

12-2009

Personality as a Gestalt: A Cluster Analytic Approach to the Big Five

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PERSONALITY AS A GESTALT:
A CLUSTER ANALYTIC APPROACH TO THE BIG FIVE

A Thesis
Presented to
The Faculty of the Department of Psychology
Western Kentucky University
Bowling Green, Kentucky

In Partial Fulfillment
Of the Requirements for the Degree
Master of Arts

By
Thomas John Reece

December 2009

**PERSONALITY AS A GESTALT:
A CLUSTER ANALYTIC APPROACH TO THE BIG FIVE**

Date Recommended _4-Nov-2009_____

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Acknowledgements

First, I would like to express gratitude to my thesis chair, Dr. Reagan Brown, for his patient guidance throughout the process of writing this thesis. I am sure you are as happy as I am to see this project completed. Next, I would like to thank Dr. Rick Grieve for his continued assistance and support towards the finishing of my degree. It has taken a while, but it seems you will finally be rid of me. I would also like to thank Dr. Tony Paquin for being on my committee. In addition, I must thank Dr. Phil Pegg for the use of his data for this project. Finally, I wish to acknowledge Dr. John Bruni for his unflagging mentorship throughout my academic career at Western Kentucky University. You awoke the latent statistical geek in me and regardless of whether that is a good thing or not, I owe it, and more, to you.

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December 2009

Pages 31

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There has been a recent resurgence in interest in the study of personality types. This personality type research has focused on the uncovering of statistical types, rather than relying on rationally developed types. Using the method of cluster analysis, I investigated whether such statistical types could be uncovered and whether they correspond to the types described in previous analyses. The expected number of personality types was uncovered and, while these types resembled the personality types discussed in the literature, the patterns of scores for these types were not exactly as hypothesized.

PERSONALITY AS A GESTALT:

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A perennial debate in personality research is whether personality should be treated as consisting of a number of independent traits, or whether it should be considered as a gestalt, in which the components of the system interact to form a structure that is greater than the components taken by themselves (Asendorpf, Borkenau, Ostendorf, & Van Aken, 2001; Liebert & Spiegler, 1998; Mischel, 1981). It is in the spirit of viewing personality as a gestalt that the current research is conducted.

The Big Five

Although a number of methods and measures have been used to derive personality types, the practice is to translate existing inventories into the taxonomy of the Five Factor Model (Asendorpf, 2003; De Fruyt, Mervielde, & Van Leeuwen, 2002). As such, an understanding of the Five Factor Model is pertinent to the discussion of modern typological research. Given that the current study will also use a measure of the Big Five, I will begin with a brief overview of the Five Factor Model before continuing on to personality types.

The Big Five, and the personality inventories that have been developed for it, is a variable centered taxonomy. It seeks in its five factors to be broad enough to include a maximum of different and meaningful traits with a minimum of dimensions (Asendorpf et al., 2001). The five factors are as follows. The Neuroticism factor is a measure of emotional stability and mental health. It identifies individuals who are prone to psychological distress and maladaptive coping responses. The Extraversion factor measures interpersonal style and temperament. It identifies the quantity and intensity of

interpersonal interaction, activity level, and need for stimulation. The Agreeableness factor also measures interpersonal tendencies, like Extraversion, but does so along a continuum from compassion to antagonism in thoughts, feelings and actions. The Conscientiousness factor assesses the individual's degree of organization, persistence, and motivation in goal directed behavior. The Openness to Experience factor identifies an individual's toleration for, and the exploration of, the unfamiliar as well as an appreciation of experience for its own sake (McCrae & John, 1992). Although there are some who argue that these five factors are insufficient to explain personality (Becker, 1996; De Raad, 1996), the general consensus is that the Five Factor Model is a comprehensive model of personality (McCrae & John, 1992).

Personality typing in the past

Approaching personality as a discrete type, rather than a set of continuous traits, has been a topic of debate for as long as there have been questions about personality. From the ancient Greek philosopher Hippocrates, to more recent type theories such as the Myers-Briggs Type Indicator (Myers & McCaulley, 1985), based on Jungian psychodynamic theory, people have been trying to create personality types (Robins, John, & Caspi, 1998). The problem with past efforts to create valid personality types has often been that personality typologies were rationally developed from (or inspired by) personality theories. These theories were themselves developed rationally, rather than empirically. Past type theories focused on the constitution of the body (Hippocrates's humors, and Sheldon's somatatypes) or focused on singular traits (Jung's introversion-extroversion typology). Textbooks on personality psychology tend to devote minimal space to the discussion of personality types; discussion is typically treated as merely a

footnote for the evolution of trait theories (Liebert & Spiegler, 1998; Mischel, 1981).

There are a number of reasons why, in recent times, personality typologies have been ignored. The first reason has already been stated: most typologies have been rational or theory driven rather than empirical. The result is that typological research has been generally stigmatized. A second reason is, as Asendorpf (2002) noted:

The empirical study of personality differences is sometimes like a rough ride through a desert without orientation (lacking constructs, established methods, and replicable empirical findings), sometimes like an expedition into a jungle (facing an inextricable net of many similar but non-identical constructs, diverse established methods, and contradictory findings), and sometimes like a puzzle (trying to put together apparently incoherent pieces based on established constructs and methods). (p. 1)

Finally, until recently, there has been little consensus on the creation of a taxonomy of human personality (Asendorpf, 2002; Block, 1971). However, as the 2002 special edition of the *European Journal of Personality* (focused on personality typing) suggested, there is a growing interest in the identification and development of a replicable and generalizable personality taxonomy using empirical methods.

Current research on personality typing has been focused on using cluster analysis or other forms of sorting analyses to uncover personality prototypes. In the cluster analysis approach, which will be used in the current study, personality prototypes are typically defined as the mean profile of the cluster members (De Fruyt et al., 2002). The profiles of individuals are grouped into relatively homogeneous clusters with the aim of maximizing the similarities of individual profiles within clusters, while minimizing the

similarities between clusters. An individual profile's distance to a prototype is then used as an index of that profile's prototypicality (Schnabel, Asendorpf, & Ostendorf, 2002). Cluster analysis derives personality types through a mathematical technique of clustering individuals with profiles of similar patterns, characteristics, or scores on a number of variables. In the case of the current study, those variables are the domain scores on the NEO Five Factor Inventory (NEO-FFI; Costa & McCrae, 1992). As stated by Tryon and Bailey (1970, p.1), it is "the general logic, formulated as a procedure, by which we objectively group together entities on the basis of their similarities and differences." The ultimate goal of using cluster analysis to develop personality types, therefore, is "to describe the salient characteristics of a person by identifying him with a 'type'" (Tryon & Bailey, 1970, p. 135).

Why Develop Types?

The typological approach to personality is centered on the person, rather than on the variables, in that it places the focus on understanding the similarities and differences among people instead of the similarities and differences among variables. The use of trait configurations in clinical disorders (most relevant to this discussion: personality disorders) is generally accepted, but the suggestion that there may be non-pathological personality types (perhaps personality orders) is found to be questionable.

In light of the previous problems with personality types, Robins et al. (1998) suggest the adoption of a set of standards for the empirical development of a taxonomy of personality including: (a) the uncovering of types statistically, rather than rationally; (b) a focus on replicable types; (c) the use of construct validity studies as the basis for the interpretation of types, rather than rational interpretations; (d) a focus on generalizability

across gender, developmental period, ethnicity, and culture; and (e) the work should be toward a hierarchical taxonomy akin to biology's classification of organisms. Currently, the development of an empirical taxonomy of personality has focused primarily on the first two standards with occasional forays into the others. The current study will be working solely on the second standard of replicability.

Tryon and Bailey (1970) discussed three primary reasons why the development of typologies is desirable. First, any individual who fits a type can be better understood in the context of being a member of that type. Information derived from research of individuals who fit that type can be generalized to other individuals who also fit the type. This practice is common in personality research and in the applied use of personality measures, such as the use of codetypes in the Minnesota Multiphasic Personality Inventory (MMPI; Greene, 2000) or the personality types in the Myers-Briggs Type Indicator. Second, because personality typing consists of maximizing similarities within clusters and differences between clusters, a given type possesses particular characteristics that differentiate it from other types. Thus, strengths and weaknesses in the members of a type are conceptualized in terms of the distinctive constellation of characteristics of the type. Finally, among members of a particular type, the level of an individual's score on any particular characteristic can be predicted by the elevations of the other attributes from which the profile is constructed.

Asendorpf (2003) suggests that even if a typological approach is not well suited for psychological research, types may still be useful as a means for describing personality differences or presenting personality information to the general public as it provides a sort of short-hand that may be more accessible to both professionals and the laity. Some

researchers (Hirschfield, 1996; McCrae, Terracciano, Costa, & Ozer, 2006) note that people may have a natural preference for thinking in categories and types rather than in continuous fashion. It is thus easier to present the results of a psychological assessment to clients if one describes the results in the terms personality types instead of attempting to describe each dimension individually.

De Fruyt et al. (2002) noted that the number of types does not necessarily need to be fixed, but can be determined by the application for which the information will be used. De Fruyt et al. provided as examples the use of a two cluster solution in which the sample will be split into a group characterized by socially desirable traits and one with less than desirable characteristics. This split could then be used as a means of screening job applicants or individuals who would be likely to develop mental illness in the future. With this approach, De Fruyt et al. sought to emphasize a pragmatic approach to the study of personality types focused on external validity rather than more theoretical issues.

Personality As Gestalt

Perhaps due to the nature of the Big Five, and its focus on interpreting each factor independently, the model risks missing the greater gestalt of personality. Stated differently, by focusing on the individual factors, there is a risk of missing how each factor interacts with all other factors to form the actual structure of personality. Cattell defined personality more pragmatically as “that which permits prediction of what a person will do in a given situation” (Liebert & Spiegler, 1998; p. 5). Costa and McCrae (1992), in developing their personality inventory, were less concerned with defining personality or with theory than they were about defining personality traits, which they define as “pervasive consistencies in thought, feelings and behaviors.” (p. 39) In this

respect they were following the tradition of Cattell. As such, the NEO personality inventories were intended to focus purely on defining traits that result from factor analysis.

The literature of personality research has focused on the classification of variables, but as defined by Allport (1937), personality is the “dynamic organization within the individual of those psychophysical systems that determine his unique adjustments to his environment” (p. 48). The beginning of Allport’s definition should be noted; the “dynamic organization within the individual” suggests the importance of examining personality, not simply as the sum of a set of variables, but from a gestalt perspective. In other words, examining the total constellation of personality variables and how they interact with each other to form an individual’s personality. Similarly, Eysenck defined personality as “the more or less stable and enduring organization of a person’s character, temperament, intellect and physique, which determines his unique adjustment to his environment” (Liebert & Spiegler, 1998; p. 5). Again, the suggestion is that personality is the organization within the person of a number of characteristics. The goal of personality type research is to create a typological or, as Schnabel et al. (2002) refer to it, a person-centered approach which does not focus on personality dimensions in isolation, but on the overall structure of personality within the individual.

The most commonly used personality typology at the moment is based on the concepts of ego-control and ego-resiliency in the form of Block and Block’s (1980) three empirically derived personality types. Ego-control is defined as “the threshold or operating characteristics of an individual with regard to the expression or containment” of his/her impulses, feelings, and desires (Block & Block, 1980, p. 43). Ego-resilience refers

to a “dynamic capacity ... to modify his or her modal level of ego-control, in either direction, as a function of the demand characteristics of the environmental context” (Block & Block, 1980, p. 48).

The three personality types developed from the two concepts of ego-control and ego-resilience are Resilients, who are high in both constructs and are described as being generally well adjusted both socially and cognitively, Undercontrollers, who are low on both ego-control and resilience and are characterized by being impulsive and antisocial, and Overcontrollers, who are overly high on ego-control and low on ego-resilience, exhibit internalizing tendencies, such as inhibition or shyness, and are characterized by rigidity and a maladaptive need for control (Asendorpf et al., 2001; Robins et al., 1998). Asendorpf et al. found these three types to be temporally stable after a six month retest.

As stated above, Block and Block (1980) defined their personality types around ego-control and ego-resilience, not according to the Big Five. As such, it has been left to the individual researcher to define them operationally. This has resulted in the three personality types being defined in varying ways, but generally these have been variations on the same theme. As Gramzow, Sedikides, Panter, Sathy, Harris, and Insko (2004) stated, the use of the Big Five scales instead of measures of ego-control and ego-resilience are due to the focus of the research. Rather than focusing on patterns of self-regulatory processes, current typological research has been more focused on the personality types that may underlie the Big Five factors. The convention of labeling types derived from cluster analysis with Block’s types is for the purpose of providing those clusters with meaningful labels and connecting them with theory.

The general consensus for the Resilient type is that it is characterized by a low

Neuroticism score (Costa, Herbst, McCrae, Samuels, & Ozer, 2002). However, a number of researchers have also noted other characteristics of the Resilient type. Asendorpf et al. (2001) included above average scores on Conscientiousness in their version of the type. Boehm, Asendorpf, and Maria's (2002) Resilient type included low scores on Neuroticism and high scores on Conscientiousness, Openness, and Extraversion. Still other researchers characterized the Resilient type as being low on Neuroticism and high on all other factors (Barbaranelli, 2002; Rammstedt, Riemann, Angleitner, Borkenau, 2004; Schnabel et al., 2002). The Resilient type has consistently been the largest of the three types. Often the cluster identified as the Resilient type contained up to twice the number of participants as the other clusters.

Overcontrollers are characterized by above average to high scores in Neuroticism and below average to low scores in Extraversion (Asendorpf et al., 2001; Costa et al., 2002; Schnabel et al., 2002), Openness (Rammstedt et al., 2004), and Agreeableness (Boehm et al., 2002). The cluster representing this type is often the smallest of the three.

Undercontrollers are distinguished by low scores in Conscientiousness (Boehm et al., 2002; Schnabel et al., 2002), low scores in Agreeableness (Asendorpf et al., 2001; Robins et al., 1998), and low scores on Openness (Costa et al., 2002). The cluster described as the Undercontroller type is somewhat larger than the Overcontroller type, but still little more than half the size of the Resilient type. There has been some dispute over whether low Agreeableness is a part of this type. Schnabel et al. state that the low Agreeableness found in some studies is due to the participants being adolescents whose personality is being judged by someone else, whereas in their study, which used adults making self judgments, participants did not rate themselves as disagreeable. Barbaranelli

(2002) also noted unusually high scores in Agreeableness. The argument is countered, however, by Asendorpf et al.'s (2001) study of adults, in which the Undercontrolled type is characterized by low Agreeableness.

De Fruyt et al. (2002) suggested that the current practice of assuming only three prototypes may be less than productive and future research should examine the possibility of additional personality types. In Barbaranelli's (2002) study, there was an example of a fourth personality type, which they labeled "Non-desirable." This type was found instead of the Overcontroller type. The Non-desirable type is marked by high Neuroticism, low Extraversion, and low Openness to Experience. What separates this type from the Overcontroller type is that it also shows low Conscientiousness scores, which Barbaranelli (2002) noted as contrary to the definition of overcontrol found in Asendorpf et al. (2001). Barbaranelli (2002) noted that this type, rather than being an overcontrolling type, is characterized as being generally socially undesirable. In consideration of this issue, supported by the findings of Barbaranelli (2002) and Lorr and Strack (1993), the current study will seek to find additional prototypes. Also, this study will attempt to replicate the Resilient, Undercontroller, and Overcontroller prototypes, along with Barbaranelli's (2002) Non-desirable prototype.

Criticisms of Personality Typing

Costa et al. (2002) listed a number of criticisms of the statistics used in deriving the personality types. First, Costa et al. (2002) noted the intercorrelations between factors in the Big Five factors. Specifically, Digman (1997) found that Agreeableness and Conscientiousness are often negatively correlated with Neuroticism; he also reported that Extraversion and Openness are also positively correlated. McCrae and Costa (1999)

interpreted these two sets of intercorrelations as being the result of negative and positive evaluative biases respectively. Costa et al. (2002) stated that, because of these intercorrelations, orthogonal factor scores should be used in interpretation.

As an example of the potential for statistical artifacts to affect the results of typological research, Costa et al. (2002) created five random variables with intercorrelations similar to those reported in the normative data for the NEO-PI-R and followed the clustering procedures outlined in Asendorpf et al. (2001). After ten samples of 1000 cases each, Costa et al.'s analysis revealed four types. As expected, two types showed similarities to Digman's (1997) two clusters of intercorrelations. Costa et al. also found clusters that were similar to the Resilient (low Neuroticism, high on all other factors), Undercontroller (high Neuroticism, low Agreeableness and Conscientiousness) and Overcontroller (high Neuroticism, low on all other factors) types.

Upon initial inspection, Costa et al.'s (2002) findings suggest that these three types are more statistical artifacts than actual personality types. However, as Costa et al. note, although clusters similar to the actual personality types appeared frequently in their Monte Carlo study, other clusters also appeared just as frequently in their samples of random data but do not appear in real world personality type studies. Additionally, clusters characterized by the exact opposite constellation of scores for each of the four clusters occurred equally frequently in the sample of random variables, but not in real world studies. For example, a cluster characterized by high Neuroticism, low Agreeableness, and low Conscientiousness (the Undercontroller type) was found as often as a cluster characterized by low Neuroticism, high Agreeableness, and high Conscientiousness. Finally, the clusters derived from the random samples are similar, but

not identical to the types found in personality studies. For example, although the clusters labeled Overcontroller and Resilient are exact opposites, past studies did not show this relationship. Also, the cluster labeled Undercontroller was not characterized by high Neuroticism in real world studies. In summary, the factor intercorrelations do not appear to be the sole force behind the results of personality type research.

Costa et al. (2002) also identified another potential statistical confound in the matter of using standardized versus raw scores. Asendorpf et al. (2001) suggested that personality types are more reliably obtained by using raw scores. Costa et al. (2002), however, argued that differences in standard deviations among factors will result in certain factors contributing more to the clustering procedure than others. Milligan and Cooper (1988) also found that, despite the variety of standardization strategies, standardized scores consistently uncovered the underlying cluster structure better than raw scores. In reviewing the literature, it is rare to find any mention of whether raw or standardized scores were used, unless one includes a general statement of using the clustering method described in the Asendorpf et al. (2001) study (which implies the use of raw scores). Often, the type of score is reported as being standardized only if the study includes multiple measures of personality so that they may be directly comparable.

One last methodological issue of concern regarding Block and Block's (1980) three types is how they are operationalized. The problem is that the method typically used in studies has been to run the cluster analysis, find any replicable types, and only then define Block's three personality types *a posteriori*, or after the fact. Rammstedt et al. (2004) provide an example of the lack of operationalized definitions for the three types. Their Undercontroller type is unique in its pattern of scores in that it was characterized by

high scores on Neuroticism and above average scores on both Extraversion and Openness. The Resilient type has been characterized narrowly by a low Neuroticism score only (Costa et al., 2002). It has also been described as having a low Neuroticism scores plus elevated scores on some of the other factors (Asendorpf et al., 2001; Boehm et al., 2002). Still others have defined the Resilient type very broadly as low Neuroticism and elevated scores on all other factors (Barbaranelli, 2002; Schnabel et al., 2002; Rammstedt et al., 2004). These three different Resilient types, though potentially similar in some ways, should not be considered as equivalent. In order for a sound personality typology to be developed, such inexact definitions should be replaced by more precise ones. The current study will address the issues discussed above by standardizing scores prior to performing the cluster analysis and by defining the personality types a priori.

This study has two hypotheses. First, there will be at least three replicable personality clusters. Second, these three clusters will be recognizable as Block's types. After examining the results of previous analyses (Asendorpf et al., 2001; Barbaranelli, 2002; Boehm et al., 2002; Costa et al., 2002; Schnabel et al., 2002), I have attempted to determine what may be the core Big Five characteristics of each type. I defined the characteristics of each type by using the most commonly described features of each type from past studies. For the purposes of this study the Resilient type will be operationalized as low Neuroticism and above average Extraversion, Openness, and Conscientiousness. The Overcontroller type will be operationalized by high Neuroticism and low Extraversion. Finally, the Undercontroller type will be operationalized as low scores in Conscientious and Agreeableness. High and low scores are defined as one standard deviation above or below the mean.

Method

Participants

The participants for this study were 680 university students enrolled in psychology courses at Virginia Commonwealth University. The sample consisted of 497 (73%) females and 183 (27%) males whose ages ranged from 15 to 64 ($M = 22.47$, $SD = 6.32$). More than half of participants identified as Caucasian ($n = 395$, 58%), 27% ($n = 185$) identified as African-American, and 9% ($n = 61$) of participants identified as Asian-American. The final six percent ($n = 39$) identified as either Hispanic, mixed race, or other.

Measures

The NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992) is the short form of the NEO-PI-R (Costa & McCrae, 1992) and was designed to measure an individual's relative standings on the broad domains of the Big Five personality model. Correlations between the factors of the NEO-FFI and the domain scales of the NEO-PI-R range between .88 (Agreeableness) to .94 (Openness). Coefficient alpha reliabilities in the validation sample range from .76 (Openness) to .90 (Neuroticism and Conscientiousness). Coefficient alpha reliabilities in the current sample range from .70 (Extroversion) to .84 (Neuroticism). As the NEO-FFI scales represent subsets of NEO-PI-R domain scales, the NEO-FFI shares some of the validity of the full scales (Costa & McCrae, 1992).

Procedure

Participants completed the NEO-FFI as part of a larger study examining desire for control over healthcare and personality (Auerbach & Pegg, 2002). Survey packets were

distributed through psychology classes. Students participated either to earn either extra credit or required research credit in their class. Participants were instructed to complete the survey packets on their own time and return the packet one week later.

Analysis

The sample was randomly split into two groups. The first group was analyzed using a hierarchical cluster analysis followed by a nonhierarchical cluster analysis. The cluster solution from the first sample was then applied to the second by assigning participants in the second sample to new clusters the cluster centers derived from the first sample, resulting in two sets of cluster memberships for the second sample. Cluster memberships were then compared for agreement. The scores on the NEO-FFI for replicable clusters were examined and classified.

Results

The NEO-FFI factor scores were first transformed into Z scores. The sample was then randomly split into two groups. An average-linkage hierarchical cluster analysis was performed on the first group in order to obtain a profile of the cluster centers. The average linkage method was used because it partitions clusters based on the linkage of all members of the cluster and the squared Euclidian distance between the members, rather than relying on pairs of extreme members, such as with single and complete linkage methods. The average linkage method also avoids the bias found in Ward's method (Hair & Black, 1998). Although Ward's method is generally accepted as the best all-purpose method (Saunders, 1994), it has a tendency towards producing clusters with equal numbers of members. This bias could prove to be a problem as the frequency of members in each of the three personality types found in other studies were frequently unequal.

The analysis was conducted twice, once for a three-cluster solution and a second time for a four-cluster solution. Because hierarchical cluster analyses can lead to misleading results due to undesirable combinations early in the sequence and are susceptible to the effects of outliers (Hair & Black, 1998), the hierarchical cluster analysis was then followed by a non-hierarchical cluster analysis in order to fine tune the results by allowing cluster membership switches throughout the analysis. The non-hierarchical analysis used the cluster centers from the hierarchical analysis as initial seed points (initial estimates of cluster centers). These initial points were then allowed to migrate to more optimal positions as the analysis proceeded.

This two-step procedure combined the benefits of hierarchical methods for

exploratory analysis and the finer analysis capable with nonhierarchical methods (Hair & Black, 1998).

The same procedure (a hierarchical cluster analysis followed by a non-hierarchical analysis using the cluster centers from the hierarchical analysis as initial seed points) was then used on the second group, resulting in a set of cluster centers for each group. These cluster centers were then used to assign each participant to a particular cluster based on their Euclidean distance from the cluster centers.

The participants from the second group were then assigned to new clusters on the basis of their Euclidean distance to the cluster centers from the first group, resulting in two sets of cluster memberships for the second group: the first cluster membership using cluster centers derived from the analysis of Group 1 and the second using cluster centers derived from the analysis of Group 2. These two cluster memberships were then analyzed for agreement using Cohen's coefficient Kappa as a measure of the replicability of the cluster solution. A Kappa of .60 was used as the threshold for acceptable replicability.

The four-cluster solution is not reported because coefficient Kappa could not be computed. In classifying the cases in the second sample using cluster centers from the first sample, no cases were classified in the fourth cluster, resulting in an asymmetric table. In comparing the cluster memberships in the three-cluster solution to the four-cluster solution, members in the third cluster in the three-cluster solution ($n = 83$) were divided between the third ($n = 42$) and fourth ($n = 39$) clusters in the four-cluster solution, explaining why the fourth cluster was empty.

Table 1 shows the final cluster centers from the non-hierarchical analysis for the

three-cluster solution for Group 1. The first cluster is characterized by elevated scores on Neuroticism and Openness and lowered scores on the other factors. This cluster was the smallest of the three clusters ($n = 83$). Cluster 2 is characterized by lowered scores on Neuroticism, and elevated scores on Extraversion, Agreeableness, and Conscientiousness. and was the largest of the clusters ($n = 156$). The final cluster is characterized by lowered levels of Openness and average scores on the other factors. The third cluster contained 103 participants.

Table 1
Final Cluster Centers For Group 1

NEO-FFI Factors	Clusters		
	1	2	3
Neuroticism	.86	-.69	.32
Extraversion	-.64	.68	-.44
Openness	.82	.21	-.88
Agreeableness	-.64	.60	-.29
Conscientiousness	-.93	.58	-.16

Note. Reported are z scores. A threshold of 1 standard deviation was used to define high and low scores. No score met this threshold.

Table 2
Final Cluster Centers For Group 2

NEO-FFI Factors	Clusters		
	1	2	3
Neuroticism	.66	-.57	.21
Extraversion	-.56	.70	-.52
Openness	.89	.22	-.99
Agreeableness	-.27	.55	-.58
Conscientiousness	-.50	.59	-.34

Note. Reported are z scores. A threshold of 1 standard deviation was used to define high and low scores. No score met this threshold.

Table 2 shows the final cluster centers from the non-hierarchical analysis for the three-cluster solution for Group 2. The first cluster is characterized by elevated scores on Neuroticism and Openness and lowered scores on the other factors. This cluster was the smallest of the three ($n = 72$). Cluster 2 is characterized by elevated scores on Extraversion, Agreeableness, and Conscientiousness and lowered scores on Neuroticism. About half of the sample fell into this cluster ($n = 154$). The third cluster is characterized by lowered scores on Extraversion, Agreeableness, and Openness and average scores on Neuroticism and Conscientiousness. The size of this cluster fell between the other two clusters ($n = 116$).

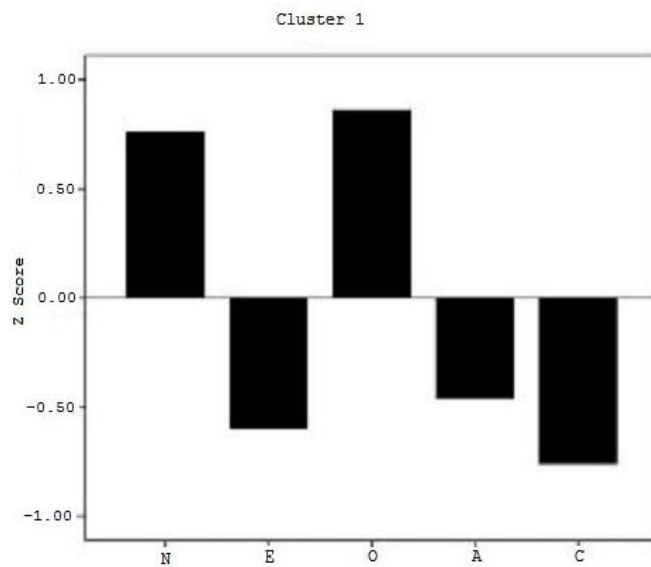
The replication cluster memberships for Group 2 were compared to the original cluster memberships from the Group 2 cluster analysis. The replicability of the three-cluster solution, as indexed by Cohen's Kappa, was .87 ($p < .001$), indicating substantial agreement between the cluster solutions from the two samples. Because of the high agreement between the cluster solutions, they were averaged to obtain an aggregate cluster solution. Table 3 shows the aggregate cluster memberships and Figures 1, 2, and 3 show the pattern of scores for each cluster. Cluster 1 is characterized by high scores on Neuroticism, high scores on Openness, and low scores on the other factors. Cluster 2 is characterized by low scores on Neuroticism and high scores on Extraversion, Agreeableness, and Conscientiousness. The third cluster is characterized by low scores on Extraversion, Openness, and Agreeableness and average scores on Neuroticism and Conscientiousness.

Table 3
Final Cluster Centers For The Aggregate Solution

NEO-FFI Factors	Clusters		
	1	2	3
Neuroticism	.76	-.63	.26
Extraversion	-.60	.69	-.48
Openness	.86	.22	-.94
Agreeableness	-.46	.58	-.44
Conscientiousness	-.76	.58	-.25

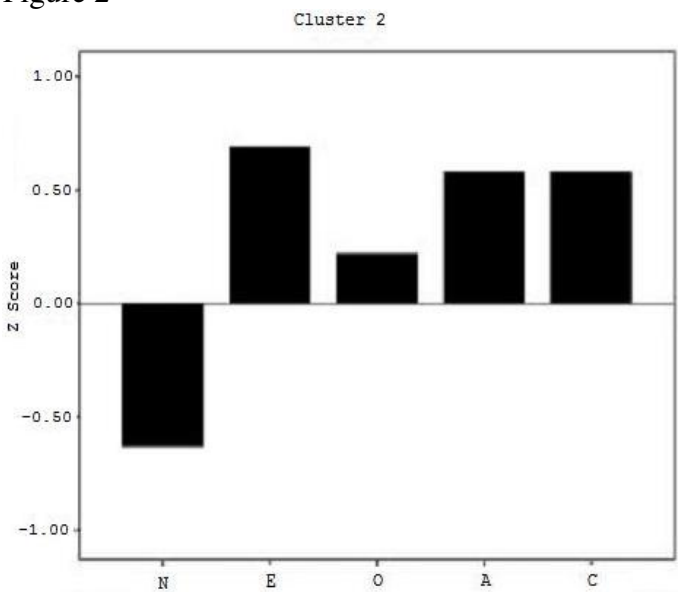
Note. Reported are z scores. A threshold of 1 standard deviation was used to define high and low scores. No score met this threshold.

Figure 1



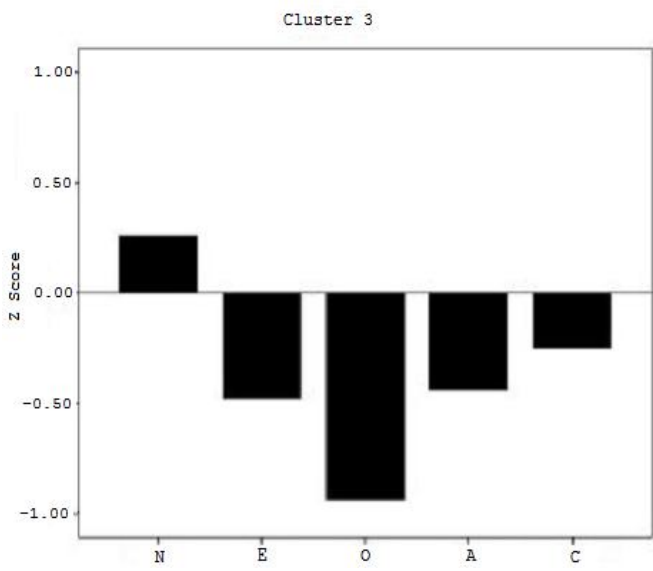
Note. First personality cluster based on the aggregate cluster solution, characterized by its Big Five pattern. N = Neuroticism; E = Extraversion; O = Openness; A = Agreeableness; C = Conscientiousness

Figure 2



Note. Second personality cluster based on the aggregate cluster solution, characterized by its Big Five pattern. N = Neuroticism; E = Extraversion; O = Openness; A = Agreeableness; C = Conscientiousness

Figure 3



Note. Third personality cluster based on the aggregate cluster solution, characterized by its Big Five pattern. N = Neuroticism; E = Extraversion; O = Openness; A = Agreeableness; C = Conscientiousness

Discussion

This study was designed to statistically identify personality types in a sample of NEO-FFI scores. There were two hypotheses. First, there would be three replicable personality types. The second was that those three types would be recognizable as Block's types (Block & Block, 1980). The first hypothesis was supported. There was substantial agreement between the three-cluster solutions for the two samples. The second hypothesis, however, was not supported.

Due to the high level of agreement between the cluster solutions of the two groups, the two solutions were averaged to create an aggregate solution. Individuals with scores similar to those found in the first cluster of the aggregate solution experience negative affects, have irrational or unconventional ideas, are reserved, and are egocentric and disorganized. This cluster could be seen as undercontrolled, but it would be a unique example of the Undercontroller type when compared to what has been found in prior samples due to its elevations on Neuroticism and Openness to Experience. The second cluster can be interpreted as an example of the Resilient type. Individuals in this cluster are emotionally stable, social, good-natured and able to control their impulses. Individuals with similar profiles as Cluster 3 are conventional, conservative, and stubborn. This cluster can be seen as overcontrolled, but it is not the Overcontroller type because it is not characterized by high Neuroticism.

Although the final clusters could be interpreted as examples of Block's three types, factor scores for the cluster centers were not at the hypothesized elevations. The first cluster, although it could be considered undercontrolled, does not match the Undercontroller type found in any previous study. An additional anomaly on this cluster,

as compared to similar types found previously, is that it is the smallest of the clusters; previous Undercontroller clusters were larger compared to the Overcontroller type. Most previous studies (Asendorpf et al., 2001; Barbaranelli, 2002; Boehm et al., 2002; Schnabel et al., 2002) have been with European samples. The difference in cluster size may suggest cultural differences between American and European populations. The second cluster was the closest to the Resilient type found in other studies and was the largest cluster in the sample. However, there were two differences between the hypothesized type and what was found. First, there is an elevation on Agreeableness rather than Openness, and second, none of the elevations met the one standard deviation threshold. The final cluster could be considered a less maladaptive Overcontroller type; compared to the Overcontroller type previously identified, it was missing the high score on Neuroticism.

Limitations

One limitation of the current study is the use of the NEO-FFI rather than the NEO-PI-R as the measure of the Big Five personality dimensions. Although the NEO-FFI is a valid measure of the Big Five, its reliability is necessarily lower than the full length NEO-PI-R due to its reduced length. Coefficient alpha reliabilities, in the normative samples, for the NEO-FFI range from .76 to .90, compared to alphas of .86 to .92 for the NEO-PI-R (Costa & McCrae, 1992). Schnabel et al. (2002) suggest that the lack of replicability across samples in their study, which used the NEO-FFI in some samples and the NEO-PI-R in others, is due to the lack of sensitivity in the NEO-FFI, which has one-quarter of the items of the NEO-PI-R. Each factor score consists of 12 items in the NEO-FFI, whereas the factors in the NEO-PI-R are made up of 48 items. This lack of

sensitivity is more a concern for finding subtypes using cluster analysis than the differences in reliability scores between the two tests.

Though any increase in reliability is likely to be an improvement, a more important reason for using the NEO-PI-R is shown by Schnabel et al. (2002). In examining the facet scores in the NEO-PI-R, Schnabel et al. found that removing the Impulsiveness facet from the Neuroticism scale produced a cleaner separation between the Overcontroller and Undercontroller types. Without the Impulsivity facet, Overcontrollers were more neurotic, and Undercontrollers were less neurotic. This indicates that impulsivity is a useful factor in determining type membership. Conceptually, one would expect that Overcontrollers would be less impulsive and Undercontrollers more so. However, with the Impulsivity facet folded into the Neuroticism factor, the difference between the two types becomes fuzzy at the edges. If the logic of this example is taken further, it is likely that the use of the NEO-PI-R facet scores rather than the factor scores may produce more pronounced differences between types. Similarly, Asendorpf's (2003) difficulties in obtaining personality types that provided greater predictability than the individual domain scores could have been lessened by using the NEO-PI-R facet scores to derive the types. Schnabel et al. use the following example: if one is only given an object's height, length, and number of legs, one would be unable to distinguish between a sheep and a table. Thus the general-purpose dimensions in the Big Five, as measured by the NEO-FFI, may not allow for sufficient precision in personality type research. The use of facet scores, instead of factor scores, might help ameliorate this potential lack of precision and could explain some of the differences between types found in different samples.

Suggestions for further research

The next step, and the subject of another study, would be to obtain measures of external variables along with the personality measure. This would provide evidence that the different uncovered types are sufficiently distinctive from each other in real life, as well as predictive of real life differences between types. As Saunders (1994) noted, cluster analysis is capable of finding clusters where none exist naturally. Thus, an analysis of the differences in scores on external variables is advised to ensure that the clusters that have been found are naturally occurring types and of real world significance. Recent studies of the predictive validity of types compared to personality variables have been less than promising (Asendorpf, 2003; Costa et al., 2002). Even after accounting for a number of methodological issues that placed the typological approach at a disadvantage in the Costa et al. (2002) study, Asendorpf (2003) found types were still less predictive than simply using the Big Five variables. A potential solution to Asendorpf's (2003) problem with predictive validity could be to use the full NEO-PI-R instead of the abbreviated NEO-FFI. The rationale for this is shown, once again, in the study by Schnabel et al. (2002).

Rationally considered, it is difficult to believe that someone could be placed into one of three boxes that provide much in the way of useful information. This issue is beginning to be addressed in the literature with the search for types within the three types. Schnabel et al. (2002) and Boehm et al. (2002), in particular, have reported some subtypes of the three larger types.

Schnabel et al. (2002), after examining of the structure of their three cluster solution against the results of their four cluster solution, suggest that the four cluster

solution is a variant of the three cluster solution with the Overcontroller type containing what the authors called “restricted” and “insecure” subtypes. The restricted subtype was differentiated from the insecure subtype by much lower levels of Openness to Experience and Neuroticism. In a more formal investigation of subtypes, however, a two-subtype solution for the Overcontroller type did not meet the replicability requirements. In searching for subtypes in the other types, higher elevations of Neuroticism and lower levels of Conscientiousness differentiated the “agentic” and “impulsive” subtypes in the Undercontroller type. As with the Overcontroller subtypes, however, the Undercontroller subtypes did not reach replicability requirements. One reason the authors put forward for why the subtypes for the Overcontroller and Undercontroller types failed to be replicated was because of the small sample sizes in each subtype’s cluster. At the subtype level, the subtypes contained only about 95 participants each. In terms of the sample sizes required to perform cluster analysis, it is not too surprising that the researchers were unable to adequately replicate their findings.

The two subtype solution for the Resilient type reached an acceptable level of replicability in Schnabel et al.’s (2002) study; this is likely because the size of the Resilient cluster was roughly twice the size of the other cluster allowing for a sufficiently large sample for the analysis. The authors suggested the names, “well adjusted” and “assertive” to the resilient subtypes. Both subtypes are characterized by low Neuroticism and high Conscientiousness, but the assertive subtype is also characterized by elevations in Extroversion and Openness to Experience. As additional support for using facet scores, the authors, in examining the facet scores for the resilient subtypes, found that the performance on the facet scores did not always mirror performance on the factor scores.

The Impulsivity, Excitement-Seeking, and Deliberation facet scores did not follow the trend of their respective factor scores in the assertive subtype whereas the facet scores in the Agreeableness factor ranged from z scores of -0.44 to 0.44. The facet scores in the well-adjusted subtype were more closely grouped (except for the Tender-Mindedness facet score in the Agreeableness factor, which deviated from the domain score by approximately half a standard deviation).

Conclusion

The final results of this most recent round of typological personality research has yielded mixed results. There is starting to be some consensus among typological researchers that there are three replicable types that vary along the dimensions of ego-control and ego-resilience. The present study was able to replicate the three types. Although the types found in the present study did not meet the operational definitions set in this study, they could be interpreted as being examples of the three types described in the literature. Cattell defined personality as “that which permits prediction of what a person will do in a given situation” (Liebert & Spiegler, 1998; p. 5). Unfortunately, this definition brings to light one of the difficulties in typological research, the inability of personality types to predict behavior better than simply using Big Five dimensions (Asendorpf, 2003; Costa et al., 2002). Unless improvements can be made in derivation (via more accurate tests and better defined types and subtypes) and predictive validity of types, personality typing may once again be relegated to the history section of personality textbooks.

References

- Allport, G. W. (1937). *Personality: A psychological interpretation*. New York: Holt.
- Asendorpf, J. B. (2002). Editorial: The puzzle of personality types. *European Journal of Personality, 16*, 1-5.
- Asendorpf, J. B. (2003). Head-to-head comparison of the predictive validity of personality types and dimensions. *European Journal of Personality, 17*, 327 – 346.
- Asendorpf, J. B., Borkenau, P., Ostendorf, F., & Van Aken, M. (2001). Carving personality description at its joints: Confirmation of three replicable personality prototypes for both children and adults. *European Journal of Personality, 3*, 169–198.
- Auerbach, S., & Pegg, P. (2002). Appraisal of desire for control over healthcare: structure, stability, and relation to health locus of control and to the ‘Big Five’ personality traits. *Journal of Health Psychology, 7*, 393-408.
- Barbaranelli, C. (2002). Evaluating cluster analysis solutions: An application to the Italian NEO Personality Inventory. *European Journal of Personality, 16*, 43-55.
- Becker, P. (1996). Wie big sind die Big Five? [How big is the Big Five?] *Zeitschrift für Differentielle und Diagnostische Psychologie, 17*, 209-221.
- Block, J. (1971). *Lives through time*. Berkeley, CA: Bancroft.
- Block, J. H., & Block, J. (1980). The role of ego-control and ego-resiliency in the organisation of behaviour. In W. A. Collins (Ed.), *Development of cognition, affect, and social relations: Minnesota Symposia on Child Psychology* (Vol. 13, pp. 39-101). Hillsdale, NJ: Erlbaum.

- Boehm, B., Asendorpf, J. B., & Maria, D. A. (2002). Replicable types and subtypes of personality: Spanish NEO-PI samples. *European Journal of Personality, 16*, 25-41.
- Costa, P. T., Herbst, J. H., McCrae, R. R., Samuels, J., & Ozer, D. J. (2002). The replicability and utility of three personality types. *European Journal of Personality, 16*, 73-87.
- Costa, P. T., Jr., & McCrae, R. R. (1992). *Revised NEO Personality Inventory NEO PI-R and NEO Five-Factor Inventory NEO-FFI professional manual*. Odessa, FL: Psychological Assessment Resources.
- De Fruyt, F., Mervielde, I., & Van Leeuwen, K. (2002). The consistency of personality type classification across samples and five-factor measures. *European Journal of Personality, 16*, 57-72.
- De Raad, B. (1996). Five big, Big Five issues: Rationale, content, structure, status, and crosscultural assessment. *European Psychologist, 3*, 113-124.
- Digman, J. M. (1997). Higher-order factors of the Big Five. *Journal of Personality and Social Psychology, 73*, 1246-1256.
- Gramzow, R. H., Sedikides, C., Panter, A. T., Sathy, V., Harris, J., & Insko, C. A. (2004). Patterns of self-regulation and the Big Five. *European Journal of Personality, 18*, 367-385.
- Greene, R. L. (2000). *The MMPI-2: An interpretive manual*. (2nd ed.). Needham Heights, MA: Allyn & Bacon.
- Hair, J. F. Jr., & Black, W. C. (1998). Cluster analysis. In J. R. Hair, R. E. Anderson, R. L. Tatham, & W. C. Black, *Multivariate data analysis* (pp. 469-518). Upper

Saddle River, NJ: Prentice-Hall.

Hirschfield, (1996). *Race in the making: Cognition, culture, and the child's construction of human kinds*. Cambridge, MA: MIT Press.

Liebert, R. M., & Spiegler, L. L. (1998). *Personality: Strategies and issues* (8th ed.). Pacific Grove, CA: Brooks/Cole.

Lorr, M., & Strack, S. (1993). Some NEO-PI five factor personality profiles. *Journal of personality assessment*, 60, 91-99.

McCrae, R. R., & Costa, P. T., Jr. (1999). A five-Factor Theory of personality. In L. A. Pervin, and O. P. John (Eds.), *Handbook of personality: Theory and research* (2nd ed.), (pp. 139-153). New York: Guilford.

McCrae, R. R., & John, O. P. (1992). An introduction to the five-factor model and its applications. *Journal of Personality*, 60, 175-215.

McCrae, R. R., Terracciano, A., Costa, P. T., Jr., & Ozer, D. J. (2006). Response from types to typological thinking: A reply to Asendorpf. *European Journal of Personality*, 20, 49-51.

Milligan, G. W., & Cooper, M. C. (1988). A study of standardization of variables in cluster analysis. *Journal of Classification*, 5, 181-204.

Mischel, W. (1981). *Introduction to personality* (3rd ed.). New York, NY: CBS College Publishing.

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

Rammstedt, B., Riemann, R., Angleitner, A., & Borkenau, P. (2004). Resilients, overcontrollers, and undercontrollers: The replicability of the three personality

prototypes across informants. *European Journal of Personality*, *18*, 1-14.

Robins, R. W., John, O. P., & Caspi, A. (1998). The typological approach to studying personality. In R. B. Cairns, L. R. Bergman, & J. Kagan (Eds.), *Methods and models for studying the individual*. (pp. 135-160). Thousand Oakes, CA: Sage Publications.

Saunders, J. (1994). Cluster analysis. *Journal of Marketing Management*, *10*, 13-28.

Schnabel, K., Asendorpf, J. B., & Ostendorf, F. (2002). Replicable types and subtypes of personality: German NEO-PI-R versus NEO-FFI. *European Journal of Personality*, *16*, 7-24.

Tryon, R. C., & Bailey, D. E. (1970). *Cluster analysis*. New York: McGraw-Hill.