A “Big Five” Scoring System for the Myers-Briggs Type Indicator

Robert J. Harvey
Virginia Polytechnic Institute & State University

William D. Murry
College of Business Administration,
State University of New York at Binghamton

Steven E. Markham
R. B. Pamplin College of Business,
Virginia Polytechnic Institute & State University

We examined the degree to which a scoring system based on Big Five theory (e.g., Digman, 1990) could be developed for the Myers-Briggs Type Indicator (MBTI). Our results indicated that a 5-factor model that closely matches the general definitions of the Big Five constructs can be produced using the full Form F MBTI item pool. The ability to score the MBTI in either a Jungian type-based or Big Five dimensional fashion should prove valuable to researchers and organizational practitioners.

Historically, the degree to which personality tests have been used as employee selection and placement tools has varied considerably. After enjoying a period of popularity during the earlier part of this century, during the 1960's the prevailing view (e.g., Guion & Gottier, 1965) shifted to a much more negative assessment: namely, that “the validity of standard personality measures for personnel selection [was] so poor that their continued use seemed unwarranted” (Hogan, 1991, p. 896). However, in more recent years personality-based employee selection tests have staged a resurgence in popularity, spurred by the appearance of empirical studies and meta-analyses that supported their utility as assessment devices (e.g., Barrick & Mount, 1991; Hough, Eaton, Dunnette, Kamp, & McCloy, 1990; Mount, Barrick, & Strauss, 1994; Schmit & Ryan, 1993; Tett, Jackson, & Rothstein, 1991).

One factor that has energized and directed research and practice in this area has been the growing acceptance of the Big Five view of the structure of personality (e.g., Cortina, Doherty, Schmitt, Kaufman, & Smith, 1992; Digman, 1990; Hogan & Hogan, 1992; McCrae & Costa, 1987; Schmit & Ryan, 1993). According to the Big Five taxonomy, the primary dimensions of personality are Extraversion, Agreeableness, Conscientiousness, Emotional Stability, and Openness to Experience; Table 1 presents a summary of the prototypical characteristics and illustrative adjectives that have been offered for each of these constructs. Although debate continues regarding the question of which Big Five scales are the most generally useful in selection contexts (e.g., Barrick & Mount, 1991; Tett et al., 1994; Ones, Mount, Barrick, & Hunter, 1994; Tett, Jackson, Rothstein, & Reddon, 1994) -- as well as the question of whether subscales of the Big Five provide higher levels of predictability than the main scales (e.g., Hogan & Hogan, 1992; Hough et al., 1990) -- it is evident that the Big Five taxonomy has exerted a major positive impact on current uses of personality tests for employee selection.

Despite the fact that it was not developed in the Big Five tradition, the Myers-Briggs Type Indicator (MBTI; Briggs & Myers, 1976; Myers & McCauley, 1985) has enjoyed widespread popularity in applied organizational contexts. Indeed, by some estimates the MBTI has become the most widely used personality assessment instrument in corporate America, with an estimated 1.5 million workers having completed the MBTI in 1986 alone (Moore, 1987); in 1991, that estimate had risen to over 2 million people (Supplee, 1991). The MBTI is used in a wide variety of organizational applications: for example, Poilitt (1982) described the use of the MBTI for career guidance and personal development; Hartzler and Hartzler (1982) described the application of the MBTI for "planning, organizing, directing, and controlling" (p. 20) the actions of other workers; Garden (1989) and Sample and Hoffman (1986) described the use of the MBTI for organizational development; and several studies (e.g., Gough, 1976; Hall & MacKinnon, 1969; Kirton,
1976) have used the MBTI to predict aspects of job performance (in these examples, creativity and innovation). The MBTI has even found application in job analysis and synthetic test validation: based on a job's Position Analysis Questionnaire (PAQ; McCormick, Jeanneret, & Mecham, 1972) profile, an estimate of the MBTI profile one would expect to find among job incumbents can be produced by the PAQ's scoring service using synthetic validity (e.g., Jeanneret, 1992; Mecham, 1989).

Table 1
“Big Five” Theory Dimensions and Illustrative Adjectives

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Prototypical Characteristics</th>
<th>Illustrative Adjectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conscientiousness</td>
<td>Responsible, dependable, able to plan, organized, persistent, need</td>
<td>Organized, systematic, thorough,</td>
</tr>
<tr>
<td></td>
<td>for achievement, persistence, scrupulous</td>
<td>hardworking, planful, neat, dependable, (careless), (inefficient), (sloppy), (impulsive), (irresponsible)</td>
</tr>
<tr>
<td>Extraversion, Surgency, Sociability</td>
<td>Sociable, talkative, assertive, ambitious, active, dominance,</td>
<td>Extroverted, talkative, assertive,</td>
</tr>
<tr>
<td></td>
<td>tendency to experience positive emotions</td>
<td>aggressive, gregarious, energetic, self-dramatizing, (reserved), (introverted), (quiet), (shy), (unassertive), (withdrawn)</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>Good-natured, cooperative, trusting, sympathy, altruism,</td>
<td>Sympathetic, cooperative, warm,</td>
</tr>
<tr>
<td></td>
<td>(hostility), (unsociability)</td>
<td>tactful, considerate, trusting,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(cold), (rude), (unkind), (independent)</td>
</tr>
<tr>
<td>Emotional Stability, Adjustment,</td>
<td>Calm, secure, not nervous; predisposition to experience anxiety,</td>
<td>Unenvious, relaxed, calm, stable,</td>
</tr>
<tr>
<td>(Neuroticism)</td>
<td>anger, depression, emotional instability</td>
<td>confident, effective, (moody), (touchy), (nervous), (moody), (self-doubting)</td>
</tr>
<tr>
<td>Openness to Experience, Intelligence, Culture</td>
<td>Imaginative, artistically sensitive, aesthetically sensitive, intellectual, depth of feeling, curiosity, need for variety</td>
<td>Intellectual, creative, artistic, imaginative, curious, original, (unimaginative), (conventional), (simple), (null), (literal-minded)</td>
</tr>
</tbody>
</table>

Note. Prototypical characteristics and adjectives taken from McCrae and Costa (1989), Mount et al. (1994), and Hogan (1991); items in parentheses define the opposite pole of each dimension.

In contrast to recent inventories that were inspired by the relatively atheoretical Big Five research (e.g., the NEO PI of Costa & McCrae, 1985), the MBTI was developed over 40 years ago based on a Jungian view of personality. The MBTI seeks to measure four primary dimensions: Extraversion-Introversion (EI), Sensing-Intuition (SN), Judging-Perceiving (JP), and Thinking-Feeling (TF). Although the MBTI produces continuous preference scores to measure each of these four dimensions, in most cases individuals are assigned to one of 16 type categories based on their profile of dichotomized preference scores (e.g., an INTP would denote an Introverted, Intuitive, Thinking, Perceiving type).

Although the MBTI far predated the empirical research studies that produced the Big Five taxonomy, some authors (e.g., McCrae & Costa, 1989) have noted that a strong similarity exists between the MBTI’s scales and four of the five Big Five dimensions. Specifically, MBTI’s EI scale (on the ‘E’ pole) corresponds to the Big Five’s Extraversion, the SN scale (‘N’ pole) corresponds to Openness to Experience, the TF scale (‘F’ pole) corresponds to Agreeableness, and the JP scale (‘J’ pole) corresponds to Conscientiousness. Using the NEO-PI to quantify the Big Five traits, McCrae and Costa (1989) examined the degree of empirical convergence between the MBTI preference scores and the five NEO-PI scales, concluding that “each of the four [MBTI] indices showed impressive evidence of convergence with one of the five major dimensions of normal personality” (pp. 32-33).

However, among the four main MBTI scales, McCrae and Costa (1989) found that none exhibited any significant degree of correspondence to the Emotional Stability/Neuroticism dimension from the Big Five. This is not entirely surprising, given the MBTI’s goal of not assessing individuals on dimensions that might be perceived as being “undesirable” (e.g., as low scores on Emotional Stability, or high scores on Neuroticism, might easily be viewed). As Saunders (1986) noted, “one of the greatest strengths of the MBTI was its positive, affirming nature” (p. 1). Although this lack of a scale to measure the Emotional Stability/Neuroticism dimension of the Big Five may not be of concern to MBTI users whose primary goal is to simply assign individuals to one of its 16 type categories, it does pose a limitation to practitioners who would like to use the MBTI to measure the full profile of personality dimensions specified in the Big Five taxonomy (e.g., to make use of published validity studies that have documented the predictive power of the Big Five scales for various kinds of jobs). As McCrae and Costa (1989) concluded, although the absence of the Big Five’s Neuroticism dimension from the MBTI “makes interpretation of results palatable to most respondents, this approach also omits information that may be crucial to employers, co-workers, counselors, and the individuals themselves. For many, if not most, applications, some measure of Neuroticism would be useful” (p. 36).

The goal of this study was to determine the degree to which the existing MBTI item pool could be scored to provide a measure of the Big Five’s missing Emotional Stability dimension. As Saunders (1986) noted, “every version of the Indicator, with the exception of Form E, includes unscored research items” (p. 1) in addition to the 95 items used to score the four main scales (e.g., Form F contains 71 such items). Although Myers (1980) claimed that these research items were not included for the purpose of assessing scales with “clinical” overtones (e.g., the Emotional Stability/Adjustment/Neuroticism dimension from the Big Five), our examination of the content of these unused items suggested that a number of them (e.g., those dealing with obsessive worrying, pronounced mood swings, suspicious views of people in general) might indeed be able to serve as indicators of the missing Emotional Stability dimension.

To determine whether these research items could serve in this capacity, we conducted a series of exploratory and confirmatory factor analyses on the combined item pool from Form F. A two-wave strategy was followed: (a) exploratory factor analyses were conducted in a “derivation” sample in an attempt to generate one or more new MBTI factor structures that might tap the missing Emotional Stability dimension; then (b) confirmatory factor analyses were conducted in a...
second “validation” sample to test the degree to which the new factor models would fit in an independent sample of respondents.

Method
Subjects and Instrument

For the exploratory factor analyses, we used a sample of 1,258 subjects that were used in a previous study (Harvey, Murry, & Stamoulis, in press) that examined the factor structure of the MBTI; a second sample (N = 968) was used to conduct the confirmatory factor analyses. In both samples, the majority of subjects were college students who participated in exchange for course credit, or in the context of class demonstrations; the remainder of subjects were employees of various firms who participated in the context of employee development projects. The subjects from the Harvey et al. (in press) study were used in the derivation sample because the dimensionality of the research items was not examined in that study (i.e., it focused on the 95 “production” items, finding that the a priori 4-factor model provided a convincing representation of that item pool).

165 items from Form F of the MBTI were used for the exploratory factor analyses (item 68 was not included because it allows respondents to mark more than one response alternative, which made coding of its responses problematic). For the “production” 95 items, each raw item response made in the I, N, F, or P direction was keyed as ‘1’; the other responses were scored as ‘0.’ For the “research” items, the first response alternative was coded ‘1’, the remainder were coded ‘0’ (see Harvey & Murry, 1994, or Harvey, Murry, & Markham, 1994, for details).

It should be noted that although Form F has been superseded by the newer Form J, we chose to focus on the Form F item pool because (a) a large database of Form F responses was available to us; (b) Form F is a client-scorable version of the MBTI that continues to remain popular among practitioners who are concerned primarily with measuring the four main MBTI scales (i.e., the Form J scoring system is much more fine-grained, producing scores on up to 27 dimensions of personality); and (c) the research items contained in Form F have been retained in their entirety in the newer Form J. Thus, although Form J contains some new items that are not present in Form F, both Forms F and J contain a common core of items, and users of either form will be able to make use of any new Big Five scoring system that we might develop.

Analyses

Exploratory factor analyses. As the first step in this study, we examined the underlying dimensionality of the entire Form F item pool using exploratory factor analysis; principal axis extraction, oblique Harris-Kaiser (p = 0.5) rotation, and SMC estimates of communality were used. To assess the number of factors, both eigenvalue discontinuities (i.e., the “scree” test) and examination of unrestricted maximum-likelihood factor analysis fit measures (i.e., Tucker-Lewis reliability coefficient [TLRC], Schwarz’ Bayesian criterion [SBC], and Akaike’s information criterion [AIC]) were used (higher values of the TLRC and AIC indicate better model fit, whereas the minimum value of the SBC indicates best fit).

Confirmatory factor analyses. To determine the degree to which the new factor model(s) would fit in the second sample, confirmatory factor models were also estimated. The SAS PROC CALIS procedure was used, with maximum likelihood estimation methods; fit measures of primary interest were Jöreskog’s (e.g., Jöreskog & Sörbom, 1981) goodness of fit (GFI) and adjusted goodness of fit (AGFI) measures, the null-model based ρ (Bentler & Bonnet, 1980), and the root-mean-square residual (RMSR) in reproducing the sample data matrix.

Results
Exploratory Factor Analyses

Regarding the number of factors underlying the full Form F item pool, the results of both the scree test and the unrestricted MLFA fit indices (see Table 2) strongly indicate a 5-factor solution.

Table 2
Fit Statistics for Exploratory Maximum Likelihood Factor Analyses (165-items)

<table>
<thead>
<tr>
<th># Factors</th>
<th>AIC</th>
<th>SBC</th>
<th>TLRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15355</td>
<td>-53004</td>
<td>.281</td>
</tr>
<tr>
<td>2</td>
<td>7604</td>
<td>-60212</td>
<td>.478</td>
</tr>
<tr>
<td>3</td>
<td>1187</td>
<td>-65792</td>
<td>.644</td>
</tr>
<tr>
<td>4</td>
<td>-2571</td>
<td>-68719</td>
<td>.743</td>
</tr>
<tr>
<td>5</td>
<td>-4756</td>
<td>-70076</td>
<td>.803</td>
</tr>
<tr>
<td>6</td>
<td>-5481</td>
<td>-69979</td>
<td>.825</td>
</tr>
<tr>
<td>7</td>
<td>-6033</td>
<td>-69715</td>
<td>.842</td>
</tr>
<tr>
<td>8</td>
<td>-6564</td>
<td>-69435</td>
<td>.8595</td>
</tr>
<tr>
<td>9</td>
<td>-6895</td>
<td>-68959</td>
<td>.872</td>
</tr>
<tr>
<td>10</td>
<td>-7181</td>
<td>-68442</td>
<td>.882</td>
</tr>
<tr>
<td>11</td>
<td>-7367</td>
<td>-67832</td>
<td>.891</td>
</tr>
<tr>
<td>12</td>
<td>-7550</td>
<td>-67225</td>
<td>.899</td>
</tr>
<tr>
<td>13</td>
<td>-7711</td>
<td>-66600</td>
<td>.907</td>
</tr>
</tbody>
</table>

Note. SBC = Schwarz Bayesian criterion, TLRC = Tucker-Lewis reliability coefficient, AIC = Akaike information criterion. Lower values of SBC indicate better fit; higher values of TLRC and AIC indicate better fit.
Table 3
5-Factor Rotated Solution for 165-Item Form F Item Pool

| Thinking-Feeling Dimension | F114 | 64 | 4 | -9 | 1 | 9 | feeling > thinking
| F103 | 55 | 7 | -4 | 4 | 10 | feeling > convincing
| F111 | 54 | 7 | 1 | -4 | 5 | gentle > firm
| F79 | 54 | -5 | -2 | 3 | 10 | synthesize > analyze
| F26 | 53 | 7 | 5 | 15 | 5 | value > sentiment
| F71 | 51 | 10 | 0 | -2 | 11 | warm-hearted > firm-minded
| F23 | 47 | 3 | -15 | 0 | 3 | higher complierment: feeling > reasonable
| F46 | 48 | 8 | 7 | -2 | 6 | soft > hard
| F100 | 43 | 4 | -2 | 5 | 6 | devouted > determined
| F154 | 41 | -15 | 10 | 15 | 10 | heart rule head > head rule heart
| F40 | 40 | -4 | -7 | 7 | 3 | more careful about feelings > rights
| F81 | 39 | 10 | 10 | 0 | 6 | blessings = benefit > usefulness
| F34 | 38 | 7 | 12 | -18 | 12 | unneutral > critical
| F31 | 37 | -10 | -20 | -10 | 7 | forgive > tolerate
| F120 | 38 | 14 | -1 | 2 | -21 | peacemaker > judge
| F105 | 36 | 5 | 0 | 4 | 5 | mercy > justice
| T5 | 35 | -5 | -7 | -6 | 1 | congersial-effective
| B2 | 33 | 7 | -6 | 28 | -6 | casual > correct
| F158 | 32 | 6 | -5 | -3 | 11 | worse to be unsympathetic > unreasonable
| F39 | 32 | 0 | -15 | 4 | 2 | worse to not have enough warmth
| F23 | 31 | -29 | -3 | -14 | 7 | approve > question
| 18 | 31 | -15 | 26 | 10 | 4 | trustful > wary
| F108 | 30 | -5 | -15 | -6 | -14 | trustful > wary
| 152 | 26 | 3 | 4 | -18 | -17 | sacasm never use where can hurt feeling
| 71 | 25 | -2 | 11 | -1 | 4 | play cards=socialize=wisecracks
| 36 | 25 | 3 | -16 | -11 | 6 | pers profands in/= best Judge
| F147 | 24 | -5 | -13 | -12 | 6 | 1 | affected by others aspirations
| F143 | 23 | -15 | 18 | -2 | -1 | not square deal: take it > threaten
| F64 | 19 | 3 | 8 | -14 | 14 | truth impermeable > impolite truth
| F14 | 19 | 8 | 0 | 18 | 14 | halted job/enjoy break/find work to do
| F56 | 18 | 10 | -9 | 8 | -15 | things worry about often not worth it
| F77 | 17 | 9 | -14 | -15 | -14 | imp deciistrust feel > Logical thing
| 44 | -5 | -11 | 14 | 14 | four time: enjoy stop for refreshments
| 63 | 3 | 52 | -4 | -2 | -10 | personal beliefs/some cant be proved
| 30 | -15 | 4 | -13 | -12 | -14 | decision: make wait < wait
| 96 | -21 | -8 | -8 | -5 | 5 | affect > tenderness
| 62 | -2 | 52 | -4 | -14 | -7 | opurtin big things > enjoy certainty
| 5 | -31 | 18 | -14 | -15 | -16 | enjoy deciding things

Sensing-Intuition Dimension

| F115 | 3 | 57 | -2 | 7 | 10 | ingenious > practical
| F107 | 14 | 53 | 0 | 22 | -1 | abstract > concrete
| F122 | 27 | 42 | -10 | -10 | -11 | prof teach theory > fact
| F78 | 1 | 50 | -4 | 1 | 8 | invent > build
| F88 | -3 | 49 | 6 | 8 | -12 | concept > statement
| F102 | 27 | 48 | -6 | -8 | -4 | ideas > facts
| F73 | 21 | 47 | -3 | 6 | -3 | imaginative > matter of fact
| F70 | -2 | 47 | 1 | -1 | 3 | higher praise > evaluation
| F111 | 2 | 5 | -16 | 6 | 6 | get along with > imaginative > realistic
| F30 | 9 | 44 | 2 | -1 | 3 | design > production
| F17 | 0 | 44 | 3 | 2 | -4 | enjoy old or original ways of writing
| F119 | 20 | 43 | -12 | 12 | 1 | figurative > literal
| F67 | -4 | 42 | -1 | 12 | -3 | theory = certainty
| F114 | 20 | 43 | -12 | 12 | 1 | figurative > literal
| F17 | 0 | 44 | 3 | 2 | -4 | enjoy old or original ways of writing
| F119 | 20 | 43 | -12 | 12 | 1 | figurative > literal
| F67 | -4 | 42 | -1 | 12 | -3 | theory = certainty
| F114 | 20 | 43 | -12 | 12 | 1 | figurative > literal
| F17 | 0 | 44 | 3 | 2 | -4 | enjoy old or original ways of writing
| F119 | 20 | 43 | -12 | 12 | 1 | figurative > literal
| F67 | -4 | 42 | -1 | 12 | -3 | theory = certainty
| F67 | -4 | 42 | -1 | 12 | -3 | theory = certainty

Extraversion-Introversion Dimension

| F110 | 0 | 32 | -4 | 14 | 6 | spaire > foundation
| F53 | -14 | 31 | 7 | -6 | -11 | am annoyed at people not liking theory
| F14 | -2 | 31 | -4 | -12 | -2 | see possibilities > adjust to facts
| F165 | -22 | 26 | -6 | -2 | 6 | like to argue lots of these items
| F151 | -9 | 19 | 8 | 11 | 9 | theory > experience
| F21 | 17 | 4 | 23 | -19 | 3 | active/intellectual
| 21 | -4 | -25 | -8 | 18 | 21 | * take extra work for luxuries=each import
| F222 | 22 | -27 | -3 | 7 | agree > discuss
| F121 | -25 | -31 | -10 | 6 | 2 | system=west
| F123 | -28 | -35 | -17 | 3 | exec > executive

Judging-Percieveing Dimension

| F85 | 8 | 15 | 0 | 64 | -6 | unplanned > scheduled
| F55 | -1 | 3 | 3 | 58 | -14 | prefer just going to planning trip
| F27 | -2 | 4 | 5 | 54 | -11 | find details as go along w/a job
| F102 | -1 | 2 | 5 | 54 | -11 | prefer free do to what looks fun
| F101 | -1 | 2 | 6 | 56 | -14 | making weekend list not appealing
| F102 | -1 | 2 | 6 | 56 | -14 | following schedule clamps experience
| F13 | -4 | -1 | 8 | 48 | 5 | prefer doing things at last minute
| F118 | -5 | -12 | 5 | 4 | 13 | plan in advance, uncurbs to tied down
| F74 | 26 | -19 | 10 | 19 | -2 | spontaneous > systematic
| F74 | 26 | -13 | 12 | 45 | -14 | impulse > decision
| F35 | 5 | -14 | 7 | 45 | -13 | plunge in to new projects w/o plan
| F118 | 38 | 6 | 7 | 44 | -9 | casual > systematic
| F102 | -20 | 20 | -11 | 41 | -13 | at best dealing with unexpected
| F49 | -16 | 15 | 2 | 43 | 13 | daily routine painful even when needed
| F49 | -16 | 15 | 2 | 43 | 13 | daily routine painful even when needed
| F102 | -1 | 2 | 6 | 54 | -16 | cant tell well about saturday
| F102 | -1 | 2 | 6 | 54 | -16 | cant tell well about saturday
| F104 | 0 | 0 | -3 | 40 | 13 | ext speed at end job = early start
| F109 | 32 | -5 | 5 | 37 | -11 | differently > punctual
| F104 | 0 | 0 | 4 | 42 | -16 | easy-going > orderly
| F113 | -4 | -5 | 11 | 32 | -9 | often forget small things
| F113 | -4 | -5 | 11 | 32 | -9 | often forget small things
| F120 | -29 | 23 | -5 | 31 | -7 | hard to adapt to routine
| F102 | -1 | 14 | 10 | 25 | 1 | routine parts of dayhoning
| F38 | -8 | -14 | 5 | 22 | -2 | routine things to stay in bad mood
| F61 | 8 | -14 | -4 | -15 | 2 | prefer traveling w/expanion
| F139 | -15 | 5 | -12 | -37 | 7 | at home/neg proj/clearing/sad to wait

Unscored Experimental "Research" Dimension
5

156  14  4  3  -13  49  * oppressed by many different worries
65   13  5  -4  10  43  * large ups/downs in proj. enthusiasm
163  -5  1  4  0  37  * as know ppl better let me down>improve
48   7  13  7  -2  38  * emotional ups/downs very marked
45   11 -2  0  4  35  * bad piling up>impossible work way out
130  22  -2  4  -16  31  * pers prob>worry too much>only anuf
24   -4  7  14  4  28  * ppl in gen>slow to accept>open-minded
136  -9  20  * -15  -2  25  * take on too much>only wh can handle
3   14  0  -2  6  25  * strangers staring at me in crowd
7   -1 -2  14  4  20  * guard my superior knowledge
31   7 -4  -9  5  20  * unexpected diffic>bad luck>nervous
39   -8 -5  -15 -7  20  * mistaken ppl must say right>OK tb wrong
10  14  -11  1  14  19  * children have the best of it
162 -10 -14  -4  -4  16  * have pretty definite opinion on most mat
159  7  3  2  -3  -9  * change plans to fit new sit>change situ
28  9  2  -7  -16 -14  * plans concern others>take in conf>dark
54  12   0 -12  0  -17  * in group, see cooperation>inefficiency
16  3   5  11  3  -17  * when decided>reconsider>always do as pis
51  12 -13  0  -14 -17  * as children/parents wise>resent authority
12  6  -12  -8  0  -19  * sure of parents love
135 -15  12  -19  4  -21  * new opport>decide quickly>miss out
69  7  10  -2  -5  -23  * speak up in praise>blame
43  -19  *  8  -3  -9  -23  * imp text>help>hurt>concentration
22  7  -14  -2  -17 -23  * undertake things I finish>too diff to fi
146 -11  6  -10 -13  -24  * past good resolutions:some kept to day
59  13   7  -2  -3  -24  * friends think I'm open to suggestions
131  12   8  -8  -1  -27  * when slightest=didnt mean>distrust
155  5  20  * -4  2  -28  * hear new idea>hear all about it>judge i
46  11 -2  -7  -5  -30  * most people take blame>praise>only pos
141  9  -5  -4  -10 -31  * success due to ability>luck,bluff
32   2  1  -19  12  32  * enjoy present>just ahead is more impr
67  12 -2  -16  -4  -33  * more people liked=disliked
8   15  -1  -1  -14 -34  * able to stop worrying about troubles
161 -25  *  5  -14 -12 -34  * serious choice>almost always make clear
137  4   17  -1  9  -35  * when wrong>admit>not admit>deny
34  -4  -9  -4  0  -35  * most ppl mean what say>watch for hnd

Note: Loadings are rounded to 2 decimal places (decimals omitted); items with loadings greater than the root-mean-squared loading are denoted with an *'. Items from the main 94-item pool of the MBTI Form F are prefixed by a letter indicating the pole of each a priori dimension (EI, SN, TF, JP) toward which the item is keyed (I, N, F, P).

<p>|</p>
<table>
<thead>
<tr>
<th>13 Subscales Formed from Exploratory Factor Analyses of MBTI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td><strong>EI</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Sociable, Like Parties, Lively</td>
</tr>
<tr>
<td><strong>SN</strong></td>
</tr>
<tr>
<td>Theoretical, Abstract, (Factual),</td>
</tr>
<tr>
<td>Note: Item numbers are from Form F of the MBTI; items that are used to score the four major MBTI dimensions contain a prefix (I, N, F, P) that denotes their a priori scale. Subscale content names are enclosed in parentheses to denote the opposite pole with respect to the direction in which the Big Five dimensions are phrased (i.e., Extraversion, Agreeableness, Openness to Experience, Emotional Stability, Conscientiousness).</td>
</tr>
<tr>
<td><strong>JP</strong></td>
</tr>
<tr>
<td>Systematic, Orderly, Correct, (Casual), (Spontaneous)</td>
</tr>
<tr>
<td>(Last-Minute Planner/Worker)</td>
</tr>
<tr>
<td><strong>TF</strong></td>
</tr>
<tr>
<td>Trustful, Positive View of People, (Distrustful), (Cynical)</td>
</tr>
<tr>
<td>Agreeable, Approving, (Argumentative), (Confrontational)</td>
</tr>
<tr>
<td>Decisive, Leader</td>
</tr>
<tr>
<td>Open-minded, (Closed-minded), (Blame Others)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(Concrete)</th>
<th>N70</th>
</tr>
</thead>
<tbody>
<tr>
<td>JP1</td>
<td>P49, P1, P20, P85, P60, P151, P42, P124, P55</td>
</tr>
<tr>
<td>JP2</td>
<td>P118, P109, 82, P74, P27, 83, P94, P97</td>
</tr>
<tr>
<td>JP3</td>
<td>P142, P13, P132, 44</td>
</tr>
<tr>
<td>TF</td>
<td>F86, F114, F79, F103, F26, F72, F111, F29, F81, F154, F105, F107, F89, F4, F91, F133</td>
</tr>
<tr>
<td>X1</td>
<td>130, 156, 56, 48, 127, 3, 8, 65</td>
</tr>
<tr>
<td>X2</td>
<td>34, 46, 24, 141, 116, 163, 12</td>
</tr>
<tr>
<td>X3</td>
<td>F122, 144, 110, 125, 157, N121, N64, 166, 39</td>
</tr>
<tr>
<td>X4</td>
<td>30, 161, 135, 5, 40, 62, 18</td>
</tr>
<tr>
<td>X5</td>
<td>155, 59, 69, 137, 67, 162</td>
</tr>
</tbody>
</table>

5
However, given that our goal was to explore alternative means of viewing the MBTI item pool, solutions in higher dimensionalities that were suggested by the scree plot (e.g., in 8, 10, 13, 16, and 18 factors) were also examined. The rotated 5-factor solution is presented in Table 3, and a summary of the factors obtained from the other solutions is presented in Table 4.

Interpretatively, the 5-factor solution presented in Table 3 is quite straightforward: the first four factors are, not surprisingly, the same four MBTI factors recovered by Harvey et al. (in press); significantly, the fifth factor corresponds to many of the aspects of the Big Five’s Emotional Stability/Neuroticism dimension (e.g., high-loading items include obsessive worrying, marked emotional ups and downs, negative views of people in general, defensiveness) that were summarized in Table 1. Indeed, across all five factors, a comparison of the high loading items for each MBTI factor (see Table 3) with the Big Five’s definitional traits and illustrative adjectives (see Table 1) indicates a solid match between the 5-factor MBTI solution and the conceptual definitions of the Big Five’s constructs.

However, when these items are used to compute coefficient alpha estimates of scale reliability (for an unweighted scale formed from the high loading items on each factor), the alphas for the four main MBTI scales (.82 - .85) are noticeably higher than the alpha for the new Neuroticism scale (.66), suggesting that the item pool for the missing fifth factor is still in need of some broadening. The results summarized in Table 4 indicate that the Big Five view of the MBTI can be further subdivided into up to 13 dimensions; in most cases, these factors represent subdivisions of the Big Five dimensions (e.g., the S-N dimension is subdivided into Creative/Inventive and Theoretical/Abstract scales).

Confirmatory Factor Analyses

Several confirmatory factor analyses were conducted, testing orthogonal and oblique versions of the following models: (a) a 5-factor model formed by using the best 20 items from each of the five dimensions contained in the solution presented in Table 3; and (b) a 13-factor model based on the subscale-oriented view of the MBTI’s item pool presented in Table 4. As the various measures of model fit presented in Table 5 indicate, oblique models fit better than their orthogonal equivalents, and despite the fact that more factors are estimated, the 13-factor model demonstrates somewhat better fit than the 5-factor model.

The correlation matrices among the factors of the 5- and 13-factor models are listed in Table 6. Inspection of these correlations indicates that although for the most part the interfactor correlations are low, some nontrivial correlations are present (e.g., JP and SN in the 5-factor, and the subfactors of the main scales).

<table>
<thead>
<tr>
<th>Model</th>
<th>χ²</th>
<th>df</th>
<th>GFI</th>
<th>AGFI</th>
<th>ρ</th>
<th>RMSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-factor orthogonal, 20 items/scale</td>
<td>10,211.1</td>
<td>4,850</td>
<td>.799</td>
<td>.791</td>
<td>.705</td>
<td>.070</td>
</tr>
<tr>
<td>5-factor oblique, 20 items/scale</td>
<td>9,885.5</td>
<td>4,840</td>
<td>.805</td>
<td>.796</td>
<td>.722</td>
<td>.057</td>
</tr>
<tr>
<td>13-factor orthogonal, subscales</td>
<td>13,206.4</td>
<td>5,784</td>
<td>.768</td>
<td>.760</td>
<td>.620</td>
<td>.083</td>
</tr>
<tr>
<td>13-factor oblique, subscales</td>
<td>10,374.6</td>
<td>5,706</td>
<td>.823</td>
<td>.814</td>
<td>.758</td>
<td>.052</td>
</tr>
</tbody>
</table>

Note: GFI = goodness of fit index; AGFI = adjusted GFI; RMSR = root-mean-square residual.

Discussion

Previous research (e.g., McCrae & Costa, 1989) has demonstrated that significant empirical convergence exists between the four a priori MBTI scales and four of the Big Five dimensions; the critical missing component needed to allow the MBTI to be used as a Big Five instrument is an Emotional Stability scale. Our results indicated that by including responses to a number of previously unused “research” items, the MBTI can indeed be scored to produce measures of all of the Big Five constructs: (a) exploratory factor analyses indicated that the missing Neuroticism scale (characterized by excessive worrying, swings in mood, indecisiveness, and negative views about people) can be estimated using previously unscored research items from Form F, and (b) confirmatory factor analyses indicated that the factor models developed using exploratory techniques fit well in an independent, cross-validation sample. Thus, researchers and practitioners now have available to them a scoring system that will allow the item pools from both older (e.g., F) and newer (e.g., J) versions of the MBTI to be scored in a Big Five fashion.

Of course, one might reasonably ask -- given the number of Big Five instruments available (e.g., Costa & McCrae, 1985; Goldberg, 1992; Hogan & Hogan, 1992), and the large number of other personality instruments whose scales can be viewed along Big Five lines (e.g., see Hogan, 1991, pp. 878-880) -- What advantage is gained by developing a Big Five scoring system for the MBTI? We see several advantages for such a system. First, researchers and practitioners who are currently using the MBTI and scoring it to produce 16-category “type” profiles (which is a very popular way in which to use the MBTI in organizational applications) will now have the option of additionally producing continuous scores on the Big Five dimensions (e.g., to make use of criterion-related and meta-analytic validity studies such as Barrick & Mount, 1991; Tett et al., 1991).
Table 6
Factor Correlations from the 5- and 13-Factor Confirmatory Models

<table>
<thead>
<tr>
<th>Factor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - TF</td>
<td>--</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 - SN</td>
<td>0.257</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 - E1</td>
<td>-0.202</td>
<td>-0.129</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 - JP</td>
<td>0.083</td>
<td>0.496</td>
<td>-0.076</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 - X</td>
<td>-0.036</td>
<td>-0.051</td>
<td>0.294</td>
<td>-0.063</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Factor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - E1</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 - E12</td>
<td>0.723</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 - SN1</td>
<td>-0.120</td>
<td>-0.191</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 - SN2</td>
<td>-0.074</td>
<td>-0.002</td>
<td>0.723</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 - JP1</td>
<td>-0.038</td>
<td>-0.025</td>
<td>0.348</td>
<td>0.448</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 - JP2</td>
<td>-0.111</td>
<td>-0.302</td>
<td>0.620</td>
<td>0.441</td>
<td>0.694</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 - JP3</td>
<td>0.059</td>
<td>-0.012</td>
<td>0.213</td>
<td>0.232</td>
<td>0.731</td>
<td>0.547</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 - TF</td>
<td>-0.128</td>
<td>-0.261</td>
<td>0.334</td>
<td>0.146</td>
<td>-0.114</td>
<td>0.346</td>
<td>0.001</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 - X1</td>
<td>0.229</td>
<td>0.050</td>
<td>-0.024</td>
<td>-0.093</td>
<td>-0.299</td>
<td>-0.138</td>
<td>-0.102</td>
<td>0.316</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 - X2</td>
<td>-0.340</td>
<td>-0.338</td>
<td>0.060</td>
<td>0.012</td>
<td>-0.118</td>
<td>0.094</td>
<td>-0.178</td>
<td>0.361</td>
<td>-0.270</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 - X3</td>
<td>0.199</td>
<td>0.071</td>
<td>-0.307</td>
<td>-0.480</td>
<td>-0.402</td>
<td>-0.111</td>
<td>-0.079</td>
<td>0.318</td>
<td>0.199</td>
<td>0.166</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>12 - X4</td>
<td>-0.476</td>
<td>-0.144</td>
<td>-0.012</td>
<td>-0.006</td>
<td>-0.051</td>
<td>-0.228</td>
<td>-0.295</td>
<td>-0.284</td>
<td>-0.456</td>
<td>0.179</td>
<td>-0.416</td>
<td>--</td>
</tr>
<tr>
<td>13 - X5</td>
<td>-0.254</td>
<td>-0.268</td>
<td>0.325</td>
<td>0.330</td>
<td>-0.011</td>
<td>0.224</td>
<td>-0.118</td>
<td>0.342</td>
<td>-0.169</td>
<td>0.508</td>
<td>0.121</td>
<td>-0.031</td>
</tr>
</tbody>
</table>

Note: Factors are named using their scale names from the MBTI scales, or ‘X’ (for the experimental research items).
Although opinions vary regarding the desirability of scoring the MBTI to produce categorical “types” (e.g., Harvey & Murry, 1994; Harvey et al., 1994), such methods remain popular, and our Big Five-based scoring system may provide a valuable alternative for MBTI users who have previously relied on the categorical type-based scoring system.

Second, by virtue of the fact that its items were written to project a “positive, affirming” image to examinees (Saunders, 1986, p.1), using the MBTI’s item pool to estimate scores on the Big Five dimensions might offer significant advantages in the area of legal defensibility. That is, unlike the typical employee selection lawsuit in which plaintiffs challenge a test by demonstrating that it produces disparate impact with respect to some protected class of applicants, at least one recent case (Soroka v. Dayton Hudson) claimed instead that items on the personality test violated the right to privacy of applicants (e.g., by asking questions dealing with such sensitive topics as sex, religion, bodily functions, etc.). Among currently available personality tests -- especially ones that use items like those found in the Minnesota Multiphasic Personality Inventory (MMPI) and California Psychological Inventory (CPI), which were the targets of criticism in Soroka -- the MBTI undoubtedly ranks as one of the least likely to elicit adverse reactions from examinees due to sensitivity regarding item content. Because the MBTI’s item pool is free of items that deal with sexual orientation, religious beliefs, and similar “hot button” topics, the likelihood of having a Big Five-scored MBTI challenged on invasion-of-privacy grounds would appear to be remote.

Although the Big-Five based scoring methods we derived for the MBTI in this study appear to offer a number of advantages, some concerns remain. First, as McCrae and Costa (1989) noted, it can be argued that “the MBTI does not give comprehensive information on the four domains it does sample” (p. 36). Consistent with previous research that has indicated that the measurement precision of the MBTI’s four a priori scales could stand some improvement -- especially around the cutoff scores used to dichotomize each dimension (e.g., Harvey & Murry, 1994) -- it would obviously be desirable to broaden the domain of content assessed by the MBTI’s item pool, especially for the Emotional Stability/Neuroticism dimension. Although a few of the research items were found to load on the original four MBTI dimensions, additional items are needed for these scales as well before the MBTI can claim to measure the Big Five dimensions as comprehensively as instruments that were designed specifically to assess these constructs and their subconstructs (e.g., Costa & McCrae’s NEO PI, or the Hogan Personality Inventory [HPI]). Second, whenever any personality test is used as the basis for making an employee selection or placement decision, the issue of response dissimulation or faking must be considered. Although some studies (e.g., Hough et al., 1990) have argued that faking may not be an especially serious problem, others (e.g., Furnham, 1990; Snell & Harvey, 1994) demonstrated that the MBTI can indeed be faked, and that some individuals are much more able to distort their profiles in the desired direction than others. Additional research is needed to resolve the question of how inappropriate personality test profiles should be detected, and this objective assumes even greater importance when administration conditions may encourage dissimulation (e.g., employee selection).

In summary, McCrae and Costa (1989) recommended that “if the MBTI is used, evidence to date suggests that it may be better to abandon its Jungian framework and reinterpret the MBTI in terms of the five-factor model” (p. 37). Although we continue to see merit in using the categorical 4-factor MBTI structure in some situations (e.g., those in which the presentation of personality information must be made in as nonthreatening a fashion as possible, or in which feedback using MBTI terminology is preferred), the fact that the Big Five taxonomy has achieved such a dominant position in the literature provides a compelling argument for switching to a Big Five-based view of the MBTI. Now that an initial method for scoring the missing Neuroticism dimension has been developed, those researchers and practitioners who choose to heed McCrae and Costa’s (1989) recommendation to interpret the MBTI in Big Five terms have the tools available to do so.

References


Author Information

Send correspondence concerning this study to R. J. Harvey, Department of Psychology, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0436. E-Mail: harveyrj@vt.edu.