

Measurement and Utility of Continuous Unipolar Ratings for the Myers-Briggs Type Indicator

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This study is designed to explore the measurement properties and utilities of the Myers-Briggs Type Indicator (MBTI) items when the two competing alternatives of individual items were rated separately on a 7-step, free-response continuum. Data were collected from 125 college students who volunteered for this study. Ratings were also obtained from subjects on occupational preferences reported to be leading occupational choices for the 16 MBTI personality types. Major analytic results include the findings of: (a) high factorial validity of unipolar ratings in separate analyses of the two alternatives of MBTI items, (b) high reliability coefficients for all eight preference poles and high convergent and discriminant validities for each of the four MBTI scales, and (c) four significant factors emerging from the combined factor analysis of subjects scores on occupational preferences and MBTI personality poles. Finally, the empirical evidence was discussed about the linkage between Jung theoretical constructs of personality typologies and the MBTI scales. The possibility of just using unipolar ratings for MBTI items in a continuous-response format was also suggested.

According to Myers and McCaulley (1985), Jung's theory of psychological types provided three fundamental assumptions from which the Myers-Briggs Type Indicator (MBTI; Myers, 1975) was constructed: (a) the existence of four personal preferences in perception, judgment and attitude toward the environment, and outer environment attitude; (b) these preferences are bipolar in nature with each pole being equally valuable; and (c) individuals are capable of differentiating these preferences on a self-report inventory. Based on these assumptions, the MBTI was developed initially in 1942 and was finally published in 1975 in its present form (Form G) by the Consulting Psychologist Press.

Briefly, Form G of the MBTI consists of 126 items, but only 95 items are used to measure eight preference poles on four psychological scales:

1. Judgment-Perception (J-P) scale which reflects the individual's preference for either an orderly planned (judgment, J) or a spontaneous flexible environment (perception, P).
2. Extraversion-Introversion (E-I) scale which reflects the individual's preference for an interactive outer world (extroversion, E) or a reflective inner world (introversion, I).
3. Sensing-Intuition (S-N) scale reflects the individual's preference for factual realistic (sensing, S) or global possibilities (intuition, N) perception.
4. Thinking-Feeling (T-F) scale reflects the individual's preference for cognitive, objective (thinking, T) or connotative, subjective (feeling, F) basis for making judgments.

The 95 measurement items consist of either phrases or word pairs; each has two response alternatives that represent the two opposing poles of the four theoretical constructs measured by the MBTI. For example, for the item, "When you go somewhere for the day would you rather," the two alternatives, "(A) plan for what you will do and when" or "(B) just go!", are used to represent J and P poles of the J-P scale, respectively.

A set of items were identified as markers for each of the eight preference poles. Subject responses on the 95 items were first scored to yield eight preference scores. The pole with a higher score on each MBTI scale would represent the subject's personality preference on the scale. Therefore, the combinations of two possible preferences poles on four personality scales yield a total of 16 personality types. For example, a person's eight preference scores may result in an ENFP personality type that represent the person's preference to: (a) interact more with the outer environment (E), (b) perceive globally and seek possibilities (N), (c) prefer subjective bases for making judgments (F), and (d) hold a more open and flexible attitude toward outer world (P).

Clearly, the MBTI assumes that forced-choice responses between two competing alternatives of all items can sort individuals into distinct personality types. However, no prior empirical research has been conducted to test this assumption. In fact, the use of the forced-choice format for assessing any psychological measurement was challenged by Tzeng (1983) as possessing two serious problems: (a) the respondent is always forced to accept or deny totally the characteristic stated by an item regardless of its relevance in daily life, and (b) the format cannot detect the relative differentiations between two raters on the same item or the relative saturations of two items for a single ratee. Tzeng (1983) used two measurement criteria, forced-choice versus free-responses and qualitative typology versus quantitative discrimination, to further categorize three additional response formats that have been typically used for psychological

inventories. Using the Personality Research Form (Jackson, 1974), which also uses the qualitative forced-choice format for subject responses, Tzeng (1983) demonstrated that the free-response format on an equal-interval continuum was superior to other formats. Under this premise, the qualitative, forced-choice format used in the MBTI items may also present the same problems. If this is the case, the practice of sorting individuals into different personality types may inevitably be skewed by the two measurement errors cited in Tzeng.

Another crucial issue is related to the opposite nature of the items. Early in the development of the MBTI, Myers and McCaulley (1985) discovered that different items elicited different meanings for different personality types. Therefore, it seems reasonable to assume that the two competing alternatives of the MBTI items may also reflect different levels of intensity with regard to the two opposing poles. An empirical test of this hypothesis, however, could not be found in the literature.

A third issue concerns the validity of the four theoretical constructs as measured by the MBTI. The theory postulates that differences in preference for perception, judgment, environmental attitude, and outer attitude would manifest individual differences in behaviors, interests, values, and so on. Research concerning this issue has been reported in five areas: (a) correlations of MBTI scale scores with other personality measures (Comrey, 1983; Kolb, 1976; Myers, 1962; Stein, 1972; Stricker & Ross, 1962), (b) comparison of MBTI and other Jungian type measures (Rich, 1972; Ware, Yokomoto, & Morris, 1985; J. B. Wheelwright, J. H. Wheelwright, & Buelher, 1964), (c) comparison of MBTI types with self-estimates of different personality type descriptions (Carskadon, 1975, 1982; Ware & Yokomoto, 1985), (d) studies of behavioral differences across MBTI personality types (Carlson, 1980; Carskadon, 1979; Shapiro & Alexander, 1969; Ware & Yokomoto, 1984), and (e) studies of the factorial validity of MBTI items (Tzeng, Ware, Outcalt, & Boyer, 1985).

In addition, other researchers, such as Jung (1923), Keirse and Bates (1978), and Myers and McCaulley (1985), established face validity of the MBTI scales by reporting significantly higher proportions of individuals in prospective occupations as predicted by the MBTI (e.g., engineers and accountants in the S/J category). Such validity was reported to justify the utility of the MBTI for predicting occupational preference and selections.

These issues are all related to the measurement properties of the MBTI items that have never been assessed simultaneously in a single research program. Therefore, we address these issues in reference to the following two dichotomies in measurement: the qualitative forced-choice versus quantitative continuous-response formats and the bipolar ratings of two competing alternatives versus unipolar ratings of single alternatives of individual items.

Specific questions addressed in terms of empirical data include: (a) Are the two opposing alternatives of each item really opposite in construct?, (b) To what extent are the two opposing alternatives of each item different in magnitude on

the same underlying factorial continuum?, (c) What are the relationships between ratings?, and (d) To what extent will the unipolar ratings on a continuous response format affect the reliability and validity of the MBTI items? Because these questions are interrelated and are fundamental to the measurement (validity and reliability) and utility issues of the MBTI in applied settings, they will first be assessed separately and then be integrated for overall evaluation.

METHOD

Subjects and Procedure

Three response formats of the MBTI items were constructed (with the permission from Consulting Psychologist Press) for a comprehensive research program performed at our laboratory: (a) the original MBTI Form G with 95 items, each with two (few have three) response alternatives in a qualitative forced-choice response format; (b) a revision of Form G (referred hereafter as Form 2), with the two opposing alternatives of each item in Form G being anchored at the two extreme poles of a psychological continuum on which seven discriminating steps were used for responses; and (c) unipolar ratings of the MBTI items from Form G (referred hereafter as Form 3) with the two competing alternatives of each item being treated as two new, independent items that are measured on the 7-point agree/disagree continuum. Form 3 consisted of 190 new rating items from the 95 MBTI items and was used to test the issues mentioned earlier.

In addition, in order to test the relationship between occupational preferences and the preferences for personality types, each of the 16 MBTI types was represented by a most dominant occupation identified by Keirsey and Bates (1978) and Myers and McCaulley (1985; e.g., an INFP type represented by a therapist). An additional five occupational names were included to account for multiple relevance of occupations to different personality types. For these 21 occupational names, two types of ratings were obtained: (a) subjects were asked to indicate the degree of preference to each occupation on a 7-point scale ranging from *strongly like to engage* (1) to *strongly dislike to engage* (7) with 4 as an equal endorsement or rejection; and (b) subjects were asked to rank all 21 occupational names hierarchically in accordance with their preference of selecting each for a future occupation. This strategy is consistent with the measurement of occupational preference cited in the literature because our sample of college students is assumed to have definite occupational interest (Tzeng, 1987).

One hundred twenty-five undergraduate psychology students, ranging in age from 18 years old to 55 years old with a mean of 22 years, volunteered to participate in this study. They were administered all three forms of the MBTI

mentioned earlier and rated the 21 occupation names. Demographic data were also collected from the subjects, including sex, age, education, ethnic backgrounds, marital status, occupation, birth order, and career goals.

RESULTS

Factor Structures of Unipolar Ratings

Subject responses on the first and second alternatives of the 95 items were treated as two parallel tests. Analyses were performed separately on the interitem product-moment correlations of these two sets of ratings,¹ and each resulted in a four-factor solution (using scree criteria) that accounted for over 50% of the total input variance. The rotated factor loadings through varimax criterion yielded four distinctive and equally important bipolar, independent factors in both analyses. That is, the items marking the four MBTI scales recaptured the four theoretical bipolar constructs of E versus I, S versus N, T versus F, and J versus P. Overall, at least 90% of marker items were uniquely salient on their respective theoretical factors with loadings greater than .30 (i.e., 98% on EI, 100% on SN, 95% on TF, and 91% on JP). These results clearly indicate high factorial as well as convergent and divergent validity of the MBTI items even when their alternatives were rated separately. In addition, a large proportion of nonmarkers have much smaller loadings (with a mean close to zero) on each theoretical construct (i.e., 95% of nonmarkers have loadings less than .30 on EI, 98% on SN, 98% on TF, and 92% on JP).

Assessment of Four Measurement Indices

To further evaluate validity and reliability issues, the multitrait-multimethod approach was applied to the two sets of response alternatives of the 95 MBTI items of Form 3. That is, for each MBTI scale, four different indices were derived as illustrated for the E-I scale in Figure 1. The first statistic, *internal homogeneity*, was obtained by averaging correlations across all markers within each alternative set (Nunnally, 1978). For example, the first alternative set (the E pole) has an average correlation of .30 across all 20 E markers, and the second alternative set (the I pole) has an average correlation of .28. The second index, *Spearman Brown's reliability coefficient*, was computed from the average correlation among the marker items for each pole (e.g., .90 and .89 for the E and I poles, respectively). The third type, the *convergent validity index*, was computed by averaging the intercorrelations between two competing alternatives of all markers of each MBTI scale (e.g., $-.62$ for the E-I scale in Figure 1). The last

¹Product-moment correlations of all marker items can be obtained from the authors.

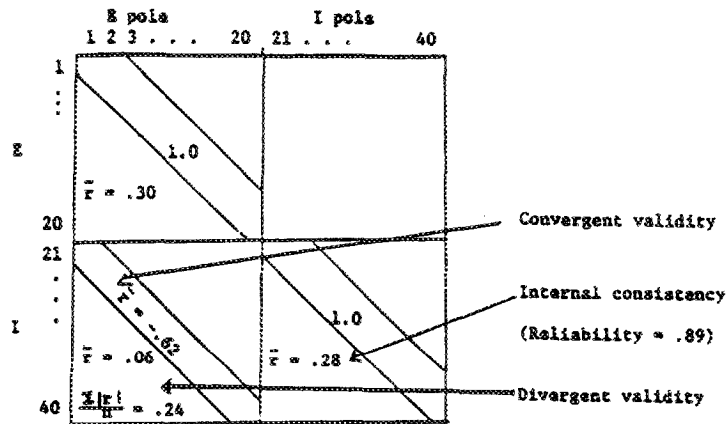


FIGURE 1 Measurement indices for the E and I poles.

index, *discriminant validity*, was represented by the mean of correlations between noncompeting alternatives of all marker items of each MBTI scale (e.g., .06 in average and .24 in absolute average correlations for the E-I scale).

The resulting indices for the four MBTI scales are presented in Table 1. The general findings include: (a) the eight MBTI poles have significant within-pole average correlations with values between .26 and .37; (b) the reliability coefficients for these eight poles are all extremely high (.89 or higher); (c) convergent validity indices of the four MBTI scales are between $-.56$ and $-.66$, which are all statistically significant beyond the .001 level (the negative values indicate the bipolar nature of the two opposing poles on each scale); and (d) the discriminant validity indices are relatively low, with the average values close to 0 and the absolute mean values in the .20 range.

TABLE 1
Within-Scale Correlations and Measurement Indices

Scale	Poles	Average Correlation	Reliability Coefficient	Convergent Validity	Discriminant Validity
E-I	E	.30	.90		
	I	.28	.89	-.62	.06* (.24) ^b
S-N	S	.37	.93		
	N	.33	.92	-.66	.00 (.33)
T-F	T	.26	.90		
	F	.28	.91	-.56	.00 (.23)
J-P	J	.35	.93		
	P	.30	.91	-.56	.00 (.29)

*The average correlation computed from noncompeting alternatives. ^bThe average of absolute values of correlation coefficients computed from noncompeting alternatives.

Relation Between MBTI Typologies and Occupational Preferences

Subjects' preference ratings of occupations and their preference scores on the eight MBTI poles (from Form 3) were submitted together to a single factor analysis. Four distinct dimensions were obtained in a common factor space which accounted for 56.4% of the total input variance. The rotated factor structure via varimax rotation is presented in Table 2.

These factors are all bipolar in nature, and the first three are dominated by the MBTI personality preferences poles. For example, Factor 1 is defined by S and J on one side of the dimension and N and P on the other side. Nine

TABLE 2
Salient Loadings From the Analysis of 17 Occupations and 8 Personality Preference Poles^a

Variables	Factors ^b			
	I	II	III	IV
(A) Occupations^c				
Assistant-ISTJ	.30			
Architect-ENTP	-.27		.35	.33
Inventor-ENTP	-.40		.24	.43
Chief Executive Officer-ENTJ	.34	.31		
Therapist (Individual)-INFP			-.32	.66
Therapist (Group)-ENFP			-.32	.65
Journalist-ENFP				.55
Professor (Teaching)-ENFJ				.69
Professor (Research)-INTJ			.30	.51
Promoter (Things)-ESTP		.55		
Promoter (People)-ESFP		.61		
Administrator-ESTJ	.36	.32		
Artist (Conceptual)-INTP	-.27			.57
Artist (Arts & Crafts)-ISTP				.58
Accountant-ISTJ	.33		.22	-.29
Entertainer-ESFJ	-.24	.35		.21
Race Driver-ESTP	-.25		.24	-.21
(B) Personality Preference Poles				
E: Extraversion		.86		
I: Introversion		-.83		
S: Sensing	.83			-.34
N: Intuition	-.74			.44
T: Thinking			.83	
F: Feeling			-.87	
J: Judgment	.87			
P: Perception	-.80			

^aLoadings with absolute values > .20 were omitted. ^bI = Formalization; II = Exhibition; III = Analytical Reasoning; IV = Creativity. ^cSymbols for personality types follow occupation labels.

occupations are also salient on this factor, with dependable assistant, chief executive officer, administrator, and accountant associating with the S and J personality preferences and architect, inventor, conceptual artist, entertainer, and race driver associating with the N and P personality preferences. Overall, the S and J side of this factor depict the mental activities and concerns with rules, regulations, and formats in occupations with definite policies and operational procedures. We call this the Formalization factor.

The second factor is uniquely defined by the E and I preferences on each side of the factor. Five occupations that are clearly associated with the E pole are promoter of people, promoter of things, chief executive officer, administrator, and entertainer. These occupations are usually in the form of public exhibition as reflected by the two leading occupations of promoters with people and things. Therefore, we call this the Exhibition factor.

The third factor is defined by the T and E poles on each side. Major associated occupations are architect, inventor, research-oriented professor, accountant, and race driver on the T pole and therapist/counselor (both individual and group situations) on the F pole. This factor differentiates two types of occupations with one type focusing on analytic and reasoning mental activities and the other types focusing on subjective feelings. Choosing the thinking aspect of characteristics, we call this the Analytic Reasoning factor.

The fourth factor is characterized mainly by occupations rather than personality preferences. Among 12 occupations that have saliences on this factor, only journalist, teaching-oriented professor, and artists (specializing in arts and crafts) are not salient simultaneously on other factors. The apparent association of personality preferences N with these three professions and other occupations, like conceptual artist and therapists for individuals or groups, seems to suggest the creativity nature of the occupational activities involved. Therefore, we call this the Creativity factor.

DISCUSSION

Results yield significant empirical evidence that supports the major measurement requirements of the MBTI at the item level. First, the ratings of both alternatives of the 95 MBTI items recaptured the four theoretical constructs very well. The loadings of two competing alternatives of individual teams are equal in magnitude, but opposite in signs, on their respective factors. This result seems to support the nature of underlying bipolarity between two preference poles in personality ratings.

Second, personality preferences were somewhat predictive of occupational preferences. Each occupation tested was reflected by its dominant personality characteristic as advocated by the MBTI literature. For example, the occupation

of dependable assistant, which was presumably dominated by personality preferences of S and J, was uniquely salient on the factor that was empirically defined by the MBTI preference poles of S and J in Table 2.

In addition, results provide empirical evidence to Jung's personality type constructs which were reported to be the theoretical foundation for the development of the MBTI by Myers (1962). However, some studies (Coan, 1978; Comrey, 1983; Mendelson, 1965; Stricker & Ross, 1964) have questioned that psychometric dimensions from analysis of MBTI did not correspond with Jung's theoretical constructs. Also, the E-I scale was regarded as purely social in characteristic (Comrey, 1983).

Our study suggests otherwise. The determination of E and I is based on the flow of energy, according to Jung (1923): Does the energy flow outward toward the environment or inward toward the self (Cattell, Eber, & Tatsouka, 1970; Gough, 1975; Gough & Heilbrum, 1983)? The Exhibition factor, found in Table 2, characterizes the exact nature of outward energy flow of actively dealing with the outside world in daily and routine activities as reflected by the behavioral contacts of such occupations as chief executive officer, promoters of things and people, and entertainer. Therefore, the E pole appears to go beyond the social, attitudinal preference in character.

Similarly, the Formalization factor, found in Table 2, indicates that the emphasis of sensory and more objective apprehensions of external as well as internal world is reflected in such occupations as dependable accountant, assistant, chief executive officer, and administrator. On the other hand, more intuitive, imaginative, and instinctive apprehensions of the human environment are reported by the occupations of architect, inventor, artist, and entertainer. The bipolar nature of this dimension seems to confirm the functional dichotomies between N and S by Jung. That is, S perceivers, such as accountants, are more aware of present realities, preferring the concrete and practical approaches in their daily occupations. N perceivers, such as artists, are more aware of patterns and relationships among information, preferring new possibilities and implicit meanings. These interpretations appear to be consistent with the observations made by other researchers who emphasized attitudinal differences between S and N poles, rather than their differences in behavioral manifestations across different occupations (Comrey, 1983; Mendelson, 1965; Stricker & Ross, 1964).

The third factor in Table 2 suggests that subjective feelings and attitudes (like and dislike) are the major behavioral determinants and counseling criteria used by therapists and counselors (both in group and individual situations). This result confirms the fact that the feelings and attitudes of patients are normally the primary targets for changes in counseling and psychotherapy. Opposed to more objective, realistic, and logical-oriented behaviors of architects, research professors, accountants, and race driver, such process-oriented usage and

changes of subjective attitudes and feelings confirm Jung's dichotomy between T and F in the process in decision making in daily life situations.

P and J, implied by Jung and made explicit by Myers, are the functional characterization of personal preferences in dealing with the outside world. Persons emphasizing the J function are decisive, goal-oriented, planned, and prefer an orderly environment, but persons emphasizing the P function are more flexible, adaptable, spontaneous, and prefer a changing environment. The preference of either J or P is considered as a "superior" (or dominant) function in general attitudes and social behaviors. This characteristic is also supported by the combination analysis between personality and occupation preferences. Occupations such as dependable assistant, chief executive officer, administrator, and accountant emphasize the orderly aspect in daily life decision making, whereas occupations such as architect, inventory, artist, and entertainer emphasize the spontaneous aspect.

Furthermore, such dichotomy represents a rather broad characterization in general life experiences, as reflected by the positive associations between S and J on the positive pole of the Formalization factor (see Table 2) and between N and P on the negative pole. These findings also provide some affirmative support to the questions raised by other researchers (Coan, 1978; Comrey, 1983; Stricker & Ross, 1964). It should be noted that the relations between occupational preferences and personality characteristics, as demonstrated herein (see Table 2), were based on responses from college students. These subjects are less crystallized and fixed about their interests in occupational realities. Even under such flexible orientations, a positive linkage has been identified. It seems reasonable to expect the existence of a stronger relationship for working adults who usually show stronger interest and stereotypic ideas about various occupations.

Overall, we illustrated an important research development: Through the availability of continuous, unipolar ratings of the MBTI items, the subject responses on personality preference poles can be assessed in reference to occupational interest preferences. Their relationships, as depicted in a common factor space, reveal the underlying characteristics between implicit personality theories and occupational orientations (Tzeng, 1987). These results provide empirical evidence in support of the initial development of the MBTI by Meyer and in support of its theoretical linkage to Jungian typology of personality.

Finally, the five measurement indices resulting from analysis of subject ratings in this study strongly support the reliability and validity of unipolar ratings of the MBTI items on a continuous-response format. In addition, such ratings overcome the two previously mentioned measurement difficulties that are usually inherent in a qualitative forced-choice format in subject responses.

Therefore, these favorable outcomes—both in measurement and potential utility for occupational differentiations—suggest the possibility and also probability of just using the single alternatives of the MBTI items in continuous

ratings. Apparently, this conclusion requires a stronger scientific base if comparison are to be made between unipolar ratings and bipolar ratings of the same MBTI items. Such verification is currently under investigation in our laboratory.

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