports than for ratings that had been obtained from peers. Furnham (1996), MacDonald, Anderson, Tsagarakis, and Holland (1994), as well as Parker and Stumpf (1998), replicated these correlational findings in British and U.S. samples, whereas Klinkosz and Iskra (2010), in a Polish sample, found only two of the NEO-4 dimensions (a measure which excludes Neuroticism) to correspond with the MBTI instrument. Using the Type Differentiation Indicator (TDI), an extended MBTI version, Johnson (1995) found correlations of similar size linking the same corresponding MBTI and Five Factor Model dimensions. All of these authors agreed that, according to the correlational overlap between the MBTI and four of the NEO-PI-R scales, both instruments would measure very similar constructs, with the sole exception of Neuroticism, for which overall low and inconsistent correlations with the MBTI scales were found. This fact points to the substantial "positive" nature of MBTI scales and their underlying theoretical constructs. Not surprisingly, when the Comfort-Discomfort Scale, a more negative measure, was added to the MBTI assessment with the TDI, its scores correlated positively with Big Five Neuroticism (Johnson, 1995).

Though some of the correlations reported were impressively high, they still leave a considerable part of the variance unexplained and only suggest that the respective scales share some common aspects. Although the FFM is extremely well-established cross-culturally for assessing broad personality traits, there is still no reason to consider it exhaustive when more detailed diagnostic requirements are to be met (Paunonen, Jackson, Trzebinski, & Fosterling, 1992). Along these lines, by regression analyses, Edwards, Lanning, and Hooker (2002) confirmed the incremental validity of the MBTI instrument over the NEO-PI-R in predicting attributional adjustment, i.e., a person's ability to correctly judge the behavior of a fictitious individual's interpersonal evaluations using a standardized case vignette. Taking into account that the MBTI assessment and the FFM are based on entirely different theoretical assumptions, it would indeed appear premature to conclude that both instruments could not add information to each other's results. In the present study we therefore expected the MBTI instrument and a measure of the FFM to tap distinct, although related, constructs and employed Confirmatory Factor Analysis (CFA) in order to examine further the question of whether the MBTI instrument would be able to measure anything beyond the FFM as assessed by the NEO-FFI. By means of CFA a hypothetical statistical model was tested against concurrent ones by examining to what extent the present data agreed with the various models. This degree of agreement is termed "model fit", which is determined by various mathematical "fit indices", to be explained in more detail later.

MATERIALS AND METHODS

Participants. A heterogeneous sample of *N* = 435 participants (255 women and 180 men) with a mean age of 37.54 years (*s* = 16.15, range 13 to 93 years) was acquired on the basis of a snowball sampling by psychology students of the Alpen-Adria-Universität Klagenfurt (Austria), i.e., about a hundred students were instructed to distribute the questionnaires to acquaintances or relatives of different age groups and preferably without an academic background. Thus, a fairly heterogeneous sample was obtained. Sixteen participants held a university degree, 120 participants had finished secondary school and 288 of them primary school.

Measures. We administered German versions of the Myers-Briggs Type Indicator Step I™ instrument (MBTI, Briggs & Myers, 2001) and of the NEO Five Factor Inventory (NEO-FFI, Borkenau & Ostendorf, 2008). This MBTI version consists of 88 dichotomous items measuring "Extraversion vs. Introversion", "Sensing vs. Intuition", "Thinking vs. Feeling", and "Judging vs. Perceiving". The NEO-FFI consists of 60 items intended to measure the Big Five factors of personality on a five-point Likert scale ranging from "Strongly Agree" (scored as "0") to "Strongly Disagree" (scored as "4"), with 27 items scored in the reversed direction.

The MBTI assessment employs a dichotomous response format that requires a choice between two options. For example, Item 1 reads as follows (translated from German): "Is it (a) Easy or (b) Difficult to get acquainted with you?"

Table 1. Intercorrelations of the MBTII® Scales and the NEO-FFI Scales.

	N	E	O	A	C
Introversion (I)	.27**	-.62**	-.10*	-.07	-.05
Extraversion (E)	-.25**	.63**	.09	.04	.02
Sensing (S)	.06	-.21**	-.52**	-.15**	.23**
Intuition (N)	-.05	.19**	.48**	.11*	-.29**
Thinking (T)	-.16**	-.15**	-.17**	-.50**	.01
Feeling (F)	.19**	.10*	.10*	.35**	-.12*
Judging (J)	-.03	-.10*	-.11*	-.01	.58**
Perceiving (P)	.03	.10*	.13**	.00	-.58**

Notes: *N = Neuroticism; E = Extraversion, O = Openness to Experience, A = Agreeableness, C = Conscientiousness as measured by the NEO-FFI.*
* p < .05; ** p < .01

RESULTS

Inercorrelations of NEO-FFI and MBTI scales. The intercorrelations of the scales from the two instruments are given in TABLE 1. As can be seen from the table, the resulting moderate intercorrelations confirm previous findings reported above. In TABLE 1, results from eight unidimensional scales were presented: for example, in contrast to the bipolar scoring method described above, for the "EI"-pair of opposites, separate Extraversion and Introversion scores were computed. It can be seen that, for example, correlations of "E" with the Big Five very closely resemble the negative correlations of "I" and vice versa. Thus, from TABLE 1 it becomes evident that for practical purposes, the usual four bipolar scales (EI, SN, TF, and JP) perfectly resemble eight unidimensional scales without any loss of information.

Fit of the Unidimensional Scales. For the same reasons, the scales under consideration were analyzed separately by confirmatory factor analysis (CFA; Bollen, 1989) in order to ascertain their fit to an hypothesized model that assigns the items for each scale to an underlying latent factor. In other words, we examined whether the items forming a scale measure "the same thing". The fit indices obtained for the NEO-FFI scales are shown in TABLE 2, and those obtained for the MBTI scales are given in TABLE 3.

The chi-squared test statistic revealed a significant result for all the scales, indicating that the hypothesized model does not fit the data, i.e., a poor "goodness of fit" (significant results of the chi-squared test indicate that data differ significantly from the model). This statistic is known, however, to become overly sensitive with larger sample sizes, sometimes rejecting valid models. Thus, the chi-squared statistic was adjusted by the "degrees of freedom" (df), producing a χ^2/df ratio (also known as normed chi-square, or NC; Schumacker & Lomax, 2004). A value of less than 5 is considered indicative of plausible model fit (cf. Carmines & MacIver, 1981; Kline, 2005); as none of the models exceeds this limit, by this criterion the fit is acceptable. The CFI and TLI are beyond .8 for all of the NEO-FFI scales and in four of the MBTI-subscales; the remaining subscales show fit indices > .7. These values are somewhat below the critical value of .9, which is supported in Bollen (1989). However, neither the RMSEA nor the SRMR exceeds .1 in any of the models, which again indicates good model fit (cf. Browne & Cudeck, 1993). Therefore, for the NEO-FFI and MBTI unidimensional models, the fit to the model is acceptable.

[1] The Comparative Fit Index (CFI; Bentler, 1990) assesses model fit by comparing the estimated model with a null-model, which assumes no latent variances to be present. A similar task accomplishes the Tucker Lewis Index (TLI; Tucker & Lewis, 1973) with a slightly different way of taking the degrees of freedom into consideration. Both indexes range from 0 to 1, indicating perfect model fit by achieving their maximum value of 1. Values greater than or equal to 0.80 can be considered sufficient (cf. Bollen, 1989; p. 274).

[2] The Standardized Root Mean Squared Residual (SRMR; Hu & Bentler, 1999) and the Root Mean Squared Error of Approximation (RMSEA; Steiger & Lind, 1980) both take the residuals (i.e., the remaining covariances of the observed variables after model parameters have been estimated) into account. Values close to zero indicate good model fit. As a rule of thumb, values not exceeding 0.05 indicate close fit and values up to 0.08 are considered as reasonable (cf. Browne & Cudeck, 1993).

Table 2. Fit of the NEO-FFI (CFA) unidimensional scales.

	fit	neo_n	neo_o	neo_v	neo_g
Chi^2	204.528	204.994	160.355	158.602	220.823
df	54.000	54.000	54.000	54.000	54.000
p-val	0.000	0.000	0.000	0.000	0.000
χ^2/df	3.788	3.796	2.970	2.937	4.089
CFI	0.879	0.841	0.840	0.843	0.868
TLI	0.853	0.805	0.804	0.809	0.839
RMSEA	0.081	0.081	0.068	0.068	0.085
SRMR	0.055	0.062	0.057	0.058	0.059

Table 3. Fit of the MBTI (CFA) unidimensional scales.

fit	MBTI-E	MBTI-I	MBTI-J	MBTI-P	MBTI-S	MBTI-N	MBTI-T	MBTI-F
Chi^2	468.372	467.188	354.760	354.760	289.588	289.179	562.112	565.179
df	275.000	275.000	152.000	152.000	152.000	152.000	252.000	252.000
p-val	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
χ^2/df	1.703	1.699	2.334	2.334	1.905	1.902	2.231	2.243
CFI	0.844	0.845	0.828	0.828	0.750	0.752	0.752	0.750
TLI	0.829	0.831	0.806	0.806	0.719	0.721	0.728	0.726
RMSEA	0.041	0.041	0.057	0.057	0.047	0.047	0.055	0.055
SRMR	0.051	0.051	0.055	0.055	0.055	0.055	0.059	0.059

Testing Three Concurrent Models. The central goal of the present study was to challenge the alleged equivalence of (a) the extraversion scales of MBTI and NEO-FFI, (b) NEO-Openness and MBTI-Sensing, (c) NEO-Agreeableness and MBTI-Thinking, and (d) NEO-Conscientiousness and MBTI-Judging, as suggested for example by Costa and McCrae (1992). Another important issue was to test whether the four bipolar MBTI scales as they are in common use (offering two "anchor points" at each end of a continuum instead of eight unidimensional scales) would be confirmed by CFA. If the MBTI scales are equivalent to the respective FFM scales, a one-dimensional CFA model would be superior. According to the moderate Pearson correlations observed between the respective scales both in previous and in the present study, however, we expected four models, each one consisting of two correlated latent factors each, one representing the NEO-FFI (e.g., Openness to Experience) and one the respective MBTI scales (e.g., Intuition vs. Sensing). For example, we expected that a model with Openness to Experience and Intuition vs. Sensing representing distinct but moderately correlated constructs would achieve optimal fit. As a third possibility, in addition, we tested models with two uncorrelated factors. The three types of models tested are visualized in **FIGURE 1** and the results of CFA are presented in **Table 4**, which also shows the estimates for the correlations of the latent factors.

For all four pairs of scales, the models assuming two distinct but correlated latent factors (2-corr Model)

Figure 1. The three modeling principles applied to each of the four pairs of scales.
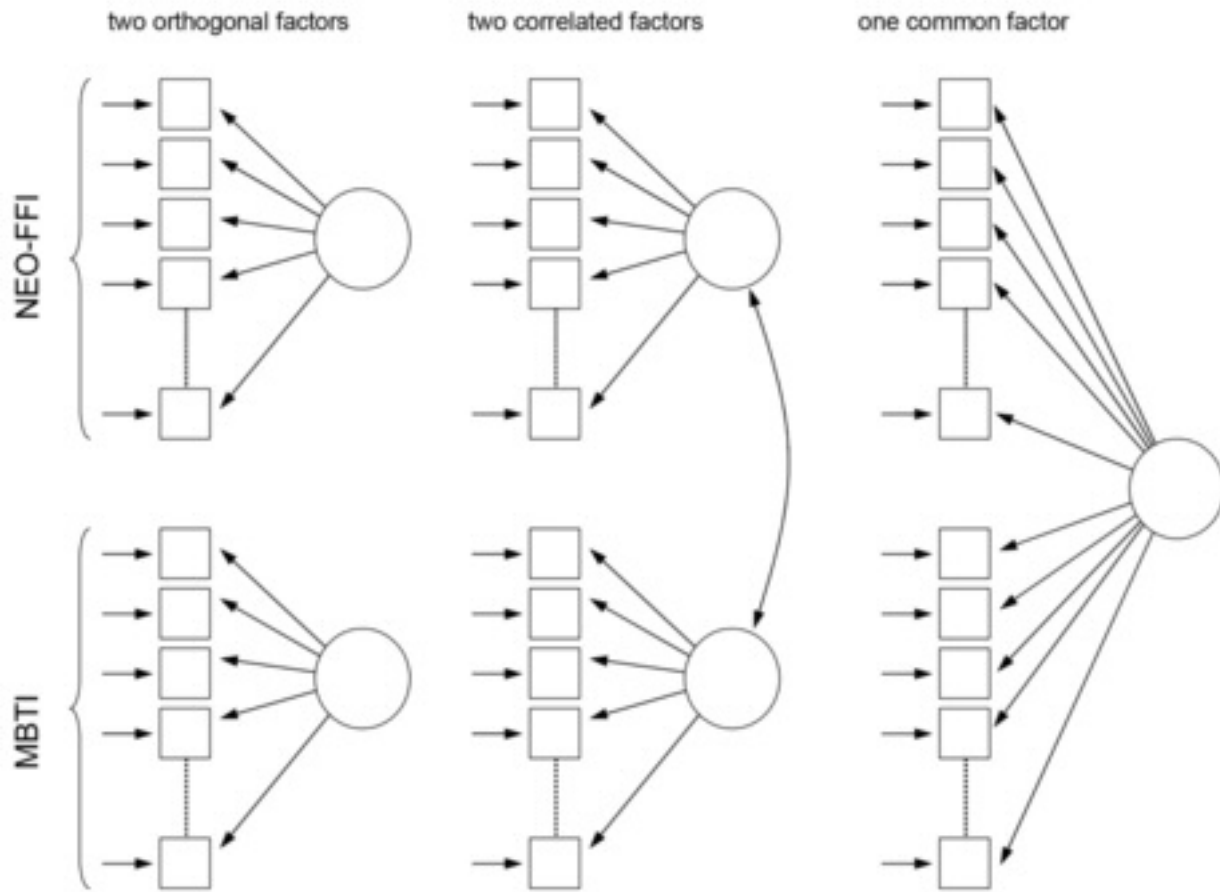
described the data significantly better than either a model with two orthogonal factors (2-orth Model) or a model with one common factor (1-com Model). For the Agreeableness/Feeling-pair, the 1-com Model fit worst; for the Openness/Intuition pair, the 2-orth Model and the 1-com Model performed equally and in the remaining two pairs, the 2-orth Model showed the worst fit.

Again, all models were significant with respect to the chi-squared test statistic. Still the 2-corr Models have acceptable fit, as the χ^2/df was below or slightly above a value of two, meeting the proposed limit of 5 by far and thus indicating acceptable fit. Fit indexes CLI and TLI were between .70 and .82, RMSEA below or slightly above .05 and the SRMR was approximately .06, generally indicative of good fit.

The latent correlations (in the last column of **TABLE 4**) vary between .61 and .79, indicative of a moderate-

to-strong relationship between the respective pairs of scales. Considering the amount of common variance explained by the two scales, for example a correlation of $r = .79$ corresponds to $r^2 = .62$. In other words, only 62% of common variance is explained by the two scales. Overall, we may conclude that the corresponding scales should by no means be considered equivalent, but are better understood as two distinct constructs sharing common variance.

DISCUSSION

In line with the notion of a five-factor structure of personality and in accordance with previous correlational studies (Furnham, 1996; MacDonald et al., 1994; McCrae & Costa, 1989 and Parker & Stumpf, 1998), we found that NEO-FFI Extraversion aligned with the MBTI E–I dimension, Conscientiousness with MBTI

Table 4. Three models applied to each of the four pairs of scales: Results of CFA.

Pairs of Scales	Model	Chi^2	df	p	χ^2/df	CFI	TLI	RMSEA	SRMR	corr.
openness v.s. intuition	2-orth	933.448	434	< .05	2.151	0.653	0.628	0.053	0.090	
	diff	98.639	1	< .05						
	2-corr	834.809	433	< .05	1.928	0.720	0.700	0.048	0.061	0.645
	diff	98.678	1	< .05						
	1-comm	933.487	434	< .05	2.151	0.652	0.628	0.053	0.064	
agreeableness v.s. feeling	2-orth	1216.011	594	< .05	2.047	0.702	0.684	0.051	0.092	
	diff	108.796	1	< .05						
	2-corr	1107.215	593	< .05	1.867	0.753	0.738	0.046	0.058	0.611
	diff	202.598	1	< .05						
	1-comm	1309.813	594	< .05	2.205	0.657	0.636	0.055	0.063	
conscientiousness v.s. judging	2-orth	1076.111	434	< .05	2.480	0.753	0.736	0.060	0.131	
	diff	185.530	1	< .05						
	2-corr	890.581	433	< .05	2.057	0.824	0.811	0.051	0.056	0.733
	diff	172.665	1	< .05						
	1-comm	1063.246	434	< .05	2.450	0.758	0.741	0.060	0.062	
extraversion v.s. extraversion	2-orth	1347.229	629	< .05	2.142	0.714	0.697	0.053	0.114	
	diff	214.579	1	< .05						
	2-corr	1132.650	628	< .05	1.804	0.799	0.787	0.044	0.055	0.789
	diff	102.795	1	< .05						
	1-comm	1235.445	629	< .05	1.964	0.758	0.744	0.049	0.057	0.057

Notes: *2-orth* = 2 orthogonal factors*; 2-corr* = 2 correlated factors, *1-comm* = 1 common factor. The rows labelled with *diff* compare the model above with the one below; the last column (corr) denotes the estimates of the correlation coefficients between the two latent factors of each of the four scales (i.e., the bent arrow in Fig. 1).

J–P, Agreeableness with MBTI T–F, and Openness to Experience with MBTI S–N. Based on a personality theory inspired by ancient and modern philosophy as well as on clinical observations and experience, Jung (1971/1921) has predicted four of the dimensions which later were found empirically by the lexical studies that established the Five Factor Model of Personality. This may be an important argument against frequent criticism of the Big Five as being merely descriptive linguistic categories, lacking a theoretical basis (see for example, Maltby, Day, & Macaskill, 2007). Conversely this is also an important argument for convergent validity for the MBTI scales.

For all four pairs of scales, the models with two correlated factors were superior to the concurrent ones. However, CFA also supported our expectations that the MBTI assessment adds important aspects of personality to the NEO-FFI and vice versa. Structuring and planning one's life carefully, as addressed by the MBTI Judging vs. Perceiving dimension, is distinct from being a competent and dependable person in the sense of NEO-FFI Conscientiousness. Quite clearly, for example, being flexible and open-minded (P) instead of punctual and methodical (J) does not exclude being responsible and careful regarding one's more global and integral duties and dedications. Similarly, emphasizing logic and rationality according to the Thinking pole of the MBTI Thinking–Feeling dimension clearly does not exclude

being friendly, understanding, and empathetic in one's personal relationships as suggested by NEO-FFI Agreeableness. Knowledge, learning, and culture, as addressed by NEO-FFI Openness to Experience do not necessarily covary perfectly with intuitiveness and vision as summarized by the MBTI Sensing vs. Intuition dimension. Even in the case of Extraversion, in spite of the common name of the constructs, it must be considered that Jung's (1921/1971) concept of extraversion emphasized orienting by the objective facts of the outer reality as opposed to the inner images of introversion (thus going far beyond a mere "sociability" notion of being extraverted), whereas FFM-Extraversion is characterized by factor markers like "bold", "talkative", or "assertive" (Saucier, 1994), which obviously again pertain to a conceptually related but distinct theoretical construct.

Thus, for the German versions of the two questionnaires, in line with our expectations we have shown that the MBTI instrument is able to add important aspects to the information provided by the FFM as measured by four of the five NEO-FFI domains.

Whereas the restricted sample size may be an important limitation of the present study, further research should aim at replicating its results, especially by employing versions of the MBTI instrument and the NEO-FFI in additional languages in other parts of the world.

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REFERENCES

Bentler, P.M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*, 238–246.

Bollen, K. A. (1989). *Structural Equations with Latent Variables*. NY: Wiley

Borkenau, P. & Ostendorf, F. (2008). *NEO Fünf-Faktoren-Inventar* [NEO five factor inventory]. Göttingen (Germany): Hogrefe.

Briggs, K. C., & Briggs Myers, I. (2001). *Myers-Briggs Type Indicator. Step 1*. Fragenheft [Questionnaire]. Oxford (UK): OPP.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In: K.A. Bollen & J. S. Long (Eds.), T*esting structural equation models* (pp. 136–162). Newbury Park, CA: Sage.

Carmines, E., & MacIver, J. (1981). Analyzing models with unobserved variables: analysis of covariance structures. In: Bohrnstedt G., Borgatta, E. (Eds.), *Social Measurement: Current Issues* (pp. 65–115). Beverly Hills, CA:Sage.

Costa, P. T., & McCrae, R. R. (1992). *Revised NEO Personality Inventory and NEO Five Factor Inventory professional manual*. Odessa, FL: Psychological Assessment Resources (First published in 1985).

de Raad, B. (2000). *The Big Five personality factors*. The psycholexical approach to personality. Seattle: Hogrefe & Huber.

Edwards, J. A., Lanning, K., & Hooker, K. (2002). The MBTI and social information processing: An incremental validity study. *Journal of Personality Assessment, 78*, 432–450.

Furnham, A. (1996). The big five versus the big four: the relationship between the Myers-Briggs Type Indicator (MBTI) and NEO-PI five factor model of personality. *Personality and Individual Differences, 21*, 303–307.

Furnham, A., & Crump, J. (2005). Personality traits, types, and disorders: An examination of the relationship between three self-report measures. *European Journal of Personality, 19*, 167–184.

Furnham, A., Jackson, C. J., Forde, L., & Cotter, T. (2001). Correlates of the Eysenck Personality Profiler. *Personality and Individual Differences, 30*, 587–594.

Hammer, A. L. (Ed.). (1996). MBTI applications: A decade of research on the Myers-Briggs Type Indicator. Mountain View (CA): CPP, Inc.

Hirsh, S. A., & Kummerow, J. M. (1998). Introduction to type in organizations. Mountain View, CA:CPP, Inc.

Hu, L.-T., & Bentler P.M. (1999). Cutoff criteria for fit indices in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1–55.

Johnson, T. A. (1995). The Myers-Briggs Type Differentiation Indicator (TDI) measures the Big Five. In J. Newman (Ed.), *Measures of the five-factor model and psychological type. A major convergence of research and theory* (pp. 81–100). Gainesville (FL): CAPT.

Jung, C. G. (1971). Psychological types. (Collected Works, Vol. 6). Princeton, NJ: Princeton University Press (Originally published in 1921).

Kline, R. B. (2005). *Principles and Practice of Structural Equation Modelling* (2nd ed.). New York: Guilford.

Klinkosz, W., & Iskra, J. (2010). Examination of the relations of the Myers-Briggs type indicator and the NEO-4 personality inventory in a Polish sample. *Psychological Reports, 107*, 578–586.

Kummerow, J. M., & Quenk, N. L. (2003). Understanding your MBTI® Step II Results: step-by-step guide to your unique expression of type, Form Q. Mountain View, CA: CPP Inc.

MacDonald, D. A., Anderson, P. E., Tsagarakis, C. I., & Holland, C. J. (1994). Examination of the relationship between the Myers-Briggs Type Indicator and the NEO Personality Inventory. *Psychological Reports, 74*, 339–344.

Maltby, J., Day, L., & Macaskill, A. (2007). *Personality, Individual Differences and Intelligence*. Harlow (UK): Pearson.

McCrae, R. R., & Costa, P. T., Jr. (1989). Reinterpreting the Myers-Briggs Type Indicatory from the perspective of the Five-Factor-Model of personality. *Journal of Personality, 57*, 17–40.

Myers, I. B. (1962). *The Myers-Briggs Type Indicator Manual*. Princeton, N.J.: Educational Testing Service.

Myers, I. B., & McCaulley, M. H. (1985). *Manual: A guide to the development and use of the Myers-Briggs Type Indicator*. Palo Alto, CA: Consulting Psychologist Press.

Myers, I. B., McCaulley, M. H., Quenk, N. L., & Hammer, A. L. (1998/2003). *MBTI manual: A guide to the development and use of the Myers-Briggs Type Indicator* (3rd ed.). Palo Alto, CA: Consulting Psychologists Press.

Parker, W. D. & Stumpf, H. (1998). A validation of the five-factor model of personality in academically talented youth across observers and instruments. *Personality and Individual Differences, 25*, 1005–1025.

Paunonen, S. V., Jackson, D. N., Trzebinski, J., & Fosterling, F. (1992). Personality structure across cultures: A multimethod evaluation. *Journal of Personality and Social Psychology, 62*, 447–456.

Pulver, C. A., & Kelly, K. R. (2008). Incremental validity of the Myers-Briggs Type Indicator in predicting academic major selection of undecided university students. *Journal of Career Assessment, 16*, 441–455.

Ross, C. F. J., & Francis, L. J. (2010). The relationship of intrinsic, extrinsic, and quest religious orientations to Jungian psychological type among churchgoers in England and Wales. *Mental Health, Religion and Culture, 13*, 805–819.

Saucier, G. (1994). Mini-markers: A brief version of Goldberg's unipolar big-five markers. *Journal of Personality Assessment, 63*, 506–516.

Schumacker, R. E., & Lomax, R. G. (2004). *A beginner's guide to structural equation modeling* (2nd ed.). NY: Taylor & Francis.

Steiger, J. H., & Lind, J. C. (1980). Statistically based tests for the number of common factors. Paper presented at the Psychometric Society Annual Meeting, Iowa City, IA.

Sjöberg, L. (2001). Emotional intelligence: A psychometric analysis. *European Psychologist, 6*, 79–95.

Thompson, B., & Ackerman, C. M. (1994). Review of the Myers-Briggs Type Indicator. In J. T. Kapes, M. M. Mastie, & E. A. Whitfield (Eds.), *A counselor's guide to career assessment instruments*, 3rd ed. (pp. 281–287). Columbus, OH: National Career Development Association.

Tucker, L.R., & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. *Psychometrika, 38*, 1–10.

Tupes, E. C., & Christal, R. C. (1961). Recurrent personality factors based on trait ratings (USAF ASD Technical Report, No. 61–97). U.S. Air Force, Lackland Air Force Base, TX.

Vacha-Haase, T. & Thompson, B. (2002). Alternative ways of measuring counselees' Jungian psychological-type preferences. *Journal of Counseling and Development, 80*, 173–179.

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