

Spanish Translation of the MBTI® for Puerto Rico and its Implications for
Education, Counseling, and Institutional Research

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Abstract

The absence of studies regarding the adequacy of using the Myers-Briggs Type Indicator (MBTI®) with Puerto Ricans led to: (a) the translation and adaptation of the MBTI®, (b) evaluation of its psychometric properties, (c) comparison of these properties with those documented, and (d) evaluation of its potential use for the benefit of educational and institutional research purposes. The resulting version of the MBTI's translation was administered to 366 students of the University of Puerto Rico at Mayagüez (UPRM). Internal consistency coefficients supporting the MBTI's reliability and adequate measures of the instrument's validity were obtained, as well as a student profile. This paper highlights the importance of carrying out an adaptation process, along with the translation of an instrument in order to guarantee the validity and utility of the information gathered from them.

Introduction

Numerous studies regarding the personality characteristics of students and professionals, their fields of study, and their learning styles have been carried out during the past decades using the Myers-Briggs Type Indicator (MBTI®; e.g., Laribee, 1994; Hawkins, 1997; Johnson & Singh, 1998; Tuel & Betz, 1998; Culp & Smith, 2001; Carr, et al., 2002; Folger, et al., 2003; Sak, 2004). The MBTI® has become a standard instrument for these purposes since due to its results' ability to identify the different ways in which people perceive information (sensing or intuition), make decisions (thinking or feeling), and their preferred orientation (judging or perceiving) and attitudes (extraversion or introversion) towards life (Briggs-Myers, McCaulley, Quenck, & Hammer, 1998). Its widespread use is also a result of its contribution to the improvement of communication and the understanding of others (Young, 2001). Annually, over two million individuals and organizations, including 89 of the Fortune 100 companies, complete the MBTI® ("CPP Celebrates", 2003).

An understanding of peoples' preferences and being able to communicate in a way that they understand can be very useful for the field of education. In addition, institutional research can benefit from studies relating the personality of students and their academic performance. Unfortunately, in Puerto Rico, we are unable to carry out these studies due to the absence of research regarding the adequacy of using the MBTI® with the Puerto Rican population. For many years, the Spanish translation of Form G, by Levy and Padilla (A. Padilla, personal communication), as well as other translations in Spanish, have been used in Puerto Rico in a variety of settings, such as consulting firms, universities, and recruiting agencies, amongst others. Nevertheless, the instrument has not been translated, nor has it been adapted for this population. There are no norms, and the psychometric properties of these versions have not been evaluated for Puerto Ricans. Prior to being able to carry out these studies, it is necessary to perform a Spanish translation of the MBTI®, evaluate its psychometric properties, and compare these results with those documented.

Theoretical Framework

The basis for the Myers-Briggs Type Indicator (MBTI®) is Katharine Briggs and Isabel Myers' interpretation of Carl Jung's theory of psychological type, published in 1921. According to Jung, human conduct is orderly and consistent due to the way in which people prefer to use their perception and their judgment. He believed that everyone uses four

functions, or basic mental processes, which he referred to as *types of functions: sensing (S), intuition (N), thinking (T), and feeling (F)*; Mattoon, 1981; Myers & McCaulley, 1985). Sensing (S) is the function through which the individual perceives that which exists (Mattoon, 1981). Intuition (N) indicates what the possibilities are, and is associated with the imagination and abstract concepts. Thinking (T) is the function that seeks to categorize or assign meaning to the elements perceived. Feeling, on the other hand, is the function that values objects and determines whether they are desirable, and their degree of importance (Mattoon, 1981).

Each function has a role. Sensing (S) seeks out the full experience of what is real and immediate, while intuition (N) pursues the breadth of the possibilities and the imagination. Thinking (T) seeks out rational order in accordance with the impersonal logic of cause and effect, while feeling (F) seeks rational order through the creation and maintenance of harmony between subjective values that are important (Briggs-Myers, et al., 1998).

The key to the dynamic theory that underlies the MBTI® is the assumption that the four functions have different areas of specialization and, as a result, pull towards different directions or domains of mental activity. In Jung's theory of psychological types, as interpreted by Briggs and Myers (Briggs-Myers, et al., 1998), one function is favored and directs personality. The other four functions are important, but are subordinate to and are in service of the goals of the dominant function, who maintains the most amount of psychic energy under its control. The dominant function, according to the underlying theory, is determined by the attitudes.

Jung wrote explicitly about the attitudes of *extraversion (E)* and *introversion (I)*. Both are complementary energy orientations and their differences translate into very different approaches towards life (Briggs-Myers, et al., 1998). In the extraverted (E) attitude, energy and attention are directed at the external world, while introversion (I) refers to the attitude that absorbs energy from the environment, applying it to the internal world of recollections and reflections. Although Carl Jung did not explicitly write about the orientations of judgment (J) and perception (P), Katharine Briggs' understanding that it was a measurable dimension led her to incorporate these concepts into the MBTI® (Myers & McCaulley, 1985).

She observed that some people habitually used judgment while interacting with the extraverted world, coming to conclusions and achieving closure rapidly. She identified them as people with a *judging (J)* attitude. Other people interacted with the world using perception, gathering

information for as long as possible before comfortably settling. These people she identified as having a *perceiving* (P) attitude. The behaviors characteristic of people who used either thinking (T) or feeling (F) in their interactions with the external world formed the basis for the judging (J) pole of the J-P dichotomy. Behaviors characteristic of people who extraverted their sensing (S) or intuition (N) formed the basis of the perceiving (P) pole.

Briggs and Myers shared a desire to contribute to the development of individuals, providing them with the tools needed to understand and appreciate individual differences while contributing to the harmony and productivity amongst different groups of people (Briggs-Myers, et al., 1998). They saw in Jung's perspective about human development, his theoretical model of types, the individuation process, and in his interpretation of the psyche's structure, the potential for them to reach their goals. With this objective, they developed an instrument capable of measuring the Jungian personality types, the MBTI®.

The responses offered on the MBTI® would provide the information needed to establish a hypothesis regarding the dynamic relationships amongst the functions (i.e., S, N, T, and F), the energetic attitudes, (i.e., E and I), and the orientations towards the outer world (i.e., J and P) of the resulting type. From Jung's writings, Briggs and Myers (Briggs-Myers, et al., 1998) assumed that:

1. For each type, a dominant function leads personality.
2. The dominant function is used through the favorite attitude (i.e., extraverted [E] people use their dominant function in the external world, while introverted [I] use it in the world of ideas and concepts).
3. In addition to a dominant function, an auxiliary, or secondary, function provides balance between extraversion (E) and introversion (I) and is used with the least favorite attitude.
4. The auxiliary function also provides a balance for the orientations towards the outer world (i.e., between J and P).
5. The J-P dichotomy determines the function used in the extraverted attitude, for both Extraverts (E) and Introverts (I).
6. The function opposite to the auxiliary is the tertiary function.
7. The function opposite to the dominant function is the inferior function, which in turn takes on the least preferred attitude of extraversion (E) and introversion (I).

8. While the dominant function operates in the preferred attitude, the auxiliary, tertiary and inferior functions take on the least preferred attitude.

Briggs and Myers' (Briggs-Myers, et al., 1998) assumptions make it possible to identify the hierarchy of the four functions and the typical attitudes for each of the 16 types that result from the MBTI®. It also provides for the identification of the different patterns in which people prefer to perceive information (sensing [S] or intuition [N]), make decisions (thinking [T] or feeling [F]), their preferred orientation to the external world (judging [J] or perceiving [P]) and their attitudes (extraversion [E] or introversion [I]) towards life. According to their theory, people develop their type by exercising their preferences with regard to their use of perception and judgment (i.e., their personal qualities develop from a choice they have made). People with the same preferences will therefore have in common whatever qualities may result from exercising those preferences.

Justification

Multiple studies have evaluated the psychometric properties of the MBTI®, as well as its usefulness for vocational and academic settings. To this extent, researchers have focused on the importance of linking vocational assessment to the theories of personality (Tuel & Betz, 1998). An example of this is the information offered by Briggs-Myers, et al., (1998) that amongst the norms for the MBTI® of 4,566 students, of which 2,389 were Engineering students and 2,177 were Liberal Arts students, 68% of the Engineering students preferred the thinking (T) dimension as compared to 54% of the Arts students.

Researchers have also used the MBTI® to measure the relationship of personality types and professions (Johnson & Singh, 1998). Amongst these researchers, McDaid, et al., (as cited in Johnson & Singh, 1998) found that engineers exhibited a preference for the ISTJ type, while Warner and Echternacht (as cited in Johnson & Singh, 1998) found that business managers tended to prefer the ISFJ type. Those studies motivated Johnson and Singh (1998) to research if there were significant differences amongst civil engineers involved in construction as opposed to those in designing.

Their sample consisted of 31 construction civil engineers and 17 design civil engineers from the state of Hawaii, to whom they administered an abbreviated version they developed of 20 items from the MBTI®. They found that over 60% of them showed a preference for introversion (I) and over 70% for sensing (S). Contrary to the hypothesis that thinking (T) would stand

out amongst those in the designing discipline, more than half of the engineers in both groups offered responses indicative of a preference for feeling (F), which was interpreted as an effect of cultural impact.

Of the engineers, approximately 60% preferred the judging (J) orientation as their mode of structuring the world around them. Nevertheless, a preference of 40% for the perceptive (P) orientation was also significant. The type that prevailed amongst civil engineers in general was ISTJ. For both disciplines, it was found that the major difference was in the judging functions, where 35.5% of the engineers from the construction group offered responses indicative of a preference for thinking (T) as opposed to 18.8% of the designers preferring this dimension over feeling (F).

In 2001, Culp and Smith presented data regarding the types that prevailed amongst 218 engineers assigned to various projects in consulting firms. They compared them with the types of the 3,009 people included in the norms of the MBTI®, Form M. They found that when evaluated as a whole, the engineers showed a preference of 62% towards introversion (I), 54% towards the sensing (S), 75% towards the thinking (T), and 67% towards the judging (J) orientation.

According to Culp and Smith (2001), the ratio of one type relative to the general population is indicative of how attractive a discipline or field is to that particular type, referred to as the *self-selection ratio*. As such, a ratio greater than 1.0 is indicative that there is a larger proportion of the preferred type amongst a particular profession as compared to the general population. Using this formula, they found that of the 16 types, approximately 25% of the engineers (N = 218) preferred the ISTJ type. The thinking function and judging orientation (i.e., TJ) was preferred by 53% of the sample. Finally, they found that the self-selection ratio of the preference towards the feeling mode of judgment and the perceptive orientation (i.e., FP), was only .33, interpreted as evidence that engineering is not a very attractive field for ISFP, INFP, ESFP, and ENFP types.

Carr, de la Garza, and Vorster (2002) sustained that "for the optimization of individual efforts, an organization must look beyond cognitive abilities, education, and experience as indicators of predicted performance", and recognize personality as a predictor of job performance. They explored the relationship between individual personality characteristics of engineering and architectural managers, as measured by Form M of the MBTI®, and the factors identified as *Critical Project Success Factors* (CPSFs;

Sanvido et al., 1992; Songer and Molenmar, 1997, as cited in Carr, et al., 2002). The success factors were based on a project (1) being on time; (2) meeting the budget; (3) meeting specifications; (4) conforming to user expectations; (5) having high quality of workmanship; (6) and minimizing construction aggravation. In order to measure the latter, they developed the *Critical Project Success Factors Questionnaire*, to define and measure success based on individual performance as inferred from the reported behaviors. From their findings of a sample of 85 engineers and architects, they concluded that their study demonstrated that the characteristics of personality influence performance and that it supported the possibility of predicting job performance based upon the natural preferences of behavior, which in turn are the result of individual personality traits.

Isabel Briggs-Myers, coauthor of the MBTI®, envisioned the instrument as a catalyst for the development of human potential due to the contributions it could make, particularly to the field of education (Briggs-Myers, et al., 1998). Knowing and understanding the dominant processes as well as the 16 psychological types would help educators promote the potential strengths of students and minimize the possible difficulties that they may confront. Not knowing about each student's preferences or their typology may lead educators to impose a learning style difficult for them to grasp. As such, education is a field where the MBTI® has been vastly studied.

In 1994, Laribee studied the types that prevailed amongst accounting students. His sample consisted of 320 accounting students from the Midwestern School of Business enrolled in 11 different undergraduate accounting courses. Form G of the MBTI® was administered to these students on their first day of class. Laribee found that amongst accounting students the prevailing type was ESTJ (20%, n=64). He also found that accounting tended to filter some psychological types, mainly the ENFP types.

Folger, Kanitz, Knudsen, and Mchenry (2003) determined the prevailing types amongst talented students through the results of 93 students who had completed Form M of the MBTI® after having received the Centralis Scholar Award between 1990 and 1994, and compared them to the Center for Applications of Psychological Types' (CAPT) databank of 28,356 respondents. They found that for 57% of the students thinking (T) was their inferior (f = 26) or tertiary (f = 27) function, while for 43% it was the dominant or auxiliary function. In comparison to the general population, amongst these students the intuitive (N) types were significantly overrepresented (p < .01), as well as the IP (p < .05), the NP (p < .01) and the IN (p < .001). There was a low

representation of sensing (S) types ($P < .01$), the ST ($p < .01$), the SP ($p < .05$), and the IS ($p < .01$) types.

To the researchers these results generate a series of worries in terms of learning styles, mainly because few educators would have concluded that from a five-year sample of talented students like these, the preference for the function associated with decision making (i.e., T) would be devaluated. For this reason, they questioned the association of these results with the perception of emotional intelligence being of greater importance than the intelligence quotient (IQ), a subject warranting further research.

Consistent with the results of Folger, et al., (2003), Moutafi, Furnham, & Crum's (2003) administration of the MBTI®, the NEO Personality Inventory (NEO PI), and two intelligence measures to 900 English adults and found that intuition (N) was the MBTI® dimension most highly and positively correlated with the intelligence measures.

In 1997, Hawkins evaluated the results of Form G of the MBTI® from 966 students admitted between 1990 and 1995 the Mississippi School for Mathematics and Sciences (MSMS). The MSMS is a highly selective school created for talented high school juniors and seniors who want to experience a rigorous academic curriculum in preparation for college. It emphasizes math, science, and technology. Hawkins' (1997) literary review suggested that those with high IQ's, those who have obtained high scores on aptitude tests or those identified as talented are highly represented by N and NP types as derived by the MBTI®. As such, he went on to compare the students from the MSMS to four groups from the CAPT's *Atlas of Type Tables*: (1) talented high school seniors, (2) talented students from the *Florida Future Scientists* summer program, (3) traditional high school students, and (4) high school students from Pennsylvania. He found that the most common type amongst his sample was ENFP (16%), followed by ENTP (10%), and INTP (9%). Extraverts (E) and introverts (I), as well as thinking (T) and feeling (F) types were equally distributed. Perceptive (P) types were slightly more numerous than judging (J) types. Sensing (S) types represented 34% of the sample, while perceiving sensing types (SP) represented 13%. As compared to the four normative groups, reexamination of the SN and JP dimensions revealed that amongst the MSMS students, there were less introverts ($I; p < .001$), and more perceptive (P) types ($p < .001$) than in the group of 164 talented high school seniors from the *Atlas of Type Tables*.

Compared to the group of Florida students, in the MSMS there were significantly less intuitive (N; $p < .001$) and more perceptive (P; $p < .01$)

types. He also found that the MSMS students differed significantly from the traditional high school students, since amongst the first there were more N's, T's, NF's, NT's, IN's, EN's, NJ's, and NP's ($p < .001$). The findings were similar to those of other studies where amongst talented students Intuitive (N) types prevailed.

Sak (2004) also found similar results. From an analysis of 14 studies with 19 independent samples about the types of 5,723 talented students, in comparison to the traditional high school students from the Atlas of Type Tables (McDaid, Kainz, & McCaulley, 1986 as cited in Sak, 2004), the talented ones were significantly more introverted (I; $p < .01$). They were also significantly more intuitive (N: $p < .01$) than the latter, but preferred thinking (T) in comparison to Folger, et al., (2003), and perception (P). In terms of the ACT results, the group with high verbal scores were significantly more intuitive (N) than the group with high math scores ($p < .01$), while the group who scored higher on Mathematics preferred Thinking (T) significantly more than the verbal group ($p < .01$). The INFP, INTP, ENFP, and ENTP types represented more than 50% of the talented group of students, as compared to 19% for the normative group.

Engagement in the learning process must include knowledge about how one perceives and processes information. Educators can help students benefit from this information by encouraging them to identify the means and ways through which they can best understand the material under consideration (McClanaghan, 2000). As such, Brightham (n.d.) presents an example of the actual application of psychological types in higher education settings. He offers educators a web page that serves as a model for the Faculty of Georgia State University (GSU), and other professors, about teaching strategies for use with different "types" of students, based on the MBTI® typology.

As mentioned previously, in Puerto Rico we are at a disadvantage to using this information for academic and research purposes. Despite the availability of Spanish versions of the instrument, there is currently no official translation of the MBTI®, Form M, for use with the Puerto Rican population although it is used with this group. The use of an instrument with populations who have a different culture and language than that for which it was originally designed requires a comprehensive translation and adaptation process (Bravo, Woodbury-Fariña, Canino, & Rubio-Stipek, 1993; Canino & Bravo, 1994). This process has never taken place with the MBTI® for the Puerto Rican population generating a need for the translation and adaptation of the MBTI® for PR.

As such, every instrument that results from a translation and adaptation process must be capable of identifying the same constructs that the original version intended to measure in a different social and cultural context (Bravo, et al., 1993; Canino & Bravo, 1994). According to Canino and Bravo (1994), the challenge for the researcher is to guarantee that the adapted and translated version of the instrument is equivalent to the original one. Only with the achievement of this equivalence will it be possible to compare the results from studies with different cultures, as transcultural research requires. In addition, just as Herrans (2000) stated, the simple translation and adaptation of instruments is not sufficient; it is necessary to develop norms for the Puerto Rican population of any psychological instrument intended to assess our people.

The practice of translating and adapting test is traced to the intelligence tests of French psychologist Alfred Binet (Hambleton & Patsula, 1999). Nevertheless, there is sufficient evidence to suggest that improved methods for adapting and translating tests from one language and culture to others is needed and that more attention should be given to this important task than is typically given by researchers and test developers. Unfortunately, all too often test adaptation is viewed as a routine task that can be performed by anyone who knows the relevant languages. An adequate cultural adaptation process often seems to be unknown, since the false idea that it is enough to translate an instrument in order to obtain a culturally adapted version seems to be the prevailing belief Gaite, Ramirez, Herrera, and Vazquez-Barquero (1997).

OBJECTIVES

In response to the previous exposition, this research presents the following objectives:

1. Translation and adaptation of the self-scorable version of the MBTI®, Form M, into Spanish, following the process outlined by Bravo, et al., (1993).
2. Evaluation of this version's psychometric properties of the internal reliability and construct validity.
3. Comparison of these properties with those documented for the instrument.
4. Obtain a typological profile of a sample of students from the University of Puerto Rico at Mayagüez (UPRM).
5. Presentation of the potential use of the MBTI® as a qualitative alternative for educational and institutional research purposes.

Hypotheses

From the established objectives, and the literary review of the MBTI® and the underlying theory of psychological types, the following hypotheses were generated about the instruments psychometric properties:

1. Reliability:
 - a. A moderately high or high internal reliability coefficient will be obtained for the MBTI®.
 - b. Moderately high or high internal reliability coefficients will be obtained for the items that form the four scales of the MBTI®.
2. Construct Validity:
 - a. The MBTI® items will come together on the factors that correspond to Katharine Briggs and Isabel Myers' interpretation of Carl Jung's theory of psychological types.
 - b. There will be low intercorrelations amongst the continuous scores of the four scales, except for the S-N and J-P scales where the correlations will be moderate, according to the MBTI® Manual (Briggs-Myers, et al., 1998).
 - c. The preferences for the dimensions of each scale will exhibit a negative correlation, as is established by the theory regarding their dichotomy.
 - d. There will be significant differences amongst the continuous scores of each scale as a function of gender, major, and year of study.

Method

Sample

This study's sample, based on availability, consisted of 366 students from the University of Puerto Rico at Mayagüez. They were enrolled in courses offered by the departments of Social Sciences and English, as well as the colleges of Engineering and Agricultural Sciences. Undergraduates constituted 89.62% of the sample, 3.01% were graduates and 7.38% did not inform their academic level. The participants completed two instruments voluntarily which would provide the information needed to carry out the study.

Instruments

Social Demographic Survey

This instrument was developed with the objective of gathering those variables (e.g., major, gender, age, etc.) that contribute to the development of norms for Puerto Rican college students. It consisted of 18 items, of

which three were not enumerated (i.e., current major, prior major and major to which they intended to change). For these items, a list of majors with the appropriate code was provided.

The items gathered academic information (e.g., current GPA, changes in majors, etc.) that would provide for the comparison of the sample's results with what has been documented regarding the association between psychological types and learning styles, amongst others. In addition, items concerning prior experience with the MBTI® and familiarity with Jung's Type Theory were included as a mechanism to control the confounding effects of responses based on experience.

Myers-Briggs Type Indicator® (MBTI), Form M

The self-scorable version of MBTI®, Form M, is an instrument designed to identify the basic preferences for the four dichotomous dimensions that were explicitly and implicitly discussed in Carl Jung's Type Theory, as well as to identify and describe the 16 psychological types that result from the interaction of these preferences. It is called a user-friendly instrument due to the simplicity of its use (Mastrangelo, 2001). It consists of 93 dichotomous items, 47 of which are statements regarding the most probable behaviors emitted under different circumstances and 46 are word pairs, of which the most appealing definitions are selected. On the self-scorable version of Form M, 21 items correspond to the E-I scale 26 to the S-N scale, 24 to the T-F scale and 22 to the J-P scale. Approximately 15 to 25 minutes are required for its completion.

The MBTI may be coded using stencils, a computerized system, the Internet, or it can also be self-scored. Although a Spanish version of Form M that may be codified electronically is available (Fleenor, 2001), the Consulting Psychologists Press (CPP) authorized the use of the self-scorable version for this study. This authorization to use this form resulted from the absence of a Spanish version for use with the Puerto Rican population, or whose psychometric properties have been evaluated with this group.

Norms. For the development of the MBTI®, in 1996 a national sample of approximately 3,036 adults was used. From this sample, the *national representative sample* was developed and published as the norms for Form M. It was developed by weighing the results of the less represented groups were weighted, in such a way that the final sample was representative of the 1990 Census. This method resulted in a final sample of 3,009. The mean age was 46 (sd = 17 years). Females made up 51% of this sample, and the ethnic

distribution was 73% White Non-Hispanic, 12% African American, 11% Hispanic, and 3% for which ethnicity was not identified.

Reliability and validity. According to the MBTI® Manual (Briggs-Myers, et al., 1998), the median item to scale correlations are .52 for E-I, .53 for S-N and T-F, and .59 for J-P. The S-N and J-P scales are the only ones that exhibit a moderate correlation ($r = .30$) amongst the items that correspond to their scales. In addition, the continuous scores of these two scales exhibit intercorrelations of .47. These correlations are indicative that sensing (S) types prefer more frequently the judging (J) orientation, while intuitive (N) types are more inclined to the perceptive (P) orientation.

For a group of 100 Hispanic adults, from the national sample, the internal consistency coefficients are .88 for the E-I scale .87 for S-N, .90 for T-F, and .91 for the J-P scale. The correlations for a sample of 28 Hispanic college students are .84 for the E-I scale .86 for S-N, .88 for T-F, and .90 for the J-P scale. Test-retest reliability (30months) for the E-I scale is documented as .79, .83 for the S-N scale, .62 for the T-F scale, and the J-P scale has a documented test-retest reliability of .82.

The manual also offers some information regarding the validity of the MBTI®. From the national sample ($n = 3,036$), adequate polychloric correlations and asymptotic covariance matrixes were obtained for the dichotomous items. The matrixes were analyzed through a diagonal Least Squares procedure. The Goodness of Fit was .949 and the normalized accommodation coefficient was .967. The median of the adjusted residuals was $-.008$, classified by the authors as an excellent result and indicative of fitting within a four-factor model.

Procedure

Translation and Adaptation of the MBTI® Self-Scorable - Form M

In order to evaluate the psychometric properties of the MBTI® with the Puerto Rican population, permission to work with the MBTI® was requested to the CPP. The authorization was granted with the agreement that the properties be evaluated with an English version of the self-scorable Form M that would be translated by a team designated by the researcher.

The translation and adaptation process followed the steps used by Bravo, et al., (1993) in their work with the *Diagnostic Interview Schedule* for Puerto Rico. First, a clinical psychologist with vast experience translating instruments from English to Spanish was selected. She carried out the translation of the instructions and the 93 items from the MBTI®. The *semantic equivalence* of the instrument (i.e., the preservation of the concept

meanings in both languages) was evaluated through a backwards translation that was carried out by the director of the UPRM English Department.

Afterwards, student research assistants from the UPRM Center evaluated the *content equivalence* (i.e., the relevance of the concepts for the Puerto Rican culture) for Applied Social Research. This process led to the substitution of the terms *sólido* (item 29), *certidumbre* (item 37) and *gregario* (item 54), identified as difficult to comprehend, with *realista*, *certeza* and *sociable*, respectively, since these concepts were interpreted as preserving the meanings of the original concepts. Finally, following the process of Bravo, et al., (1993), the *technical equivalence* (i.e., instrument's ability of obtaining a similar effect when the same evaluation strategy is used with another culture and that differences are not due to the instrument's format) and *conceptual equivalence* (i.e., the same construct is being measured in different cultures) were measured through reliability and validity analyses. The *criterion equivalence* (i.e., that the interpretation of the results be the same when measured in accordance with the norms established for each culture), could be evaluated once norms for this version were established and the instrument were administered to other samples. Such analysis was not within the scope of this study nor the permission obtained from the CPP.

Administration of the MBTI-Form M, Research Edition Spanish Translation

The translation and adaptation process of the MBTI Self-Scorable, Form M, led to the development of the *MBTI™-Form M, Research Edition Spanish Translation*. With the authorization of the UPRM's IRB, both the Social Demographic Survey and the MBTI were administered to students enrolled in 20 different course sections, after having read and signed an informed consent form. Each student's responses were offered on an electronic sheet, identified with a participant number, which would later be processed by the UPRM Computer Center's OpScan 7. This method was selected in order to reduce data entry time and potential human error. Once the data was processed, they were analyzed with SPSS 12.0 for Windows. Each student's type, along with the participant number, was published at www.uprm.edu/ideal/tipos.htm and information regarding the interpretation of these results was offered.

Data Analysis

In order to comply with the objective of evaluating the psychometric properties of the Spanish translation of the MBTI™, the instrument's reliability and validity were assessed. *Reliability*, defined as the results' degree of precision, was measured through internal consistency analyses.

Using Cronbach Alpha, the item to scale reliability, as well as the inter item correlations for each dimension were measured. This method was also used as a measure of validity since the instruments' underlying theory claims that the preferences (i.e., traits) are homogeneous (Herrans, 2000).

Validity refers to the degree to which a scale assesses that which it is intended to measure (Herrans, 2000). It is the degree to which the items on a scale serve as an empirical reference to the essential characteristics of the trait that the instrument was designed to measure. For the current purposes, construct validity, which led to the gathering of empirical studies, such as those exposed in this paper, and the collection data that support the instrument's latent theory, was selected.

The theory of psychological types presumes that there are differences amongst people that exhibit preferences for one dimension or another. As a result, it is necessary to demonstrate that there are in fact group differences (e.g., by gender, major, etc.) in order to support the instrument's construct validity. In addition, the assumption that the preferences are grouped in dimensions and come together as types, led to the selection of the statistical technique of exploratory factor analysis was selected as an additional indicator of the instrument's construct validity. This process provides an estimate of the factor loads that the instrument possesses in each one of its part and its totality. Through this process, a common factor or factors that contribute to the scales' total variance are identified (Herrans, 2000).

Based on the assumption of the independence of the four scales and the dichotomous nature of each dimension, correlation matrixes for the preference scores of the dimensions of each scale, as well as for the continuous scores of the scales were selected, as an indicator of construct validity. Since the version used for this study was the self-scorable, the preferences for each scale were based on the dimensions that were most frequently selected. As such, for each dimension, a *preference score* (i.e., the total times in which one dimension was selected as compared to the other) was obtained.

In order to perform analyses regarding group differences, the preference scores for each dimension were transformed to *continuous scores* per scale, following the procedure outlined by Myers and McCaulley (1985). As such, for each scale, the dimension with the lowest preference was subtracted from the highest and was multiplied by two. If the preference was in the direction of E, S, T, or J, one was subtracted. If the preference was for I, N, F, or P, one was added, to counter for social desirability.

Finally, to arrive at the continuous scores, 100 was subtracted from the obtained value if the preference was for E, S, T, or J, while 100 was added if the preferences were in the other direction.

The results from the exploratory factor analysis and between group differences (e.g., chi square, t test, amongst others), allowed for the comparison of this study's results and those of the empirical studies cited in the literature carried out with other versions of the MBTI®. Through the descriptions of the preferences and prevailing types of the sample the fourth objective of this research. Finally, throughout the discussion of the potential use of the MBTI® as a qualitative alternative for educational and institutional research purposes the final objective of this study was met. A detailed presentation of the implementation of the different strategies selected for the data analyses follows.

Results

Sample Characteristics

Of the 366 students, there was a higher participation rate of females (60.9%, $f = 223$) than males (39.1%, $f = 143$). Over 50.0% of the sample ($f = 195$) was 21 years old or older, while 61.0% ($f = 223$) informed that they were at least in their third year of college. Approximately 85.0% of the sample ($f = 310$) had a GPA of at least 2.50. The colleges of Engineering and Arts and Science were represented by approximately 82.0% ($f = 301$) of the sample (see Table 1 & Figure 1). Regarding the sample's past experience with the MBTI®, only seven percent ($f = 28$) had previously completed the survey, and 78.5% ($f = 277$) informed having little or no knowledge of Carl Jung's theory of psychological types.

Sample's Typological Profile

The most frequent type (i.e., the modal type) for the sample in general was ESFP, as well as for the students from the College of Engineering, and those for which academic college could not be determined. For the colleges of Agricultural Sciences, Arts and Sciences, and Business Administration the prevailing types were ENFP, ESFJ, and ISFP respectively. Females in general were more frequently ESFJ, while males were more likely to be ESFP. Over 60.0% ($f = 223$) of the total sample was represented by types ESFP, ESFJ, ISFJ, and ISFP. Types ESFJ, ESFP, ISFJ, and ISFP were represented by approximately 67% ($f = 149$) of the women, while around 63% of the men preferred types ESFP, ISFP, ESFJ, ENFP, and ISFJ.

From Table 2 it can be observed that, with the exception of the J-P scale where females tended to prefer the judging (J) orientation, both

genders exhibited similar preferences for each scale. An inspection by academic college reveals that most presented similar preferences, mainly towards sensing (S) and feeling (F; see Table 3). Nevertheless, the students from the College of Business Administration tended to prefer introversion (I) while those from Agricultural Sciences preferred the perceptive (P) orientation.

The hierarchy of the dominant and auxiliary functions is presented in Table 4. From it, one can observe that 61.0% (f = 223) of the participants offered responses indicative of a dominant sensing (S) with an auxiliary feeling (F) preference or a dominant feeling with auxiliary sensing. This dynamic was observed for 66.8% (f = 149) of the females and for 51.8% (f = 74) of the male participants. In terms of preference for dominant function alone, sensing (S; 38.3%, f = 140) and feeling (F; 35.8%, f = 131) prevailed. In both cases females presented a similar preference for both functions (39.5%, f = 88) while the male participants exhibited a slightly higher preference for sensing (S) as compared to feeling (F; 36.4%, f = 52 vs. 30.1%, f = 43).

In terms of dominant function and attitudes (see Table 5), more than half of the participants were dominant extraverted sensing types (E-S; 25.10%, f = 92) and dominant extraverted feeling types (E-F; 23.20%, f = 85). An inspection by gender reveals that the female preference was mainly for extraverted feeling (E-F; 27.8%, f = 62), while for the males it was extraverted sensing (E-S; 25.20%, f = 36). For the general sample, as well as for both genders, the preferred interaction of functions was sensing feeling (SF), with a representation of 51.7% to 66.80% of the sample. The extraverted perception (E-P) and extraverted judging (E-J) preferences also prevailed for over 30% of the sample. Finally, the preference for perception (P) and judging (J) was almost equal, except in the case of men, who exhibited a greater preference for the perceptive (P) orientation.

Psychometric Properties of the Spanish Translation of the MBTI™
Reliability

Internal consistency, through Cronbach alpha, was the measure of reliability selected for the total scale, as well as for the four subscales of the instrument. Table 6 illustrates that the instrument, as well as its four subscales, obtained internal consistency coefficients of at least .80. In addition, the item analyses through the *scale if item eliminated procedure*, the reliability indexes for the instrument and each scale remained stable. This is indicative of high intercorrelations amongst the items that

form the scale, as well as for each subscale, allowing for the documentation that the instrument and its scales are reliable for the measurement of the underlying constructs proposed by Myers and Briggs.

Validity

The high interrelatedness of each scale's items, as well as for the total scale, led to the initial documentation of the MBTI® as a valid instrument for the measurement of Carl Jung's psychological types constructs as interpreted by Myers and Briggs. Nevertheless, since its authors claim that the instrument measures personality attributes whose existence is inferred from the responses offered through the MBTI® (Briggs-Myers, et al., 1998), it is necessary to use other measures to evaluate its construct validity. As such, exploratory factor analysis, correlation matrixes and group differences were chosen as a measure of this psychometric property (Herrans, 2000).

Exploratory factor analysis. Factor analysis through principal components produced a 24 factor model (i.e., Eigen Values ≥ 1), explaining 64.0% of the variance. The *scree plot* for this analysis indicated that the best model was a six-factor solution accounting for 37.2% of the variance (see Figure 2). Nevertheless, an inspection of the instrument, using a factor loading of .30 or more as the criteria for inclusion, reveals that the items came together on the first five factors of the model. The first factor grouped 25 items, twelve from the S-N scale, twelve from T-F, and one from the J - P scale. The second factor was composed of 25 items, of which 21 belonged to the J-P scale, while four belonged to the T-F scale. The 21 items from the E-I formed a third factor scale. The fourth and fifth factors included eight items from the T-F scale and 14 items from the S-N scale, respectively. These items were submitted to an internal reliability analysis to measure the degree of relationship amongst them and the factor under which they came together. From Table 7 it can be observed that the coefficients obtained were moderate to high.

Correlation matrixes. Correlation matrixes were also used as a measure of validity. From the scales' continuous scores, it was found that the E-I and T-F scales exhibited a low correlation with the other scales (between .02 and .17). Nevertheless, the T-F scale's correlation was significant ($p < .01$) with all the other scales. Of all correlations, the highest was produced by the continuous scores for the S-N and J-P scales, despite it being moderately low ($r = .296, p < .01$). A correlation matrix was also generated for each of the MBTI™ eight dimensions' preference scores. As can

be observed from Table 8, each dichotomy was highly inversely correlated ($r > .97$, $p < .01$), as was expected from the theoretical conceptualization. In addition, all dimensions were significantly correlated ($p < .01$), though moderately low, except in the case of the E-I scale who was significantly correlated only with the T-F scale. As such, it was found that the more extraversion (E) was preferred, the more intuition (N), feeling (F) and perception (P) would be preferred. The more sensing (S) was preferred over intuition (N), the more thinking (T) and perception (P) was preferred. Finally, a response pattern inclined towards thinking (T) was more than likely associated with a judging (J) inclination.

Between group differences. In order to evaluate the MBTI™'s sorting capabilities, significant differences in the continuous scores were analyzed. Also, significant associations amongst dimension preferences (i.e., dominant and auxiliary function; dominant functions, etc.), and several social demographic characteristics were analyzed, through *Chi Squared*.

Gender differences for the continuous scores for all scales were analyzed through *Student's t-test*. The only scale that did not produce differences based on this variable was E-I. For the other scales, it was found that females preferred sensing (S) and feeling (F) significantly more often than their counterparts do ($p < .001$ and $p < .05$, respectively). For the J-P orientation, it was found that men were significantly more perceptive (P; $p < .01$) than women. Also for gender, significant associations at alpha levels of .05 and .01 were found for all preference combinations (see Table 9).

The *Analysis of Variance* (ANOVA) of each scale's continuous scores as a function of academic college revealed a significant difference ($p < .01$) only on the J-P scale for Agricultural Sciences. Multiple comparisons through a *Scheffe test* evidenced that as such, the students from the College of Agricultural Sciences were significantly more perceptive (P; $p < .05$) than students from Science programs. Nevertheless, the analysis of associations between academic colleges and preference combinations indicated no significant relationships. A significant difference ($p < .001$) on the S-N scale was found as a function of students' year of study. From Scheffe's test it was found that students in their second year of college were significantly less sensing (S) than students in their fourth ($p < .01$), fifth ($p < .01$) and sixth year or more ($p < .01$) of college. Significant associations were also found for this variable and the preference for dominant function ($p < .05$), as well as for the interaction of functions ($p <$

.01; see Table 10). It was more likely for second year students to prefer intuition (N) as their dominant function, as compared to other students, while students in their sixth year and beyond favored feeling (F) more often than second and fifth year students. Also, second year students were less frequently sensing feeling (SF) types.

Discussion

Results' Interpretation and Implications

Instrument's Psychometric Properties

Reliability. The internal reliability analysis performed for the Spanish translation of the MBTI™ as a whole and for its scales produced high reliability indexes, fluctuating between .81 and .89. This finding supports the study's first hypothesis regarding its reliability, and is consistent with the indexes established in the instrument's manual (Briggs-Myers, et al., 1998). It states that for Hispanic adults (n = 100) and college students (n = 28), where the indexes fluctuated between .87 for the S-N scale, .91 for the T-F scale, and between .84 and .90 for the E-I and J-P scales, respectively. It is also consistent with Capraro and Capraro's (2002) documentation from their meta-analysis of reliability indexes for the MBTI®, where they found that the coefficients fluctuated between .50 and .97 for the four scales, as well as for the entire instrument.

Validity. The exploratory factor analysis performed with the Spanish translation not producing a four-factor model as predicted from the theory and the instrument's manual (Briggs-Myers, et al., 1998). Nonetheless, the validity was documented through the high levels of internal consistency amongst each scale's items, the consistency of the scales to which the items that were grouped on the five factors belonged to, as well as through the between group differences that were found. The absence of a four-factor model rejects the hypothesis that was originally established regarding the instrument's structure, and is inconsistent with Bess, Harvey & Swartz's (2003) conclusion, from a study with 4,313 participants, that a four-factor model was best for Form M of the MBTI®. The findings, however do coincide with those of Harvey, Murry, and Markham (1995) with Form F, Johnson, Mauzey, Johnson, Murphy, & Zimmerman (2001) with Form G, and Saggino, Cooper, and Kline (2001), with the Italian version of Form M, all of whom found that a solution of five factors was the best adjustment for the MBTI®. Unfortunately, no further studies regarding the factor structure of Form M were obtained.

The five-factor model described by Harvey, et al., (1995) produced reliability indexes (alpha) between .82 and .85 for the first four factors and .66 for the fifth factor. In the present study, only the second and third factors produced high reliability coefficients of .88, while the first, fourth, and fifth factor generated coefficients of .66, .72, and .63, respectively. A content evaluation of the items grouped on these factors can reveal the difference found.

The first factor grouped equal amounts ($n = 12$) of items for scales S-N and T-F, and one from the J-P scale. Though, theoretically speaking, it would be expected that S-N and T-F items be grouped on different factors (Briggs-Myers, et al., 1998), it is essential to consider that both scales are subcomponents of the orientations towards the outer world (i.e., the J-P scale). As Mattoon (1981) explained, though Jung did not explicitly mention the orientations towards the outer world, he did explain that the pairs of functions shared a common characteristic of either perception (i.e., the S-N scale) or judgment (i.e., the T-F scale). According to the dynamic interactions of the preferences, the functions interact and complement each other in a hierarchy, particularly in a dominant and auxiliary function. Therefore, the grouping of these items on one factor can be the result of this dynamic interaction between dominant and auxiliary functions.

Another salient aspect of the first factor is that the items from the S-N scale, and the one from the J-P scale possess attributes similar to those associated with the T-F scale, while the T-F items exhibit characteristics associated with the S-N scale. In fact, many of the items from the S-N scale are related to the preferences one has regarding other people (e.g., item 15 determines whether one prefers to have as a friend someone with new ideas or someone who has both feet on the ground). These items, although intended to measure perceptive preferences (i.e., S-N), have a judging component that may reflect an individual's emotions. In the same manner, the concept *despreocupado* (i.e., carefree) from item 43, can be reacted to as a feeling concept, despite it being an item from the S-N scale. On the other hand, some terms from the T-F items (e.g., *logic*, *analyze*, etc) can also be interpreted as perceptive (P) attributes. The combination of items from the function scales that come together on the first factor, along with the different interpretations that may be given to some terms and the high intercorrelation found between the continuous scores of these scales, seem to explain the moderate alpha coefficient obtained for the first factor.

Factors two and three exhibited a high internal consistency coefficient, which can be explained in terms of the homogenous composition of the scales to which the items corresponded and the total items grouped on each one. Despite there being four items of the T-F scale in the second factor, the homogenous nature was not affected, particularly because an in depth analysis of these items leads to the interpretation that they are measuring a judging (J) component. For the fourth and fifth factors, despite the integrity of the scales to which the items corresponded, the number of items was small, which as a result led to a moderate reliability index. This interpretation follows the line of Nunnally and Bernstein (1994) who indicated that the more variables there are with which items can intercorrelate, the better the factor analysis will be.

The low intercorrelations amongst the continuous scores of the four scales partially confirmed this study's second hypothesis regarding its construct validity. However, in slight contrast to what was established in the hypothesis for scales S-N and J-P, according to the properties documented in the *MBTI® Manual* ($r = .47$; Briggs-Myers, et al., 1998), for this scale the correlation was moderately low ($r = .30$, $p < .01$). Also in contrast to the findings of Carr, et al., (2002), who found insignificant correlations amongst the four scales except for J-P, in this study all correlations were significant ($p < .01$), except in the case of the E-I scale with scales S-N and J-P. Nevertheless, the results of the present study do in fact confirm that sensing (S) types are more frequently judging (J) types just as thinking (T) types are (Briggs-Myers, et al., 1998; Carr, et al., 2002).

As the theory of each scale's dichotomous nature proposes, negative associations amongst the preference scores for each dimension were expected. This hypothesis was confirmed with significant coefficients ($p < .01$) of $-.97$ for the S-N and T-F scales, as well as perfect correlation coefficients ($r = -1.00$) for the E-I and J-P scales. This not only validates the bipolarity of the dichotomies, but also implies that the types were adequately sorted in terms of preference due to their highly consistent preferences, as evidenced by the participants' responses.

Many of the studies cited in this paper (e.g., Laribee, 1994; Hawkins, 1997; Johnson & Singh, 1998; Tuel & Betz, 1998; Culp & Smith, 2001; Carr, et al., 2002; Folger, et al., 2003; Sak, 2004) found significant differences and associations for the different preference combinations that are determined by the MBTI® as a function of various social demographic variables. As such, this study posed as its final hypothesis, which was partially confirmed,

significant differences for the scales' continuous scores and significant associations for the different preferences as a function of several variables (e.g., gender, academic college, and year of study).

Of the associations found as a function of gender, it is important to highlight the significance of the relationship amongst the function combinations, where it was found that women were more frequently than men sensing-feeling (SF) types (66.8%, $f = 149$ vs. 51.7% $f = 74$). There was also a tendency for men to prefer extraverted perception more often as opposed to their counterparts (E-P; 42.0%, $f = 60$ vs. 33.2%, $f = 74$), as well as for women to prefer an extraverted judging orientation (E-J; 36.8%, $f = 82$ vs. 23.1%, $f = 33$). These findings are consistent with the stereotypes of the ways in which men and women relate to the external world, albeit a result of social-cultural determinants or learning (Hergenhahn & Olson, 1999). It is also consistent with the perception that Puerto Rican women are taught to be more sentimental than men are (Nieves Falcón, as cited in Aronson-Fuentes, 1995).

The findings of Culp and Smith (2001) as well as Laribee's (1994), amongst others led to the expectation that significant differences were to be found as a function of major or academic college. Nonetheless, the only difference found was for the J-P scale and the students of the College of Agricultural Sciences. But the results of this study do make it possible to make a comparison with what has been documented in the MBTI® Manual (Briggs-Myers, et al., 1998), where it has been stated that 68% of the Engineering students, as compared to 54% of Arts students prefer the thinking (T) dimension. For the UPRM students, however, it was found that feeling (F) was preferred by Engineering students almost as much as Arts students (72.7%, $f = 101$ vs. 71.7%, $f = 71$). Johnson and Singh (1998) found that of a sample of 48 engineers, 61.7% ($f = 29$) preferred introversion (I), 72.3% ($f = 34$) preferred sensing (S), 29.8% ($f = 14$) thinking (T) and 53.2% ($f = 25$) preferred judging. Culp and Smith (2001) found that amongst 218 engineers 62.0% ($f = 135$) preferred introversion (I), 54.0% ($f = 118$) sensing (S), 75.0% ($f = 163$) thinking (T), while 67.0% ($f = 146$) preferred judging (J). For the UPRM engineering students, the preference was 31.7% towards introversion (I), 71.2% ($f = 99$) sensing, thinking 27.3% ($f = 38$), and judging (J) was preferred by 45.3% ($f = 63$). These results are very similar to the findings of Johnson and Singh (1998), except in the preference towards introversion (I).

Johnson and Singh (1998) proposed that the preference of their sample towards feeling (F) was a result of cultural aspects, since they were Hawaiian. This can also be a factor contributing to the UPRM students' preference for this function. In fact, the cultural impact is even more salient in the difference of the Hawaiian engineers' preference towards introversion (I), after considering the Hawaiian code of Conduct (Institute for the Advancement of Hawaiian Affairs, 1985), which explains the value Hawaiians place on introversion (I). In contrast, the Puerto Rican sample's preference for extraversion (E) may be indicative of a more valued attribute, something to be explored further. Nevertheless, the age of the participants in these studies may be a confounding variable for the preferences on the E_I scale, particularly when Jung pointed out that during the second half of life, in contrast to the demands placed on youth, a great deal of introversion (I) was needed in order to meet life's demands (Mattoon, 1981). In this study, more than half of the participants were 21 years old or younger.

Most studies regarding the psychological types that prevail amongst professions related to individuals in practice. Taking into account that students often pursue graduate studies in fields that differ from their undergraduate preparation, some may argue that undergraduate students may not be the best samples to evaluate the prevalence of types as a function of majors. Nevertheless, this study's sample was composed mainly of engineering students, a field for which in Puerto Rico there are many job opportunities for those who possess only a bachelor's degree, particularly since they can be licensed at this level of education. Though the results from the between group differences analyses support the instrument's sorting abilities, they also make way for the debate of it measuring stable personality traits, as is its objective, or if it measures state dependent traits.

The participants of this study represented little more than 3% of the UPRM student population enrolled in the second semester of the 2003-2004 academic year. Proportionally, in this sample, females were overrepresented, as well as the amount of students from the College of Arts and Sciences. On the other hand, there was a low representation of the student population from the College of Business Administration. These factors affect the generalization of the study's results to the UPRM student population.

Nevertheless, since the students were Hispanic, this sample was of similar size to the Latin adults described by Briggs-Myers, et al., (1998; n = 340) for Form M, and is larger than Hammer and Mitchell's (1996; n = 96) for

Form G. For the Latin population completing Form M, the three most frequent types were (ESFJ (18.0%, f = 61), ISTJ (11.5%, f = 39) and ISFJ (11.2%, f = 38). Amongst those completing Form G the most frequent types were ISTJ (16%) and ISFJ (12%). In addition, Hammer and Mitchel (1996) found that Hispanics preferred feeling (F; 54%) and judging (J; 54%).

In contrast, here it was found that the two most frequent types were ESFP (28.80%, f = 76) and ESFJ (19.90%, f = 73). This result is somewhat consistent with Briggs-Myers, et al., (1998), but different to Hammer and Mitchel's (1996) findings. Nevertheless, the percentage distribution of the preferences by dimension of scales T-F and J-P for the UPRM is consistent with the latter's description regarding Hispanic's preferences for feeling (F) and judging (J), which highlights once more the cultural impact on personality.

It is also important to highlight that the preference for feeling (F) was much higher (75.4% vs. 54%) than what Hammer and Mitchel (1996) found, providing even more evidence for the cultural impact on test results. Despite their sample being Hispanic, just as those that formed part of the national representative sample, they all resided in the US, which in turn means that they highly influenced by the American culture, which could explain the differences between the results for Hispanic groups documented in the literature and this study's sample. Findings, such as these are worrisome in terms of the adequacy of using the North American norms of the MBTI® with the Puerto Rican population.

Particularly, for academic and vocational counseling, Puerto Rican students and employees may be receiving inadequate counseling regarding majors and professional fields in which to work, even when counseled based on the Latin norms of the MBTI®. Although the composition of the UPRM student population, as a whole, was not highly represented, there were a large number of students from the College of Engineering in this study, amongst whom ESFP prevailed. This counters Culp and Smith's (2001) claim that engineering is not an attractive field for ESFP types. It is also contrary in terms of the preference for attitudes and functions presented by McDaid, et al., (as cited in Johnson & Singh, 1998) who claimed that engineers are more frequently ISTJ. This finding denotes a cultural impact on the responses offered through the MBTI®, which warrants more studies regarding the adequacy of using translations with populations other than those for whom an instrument was originally created and performing evaluations based on the instrument's norms and the CAPT's databank, as is being currently done with the MBTI®.

The similarity of the psychological types and preferences that prevailed in this study and the results of Johnson & Singh's (1998) Hawaiian sample, as opposed to those from the national representative sample demonstrate the effect that culture has in the interpretation of instruments' results. It is necessary to continue studying the psychometric properties of the MBTI® and the distribution of types, as well as the preferences for each dimension with the Puerto Rican population, and compare those results what has been documented in the studies carried out with this instrument. The differences found for the UPRM students and the national representative sample should motivate psychologists, counselors, and educators, amongst others, to build up on the literature and data regarding the adequacy of the MBTI® for Puerto Rico, or any other culture for that matter. Only in this manner will it be possible to decide responsibly if use of this instrument should continue as it is with different populations, or if its continued use should depend on the CPP's development of culture specific versions.

The International Test Commission's (ITC; 2000) *Test Adaptation Guidelines* provide an excellent framework to guide researchers in the test administration process (Hambleton, 1994; van de Vijver & Hambleton, 1996, as cited in Hambleton & Patsula, 1999). Amongst these guidelines is the selection of an instrument appropriate for the group to be evaluated. Unfortunately, this guideline cannot be met in Puerto Rico, if the MBTI® is the tool intended for use. In fact, when this issue was discussed with the CPP the response was that creating a version for Puerto Rico would depend on marketability of the instrument here. Seeing in this instrument the potential for continued use in Puerto Rico, it the results of this study were offered to the CPP, but no interest was shown. They did however state that if an instrument for PR was to be developed it would be on their behalf, with their selection of translators.

An issue regarding how companies develop instruments for different cultures is of great importance for institutional, psychological, and academic research. As Hambleton and Patsula (1999) stated, test translators need to be familiar with both the source and target languages, the cultures, the construct under assessment, and the principles of good test development practices. In order to insure that test adaptation takes into account linguistic and cultural differences, the translators must know languages, cultures, basic test development knowledge, and subject matter or construct. Successful adaptation is a mixture of good designs, excellent translators, questionnaires, observations, good judgments, statistical analyses, validity

studies, etc. (Hambleton & Li, 2004). Adaptation needs to consider the whole cultural context within which a test is to be used (ITC, 2000). If cross-cultural comparisons are not of interest, it may be easier and more relevant to construct a new test for a second language group. This avoids any complications with copyright, insures that the format will be suitable, and any desired modifications in the definition of the construct of interest can be made at the outset of the test development process (Hambleton & Patsula, 1999).

UPRM students' conceptual profile. The psychological types derived from the MBTI® led to the generation of a conceptual profile of the UPRM students. As previously mentioned, the most common type amongst males was ESFP, extroverting sensing as their dominant function and introverting feeling as their auxiliary function. This is indicative of a male population that is highly interested in people and new experiences. We would expect them to use their feeling judgment internally when making decisions through the identification and empathy with the people that surround them.

ESFP types are highly observant, practical, realistic and specific people. As such, the male students at the UPRM are seen as active individuals who enjoy being part of immediate experiences. Their enthusiasm is highly attractive to those who surround them. They are perceived as flexible, highly adaptive, and easygoing individuals. They rarely make plans in advance, since they trust their abilities to respond to the moment and deal with whatever is presented to them.

Learning for these students is best through practice and interaction with the environment. They will show a lack of interest in theories and written explanations. As a result, traditional teaching methods would result highly difficult for them to grasp. Nevertheless, they will react adequately once they see the relevance of the topics being discussed and when they are permitted to interact with others to analyze the subject under consideration (e.g., working in groups, etc.).

Female students on the other hand were mainly ESFJ types, extroverting feeling as their dominant function and making use of their introverted sensing as the auxiliary function. As a result, they enjoy organizing and structuring situations prior to handling them with the objective of completing tasks in a precise and timely fashion. They value security and stability. Sociability and enjoyment of celebrations and tradition are some of their characteristics. These females prefer being appreciated for their attributes and all that they offer to those that surround them.

Extroverting feeling the (F) function means they will project their warmth and energy. They are motivated by acceptance and are hurt by indifference or the lack of sympathy. Their preferences allow them to be distinguished as practical, realistic, decisive, and consistent people. The bases for their decisions are experiences and facts, preferring to do things in a more traditional and accepted way.

UPRM females are not attracted to learning styles that require dominating abstract ideas or impersonal analysis. They enjoy learning about everything that is perceived as useful and practical. Like their counterparts, they enjoy learning through practice. Their style requires clear and precise instructions and a preference for professors who demonstrate empathy, support, and individual recognition.

Study's implications for education and institutional research. As Wheeler (2001) indicated, the learning styles of individuals impacts their performance, which in turn is affected by their personalities. The MBTI® has the potential to help us understand the ever-changing learning styles. Understanding the theory of psychological types, could offer educators the opportunity to provide their students with the quality experiences and environments that students need to transform themselves into autonomous learners (Hawkins, 1997). The use of the MBTI® can assist educators to recognize the differences amongst students as potential sources of strength instead of disabilities towards learning. Of all the instruments administered in educational, organizational and industrial settings, it is the least invasive, since its items cannot be identified as directed at invading privacy. The use of the MBTI® for education, vocational counseling, consulting, personnel recruitment, and other organizational uses presents advantages not shared with the majority of the psychological diagnostic measures available (McCaulley, 2000). Its items are less invasive, and its constructs are easily recognized in everyday life. The description of psychological types, which are expressed in a simple language, focuses on the best qualities of each type, which in turn sets forth the opportunity to appreciate differences as virtues.

Faculty members nationwide are becoming increasingly frustrated with the new generations of students that they are encountering, mainly because the way in which these students view knowledge and acquire meaning is significantly different from the approaches used by their instructors. In an exposition, Schroeder (1993), then Vice Chancellor for Student Affairs at the University of Missouri-Columbia, presents information that he gathered for 15

years of approximately 4,000 students entering the University of Missouri at Columbia who took the MBTI®. Of these students, about 60% percent emitted responses indicative of a preference for sensing (S). A preference for concrete experiences; high degrees of structure; sequential learning and, all too frequently, a need to know why prior to doing something characterizes the learning styles of these students. They are more dependent on immediate gratification and exhibit more difficulty with basic academic skills such as reading and writing. In contrast, the learning characteristics esteemed as most important to faculty members who praise critical thinking, independence and originality of thought, are those of the intuitive types (N). These marked differences can easily lead to a gap in the learning process.

In Dave Kalsbeek's (as cited in Schroeder, 1993) eight year study titled *Tracking Retention and Academic Integration by Learning Styles* (TRAILS) at Saint Louis University, it was found that the mean SAT score for E-S learners was 932, as compared to the I-N learners, whose mean score was 1,110. This implies an effect of the sensing students taking longer to read questions, which seems to put them at a disadvantage on timed aptitude tests. Therefore, one has to consider if timed exams are an appropriate intelligence measure for sensing (S) students, since they require ability to manipulate symbols and patterns in relationships between words and concepts quickly.

According to Schroeder (1993), MBTI® data collected over the years of faculty members from multiple campuses revealed that more than 75% of them preferred an abstract reflective and intuitive learning pattern (IN). This would mean that the gap or the root of the dilemma between students and teachers might precisely be the incongruence between learning and teaching styles. All too often educators under these circumstances create classroom environments that are rewarding for themselves and students who share their preferences, but the settings can be all too frustrating for the "concrete active learners" (ES) of today who enter the classroom seeking direct, concrete experience, moderate to high degrees of structure and a linear approach.

Schroeder (1993) concluded that by utilizing information such as the one obtained from the MBTI®, a greater degree of congruence can be achieved between teaching and learning styles, thereby increasing the probability of students' ability to master content, acquire critical thinking skills, and understand increasingly complex issues. His suggestion is that an overall understanding of how students learn and where they are in the process can help educators meet the needs of new students who sit in their classrooms.

*Limitations, Strengths, and Future Research**Limitations*

1. The sample used, based on availability, is not representative of the UPRM general student population.
2. The potential for electronic codification of the MBTI®, Form M, which in turn allows for analysis based on the item response theory, has been documented as one of the improvements of this form as compared to previous forms. All the same, the version authorized by the CPP for use in this study was the self-scorable version, which impeded the use of this technique for the evaluation of the translation's psychometric properties.
3. Although cultural adaptation was aspired, this process was not carried out to the extent outlined by Bravo, et al., (1993) and outlined by the ITC (2000).

Strengths

1. One of the first studies carried out in PR regarding the MBTI®'s psychometric properties and whose intention was the development of norms for its people.
2. Fleenor (2001) stated that the MBTI® lacks studies appropriate for categorical variables. The fact this study emphasized the use of categorical variables is a contribution to the documentation that the CPP maintains regarding the instrument.
3. Evidence highlighting the importance of evaluating the continued use of the MBTI® as is with Puerto Ricans is provided through the differences found amongst the results of this study's sample, and those of North American samples.
4. Beyond the results obtained in this study, it serves as a reference for future studies about the MBTI® and psychological types, due to its abundance of references on the matter.

Future Studies

1. Since there seems no intention on behalf of the CPP to develop a version of the MBTI® for Puerto Rico, a databank of results from administrations performed on the island could be put together and submitted to analyses similar to those outlined in this study. This would in turn provide for further evaluation of the psychometric properties of Spanish translations and to the development of norms.
2. If the CPP granted permission to use the version developed for this study again, it could be administered to a larger sample in order to

perform comparisons with this study and those cited in the literature.

3. The perception that the CPP may take a more commercial stance regarding the MBTI®, and the criticisms regarding its forced choice format and distortion of Jung's theory, may lead to a reevaluation about if a new instrument with a different format that is more consistent with Jung's theory should be developed for PR.

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Table I

Frequencies and Percentages by Gender, Age, and Year of Study

Variables	f	%
Gender		
Female	223	60.90
Male	143	39.10
Age		
16 and under	0	0.00
17	2	0.50
18	37	10.10
19	69	18.90
20	63	17.20
21 or more	195	53.30
Year of Study		
First	52	14.20
Second	90	24.70
Third	54	14.80
Fourth	87	23.80
Fifth	51	14.00
Sixth and beyond	31	8.50

Table II

Frequency Distribution and Percentage of Preferences by Gender

Dimension	Total		Females		Males	
	f	%	f	%	f	%
Extroversion - Introversion						
E	249	68.00	156	70.00	93	65.00
I	117	32.00	67	30.00	50	35.00
Sensing - Intuition						
S	277	75.70	182	81.60	95	66.40
N	89	24.30	41	18.40	48	33.60
Thinking - Feeling						
T	90	24.60	47	21.10	43	30.10
F	276	75.40	176	78.90	100	69.90
Judging - Perceiving						
J	173	47.30	118	52.90	55	38.50
P	193	52.70	105	47.10	88	61.50

Note. E = extraversion; I = introversion; S = sensing; N = intuition; T = thinking; F = feeling; J = judging; P = perceiving.

Table III

Frequency Distribution and Percentage of Dimension Preferences by Academic College

College	Dimension			
	f	%	f	%
	E		I	
AGSCI	16	72.70	6	27.30
SCIEN	45	71.40	18	28.60
ARTS	68	68.70	31	31.30
BUSADM	5	41.70	7	58.30
ENGIN	95	68.30	44	31.70
OTHER	20	64.50	11	35.50
	S		N	
AGSCI	14	63.60	8	36.40
SCIEN	55	87.30	8	12.70
ARTS	74	74.70	25	25.30
BUSADM	11	91.70	1	8.30
ENGIN	99	71.20	40	28.80
OTHER	24	77.40	7	22.60
	T		F	
AGSCI	6	27.30	16	72.70
SCIEN	9	14.30	54	85.70
ARTS	28	28.30	71	71.70
BUSADM	2	16.70	10	83.30
ENGIN	38	27.30	101	72.70
OTHER	7	22.60	24	77.40
	J		P	
AGSCI	4	18.20	18	81.80
SCIEN	36	57.10	27	42.90
ARTS	53	53.50	46	46.50
BUSADM	5	41.70	7	58.30
ENGIN	63	45.30	76	54.70
OTHER	12	38.70	19	61.30

Note. AGSCI = Agricultural Sciences; SCIEN = Science programs; ARTS = Arts programs; BUSADM = Business Administration; ENGIN = Engineering; E = extraversion; I = introversion; S = sensing; N = intuition; T = thinking; F = feeling; J = judging; P = perceiving.

Table IV

Frequency Distribution and Percentages of Dominant and Auxiliary Functions

Function		Total		Females		Males	
Dominant	Auxiliary	f	%	f	%	f	%
S	F	113	30.90	73	32.70	40	28.00
F	S	110	30.10	76	34.10	34	23.80
N	F	32	8.70	15	6.70	17	11.90
S	T	27	7.40	15	6.70	12	8.40
T	S	27	7.40	18	8.10	9	6.30
F	N	21	5.70	12	5.40	9	6.30
N	T	20	5.50	7	3.10	13	9.10
T	N	16	4.40	7	3.10	9	6.30

Note. E = extraversion; I = introversion; S = sensing; N = intuition; T = thinking; F = feeling; J = judging; P = perceiving.

Table V

Frequency Distribution and Percentages of the Combination of Dominant Function and Attitude Preference

Attitude & Dominant Function	Total		Females		Males	
	f	%	f	%	f	%
E-S	92	25.10	56	25.10	36	25.20
E-F	85	23.20	62	27.80	23	16.10
I-S	48	13.10	32	14.30	16	11.20
I-F	46	12.60	26	11.70	20	14.00
E-N	42	11.50	18	8.10	24	16.80
E-T	30	8.20	20	9.00	10	7.00
I-T	13	3.60	5	2.20	8	5.60
I-N	10	2.70	4	1.80	6	4.20

Note. E = extraversion; I = introversion; S = sensing; N = intuition; T = thinking; F = feeling; J = judging; P = perceiving.

Table VI

Instrument and Scales' Internal Reliability Coefficients

Scale	Alpha
MBTI®	.85
E-I	.88
S-N	.81
T-F	.87
J-P	.89

Table VII

Alpha Coefficients of the Factors Produced by the Spanish Translation of the MBTI®, Form M

Factor	Alpha
1	.66
2	.88
3	.88
4	.72
5	.63

Table VIII

Preference Score Intercorrelations Amongst the MBTI®'s Eight Dimensions

Pole	I	S	N	T	F	J	P
E	-1.00**	-.01	.03	-.15**	.16**	-.05	.05
I		.02	-.03	.15**	-.15**	.06	-.06
S			-.97**	-.15**	.19**	.30**	-.30**
N				.17**	-.15**	-.29**	.29**
T					-.97**	.18**	-.18**
F						-.16**	.16**
J							-1.00**

Note. E = extraversion; I = introversion; S = sensing; N = intuition; T = thinking; F = feeling; J = judging; P = perceiving.

** $p < .01$.

Table IX

Analysis of the Relationship between Gender and Preference Combinations

Preference Combinations	χ^2
Dominant & Auxiliary Function	14.83*
Dominant Function	10.08*
Dominant Function & Attitude	16.97*
Function Pairs	12.81**
Attitude and Orientation	8.81*
Orientations	2.24

* $p < .05$, ** $p < .01$.

Table X

Analysis of the Relationship between Year of Study and Preference Combinations

Preference Combinations	χ^2
Dominant & Auxiliary Function	45.64
Dominant Function	28.87*
Dominant Function & Attitude	46.91
Function Pairs	36.93**
Attitude and Orientation	10.50
Orientations	2.47

* $p < .05$, ** $p < .01$.

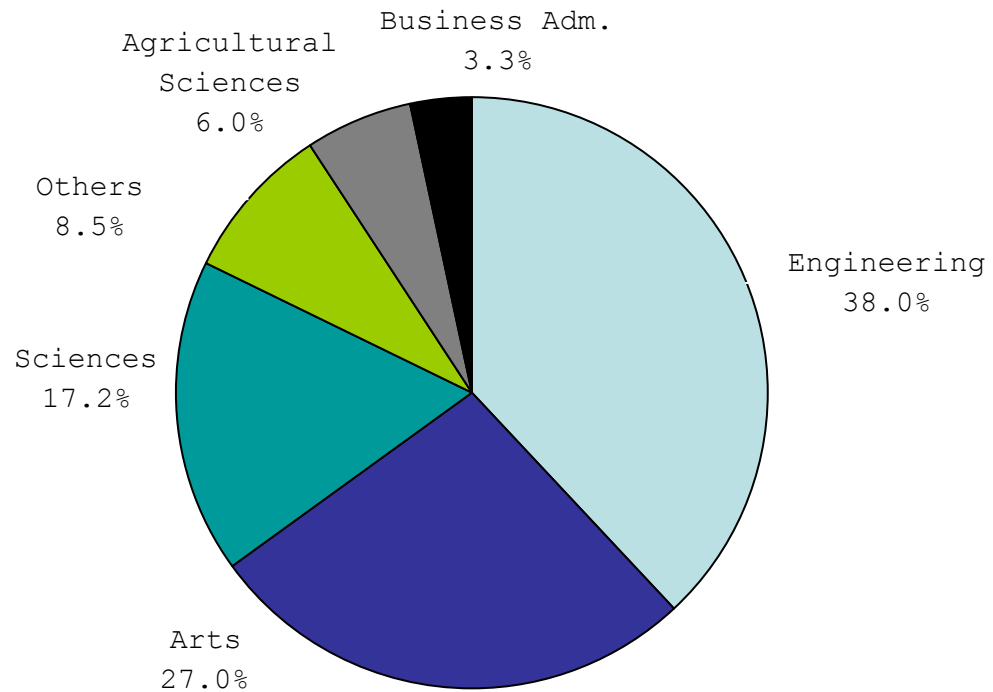


Figure 1. Sample's distribution by academic college.

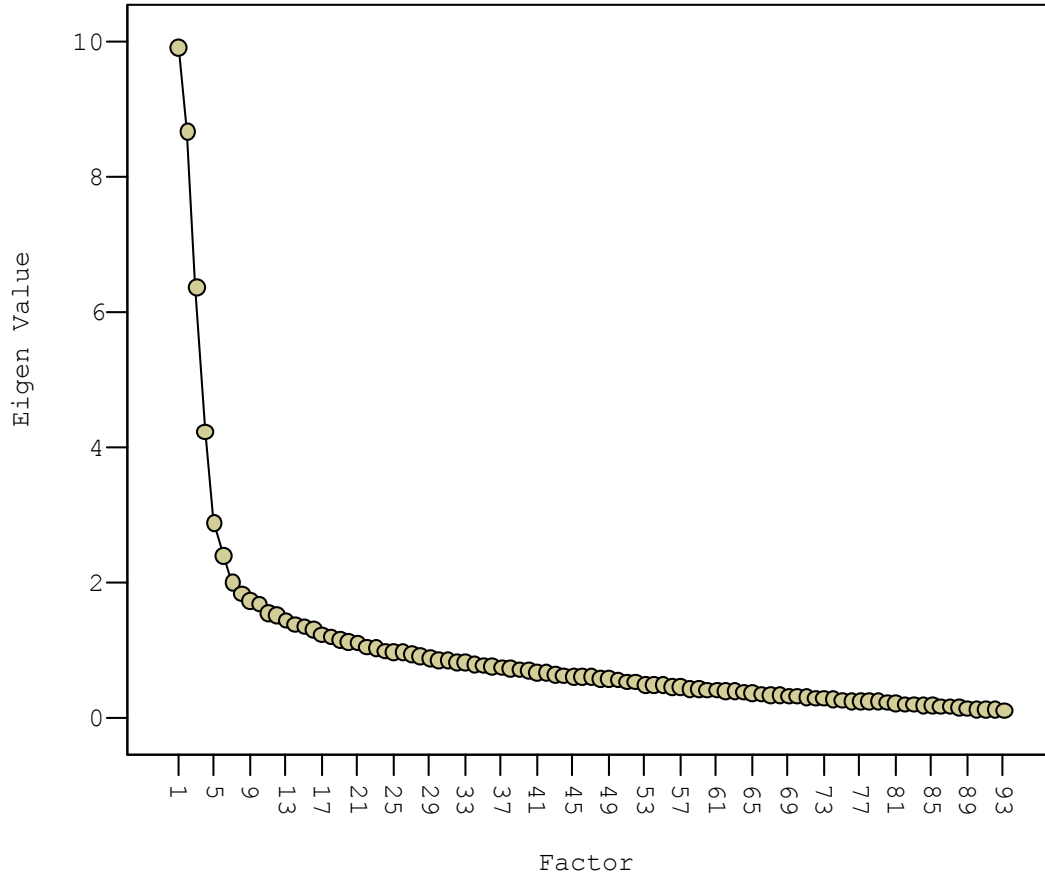


Figure 2. Scree plot of the MBTI®, Form M, Spanish translation's exploratory factor analysis.