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Personality and Intelligence

An Interactive Qualifying Project
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in partial fulfillment of the requirements for the
Degree of Bachelor of Science

by

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and

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Abstract

This report describes the investigation of the currently open question of whether or not there is a link between a person's MBTI personality preference and their performance on a specialized battery of cognitive ability tests, The Woodcock-Johnson IIIR Tests of Cognitive Abilities. The study focuses on analysis of a sample of 32 people who took both measures this year. Correlational analysis and significance tests were used to test hypotheses about which dimensions of the two measures would be related to one another.

Table of Contents

Introduction

The issue of whether or not there is a relationship between personality and intelligence is a very thought-provoking question. Indeed, it is an open issue in the field of psychology. The goal of this project is to find an empirical answer to this question through the use of two well known psychological instruments.

The notion commonly held by the public is that no link exists between personality and intelligence. Personality is regarded as a bundle of preferences with no pattern superior to another. That is to say, one particular personality type from the sixteen possible Myers-Briggs Type Indicator (MBTI) profiles is no better than any other. This is not true of intelligence, however. A higher intelligence quotient is considered superior, or better than a lower one, indicative of a higher potential for logical processes and mental functions in general. Many different tools exist to identify personality and intelligence. It is the intent of this project to focus on two of them: the MBTI will be used to measure personality, and the Woodcock-Johnson® III Tests of Cognitive Abilities will be used to describe our pattern of cognitive abilities. We intend to compare the results of these measures in the hopes that we will find correlations between some of the four dimensions of personality type and certain broad cognitive abilities.

This is a good project opportunity for several reasons. First, to the best knowledge of the students, faculty, and other professionals involved in this project, no previous formal research with these measures has been conducted or documented. Previous research has been done that links the MBTI to performance on the Scholastic Aptitude Test, as you will see later in the paper. We are in a very good position to do some groundbreaking research in the field of psychology. Also, we will be involving two prominent pieces of technology, the Woodcock-Johnson and the MBTI instruments, both of which intersect society in a big way. Personality and cognitive ability are two of the major aspects of psychology used to distinguish human beings in a society. Finally, we were approached by an educational diagnostician experienced in the use of the Woodcock-Johnson test battery, Jim Creed, who was willing to help us acquire the materials and train us to administer the Woodcock-Johnson if we would assist him in doing research to answer this question.

If personality preference and cognitive ability are related, there is really no telling how big an impact those results would have on psychology. If it is found that personality and multiple intelligences are related, new theorizing will be called for. The MBTI is used to think about learning styles, leadership, job performance, standardized test performance, and relationships.

Many different individuals and organizations have a potential interest in the results of this study. Our advisor, Professor John Wilkes is extremely interested in the study, as he is qualified in the use of the MBTI as a learning styles indicator. WPI administered the MBTI to a large number of its students in order to study differences in learning styles. Hence, WPI may also benefit from any results we uncover that deal with that measure. Jim Creed, an expert in the use of the Woodcock-Johnson, has been fascinated by this question for many years, ever since he became qualified to use the MBTI. He is very eager to see some research on the subject. The Woodcock-Muñoz Foundation and many of Creed's colleagues in the field of educational diagnostics are also very interested in answering this question.

In summary, our group is in a very good position to break new ground in the field of psychology, by correlating two prominent pieces of cognitive measurement technology used in the field of psychology. Since we were approached by a professional in the field to help solve this problem, it is clear that there not only exists an interest in the scientific community to have this problem solved, but we will be given the resources and training necessary to collect data. We feel that this project will serve as good research experience, as well as a compelling investigation into how these tools intersect with society. As we understand it, exploring the society-technology connection is the very essence of an Interactive Qualifying Project.

Background

The Myers-Briggs Type Indicator (MBTI)

At the heart of cognitive psychology is the need to understand how the mind works. The human mind is perhaps the most complex object that can be studied, and naturally, learning more about the way it functions can lead to a better understanding of humans as a species. In recent history, many achievements have been made that allow scientists to more closely study the brain. For example, different scanning methods allow us to study which regions of the brain are most active during certain cognitive tasks. A different kind of tool (in some ways more subtle) is the personality test, specifically the Myers-Briggs Type Indicator (MBTI). Indicators such as this are no less a piece of technology than the most expensive state-of-the-art brain scanning machinery. Both tools yield very concrete, empirical results, and both can be used as measurement and classification instruments in the field of psychology.

The MBTI is different from most personality trait measures in that it does not measure variation along a continuum. Rather, the measure attempts to find the respondent's position on either side of four different factors, arrayed as dichotomies. The assumption is that one of each pair of categories appeals more directly to the respondent. So the measure indicates the respondent's preference between equally viable mental processes and attitudes, whereas other measures identify a scale as a single trait (Myers et al, p. 5). The four dichotomies are as follows[1]:

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[1] The dichotomies and their descriptions are taken from Dr. Gordon D. Lawrence's "Description of the Sixteen Types."

Extraversion—Introversion

Extraverts are categorized by their focus on the outer world, people, and things. They are active, using trial and error with confidence and scanning the environment for stimulation. Introverts, on the other hand, are oriented to the inner world, ideas, and inner impressions. They are reflective, considering deeply before acting, and finding stimulation inwardly.

Sensing Perception—Intuitive Perception

Sensing is best described as perceiving with the five senses, and attending to practical and factual detail. It is attending to the present moment, confining attention to what is said and done, and letting "the eyes tell the mind." Intuition is the opposite, perceiving with memory and associations, seeing patterns and meanings, and projecting possibilities for the future. It is "reading between the lines," looking for the big picture, having hunches, and letting "the mind tell the eyes."

Thinking Judgment—Feeling Judgment

When reasoning with thinking, we use logic, objectivity, and impersonal criteria. We draw cause and effect relationships. We are firm minded and skeptical, prizing logical order. When we reason with feeling, however, we apply personal priorities, weighing human values and motives, our own as well as others. We value warmth in human relationships, prizing empathy, harmony and trust in coming to a decision.

Judgment—Perception

When taking a judging attitude, we use thinking or feeling judgment outwardly, controlling and regulating, wanting closure, even when data are incomplete. When taking a perceiving attitude, however, we use sensing or intuitive perception outwardly, taking in information with open-mindedness, adapting and changing, resisting closure to obtain more data.

It is clear that in each dichotomy, either trait is considered equally valuable—and appropriate, depending on the context. That is, one of them cannot be said to be better than the other. Everyone uses all eight of the methods, but each person has a preferred method from each pair, and uses that one more (Lawrence, p. 1). The MBTI ranks these preferences, and as a result, reports and personality type from one of the 16 possible combinations of preferences. Lawrence stresses that, "A type is not a pigeonhole or stereotype; it is a particular way of that mental energy is organized." (Lawrence, p. 1) The MBTI is a very useful measure because it makes the theories of Carl Jung instantly accessible to the common populace. This is because almost every human experience involves the use of perception and judgment. Furthermore, these experiences happen in action-oriented extraversion or in reflective introversion, so there is a broad range of relevant experience for each person where type differences are immediately apparent (Myers et al, p. 8).

Cattell-Horn-Carroll (CHC) Theory of Cognitive Abilities

The definitive intelligence theory of this decade is the Cattell-Horn-Carroll (CHC) Theory of Cognitive Abilities. This theory is the most empirically validated theoretical structural model of human cognitive abilities, and has evolved from over 100 years of psychometric research. The framework is comprised of 3 strata—general intelligence (stratum III), broad cognitive abilities (stratum II), and narrow cognitive abilities (stratum I). The broad cognitive abilities are Fluid Reasoning (*Gf*), Comprehension-Knowledge (*Gc*), Short-term Memory (*Gsm*), Visual Processing (*Gv*), Auditory Processing (*Ga*), Long-term Retrieval (*Glr*), Processing Speed (*Gs*), Decision/Reaction Time or Speed (*Gt*), Reading and Writing (*Grw*), and Quantitative Knowledge (*Gq*). These broad categories subsume approximately 70 narrow abilities (McGrew, Evans, p. 3).

CHC theory currently consists of nine broad abilities (*Gf, Gc, Gv, Ga, Gsm, Glr, Gs*, *Gq, Grw*) (McGrew, Evans, p. 13). The Woodcock-Johnson battery tests seven of nine, namely *Gf, Gc, Gv, Ga, Gsm, Glr,* and *Gs*. It is very easy to test these seven abilities and obtain empirical results. The theory behind the Woodcock-Johnson measure is that if one can obtain empirical data about the seven broad cognitive abilities, which in CHC Theory are a subset of general intelligence, then reasonable conclusions can be made concerning the cognitive strengths of the subject. The test battery consists of 14 individual tests. Each test measures performance of one of the seven broad cognitive abilities. For example, a particular test may strictly measure performance of visual processing, where another test might measure performance of short-term memory. The 14 tests are scored individually, and the resulting empirical data are used to draw conclusions about the cognitive strengths of the subject. The definitions for these seven broad cognitive factors that follow here are taken verbatim from McGrew and Evans' HCA Project Research Report #2:

Fluid Intelligence/Reasoning (*Gf*): The use of deliberate and controlled mental operations to solve novel "on the spot" problems (i.e., tasks that cannot be performed automatically). Mental operations often include drawing inferences, concept formation, classification, generating and testing hypotheses, identifying relations, comprehending implications, problem solving, extrapolating, and transforming information. Inductive (inference of a generalized conclusion from particular instances) and deductive reasoning (the deriving of a conclusion by reasoning; specifically: inference in which the conclusion about particulars follows necessarily from general or universal premises) are generally considered the hallmark indicators of *Gf*. *Gf* has been linked to *congnitive complexity* which can be defined as a greater use of a wide and diverse array of elementary cognitive process during performance.

Comprehension-Knowledge (*Gc*): "Can be thought of as the intelligence of the culture that is incorporated by individuals through a process of acculturation" (Horn, 1994, p.443). *Gc* is typically described as a person's wealth (breadth and depth) of acquired knowledge of the language, information and concepts of a specific culture, and/or the application of this knowledge. *Gc* is primarily a store of verbal or language-based declarative (knowing "what") and procedural (knowing "how") knowledge acquired through the "investment" of other abilities during formal and informal educational and general life experiences.

Visual-Spatial Abilities (*Gv*): "The ability to generate, retain, retrieve, and transform well-structured visual images" (Lohman, 1994, p.1000). The *Gv* domain represents a collection of different abilities each that emphasize a different process involved in the generation, storage, retrieval and transformation (e.g., mentally reverse or rotate shapes in space) of visual images. *Gv* abilities are measured by tasks (figural or geometric stimuli) that require the perception and transformation of visual shapes, forms, or images and/or tasks that require maintaining spatial orientation with regard to objects that may change or move through space.

Auditory Processing (*Ga*): Abilities that "depend on sound as input and on the functioning of our hearing apparatus" (Stankov, 1994, p.157). A key characteristic of *Ga* abilities is the extent an individual can cognitively "control" (i.e., handle the competition between "signal" and "noise") the perception of auditory information (Gustafsson and Undheim, 1996), The *Ga* domain circumscribes a wide range of abilities involved in discriminating patterns in sounds and musical structure (often under background noise and/or distorting conditions) and the ability to analyze, manipulate, comprehend and synthesize sound elements, groups of sounds, or sound patterns. Although *Ga* abilities play an important role in the development language abilities (*Gc*), *Ga* abilities do not require the comprehension of language (*Gc*).

Short-term Memory (*Gsm*): The ability to apprehend and maintain awareness of elements of information in the immediate situation (events that occurred in the last minute or so). A limited-capacity system that loses information quickly through the decay of memory traces, unless and individual activates other cognitive resources to maintain the information in immediate awareness.

Long-term Storage and Retrieval (*Glr*): The ability to store and consolidate new information in long-term memory and later fluently retrieve the stored information (e.g., concepts, ideas, items, names) through association. Memory consolidation and retrieval can be measured in terms of information stored for minutes, hours, weeks, or longer. Horn (Horn & Masunaga, 2000) differentiates two major types of *Glr*—fluency of retrieval of information over minutes or a few hours (intermediate memeory) and fluency of association in retrieval from storage over days, months or years. Exstrom et al. (1979) distinguished two additional characteristic processes of *Glr*: "(1) reproductive processes, which are concerned with retrieving stored facts, and (2) reconstructive processes, which involve the generation of material based on stored rules" (p.24). *Glr* abilities have been prominent in creativity research where they have been referred to as idea production, ideational fluency, or associative fluency.

Cognitive Processing Speed (*Gs*): The ability to automatically and fluently perform relatively easy or over-learned cognitive tasks, especially when high mental efficiency (i.e., attention and focused concentration) is required. The speed of executing relatively over-learned or automatized elementary cognitive processes.

The Woodcock-Johnson® III Tests of Cognitive Abilities

The Woodcock-Johnson® III cognitive test battery examines the seven CHC factors defined in the previous section. The tests that deal with these factors are tests one through seven of the standard battery, and tests eleven through seventeen of the extended battery. The descriptions of the tests are as follows. Please note that these descriptions are taken from the Woodcock-Johnson® III Tests of Cognitive Abilities Examiner's Manual written by Nancy Mather and Richard W. Woodcock.

Test 1: Verbal Comprehension: This test has four subtests, namely, Picture Vocabulary, Synonyms, Antonyms, and Verbal Analogies. Each tests a different aspect of English language development. Picture Vocabulary measures lexical knowledge. The test requires the person to identify pictures of objects. The beginning items require the subject to point to pictures of common objects. The remaining items require the subject to name pictures orally. The difficulty of test items increases gradually as the selected pictures are not necessarily commonplace, nor do they necessarily represent familiar concepts. Synonyms measures vocabulary knowledge. The test involves the subject hearing a word and providing a synonym. Antonyms measures a counterpart aspect of vocabulary knowledge. In this test, the subject hears a word and then must provide an antonym for that word. Finally, Verbal Analogies is a measure of the subject's ability to reason using lexical knowledge. In this test, the subject listens to three words of an analogy and must then complete the analogy with an appropriate fourth word. Verbal Comprehension has a median reliability of .90 in the age 2 to 19 range, and .95 in the adult range. The test corresponds to the *Gc* factor of CHC theory.

Test 2: Visual-Auditory Learning: This test is a long-term storage and retrieval exercise (*Glr*). The test requires the subject to learn, store, and retrieve a series of visual-auditory associations. On this test of associative and meaningful memory, the subject must learn and recall rebuses (pictographic representations of words). Visual-Auditory Learning has a median reliability of .86 in the age 5 to 19 range and .91 in the adult range.

Test 3: Spatial Relations: This test measures ability in visual-spatial thinking (*Gv*). The task requires the subject to identify the two or three pieces that form a complete target shape. The difficulty of each test item increases gradually as pieces are flipped, rotated, and become more similar in appearance. Spatial Relations has a median reliability of .81 in the age 5 to 19 range and .85 in the adult range.

Test 4: Sound Blending: This is auditory processing (*Ga*) measure. The test measures skill in synthesizing language sounds (phonemes). The subject must listen to a series of syllables or phonemes and then blend the sounds into a complete word. The difficulty of test items increases gradually as words comprising an increasing number of phonemes are spoken to the subject. Sound Blending has a median reliability of .86 in the age 5 to 19 range and .93 in the adult range.

Test 5: Concept Formation: This is a test of fluid reasoning (*Gf*), and is a controlled-learning task. The task involves categorical reasoning based on principles of inductive logic. The test also measures an aspect of executive processing—flexibility in thinking when required to shift mental sets frequently. This test does not include a memory component, which sets it apart from most other concept formation tasks. The subject is presented with a stimulus set from which he or she must derive the rule for each item.

For all but the last few test items the subject is given immediate feedback regarding the correctness of each given answer before the next item is presented. Concept Formation has a median reliability of .94 in the age 5 to 19 range and .96 in the adult range.

Test 6: Visual Matching: This is a test of processing speed (*Gs*). Specifically, the test is a measure of perceptual speed. It measures the speed at which the subject can make visual symbol distinctions. There are two versions of the test. Visual Matching 1 is designed to be administered among preschool children and individuals who have developmental delays or reduced functioning. This version requires the subject to point to the two matching shapes in a row of four to five shapes. There is a two minute time limit and the subject is not required to write. Visual Matching 2 is for individuals above the developmental age of an average 5-year-old. The subject is required to look along a row of six numbers and circle the two numbers that are the same. The test items increase in difficulty, beginning with single-digit numbers and ending with triple-digit numbers. There is a three minute time limit. Visual Matching has a median reliability of .89 in the age 5 to 19 range and .93 in the adult range. Please note that only Visual Matching 2 applied to the subjects in this project, and Visual Matching 1 was not administered at all.

Test 7: Numbers Reversed: This is a test of short-term memory (*Gsm*). It is primarily a measure of short-term memory span, but it can also be used to measure working memory or attentional capacity. In this test, the subject must hold a sequence of numbers in memory while performing a mental operation on it, in this case, reversing the order of the numbers. Numbers Reversed has a median reliability of .86 in the age 5 to 19 range and .90 in the adult range.

Test 11: General Information: This test measures comprehension-knowledge (*Gc*), namely the depth of the subject's general verbal knowledge. General Information has two subtests. In the first subtest, subjects are asked "Where would you find…(an object)?" In the second subtest, subjects are asked "What would you do with…(an object)?" The test progresses in difficulty, beginning with objects that are commonplace and ending with objects that are more unusual. General Information has a median reliability of .88 in the age 5 to 19 range and .94 in the adult range.

Test 12: Retrieval Fluency: This test measures an aspect of long-term retrieval (*Glr*), namely fluency of retrieval from stored knowledge. The subject is asked to name as many examples from a given category as possible in one minute. There are three different categories: things you eat or drink, first names of people, and animals. Retrieval Fluency has a median reliability of .83 in the age 5 to 19 range, and .91 in the adult range.

Test 13: Picture Recognition: This test measures an aspect of visual-spatial thinking (*Gv*), namely, visual memory of objects or pictures. The subject is presented a set of pictures for five seconds, and is asked to identify a subset of those pictures among a field of distracting pictures. Verbal mediation is eliminated as a memory strategy, varieties of the same type of object are used as the stimuli and distraction images. The difficulty of the test increases as the number of stimulus pictures increases. Picture Recognition has a median reliability of .72 in the age 5 to 19 range and .79 in the adult range.

Test 14: Auditory Attention: This test measures an aspect of speech-sound discrimination—the ability to overcome the effects of auditory distortion or masking in understanding oral language. This is one of the narrow cognitive factors of auditory processing (*Ga*) that requires selective attention. The subject must listen to a word while seeing a row of four pictures, and must point to the correct picture for that word. The difficulty increases as some background noise increases in intensity. Auditory Attention has a median reliability of .87 in the age 5 to 19 range, and .89 in the adult range.

Test 15: Analysis-Synthesis: This is a test of fluid reasoning (*Gf*), namely, general deductive reasoning, a thinking ability. It is a controlled-learning task in which the subject is given instructions on how to perform an increasingly complex procedure. In all but the last few test items, the subject is given immediate corrective feedback for each response before the next item is presented. The test actually involves learning a miniature system of mathematics, although this information is not told to the subject. The test also contains some of the features involved in using symbolic formulations in other fields, like logic and chemistry. Analysis-Synthesis has a median reliability of .89 in the age 5 to 19 range and .94 in the adult range.

Test 16: Decision Speed: This measures an aspect of processing speed (*Gs*), namely, the ability to make correct conceptual decisions quickly. The subject is shown rows of pictures. For each row he or she must locate as quickly as possible the two pictures that are most similar conceptually. There is a three minute time limit. Decision speed has a median reliability of .87 in the age 5 to 19 range and .90 in the adult range.

Test 17: Memory for Words: This test measures short term memory span (*Gsm*). The subject is asked to repeat lists of unrelated words in the order they are given. As the test progresses, the number of words in each list increases. Memory for Words has a median reliability of .78 in the age 5 to 19 range and .85 in the adult range.

As described above, each of the fourteen tests from the Woodcock-Johnson® III Tests of Cognitive Abilities that were administered as part of this study corresponds to one of the seven previously defined CHC factors. Each factor also has exactly two tests that measure cognitive performance of a subject therein. Given that none of the tests administered has a median reliability below .72, it is reasonably safe to assume that once all tests are administered to a particular subject, researchers will have a good measure of the cognitive performance of the subject in the *Gc*, *Glr*, *Gv*, *Ga*, *Gf*, *Gs*, and *Gsm* factors of CHC theory.

Hypotheses

We will consider each of the fourteen tests described above independently. Thus, we have fourteen different hypotheses. For each test, we have predicted which MBTI preferences will correlate highly with performance in that test. In formulating each hypothesis, CHC Theory, MBTI Theory, and results from past research were all taken into account. Our hypotheses can be seen at a glance using the matrix below, where are darkened square indicates an MBTI preference that will correlate with performance in the corresponding test. For example, for Verbal Comprehension, the I and N squares are darkened. This means we predict that given a subject's I and N scores from the MBTI, one can predict with a relatively high correlation (better than random chance) that subject's performance on the verbal comprehension test. An explanation of each hypothesis follows.

	MBTI Types							
Woodcock-Johnson Tests	E	I	S	N	T	F	J	P
Verbal Comprehension		■		■				
Visual-Auditory Learning		■		■				■
Spatial Relations			■					■
Sound Blending	■		■				■	
Concept Formation				■	■		■	
Visual Matching	■		■				■	
Numbers Reversed		■		■			■	
General Information				■	■			■
Retrieval Fluency		■	■					
Picture Recognition			■					■
Auditory Attention	■		■					■
Analysis-Synthesis		■		■	■		■	
Decision Speed				■			■	
Memory for Words			■					■

Hypotheses Matrix—taken from a private communication with Mary Brock

1. **Verbal Comprehension:** We predict that Introverts (I) and Intuitives (N) will have an advantage at this test. Previous research has shown that Intuitives score consistently better than Sensors (S) on the verbal portion of the SAT, and we believe that this test is very similar. Introverts are very oriented to the inner world, and prefer to turn words into symbols as a way of internalizing them. This

behavior may help them to better remember the words. Intuitives are comfortable with forming associations and using connective logic, and we predict this will help them since Verbal Comprehension requires knowledge of specific vocabulary and verbal analogies. So the stronger a person's I or N dimension is, the better that person will perform on this test.

2. **Visual-Auditory Learning:** Introversion (I), Intuition (N), and Perception (P) will lend an advantage in this test. Introverts should be more comfortable with the symbol-to-word translation that this test requires, and should have no trouble maintaining a large pool of symbols and their word equivalents. Intuitives should find that it is easy to use logic in order to deduce the word from the symbol. In many cases the symbol resembles the word it means, although sometimes the resemblance is quite abstract. We also predict that Perception will provide an advantage because it uses Sensing and Intuition outwardly, therefore, enhancing the Intuition of a subject.
3. **Spatial Relations:** Sensing (S) and Perception (P) will provide the subject with an advantage on this primarily visual test. Because success in this test depends largely on one's ability to see the small details of how the individual pieces fit together, Sensors should show better performance. Again, since a major quality of Perception is using Sensing and Intuition outwardly, we believe that Perception will enhance Sensing for even greater performance.
4. **Sound Blending:** Sensing (S) should definitely provide an advantage on this task, which requires blending individual phonemes into a complete word. This is a strictly perceptual task, requiring minimal low-level processing of mainly

sensory input. Thus we predict that strong Sensors will do well on this test. Now, there are certain other facets of personality that cannot be ignored. Judging (J) lends a need for closure, even when the data are incomplete. Perhaps if a Judging subject misses one or two phonemes, he or she will think carefully about the phonemes that can be remembered, and possibly be able to interpolate the correct word from the incomplete data. A Perceiving subject, on the other hand, might simply make a blind guess at the word if he or she fails to remember some of the phonemes. Also, Extraverts (E) might have a slight advantage on this test, because they are more oriented toward the outer world, and generally have an easy time scanning the surrounding environment for stimulation.

5. **Concept Formation:** Thinking (T) will have a definite advantage in this test. Determining the rule for a certain puzzle requires the use of logic, and Thinkers are very comfortable with this. Intuitives (N) should also be fairly comfortable with this task, as they are comfortable picking out patterns and meanings. Judging (J) lends assistance in this test, as it involves using Thinking and Feeling outwardly, and it also involves organizing information. This is very useful during Concept Formation because the task requires that you deduce one or more facts about the puzzle before using logic to connect those facts and arrive at a final answer.

6. **Visual Matching:** The main advantage on this task will come from Sensing (S). Visual Matching is another cognitive test that is strictly perceptual. The task involves looking along a row of numbers and circling the two that are identical. This is simply a visual test, and little or no low level thinking or processing is

required. Therefore we believe Sensors will excel at this task. Extraverts (E), again, may have a slight advantage due to their comfort with taking in outside information. Furthermore, Judging (J) subjects may have a slight advantage due to their goal-oriented nature. That is, they may perform the task quicker, resulting in a higher score, provided the added speed doesn't jeopardize their accuracy. It is important to note that we expect the advantages due to Extraversion and Judgment to be slight compared to the advantage due to Sensing.

7. **Numbers Reversed:** Introverts (I) and Intuitives (N) should be able to easily "see" patterns in the numbers. This should make it easier to perform the processing on them (reversing the sequence, in this case). Judging (J) may also help this ability, due to its knack for organizing. It is important to note that there were dissenting opinions in discussing this hypothesis. Some group members believed that Sensors would be more comfortable using their visual-spatial sketchpad and phonological loop (two brain functions for holding sensory data in working memory) for this task. It was thought that this strength would override the strength granted by the mnemonic strategies that I's, N's, and J's would develop. In the end, it was decided that Intuition would have the edge in this test, as their mnemonic strategies would enhance the use of their phonological loop and visual-spatial sketchpad to give them an easier time with this task.

8. **General Information:** Intuitives (N) will have an easier time remembering what certain objects are due to the associations they have formed with them. Thinkers (T) may think logically about the nature of a particular object and therefore will answer more mindfully. Finally, Perception (P) may grant an advantage by

enhancing the Thinking trait. Also, those with Perception may be more familiar with the more obscure test items, as they are naturally curious and enjoy collecting data.

9. **Retrieval Fluency:** Sensors (S) will have an advantage because they will more easily be able to think of details for this test. For example an Intuitive might give broad answers such as "turkey…juice…sandwiches…" for the food and drink section of Retrieval Fluency. A Sensor may be more familiar with details, and may thus have access to more answers, such as "honey smoked turkey…roasted turkey…apple juice…grape juice…BLT…ham sandwich…". In other words, a Sensor may be more averse to naming broad categories as opposed to specific items within those categories, and would therefore have an easier time thinking of more items with which to respond. Introverts (I) should also have an advantage here. Because they prefer to represent their world internally, it should be very easy for them to imagine themselves walking down the aisles of a grocery store in order to come up with examples to name for the food and drink category. A similar strategy can be employed for the other categories. For instance, a zoo could be used for the animals category, and an old high school classroom can be used for the first names category. Certain members of the group felt that Extraverts would have the advantage here, because their outgoing nature would allow them to have amassed a larger database of names, items, and animals. It was eventually decided, however, that Introverts would have an easier time accessing their internal database of objects and would therefore excel at this task.

10. **Picture Recognition:** This test is another strictly perceptual test. Since each group of pictures contains items from the same category, Sensors (S) should have an advantage in this task, as they will be able to easily identify the details that set each picture apart from the others. In addition, Sensors should be more comfortable with their visual-spatial sketchpad, and should therefore be able to easily hold visual data in their short term memory. Perception (P) will also provide an edge, as it will enhance the Sensing ability and provide skills that are also helpful to taking in and holding visual data.
11. **Auditory Attention:** Sensors (S) have the advantage again in this mainly perceptual test. We predict that Sensors will be more easily able to distinguish the subtle differences between the spoken word and the growing background noise. Extraverts (E) may have a slight advantage due to the fact that they should be more confident with acting on their hunches and they should excel at processing external information.
12. **Analysis-Synthesis:** Thinking (T) and Judging (J) will provide a large advantage in this task, as Analysis-Synthesis is a highly logic based test. Thinking and Judging abilities will allow the subject to comfortably use logic to figure out the correct color combination for each puzzle. T's and J's should also be able to plan faster methods of obtaining the correct answer (although time is not really a factor in this test, beyond the fact that each puzzle has a one minute limit). Intuitives (N) should also have an edge, as they should be able to easily see logic patterns. Introverts (I) might have a slight advantage in that they may be able to internalize the color addition process and better understand the logic.

13. **Decision Speed:** Intuitives (N) will have an advantage in this test because they will be able to pick the two objects that are related quickly. Sensors, on the other hand, may get hung up on the details of each picture. Judging (J) will also prove useful, as it will help with deducing the logical relationship. Furthermore, Judging types are more goal-oriented and will be very intent on finishing this timed test, causing them to push ahead where Perceiving types may linger.
14. **Memory for Words:** Sensing (S) and Perceiving (P) types will excel at this test because of their ability to take in and hold information without processing. This test simply involves repeating random words in order, so Sensing will provide the largest edge. Perceiving will enhance this edge, and Introversion will also provide a slight advantage.

Methodology

Our methodology had to be changed substantially from the original project proposal. For reference, the original proposal is attached in its entirety as an appendix. The first task that needed to be accomplished was to secure funds from the Worcester Polytechnic Institute. This goal was the impetus for the original project proposal. The purpose of these funds was to act as a spillover account in case additional supplies were needed during the course of the study. The amount of money WPI typically grants to an Interactive Qualifying Project is not enough to purchase a Woodcock-Johnson cognitive battery. In order to secure the test batteries, the same proposal was sent to the Woodcock-Muñoz Foundation. The Foundation awarded our project group an in kind materials grant of five full Woodcock-Johnson batteries, worth nearly $6,000. These test kits will remain in the custody of John Wilkes and/or Jim Creed for use with further research regarding the cognitive battery.

Now that the necessary materials had been acquired, all project members had to be trained in the proper use of the Woodcock-Johnson cognitive battery. The battery generally requires a level of education further than that provided by a college bachelor's degree. That is, most of the people trained to administer the tests do so at the master's level or above. Furthermore, actually interpreting the results of the test is generally reserved for those who have earned their doctoral degree in psychology. We were very fortunate to have Jim Creed as a consultant on this project. Jim is an educational diagnostician who has many years of experience with the Woodcock-Johnson, and is certified to train others in its administration. It took most of A Term 2004 to prepare the proposals and secure the materials. This already put us behind schedule. The original project proposal called for the data collection phase to take place during B term 2004. We were not, however, in any place to perform data collection, as we had not even yet learned how to properly administer the test battery.

Given the stringent standards by which the test battery must be administered in order for the results to be considered scientifically valid, and our relative inexperience in doing so, the grant from the Woodcock-Muñoz Foundation was an extraordinary show of faith on their part. As part of the agreement, however, the foundation required that Creed sign an affidavit assuring that we were in fact completely competent to act as administrators of the test. Since Creed's good standing with the board of directors at the Woodcock-Muñoz Foundation was on the line, he decided that the training itself must occupy an entire term before he would feel confident enough to allow us to collect data.

The training, which occupied the entirety of B term 2004, was extraordinarily rigorous, compared to Jim Creed's normal practices. Our project group met with him twice weekly. Each meeting session lasted three to four hours. During the sessions, Creed went over in detail the general practice of administering each of the fourteen tests, as well as the finer points of administration. Numerous practice administrations of each test were done. The practice administrations were conducted in the following way. One group member, the examinee, sat in the chair. The examinee's job, having learned the rules of each test beforehand, was to "test" the examiner by responding to the test items in ways that would force him or her to practice the fine points of administering each test. For example, this may include answering in a manner that would require an additional query by the examiner. A second group member, the examiner, administered each test as taught by Creed. Yet another group member, the observer, sat alongside the examiner and monitored the proctoring of each test. The observer's job was to ensure that the examiner adhered to the administration guidelines for each test, and give corrective feedback when he or she failed to do so. Creed would also be overseeing this three-person unit to ensure that everyone was doing their respective jobs properly. At the end of seven weeks, a brief oral exam, including questions and practice administrations of certain tests, was administered.

As a result of this prolonged training, Creed felt that all group members were indeed competent to begin collecting data. More than that, he was very pleased at the outcome of the training. His usual circumstances involve training large rooms of people in the use of the battery, and he does not often get to oversee and test each of them personally. Since the training took place over seven weeks as opposed to a weekend seminar, and considerable one-on-one time was spent with Creed, he was very confident that we had attained a unique level of comfort with the battery. Unfortunately, since the training *was* so long, data collection did not begin until C term 2005, putting the project far behind schedule.

We initially planned to collect data only from Worcester Polytechnic Institute students. WPI keeps a large database of student MBTI results for research of this kind. It was assumed that given the MBTI results, we would only have to collect Woodcock-Johnson cognitive data for each subject. Thus, only students from WPI who had taken the MBTI were going to be considered for the study. Finding willing subjects, however, was very difficult. The Woodcock-Johnson is a two-hour time commitment at the very least, and few were willing to take the test. The criteria for eligibility were therefore broadened so that one need not attend WPI. It was also no longer necessary that a potential subject have previous MBTI results on file. The MBTI is a simple measure to take, requiring only about twenty minutes of time and no special proctoring, unlike the Woodcock-Johnson. For this reason, we felt that it would not be difficult to give the MBTI to those who needed it. The new selection criteria helped increase the number of respondents for the study, but we still failed to reach our goal of sixty cases. Instead only forty were acquired. This leads us to believe that our findings, although perhaps *suggestive*, will not be *definitive*. This project has nonetheless paved the way for further research along this line at WPI by securing the materials, starting an initial dataset, and performing the initial research and theorizing. Any subsequent project work will progress more smoothly due to this contribution. Data collection concluded at the end of C term 2005.

Analysis

After the data was collected we had a total count of 32 cases. We had administered 39 WJ test but only 32 MBTI's so we were not able to use all of the cases tested for analysis. The analysis was done using the statistical software SPSS 12. The first step was to look at large spearman correlation matricies that correlated all 4 continuous MBTI dimensions with the 17 WJ test dimensions against each other. This showed us a total pattern of correlations both for items where we had hypothesized a relationship and many others where we had not. There were also correlations between several WJ test scores and them other WJ test scores, but they did not figure in the theory for this study.

Correlations

			WJ3	WJ5	WJ6	WJ 12A	WJ 12B	WJ 12C	WJ13	WJ 15
Spearman's rho	E-I	Correlation Coefficient				0.363		0.364	0.453	0.332
		Sig. (2-tailed)				**0.045		**0.044	**0.010	*0.068
	T-F	Correlation Coefficient	0.327							
		Sig. (2-tailed)	*0.073							
	S-N	Correlation Coefficient		0.551	0.382		(.318)			
		Sig. (2-tailed)		**0.001	**0.034		*0.081			
	J-P	Correlation Coefficient						(.349)		
		Sig. (2-tailed)						*0.055		

* Correlation is significant at the 0.10 level (2-tailed).
** Correlation is significant at the 0.05 level (2-tailed).
Correlation Matrix only displays significant findings. Complete matrix is in Appendix A

The matrices were very clear as far as whether or not there was a linear relationship, but did very little to explain other possible patterns and trends in the data. Another problem with the matrices is that the MBTI is different from most personality trait measures in that it does not measure variation along a continuum. Rather, the measure attempts to find the respondent's position on either side of four different factors, arrayed as dichotomies. The assumption is that one of each pair of categories appeals more directly to the respondent. So the measure indicates the respondent's preference between equally viable mental processes and attitudes, whereas other measures identify a scale as a single trait (Myers et al, p. 5). In an effort to better understand the data we broke the WJ scores into a trichotomy to aid us in looking for visual patterns not picked up by the statistics. The WJ scores were split into a low, medium, and a high group and then were tested against either trichotomized MBTI scores (in which an indeterminate middle zone where one was not clearly E or I, S or N was noted), or a combination of 2 dichotomized MBTI dimensions was used. Significance tests and correlations were calculated for these 3 by 3 or 4 by 3 tables. . We used percentages of scores in each group rather than means. It would have been easier to compare means of the WJ scores but we opted against such an approach due to the lack of visual clarity. For example, in the WJ5 test the means of the high, medium and low group were 38, 38, and 35 respectively. Visually this would not seem like a correlation but statistically there was a significant difference and a strong correlation value. Using the trichotomy we did lose some sensitivity on numerical power by classifying continuous data but we were more capable of seeing patterns. The trichotomy allowed us to better interpret the data because we became more immersed in the data, which made it a better way to use a limited body of data to test our hypotheses.

	Low % of Trichotomized WJ1			
	1A	1B*	1C	1D
ES	42.9	71.4	57.1	57.1
IS	37.5	50	62.5	62.5
IN	55.6	44.4	33.3	66.7
EN	42.9	14.3	57.1	28.6

*Significant at 0.005 level

In WJ1 we had predicted an I-N advantage (Quinn, ET all, 2005). We cross-tabulated the EI-SN scores against the trichotomized WJ1 scores. In test 1B we had 43% of EN's in the high group, 25% of IS's in the high group, 14% of ES's in the high group and only 11% of IN's in the high group. Viewing the results in this way clearly shows our hypothesis was wrong and that was confirmed by the significance test. So we are unable to report a significant correlation for test 1A, though the differences were suggestive, on the high end.

EI and SN cross * Trichotomized 1B Crosstabulation

			Trichotomized 1B			Total
			Low	Medium	High	
EI and SN cross	ES	Count	5	2	0	7
		% within EI and SN cross	71.4%	28.6%	.0%	100.0%
		Residual	1.8	-1.2	-.7	
	IS	Count	4	4	0	8
		% within EI and SN cross	50.0%	50.0%	.0%	100.0%
		Residual	.4	.4	-.8	
	IN	Count	4	4	1	9
		% within EI and SN cross	44.4%	44.4%	11.1%	100.0%
		Residual	-.1	-.1	.1	
	EN	Count	1	4	2	7
		% within EI and SN cross	14.3%	57.1%	28.6%	100.0%
		Residual	-2.2	.8	1.3	
Total		Count	14	14	3	31
		% within EI and SN cross	45.2%	45.2%	9.7%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.565	.174	2.805	.005
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

When we examined the results of test 1B there was clearly a strong group and a weak group. The EN's again were the strong group and the ES's were the weak group. The EN's had 29% in the high with only 14% in the low and the ES had none in the high and 71% in the low. The significance test also confirms there is significant EI-SN relation ship but not the one predicted.

Test 1C did not produce a correlation strong enough to be considered significant. It is good to note, however, that the IN group did have 67% in the medium and high groups. The EN's and ES's, the next closest groups, each had 43% in the medium and high groups.

Test 1D did not produce a strong EI-SN correlation but the EN group undoubtedly outperformed the other groups which is clearly shown by the trichotomized data. We had hypothesized an IN advantage but the results suggest there may be an EN advantage because the EN's were the high performance group in 3 out of the 4 sub-tests of WJ1..

In WJ2 we had predicted an INP advantage (Quinn, et all, 2005). When we tested for an EI-SN relationship we did not find a correlation, and looking at the trichotomized data there was no clear strong group. When we tested for an SN-JP relationship we did not get a significant difference between the groups and no group could clearly be described as stronger than the rest.

In WJ3 we had predicted an SP advantage (Quinn, et all, 2005). For this test we crosstabulated SN-JP scores against the Trichotomized WJ3 Scores. The result of the crosstabulation was inconclusive. The data did not seem to have any noticeable visual patterns and the groups seem to perform at rather similar levels.

Crosstab

			trichotomized wj4			Total
			Low	Medium	High	
4 types theoretical for EJ advantage	IP	Count	4	1	3	8
		% within 4 types theoretical for EJ advantage	50.0%	12.5%	37.5%	100.0%
		Residual	.1	-1.3	1.2	
	IJ	Count	5	3	1	9
		% within 4 types theoretical for EJ advantage	55.6%	33.3%	11.1%	100.0%
		Residual	.6	.4	-1.0	
	EP	Count	5	4	1	10
		% within 4 types theoretical for EJ advantage	50.0%	40.0%	10.0%	100.0%
		Residual	.2	1.1	-1.3	
	EJ	Count	1	1	2	4
		% within 4 types theoretical for EJ advantage	25.0%	25.0%	50.0%	100.0%
		Residual	-.9	-.2	1.1	
Total		Count	15	9	7	31
		% within 4 types theoretical for EJ advantage	48.4%	29.0%	22.6%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.093	.256	.361	.718
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

In WJ4 we had predicted an ESJ advantage (Quinn, et all, 2005). For this test we crosstabulated the EI-JP scores against the trichotomized WJ4 scores. The results were not significantly different enough for a correlation but the EJ's had 50% in the high group which out performed all others. The EJ's also had a total of 75% in the medium and high Groups which clearly outperformed the others. The data seems to agree with the hypothesis but due to the lack of significance the hypothesis is rejected.

4 types in theoretical order * Trichotomized WJ5 Crosstabulation

			Trichotomized WJ5			Total
			30-35	36-38	39-40	
4 types in theoretical order	ST	Count	9	3	3	15
		% within 4 types in theoretical order	60.0%	20.0%	20.0%	100.0%
		Residual	3.7	-1.4	-2.3	
	NF	Count	1	3	3	7
		% within 4 types in theoretical order	14.3%	42.9%	42.9%	100.0%
		Residual	-1.5	1.0	.5	
	NT	Count	1	3	5	9
		% within 4 types in theoretical order	11.1%	33.3%	55.6%	100.0%
		Residual	-2.2	.4	1.8	
Total		Count	11	9	11	31
		% within 4 types in theoretical order	35.5%	29.0%	35.5%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.587	.178	2.923	.003
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

In WJ5 we had predicted an NT advantage (Quinn, et all, 2005). We crosstabulated the SN-TF scores against the trichotomized WJ5 scores. We found that the NT's had outperformed the other groups just as predicted. The NT's had 56% in the high group while the next highest group, the NF's, had 43%. This finding was also confirmed by the significance test and correlation coefficient. The hypothesis had been successfully predicted.

4 types in empir. order * Trichotomized WJ5 Crosstabulation

			Trichotomized WJ5			Total
			30-35	36-38	39-40	
4 types in empir. order	IS	Count	6	1	1	8
		% within 4 types in empir. order	75.0%	12.5%	12.5%	100.0%
	ES	Count	3	2	2	7
		% within 4 types in empir. order	42.9%	28.6%	28.6%	100.0%
	EN	Count	2	3	2	7
		% within 4 types in empir. order	28.6%	42.9%	28.6%	100.0%
	IN	Count	0	3	6	9
		% within 4 types in empir. order	.0%	33.3%	66.7%	100.0%
Total		Count	11	9	11	31
		% within 4 types in empir. order	35.5%	29.0%	35.5%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.656	.142	4.166	.000
	Spearman Correlation	.564	.132	3.679	.001(c)
Interval by Interval	Pearson's R	.561	.130	3.653	.001(c)
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.
c Based on normal approximation.

While analyzing the data, we also stumbled upon another correlation. We tested WJ5 for an EI-SN relationship and found the IN's to outperform the other groups. This is an unpredicted relationship that was confirmed using the significance test.

Crosstab

			trichotomized wj6			Total
			Low	Medium	High	
4 types in empir. order	IS	Count	4	4	0	8
		% within 4 types in empir. order	50.0%	50.0%	.0%	100.0%
		Residual	.6	1.4	-2.1	
	ES	Count	4	2	1	7
		% within 4 types in empir. order	57.1%	28.6%	14.3%	100.0%
		Residual	1.1	-.3	-.8	
	EN	Count	3	2	2	7
		% within 4 types in empir. order	42.9%	28.6%	28.6%	100.0%
		Residual	.1	-.3	.2	
	IN	Count	2	2	5	9
		% within 4 types in empir. order	22.2%	22.2%	55.6%	100.0%
		Residual	-1.8	-.9	2.7	
Total		Count	13	10	8	31
		% within 4 types in empir. order	41.9%	32.3%	25.8%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.451	.175	2.417	.016
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

In WJ6 we had predicted an ES advantage (Quinn, et all, 2005). To test the hypothesis we crosstabulated EI-SN against the trichotomized WJ6 scores. We analyzed the results and found that the IN's performed significantly better on this test than the other 3 groups. This was another unpredicted relationship that is clearly shown by the data and confirmed by the significance test.

Crosstab

			trichotomized wj7			
			Low	Medium	High	Total
SN/JP reordered	SJ	Count	5	3	0	8
		% within SN/JP reordered	62.5%	37.5%	.0%	100.0%
		Residual	1.4	.2	-1.5	
	SP	Count	3	3	1	7
		% within SN/JP reordered	42.9%	42.9%	14.3%	100.0%
		Residual	-.2	.5	-.4	
	NP	Count	5	3	3	11
		% within SN/JP reordered	45.5%	27.3%	27.3%	100.0%
		Residual	.0	-.9	.9	
	NJ	Count	1	2	2	5
		% within SN/JP reordered	20.0%	40.0%	40.0%	100.0%
		Residual	-1.3	.2	1.0	
Total		Count	14	11	6	31
		% within SN/JP reordered	45.2%	35.5%	19.4%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.401	.186	2.014	.044
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

In WJ7 we had predicted an NJ advantage (Quinn, et all, 2005). We tested the hypothesis by crosstabulating SN-JP scores against the trichotomized WJ7 scores. Just as we predicted the NJ's had outperformed the other groups in both the high and low categories. The linear relationships can visually be seen and are confirmed by the significant test.

HIgh % of Trichotomized WJ11		
	11A	11B
SP	0	0
SJ	37.5	0
NP	36.4	27.3
NJ	20	0

Crosstab

			trichotomized 11A			Total
			Low	Medium	High	
4 types empirical order	NP	Count	3	4	4	11
		% within 4 types emperical order	27.3%	36.4%	36.4%	100.0%
		Residual	-2.3	1.2	1.2	
	SJ	Count	2	3	3	8
		% within 4 types emperical order	25.0%	37.5%	37.5%	100.0%
		Residual	-1.9	.9	.9	
	NJ	Count	4	0	1	5
		% within 4 types emperical order	80.0%	.0%	20.0%	100.0%
		Residual	1.6	-1.3	-.3	
	SP	Count	6	1	0	7
		% within 4 types emperical order	85.7%	14.3%	.0%	100.0%
		Residual	2.6	-.8	-1.8	
Total		Count	15	8	8	31
		% within 4 types emperical order	48.4%	25.8%	25.8%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	-.562	.165	-3.150	.002
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

In WJ11 we had predicted an NP advantage (Quinn, et all, 2005). We crosstabulated SN-JP scores against the trichotomized WJ11A scores and found that the SJ's were the strongest group. The significance test confirms that there is a linear relationship, but the data can be misleading. The NP group which we predicted to outperform the SJ group had numbers very similar to the SJ group. The NJ and the SP groups also scored at very similar levels on this test.

Crosstab

			trichotomized 11B			Total
			Low	Medium	High	
4 types theoretical for NJ advantage	SP	Count	6	1	0	7
		% within 4 types theoretical for NJ advantage	85.7%	14.3%	.0%	100.0%
		Residual	3.3	-2.6	-.7	
	SJ	Count	1	7	0	8
		% within 4 types theoretical for NJ advantage	12.5%	87.5%	.0%	100.0%
		Residual	-2.1	2.9	-.8	
	NP	Count	3	5	3	11
		% within 4 types theoretical for NJ advantage	27.3%	45.5%	27.3%	100.0%
		Residual	-1.3	-.7	1.9	
	NJ	Count	2	3	0	5
		% within 4 types theoretical for NJ advantage	40.0%	60.0%	.0%	100.0%
		Residual	.1	.4	-.5	
Total		Count	12	16	3	31
		% within 4 types theoretical for NJ advantage	38.7%	51.6%	9.7%	100.0%

Symmetric Measures

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.394	.210	1.767	.077
N of Valid Cases		31			

For WJ11B there was a linear correlation. We had predicted NP's to perform better than the other groups and the data indicates that the NP's did indeed outperform the rest. The NP's were the only group to score in the High category. What is interesting to note however, is that the SJ group again performed quite well with only 12% of their scores in the low group. The data is hard to read as an NP advantage when the cognitive opposite SJ group performs almost as well. There is a theoretical problem, even though it is clear that some MBTI types are dealing with these tasks better than others.

Crosstab

			trichotomized 12b			Total
			Low	Medium	High	
4 types in empir. order	IS	Count	2	1	5	8
		% within 4 types in empir. order	25.0%	12.5%	62.5%	100.0%
		Residual	-.8	-1.6	2.4	
	ES	Count	1	4	2	7
		% within 4 types in empir. order	14.3%	57.1%	28.6%	100.0%
		Residual	-1.5	1.7	-.3	
	EN	Count	3	2	2	7
		% within 4 types in empir. order	42.9%	28.6%	28.6%	100.0%
		Residual	.5	-.3	-.3	
	IN	Count	5	3	1	9
		% within 4 types in empir. order	55.6%	33.3%	11.1%	100.0%
		Residual	1.8	.1	-1.9	
Total		Count	11	10	10	31
		% within 4 types in empir. order	35.5%	32.3%	32.3%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	-.464	.191	-2.298	.022
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

In WJ12 we had predicted an IS advantage (Quinn, et all, 2005). For test 12A, 12B, and 12C we crosstabulated the EI-SN scores against the trichotomized WJ12 scores. For test 12A and 12C the IS's were the strongest but not an acceptable level of statistical significance. For test 12B there was a linear relationship. We found that the IS group clearly outperformed the other groups and that is confirmed with the significance test. The data supports our hypothesis and suggest that the IS's have an advantage on this type of test.

Crosstab

			trichotomized 12b			Total
			Low	Medium	High	
4 types theoretical for NJ advantage	SP	Count	2	3	2	7
		% within 4 types theoretical for NJ advantage	28.6%	42.9%	28.6%	100.0%
		Residual	-.5	.7	-.3	
	SJ	Count	1	2	5	8
		% within 4 types theoretical for NJ advantage	12.5%	25.0%	62.5%	100.0%
		Residual	-1.8	-.6	2.4	
	NP	Count	5	3	3	11
		% within 4 types theoretical for NJ advantage	45.5%	27.3%	27.3%	100.0%
		Residual	1.1	-.5	-.5	
	NJ	Count	3	2	0	5
		% within 4 types theoretical for NJ advantage	60.0%	40.0%	.0%	100.0%
		Residual	1.2	.4	-1.6	
Total		Count	11	10	10	31
		% within 4 types theoretical for NJ advantage	35.5%	32.3%	32.3%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	-.355	.182	-1.902	.057
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

While examining the data we also reported that the SJ's outperformed the other 3 groups at a significant level. This was another unpredicted finding.

Crosstab

			trichotomized WJ13			Total
			Low	Medium	High	
4 types theoretical for NJ advantage	SP	Count	5	1	1	7
		% within 4 types theoretical for NJ advantage	71.4%	14.3%	14.3%	100.0%
		Residual	2.7	-2.4	-.4	
	SJ	Count	3	4	1	8
		% within 4 types theoretical for NJ advantage	37.5%	50.0%	12.5%	100.0%
		Residual	.4	.1	-.5	
	NP	Count	2	8	1	11
		% within 4 types theoretical for NJ advantage	18.2%	72.7%	9.1%	100.0%
		Residual	-1.5	2.7	-1.1	
	NJ	Count	0	2	3	5
		% within 4 types theoretical for NJ advantage	.0%	40.0%	60.0%	100.0%
		Residual	-1.6	-.4	2.0	
Total		Count	10	15	6	31
		% within 4 types theoretical for NJ advantage	32.3%	48.4%	19.4%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.613	.187	2.926	.003
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

In WJ13 we had predicted an SP advantage (Quinn, et all, 2005). To test this we crosstabulated SN-JP scores against the trichotomized WJ13 scores. The data did report a linear relationship but the complete opposite of what was predicted. The NJ's had the best scores while the SP's had the worst.

Crosstab

			trichotomized WJ13			Total
			Low	Medium	High	
EI and SN cross	ES	Count	5	2	0	7
		% within EI and SN cross	71.4%	28.6%	.0%	100.0%
		Residual	2.7	-1.4	-1.4	
	IS	Count	3	3	2	8
		% within EI and SN cross	37.5%	37.5%	25.0%	100.0%
		Residual	.4	-.9	.5	
	IN	Count	0	7	2	9
		% within EI and SN cross	.0%	77.8%	22.2%	100.0%
		Residual	-2.9	2.6	.3	
	EN	Count	2	3	2	7
		% within EI and SN cross	28.6%	42.9%	28.6%	100.0%
		Residual	-.3	-.4	.6	
Total		Count	10	15	6	31
		% within EI and SN cross	32.3%	48.4%	19.4%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.464	.203	2.183	.029
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

While analyzing the data we did uncover another an unpredicted finding. We crosstabulated the EI-SN scores against the trichotomized WJ13 scores and found that the IN group had an advantage in this type of test.

Crosstab

			trichotomized WJ14			Total
			Low	Medium	High	
EI and SN cross	ES	Count	1	3	3	7
		% within EI and SN cross	14.3%	42.9%	42.9%	100.0%
		Residual	-1.3	.1	1.2	
	IS	Count	2	2	4	8
		% within EI and SN cross	25.0%	25.0%	50.0%	100.0%
		Residual	-.6	-1.4	1.9	
	IN	Count	2	6	1	9
		% within EI and SN cross	22.2%	66.7%	11.1%	100.0%
		Residual	-.9	2.2	-1.3	
	EN	Count	5	2	0	7
		% within EI and SN cross	71.4%	28.6%	.0%	100.0%
		Residual	2.7	-.9	-1.8	
Total		Count	10	13	8	31
		% within EI and SN cross	32.3%	41.9%	25.8%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	-.566	.158	-3.209	.001
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

In WJ14 we had predicted an ESP advantage (Quinn, et all, 2005). We tested this hypothesis by first crosstabulating SN-JP scores against the trichotomized WJ14 scores then crosstabulating the EI-SN scores against the WJ14 scores. The results of the EI-SN test shows that the ES's outperformed the other groups at a level of statistical significance.

Crosstab

			trichotomized WJ14			Total
			Low	Medium	High	
4 types theoretical for NJ advantage	SP	Count	0	3	4	7
		% within 4 types theoretical for NJ advantage	.0%	42.9%	57.1%	100.0%
		Residual	-2.3	.1	2.2	
	SJ	Count	3	2	3	8
		% within 4 types theoretical for NJ advantage	37.5%	25.0%	37.5%	100.0%
		Residual	.4	-1.4	.9	
	NP	Count	6	5	0	11
		% within 4 types theoretical for NJ advantage	54.5%	45.5%	.0%	100.0%
		Residual	2.5	.4	-2.8	
	NJ	Count	1	3	1	5
		% within 4 types theoretical for NJ advantage	20.0%	60.0%	20.0%	100.0%
		Residual	-.6	.9	-.3	
Total		Count	10	13	8	31
		% within 4 types theoretical for NJ advantage	32.3%	41.9%	25.8%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	-.426	.181	-2.279	.023
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

The results of the SN-JP test shows that the SP's also outperformed the other groups at a level of statistical significance. These findings support our hypothesis that the ESP's have an advantage.

Crosstab

			trichotomized WJ15			Total
			Low	Medium	High	
4 types theoretical for IT advantage	EF	Count	3	0	0	3
		% within 4 types theoretical for IT advantage	100.0%	.0%	.0%	100.0%
		Residual	1.5	-.9	-.7	
	ET	Count	6	3	2	11
		% within 4 types theoretical for IT advantage	54.5%	27.3%	18.2%	100.0%
		Residual	.7	-.2	-.5	
	IF	Count	2	0	2	4
		% within 4 types theoretical for IT advantage	50.0%	.0%	50.0%	100.0%
		Residual	.1	-1.2	1.1	
	IT	Count	4	6	3	13
		% within 4 types theoretical for IT advantage	30.8%	46.2%	23.1%	100.0%
		Residual	-2.3	2.2	.1	
Total		Count	15	9	7	31
		% within 4 types theoretical for IT advantage	48.4%	29.0%	22.6%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.407	.199	1.974	.048
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

In WJ15 we predicted an INT advantage (Quinn, et all, 2005). We tested this hypothesis by first crosstabulating EI-TF scores against the trichotomized WJ15 scores then crosstabulating the SN-TF scores against the WJ15 scores. On the EI-TF test found that the IT's outperformed the other groups at statistically significant level just as we predicted. On the SN-TF test found that the NT's did not outperformed the other groups at statistically significant level as we predicted. The results of these test suggest that only the IT's have an advantage on this type of test.

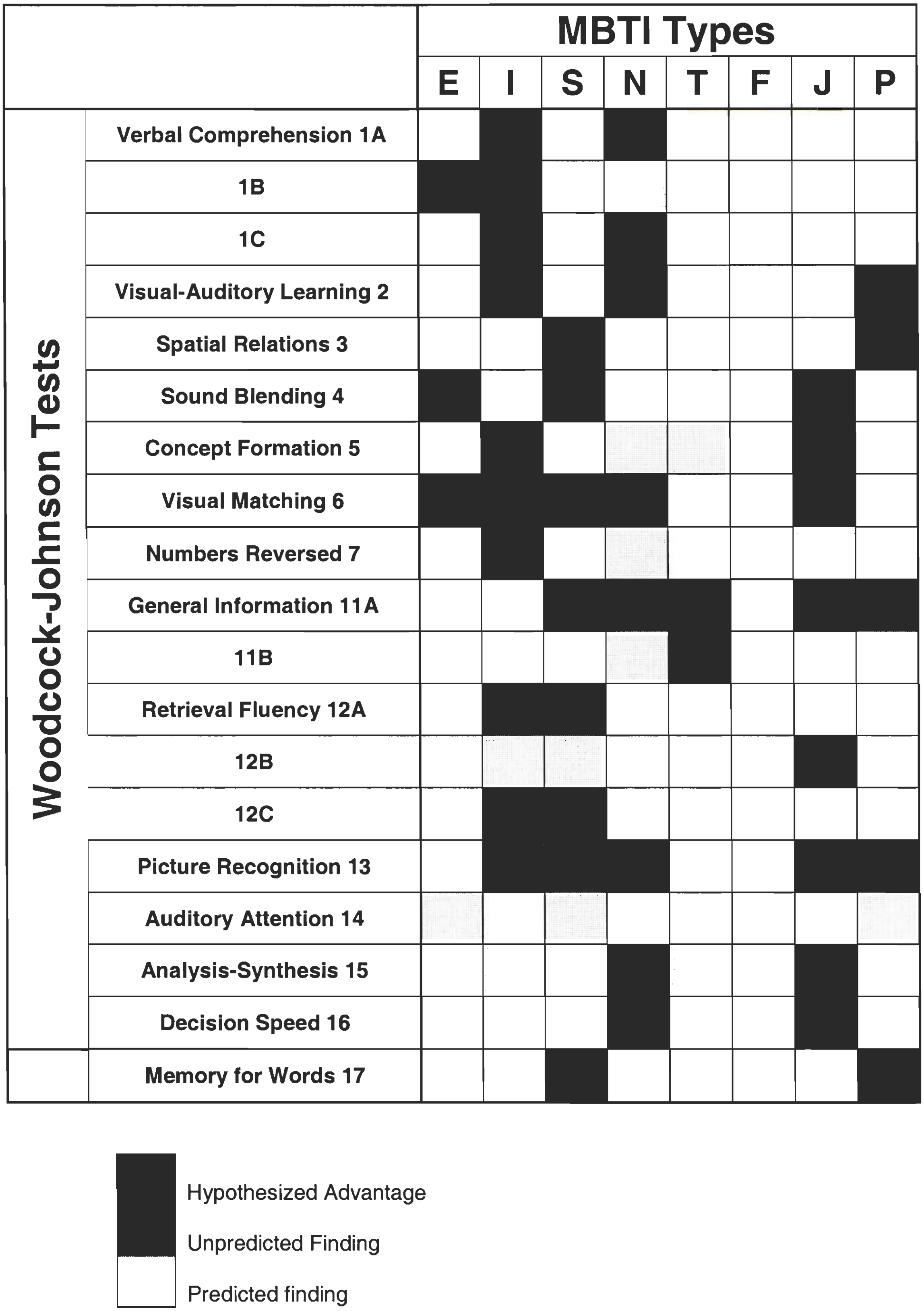
4 types theoretical for NJ advantage * trichotomized WJ16

			trichotomized WJ16			
			Low	Medium	High	Total
4 types theoretical for NJ advantage	SP	Count	2	3	2	7
		% within 4 types theoretical for NJ advantage	28.6%	42.9%	28.6%	100.0%
		Residual	.2	.5	-.7	
	SJ	Count	2	3	3	8
		% within 4 types theoretical for NJ advantage	25.0%	37.5%	37.5%	100.0%
		Residual	-.1	.2	-.1	
	NP	Count	3	4	4	11
		% within 4 types theoretical for NJ advantage	27.3%	36.4%	36.4%	100.0%
		Residual	.2	.1	-.3	
	NJ	Count	1	1	3	5
		% within 4 types theoretical for NJ advantage	20.0%	20.0%	60.0%	100.0%
		Residual	-.3	-.8	1.1	
Total		Count	8	11	12	31
		% within 4 types theoretical for NJ advantage	25.8%	35.5%	38.7%	100.0%

In WJ16 we had predicted an NJ advantage (Quinn, et all, 2005). For this test we crosstabulated SN-JP against the trichotomized WJ16 scores. Just as we predicted the NJ's scored the best and the SP's scored the worst but not at a level of statistical significance. Visually the data looks as if there is a linear relationship but the significance test did not confirm this.

In WJ17 we had predicted an SP advantage (Quinn, et all, 2005).). To test this we crosstabulated SN-JP scores against the trichotomized WJ17 scores. The test was inconclusive and did not have any apparent linear patterns.

Summary of Findings



Several of the predictions were confirmed using the test for significance. The chart above displays visually where we had success and where we were wrong. In 7 out of the 19 total tests we accurately predicted that at least one dimension of the MBTI would be related to that aspect of the WJ battery. In 6 out of the 19 tests we had unpredicted findings. The full pattern of results will be discussed in detail at a later time by Mary Brock. In WJ14, Test of Auditory Attention, the findings completely confirmed the hypothesis. In test WJ12, Retrieval Fluency, we had confirmed the hypothesis for 12B only but the data strongly suggest that there is at least one area of the Intelligence battery in which the Sensing students, especially the IS students, have the advantage.

Overall, given the number of relationships we expected to find, the weight of evidence suggests that the differences between the personality measure and the IQ measure are more striking than the similarities. However, the existence of some rather robust relationships between MBTI and WJ dimensions raise questions that deserve further analysis with a larger sample.

Appendix A:

EI and SN cross * trichotomized 1A Crosstabulation

			trichotomized 1A			Total
			Low	Medium	High	
EI and SN cross	ES	Count	3	3	1	7
		% within EI and SN cross	42.9%	42.9%	14.3%	100.0%
		Residual	-.2	.7	-.6	
	IS	Count	3	3	2	8
		% within EI and SN cross	37.5%	37.5%	25.0%	100.0%
		Residual	-.6	.4	.2	
	IN	Count	5	3	1	9
		% within EI and SN cross	55.6%	33.3%	11.1%	100.0%
		Residual	.9	.1	-1.0	
	EN	Count	3	1	3	7
		% within EI and SN cross	42.9%	14.3%	42.9%	100.0%
		Residual	-.2	-1.3	1.4	
Total		Count	14	10	7	31
		% within EI and SN cross	45.2%	32.3%	22.6%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.385(a)	6	.759
Likelihood Ratio	3.421	6	.754
Linear-by-Linear Association	.112	1	.737
N of Valid Cases	31		

a 12 cells (100.0%) have expected count less than 5. The minimum expected count is 1.58.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.043	.233	.183	.855
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

EI and SN cross * Trichotomized 1B Crosstabulation

			Trichotomized 1B			Total
			Low	Medium	High	
EI and SN cross	ES	Count	5	2	0	7
		% within EI and SN cross	71.4%	28.6%	.0%	100.0%
		Residual	1.8	-1.2	-.7	
	IS	Count	4	4	0	8
		% within EI and SN cross	50.0%	50.0%	.0%	100.0%
		Residual	.4	.4	-.8	
	IN	Count	4	4	1	9
		% within EI and SN cross	44.4%	44.4%	11.1%	100.0%
		Residual	-.1	-.1	.1	
	EN	Count	1	4	2	7
		% within EI and SN cross	14.3%	57.1%	28.6%	100.0%
		Residual	-2.2	.8	1.3	
Total		Count	14	14	3	31
		% within EI and SN cross	45.2%	45.2%	9.7%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.334(a)	6	.291
Likelihood Ratio	8.313	6	.216
Linear-by-Linear Association	6.002	1	.014
N of Valid Cases	31		

a 12 cells (100.0%) have expected count less than 5. The minimum expected count is .68.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.565	.174	2.805	.005
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Trichotomized 1C			Total
			Low	Medium	High	
EI and SN cross	ES	Count	4	2	1	7
		% within EI and SN cross	57.1%	28.6%	14.3%	100.0%
		Residual	.4	.2	-.6	
	IS	Count	5	1	2	8
		% within EI and SN cross	62.5%	12.5%	25.0%	100.0%
		Residual	.9	-1.1	.2	
	IN	Count	3	4	2	9
		% within EI and SN cross	33.3%	44.4%	22.2%	100.0%
		Residual	-1.6	1.7	.0	
	EN	Count	4	1	2	7
		% within EI and SN cross	57.1%	14.3%	28.6%	100.0%
		Residual	.4	-.8	.4	
Total		Count	16	8	7	31
		% within EI and SN cross	51.6%	25.8%	22.6%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.336(a)	6	.766
Likelihood Ratio	3.411	6	.756
Linear-by-Linear Association	.288	1	.591
N of Valid Cases	31		

a 12 cells (100.0%) have expected count less than 5. The minimum expected count is 1.58.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.120	.229	.523	.601
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Trichotomized 1D			Total
			Low	Medium	High	
EI and SN cross	ES	Count	4	2	1	7
		% within EI and SN cross	57.1%	28.6%	14.3%	100.0%
		Residual	.2	.2	-.4	
	IS	Count	5	0	3	8
		% within EI and SN cross	62.5%	.0%	37.5%	100.0%
		Residual	.6	-2.1	1.5	
	IN	Count	6	2	1	9
		% within EI and SN cross	66.7%	22.2%	11.1%	100.0%
		Residual	1.1	-.3	-.7	
	EN	Count	2	4	1	7
		% within EI and SN cross	28.6%	57.1%	14.3%	100.0%
		Residual	-1.8	2.2	-.4	
Total		Count	17	8	6	31
		% within EI and SN cross	54.8%	25.8%	19.4%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.859(a)	6	.249
Likelihood Ratio	9.185	6	.163
Linear-by-Linear Association	.124	1	.725
N of Valid Cases	31		

a 12 cells (100.0%) have expected count less than 5. The minimum expected count is 1.35.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.130	.210	.623	.533
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Tricotomized WJ2			Total
			Low	Medium	High	
EI and SN cross	ES	Count	3	0	4	7
		% within EI and SN cross	42.9%	.0%	57.1%	100.0%
		Residual	1.0	-2.7	1.7	
	IS	Count	2	4	2	8
		% within EI and SN cross	25.0%	50.0%	25.0%	100.0%
		Residual	-.3	.9	-.6	
	IN	Count	3	3	3	9
		% within EI and SN cross	33.3%	33.3%	33.3%	100.0%
		Residual	.4	-.5	.1	
	EN	Count	1	5	1	7
		% within EI and SN cross	14.3%	71.4%	14.3%	100.0%
		Residual	-1.0	2.3	-1.3	
Total		Count	9	12	10	31
		% within EI and SN cross	29.0%	38.7%	32.3%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.242(a)	6	.221
Likelihood Ratio	10.548	6	.103
Linear-by-Linear Association	.102	1	.750
N of Valid Cases	31		

a 12 cells (100.0%) have expected count less than 5. The minimum expected count is 2.03.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	-.073	.224	-.324	.746
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Tricotomized WJ2			Total
			Low	Medium	High	
4 types emperical order	NP	Count	3	6	2	11
		% within 4 types emperical order	27.3%	54.5%	18.2%	100.0%
		Residual	-.2	1.7	-1.5	
	SJ	Count	2	4	2	8
		% within 4 types emperical order	25.0%	50.0%	25.0%	100.0%
		Residual	-.3	.9	-.6	
	NJ	Count	1	2	2	5
		% within 4 types emperical order	20.0%	40.0%	40.0%	100.0%
		Residual	-.5	.1	.4	
	SP	Count	3	0	4	7
		% within 4 types emperical order	42.9%	.0%	57.1%	100.0%
		Residual	1.0	-2.7	1.7	
Total		Count	9	12	10	31
		% within 4 types emperical order	29.0%	38.7%	32.3%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.589(a)	6	.361
Likelihood Ratio	9.034	6	.172
Linear-by-Linear Association	.528	1	.467
N of Valid Cases	31		

a 12 cells (100.0%) have expected count less than 5. The minimum expected count is 1.45.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.174	.240	.721	.471
N of Valid Cases		31			

a Not assuming the null hypothesis.

b Using the asymptotic standard error assuming the null hypothesis.

4 types emperical order * trichotomized wj3 Crosstabulation

			trichotomized wj3			Total
			Low	Medium	High	
4 types emperical order	NP	Count	4	3	4	11
		% within 4 types emperical order	36.4%	27.3%	36.4%	100.0%
		Residual	-.6	-.5	1.2	
	SJ	Count	4	2	2	8
		% within 4 types emperical order	50.0%	25.0%	25.0%	100.0%
		Residual	.6	-.6	-.1	
	NJ	Count	1	4	0	5
		% within 4 types emperical order	20.0%	80.0%	.0%	100.0%
		Residual	-1.1	2.4	-1.3	
	SP	Count	4	1	2	7
		% within 4 types emperical order	57.1%	14.3%	28.6%	100.0%
		Residual	1.1	-1.3	.2	
Total		Count	13	10	8	31
		% within 4 types emperical order	41.9%	32.3%	25.8%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.403(a)	6	.285
Likelihood Ratio	7.895	6	.246
Linear-by-Linear Association	.488	1	.485
N of Valid Cases	31		

a 12 cells (100.0%) have expected count less than 5. The minimum expected count is 1.29.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	-.161	.233	-.688	.492
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			trichotomized wj4			Total
			Low	Medium	High	
4 types theoretical for EJ advantage	IP	Count	4	1	3	8
		% within 4 types theoretical for EJ advantage	50.0%	12.5%	37.5%	100.0%
		Residual	.1	-1.3	1.2	
	IJ	Count	5	3	1	9
		% within 4 types theoretical for EJ advantage	55.6%	33.3%	11.1%	100.0%
		Residual	.6	.4	-1.0	
	EP	Count	5	4	1	10
		% within 4 types theoretical for EJ advantage	50.0%	40.0%	10.0%	100.0%
		Residual	.2	1.1	-1.3	
	EJ	Count	1	1	2	4
		% within 4 types theoretical for EJ advantage	25.0%	25.0%	50.0%	100.0%
		Residual	-.9	-.2	1.1	
Total		Count	15	9	7	31
		% within 4 types theoretical for EJ advantage	48.4%	29.0%	22.6%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.150(a)	6	.525
Likelihood Ratio	5.235	6	.514
Linear-by-Linear Association	.122	1	.727
N of Valid Cases	31		

a 12 cells (100.0%) have expected count less than 5. The minimum expected count is .90.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.093	.256	.361	.718
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

4 types in theoretical order * Trichotomized WJ5 Crosstabulation

			Trichotomized WJ5			Total
			30-35	36-38	39-40	
4 types in theoretical order	ST	Count	9	3	3	15
		% within 4 types in theoretical order	60.0%	20.0%	20.0%	100.0%
		Residual	3.7	-1.4	-2.3	
	NF	Count	1	3	3	7
		% within 4 types in theoretical order	14.3%	42.9%	42.9%	100.0%
		Residual	-1.5	1.0	.5	
	NT	Count	1	3	5	9
		% within 4 types in theoretical order	11.1%	33.3%	55.6%	100.0%
		Residual	-2.2	.4	1.8	
Total		Count	11	9	11	31
		% within 4 types in theoretical order	35.5%	29.0%	35.5%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.016(a)	4	.091
Likelihood Ratio	8.418	4	.077
Linear-by-Linear Association	5.971	1	.015
N of Valid Cases	31		

a 7 cells (77.8%) have expected count less than 5. The minimum expected count is 2.03.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.587	.178	2.923	.003
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

4 types in empir. order * Trichotomized WJ5 Crosstabulation

			Trichotomized WJ5			Total
			30-35	36-38	39-40	
4 types in empir. order	IS	Count	6	1	1	8
		% within 4 types in empir. order	75.0%	12.5%	12.5%	100.0%
	ES	Count	3	2	2	7
		% within 4 types in empir. order	42.9%	28.6%	28.6%	100.0%
	EN	Count	2	3	2	7
		% within 4 types in empir. order	28.6%	42.9%	28.6%	100.0%
	IN	Count	0	3	6	9
		% within 4 types in empir. order	.0%	33.3%	66.7%	100.0%
Total		Count	11	9	11	31
		% within 4 types in empir. order	35.5%	29.0%	35.5%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.033(a)	6	.061
Likelihood Ratio	14.411	6	.025
Linear-by-Linear Association	9.456	1	.002
N of Valid Cases	31		

a 12 cells (100.0%) have expected count less than 5. The minimum expected count is 2.03.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.656	.142	4.166	.000
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			trichotomized wj6			Total
			Low	Medium	High	
4 types in empir. order	IS	Count	4	4	0	8
		% within 4 types in empir. order	50.0%	50.0%	.0%	100.0%
		Residual	.6	1.4	-2.1	
	ES	Count	4	2	1	7
		% within 4 types in empir. order	57.1%	28.6%	14.3%	100.0%
		Residual	1.1	-.3	-.8	
	EN	Count	3	2	2	7
		% within 4 types in empir. order	42.9%	28.6%	28.6%	100.0%
		Residual	.1	-.3	.2	
	IN	Count	2	2	5	9
		% within 4 types in empir. order	22.2%	22.2%	55.6%	100.0%
		Residual	-1.8	-.9	2.7	
Total		Count	13	10	8	31
		% within 4 types in empir. order	41.9%	32.3%	25.8%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.998(a)	6	.238
Likelihood Ratio	9.409	6	.152
Linear-by-Linear Association	4.915	1	.027
N of Valid Cases	31		

a 12 cells (100.0%) have expected count less than 5. The minimum expected count is 1.81.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.451	.175	2.417	.016
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			trichotomized wj7			Total
			Low	Medium	High	
SN/JP reordered	SJ	Count	5	3	0	8
		% within SN/JP reordered	62.5%	37.5%	.0%	100.0%
		Residual	1.4	.2	-1.5	
	SP	Count	3	3	1	7
		% within SN/JP reordered	42.9%	42.9%	14.3%	100.0%
		Residual	-.2	.5	-.4	
	NP	Count	5	3	3	11
		% within SN/JP reordered	45.5%	27.3%	27.3%	100.0%
		Residual	.0	-.9	.9	
	NJ	Count	1	2	2	5
		% within SN/JP reordered	20.0%	40.0%	40.0%	100.0%
		Residual	-1.3	.2	1.0	
Total		Count	14	11	6	31
		% within SN/JP reordered	45.2%	35.5%	19.4%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.695(a)	6	.584
Likelihood Ratio	6.089	6	.413
Linear-by-Linear Association	3.480	1	.062
N of Valid Cases	31		

a 12 cells (100.0%) have expected count less than 5. The minimum expected count is .97.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.401	.186	2.014	.044
N of Valid Cases		31			

a Not assuming the null hypothesis.

b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			trichotomized 11A			Total
			Low	Medium	High	
4 types emperical order	NP	Count	3	4	4	11
		% within 4 types emperical order	27.3%	36.4%	36.4%	100.0%
		Residual	-2.3	1.2	1.2	
	SJ	Count	2	3	3	8
		% within 4 types emperical order	25.0%	37.5%	37.5%	100.0%
		Residual	-1.9	.9	.9	
	NJ	Count	4	0	1	5
		% within 4 types emperical order	80.0%	.0%	20.0%	100.0%
		Residual	1.6	-1.3	-.3	
	SP	Count	6	1	0	7
		% within 4 types emperical order	85.7%	14.3%	.0%	100.0%
		Residual	2.6	-.8	-1.8	
Total		Count	15	8	8	31
		% within 4 types emperical order	48.4%	25.8%	25.8%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.286(a)	6	.113
Likelihood Ratio	13.081	6	.042
Linear-by-Linear Association	6.728	1	.009
N of Valid Cases	31		

a 11 cells (91.7%) have expected count less than 5. The minimum expected count is 1.29.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	-.562	.165	-3.150	.002
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			trichotomized 11B			Total
			Low	Medium	High	
4 types theoretical for NJ advantage	SP	Count	6	1	0	7
		% within 4 types theoretical for NJ advantage	85.7%	14.3%	.0%	100.0%
		Residual	3.3	-2.6	-.7	
	SJ	Count	1	7	0	8
		% within 4 types theoretical for NJ advantage	12.5%	87.5%	.0%	100.0%
		Residual	-2.1	2.9	-.8	
	NP	Count	3	5	3	11
		% within 4 types theoretical for NJ advantage	27.3%	45.5%	27.3%	100.0%
		Residual	-1.3	-.7	1.9	
	NJ	Count	2	3	0	5
		% within 4 types theoretical for NJ advantage	40.0%	60.0%	.0%	100.0%
		Residual	.1	.4	-.5	
Total		Count	12	16	3	31
		% within 4 types theoretical for NJ advantage	38.7%	51.6%	9.7%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.278(a)	6	.018
Likelihood Ratio	15.979	6	.014
Linear-by-Linear Association	2.812	1	.094
N of Valid Cases	31		

a 11 cells (91.7%) have expected count less than 5. The minimum expected count is .48.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.394	.210	1.767	.077
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			trichotomized 12A			Total
			Low	Medium	High	
4 types in empir. order	IS	Count	2	2	4	8
		% within 4 types in empir. order	25.0%	25.0%	50.0%	100.0%
		Residual	-1.4	-.3	1.7	
	ES	Count	4	1	2	7
		% within 4 types in empir. order	57.1%	14.3%	28.6%	100.0%
		Residual	1.1	-1.0	.0	
	EN	Count	5	2	0	7
		% within 4 types in empir. order	71.4%	28.6%	.0%	100.0%
		Residual	2.1	.0	-2.0	
	IN	Count	2	4	3	9
		% within 4 types in empir. order	22.2%	44.4%	33.3%	100.0%
		Residual	-1.8	1.4	.4	
Total		Count	13	9	9	31
		% within 4 types in empir. order	41.9%	29.0%	29.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.827(a)	6	.251
Likelihood Ratio	9.632	6	.141
Linear-by-Linear Association	.264	1	.607
N of Valid Cases	31		

a 12 cells (100.0%) have expected count less than 5. The minimum expected count is 2.03.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	-.069	.222	-.311	.756
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			trichotomized 12b			Total
			Low	Medium	High	
4 types in empir. order	IS	Count	2	1	5	8
		% within 4 types in empir. order	25.0%	12.5%	62.5%	100.0%
		Residual	-.8	-1.6	2.4	
	ES	Count	1	4	2	7
		% within 4 types in empir. order	14.3%	57.1%	28.6%	100.0%
		Residual	-1.5	1.7	-.3	
	EN	Count	3	2	2	7
		% within 4 types in empir. order	42.9%	28.6%	28.6%	100.0%
		Residual	.5	-.3	-.3	
	IN	Count	5	3	1	9
		% within 4 types in empir. order	55.6%	33.3%	11.1%	100.0%
		Residual	1.8	.1	-1.9	
Total		Count	11	10	10	31
		% within 4 types in empir. order	35.5%	32.3%	32.3%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.183(a)	6	.225
Likelihood Ratio	8.296	6	.217
Linear-by-Linear Association	4.502	1	.034
N of Valid Cases	31		

a 12 cells (100.0%) have expected count less than 5. The minimum expected count is 2.26.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	-.464	.191	-2.298	.022
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			trichotmized 12C			Total
			Low	Medium	High	
4 types in empir. order	IS	Count	2	2	4	8
		% within 4 types in empir. order	25.0%	25.0%	50.0%	100.0%
		Residual	-1.1	-.6	1.7	
	ES	Count	4	2	1	7
		% within 4 types in empir. order	57.1%	28.6%	14.3%	100.0%
		Residual	1.3	-.3	-1.0	
	EN	Count	4	2	1	7
		% within 4 types in empir. order	57.1%	28.6%	14.3%	100.0%
		Residual	1.3	-.3	-1.0	
	IN	Count	2	4	3	9
		% within 4 types in empir. order	22.2%	44.4%	33.3%	100.0%
		Residual	-1.5	1.1	.4	
Total		Count	12	10	9	31
		% within 4 types in empir. order	38.7%	32.3%	29.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.171(a)	6	.522
Likelihood Ratio	5.177	6	.521
Linear-by-Linear Association	.064	1	.801
N of Valid Cases	31		

a 12 cells (100.0%) have expected count less than 5. The minimum expected count is 2.03.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	-.033	.224	-.146	.884
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			trichotomized 12b			Total
			Low	Medium	High	
4 types theoretical for NJ advantage	SP	Count	2	3	2	7
		% within 4 types theoretical for NJ advantage	28.6%	42.9%	28.6%	100.0%
		Residual	-.5	.7	-.3	
	SJ	Count	1	2	5	8
		% within 4 types theoretical for NJ advantage	12.5%	25.0%	62.5%	100.0%
		Residual	-1.8	-.6	2.4	
	NP	Count	5	3	3	11
		% within 4 types theoretical for NJ advantage	45.5%	27.3%	27.3%	100.0%
		Residual	1.1	-.5	-.5	
	NJ	Count	3	2	0	5
		% within 4 types theoretical for NJ advantage	60.0%	40.0%	.0%	100.0%
		Residual	1.2	.4	-1.6	
Total		Count	11	10	10	31
		% within 4 types theoretical for NJ advantage	35.5%	32.3%	32.3%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.988(a)	6	.322
Likelihood Ratio	8.334	6	.215
Linear-by-Linear Association	2.574	1	.109
N of Valid Cases	31		

a 12 cells (100.0%) have expected count less than 5. The minimum expected count is 1.61.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	-.355	.182	-1.902	.057
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			trichotomized WJ13			Total
			Low	Medium	High	
4 types theoretical for NJ advantage	SP	Count	5	1	1	7
		% within 4 types theoretical for NJ advantage	71.4%	14.3%	14.3%	100.0%
		Residual	2.7	-2.4	-.4	
	SJ	Count	3	4	1	8
		% within 4 types theoretical for NJ advantage	37.5%	50.0%	12.5%	100.0%
		Residual	.4	.1	-.5	
	NP	Count	2	8	1	11
		% within 4 types theoretical for NJ advantage	18.2%	72.7%	9.1%	100.0%
		Residual	-1.5	2.7	-1.1	
	NJ	Count	0	2	3	5
		% within 4 types theoretical for NJ advantage	.0%	40.0%	60.0%	100.0%
		Residual	-1.6	-.4	2.0	
Total		Count	10	15	6	31
		% within 4 types theoretical for NJ advantage	32.3%	48.4%	19.4%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.946(a)	6	.030
Likelihood Ratio	13.935	6	.030
Linear-by-Linear Association	7.143	1	.008
N of Valid Cases	31		

a 11 cells (91.7%) have expected count less than 5. The minimum expected count is .97.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.613	.187	2.926	.003
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			trichotomized WJ13			Total
			Low	Medium	High	
EI and SN cross	ES	Count	5	2	0	7
		% within EI and SN cross	71.4%	28.6%	.0%	100.0%
		Residual	2.7	-1.4	-1.4	
	IS	Count	3	3	2	8
		% within EI and SN cross	37.5%	37.5%	25.0%	100.0%
		Residual	.4	-.9	.5	
	IN	Count	0	7	2	9
		% within EI and SN cross	.0%	77.8%	22.2%	100.0%
		Residual	-2.9	2.6	.3	
	EN	Count	2	3	2	7
		% within EI and SN cross	28.6%	42.9%	28.6%	100.0%
		Residual	-.3	-.4	.6	
Total		Count	10	15	6	31
		% within EI and SN cross	32.3%	48.4%	19.4%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.577(a)	6	.102
Likelihood Ratio	13.781	6	.032
Linear-by-Linear Association	4.454	1	.035
N of Valid Cases	31		

a 12 cells (100.0%) have expected count less than 5. The minimum expected count is 1.35.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.464	.203	2.183	.029
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			trichotomized WJ14			Total
			Low	Medium	High	
EI and SN cross	ES	Count	1	3	3	7
		% within EI and SN cross	14.3%	42.9%	42.9%	100.0%
		Residual	-1.3	.1	1.2	
	IS	Count	2	2	4	8
		% within EI and SN cross	25.0%	25.0%	50.0%	100.0%
		Residual	-.6	-1.4	1.9	
	IN	Count	2	6	1	9
		% within EI and SN cross	22.2%	66.7%	11.1%	100.0%
		Residual	-.9	2.2	-1.3	
	EN	Count	5	2	0	7
		% within EI and SN cross	71.4%	28.6%	.0%	100.0%
		Residual	2.7	-.9	-1.8	
Total		Count	10	13	8	31
		% within EI and SN cross	32.3%	41.9%	25.8%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.764(a)	6	.067
Likelihood Ratio	12.549	6	.051
Linear-by-Linear Association	6.727	1	.009
N of Valid Cases	31		

a 12 cells (100.0%) have expected count less than 5. The minimum expected count is 1.81.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	-.566	.158	-3.209	.001
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			trichotomized WJ14			Total
			Low	Medium	High	
4 types theoretical for NJ advantage	SP	Count	0	3	4	7
		% within 4 types theoretical for NJ advantage	.0%	42.9%	57.1%	100.0%
		Residual	-2.3	.1	2.2	
	SJ	Count	3	2	3	8
		% within 4 types theoretical for NJ advantage	37.5%	25.0%	37.5%	100.0%
		Residual	.4	-1.4	.9	
	NP	Count	6	5	0	11
		% within 4 types theoretical for NJ advantage	54.5%	45.5%	.0%	100.0%
		Residual	2.5	.4	-2.8	
	NJ	Count	1	3	1	5
		% within 4 types theoretical for NJ advantage	20.0%	60.0%	20.0%	100.0%
		Residual	-.6	.9	-.3	
Total		Count	10	13	8	31
		% within 4 types theoretical for NJ advantage	32.3%	41.9%	25.8%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.215(a)	6	.082
Likelihood Ratio	15.359	6	.018
Linear-by-Linear Association	4.385	1	.036
N of Valid Cases	31		

a 12 cells (100.0%) have expected count less than 5. The minimum expected count is 1.29.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	-.426	.181	-2.279	.023
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			trichotomized WJ15			Total
			Low	Medium	High	
4 types theoretical for IT advantage	EF	Count	3	0	0	3
		% within 4 types theoretical for IT advantage	100.0%	.0%	.0%	100.0%
		Residual	1.5	-.9	-.7	
	ET	Count	6	3	2	11
		% within 4 types theoretical for IT advantage	54.5%	27.3%	18.2%	100.0%
		Residual	.7	-.2	-.5	
	IF	Count	2	0	2	4
		% within 4 types theoretical for IT advantage	50.0%	.0%	50.0%	100.0%
		Residual	.1	-1.2	1.1	
	IT	Count	4	6	3	13
		% within 4 types theoretical for IT advantage	30.8%	46.2%	23.1%	100.0%
		Residual	-2.3	2.2	.1	
Total		Count	15	9	7	31
		% within 4 types theoretical for IT advantage	48.4%	29.0%	22.6%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.035(a)	6	.236
Likelihood Ratio	9.934	6	.127
Linear-by-Linear Association	2.692	1	.101
N of Valid Cases	31		

a 10 cells (83.3%) have expected count less than 5. The minimum expected count is .68.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.407	.199	1.974	.048
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			trichotomized WJ15			Total
			Low	Medium	High	
4 types in theoretical order	ST	Count	8	4	3	15
		% within 4 types in theoretical order	53.3%	26.7%	20.0%	100.0%
		Residual	.7	-.4	-.4	
	NF	Count	5	0	2	7
		% within 4 types in theoretical order	71.4%	.0%	28.6%	100.0%
		Residual	1.6	-2.0	.4	
	NT	Count	2	5	2	9
		% within 4 types in theoretical order	22.2%	55.6%	22.2%	100.0%
		Residual	-2.4	2.4	.0	
Total		Count	15	9	7	31
		% within 4 types in theoretical order	48.4%	29.0%	22.6%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.515(a)	4	.164
Likelihood Ratio	8.298	4	.081
Linear-by-Linear Association	.785	1	.376
N of Valid Cases	31		

a 8 cells (88.9%) have expected count less than 5. The minimum expected count is 1.58.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.224	.216	1.015	.310
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			trichotomized WJ16		Total
			Low	Medium	
4 types theoretical for NJ advantage	SP	Count	4	3	7
		% within 4 types theoretical for NJ advantage	57.1%	42.9%	100.0%
		Residual	.8	-.8	
	SJ	Count	5	3	8
		% within 4 types theoretical for NJ advantage	62.5%	37.5%	100.0%
		Residual	1.4	-1.4	
	NP	Count	4	7	11
		% within 4 types theoretical for NJ advantage	36.4%	63.6%	100.0%
		Residual	-1.0	1.0	
	NJ	Count	1	4	5
		% within 4 types theoretical for NJ advantage	20.0%	80.0%	100.0%
		Residual	-1.3	1.3	
Total		Count	14	17	31
		% within 4 types theoretical for NJ advantage	45.2%	54.8%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.999(a)	3	.392
Likelihood Ratio	3.114	3	.374
Linear-by-Linear Association	2.305	1	.129
N of Valid Cases	31		

a 7 cells (87.5%) have expected count less than 5. The minimum expected count is 2.26.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	-.022	.244	-.089	.929
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			trichotomized wj17			Total
			Low	Medium	High	
4 types theoretical for NJ advantage	SP	Count	3	1	3	7
		% within 4 types theoretical for NJ advantage	42.9%	14.3%	42.9%	100.0%
		Residual	-.2	-.8	1.0	
	SJ	Count	4	2	2	8
		% within 4 types theoretical for NJ advantage	50.0%	25.0%	25.0%	100.0%
		Residual	.4	-.1	-.3	
	NP	Count	5	4	2	11
		% within 4 types theoretical for NJ advantage	45.5%	36.4%	18.2%	100.0%
		Residual	.0	1.2	-1.2	
	NJ	Count	2	1	2	5
		% within 4 types theoretical for NJ advantage	40.0%	20.0%	40.0%	100.0%
		Residual	-.3	-.3	.5	
Total		Count	14	8	9	31
		% within 4 types theoretical for NJ advantage	45.2%	25.8%	29.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.141(a)	6	.906
Likelihood Ratio	2.152	6	.905
Linear-by-Linear Association	.023	1	.878
N of Valid Cases	31		

a 12 cells (100.0%) have expected count less than 5. The minimum expected count is 1.29.

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	-.022	.244	-.089	.929
N of Valid Cases		31			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Correlations

			E-I	T-F	S-N	J-P	1A	1B
Spearman's rho	E-I	Correlation Coeffic	1.000	(0.036)	(0.004)	(0.267)	(0.004)	0.022
		Sig. (2-tailed)	.	0.844	0.983	0.140	0.984	0.906
		N	32.000	32.000	32.000	32.000	31.000	31.000
	T-F	Correlation Coeffic	(0.036)	1.000	0.542	0.184	(0.031)	(0.057)
		Sig. (2-tailed)	0.844	.	0.001	0.314	0.869	0.759
		N	32.000	32.000	32.000	32.000	31.000	31.000
	S-N	Correlation Coeffic	(0.004)	0.542	1.000	0.243	(0.004)	0.258
		Sig. (2-tailed)	0.983	0.001	.	0.180	0.984	0.161
		N	32.000	32.000	32.000	32.000	31.000	31.000
	J-P	Correlation Coeffic	(0.267)	0.184	0.243	1.000	(0.127)	0.146
		Sig. (2-tailed)	0.140	0.314	0.180	.	0.495	0.434
		N	32.000	32.000	32.000	32.000	31.000	31.000
	1A	Correlation Coeffic	(0.004)	(0.031)	(0.004)	(0.127)	1.000	0.582
		Sig. (2-tailed)	0.984	0.869	0.984	0.495	.	0.000
		N	31.000	31.000	31.000	31.000	38.000	38.000
	1B	Correlation Coeffic	0.022	(0.057)	0.258	0.146	0.582	1.000
		Sig. (2-tailed)	0.906	0.759	0.161	0.434	0.000	.
		N	31.000	31.000	31.000	31.000	38.000	38.000
	1C	Correlation Coeffic	0.076	0.040	0.211	(0.137)	0.552	0.332
		Sig. (2-tailed)	0.686	0.829	0.255	0.462	0.000	0.041
		N	31.000	31.000	31.000	31.000	38.000	38.000
	1D	Correlation Coeffic	(0.144)	0.241	0.162	0.026	0.364	0.468
		Sig. (2-tailed)	0.440	0.191	0.385	0.889	0.025	0.003
		N	31.000	31.000	31.000	31.000	38.000	38.000
	WJ2	Correlation Coeffic	(0.058)	(0.022)	0.011	0.037	(0.422)	(0.308)
		Sig. (2-tailed)	0.756	0.908	0.954	0.845	0.008	0.060
		N	31.000	31.000	31.000	31.000	38.000	38.000
	WJ3	Correlation Coeffic	0.158	0.327	0.233	0.078	0.155	0.217
		Sig. (2-tailed)	0.397	0.073	0.206	0.678	0.353	0.190
		N	31.000	31.000	31.000	31.000	38.000	38.000
	WJ4	Correlation Coeffic	(0.011)	0.171	(0.088)	(0.063)	0.121	(0.086)
		Sig. (2-tailed)	0.953	0.359	0.638	0.736	0.469	0.606
		N	31.000	31.000	31.000	31.000	38.000	38.000
	WJ5	Correlation Coeffic	0.106	0.283	0.551	0.181	0.150	0.354
		Sig. (2-tailed)	0.570	0.122	0.001	0.330	0.370	0.029
		N	31.000	31.000	31.000	31.000	38.000	38.000
	WJ6	Correlation Coeffic	0.219	0.130	0.382	(0.092)	0.026	0.111
		Sig. (2-tailed)	0.236	0.485	0.034	0.622	0.877	0.508
		N	31.000	31.000	31.000	31.000	38.000	38.000
	WJ7	Correlation Coeffic	(0.164)	0.130	0.163	0.070	(0.243)	(0.101)
		Sig. (2-tailed)	0.378	0.485	0.380	0.709	0.141	0.545
		N	31.000	31.000	31.000	31.000	38.000	38.000
	11A	Correlation Coeffic	0.118	(0.127)	0.150	(0.007)	0.662	0.629
		Sig. (2-tailed)	0.528	0.496	0.419	0.968	0.000	0.000
		N	31.000	31.000	31.000	31.000	38.000	38.000
	11B	Correlation Coeffic	0.126	0.124	0.196	(0.116)	0.607	0.470
		Sig. (2-tailed)	0.498	0.507	0.290	0.534	0.000	0.003
		N	31.000	31.000	31.000	31.000	38.000	38.000
	12A	Correlation Coeffic	0.363	(0.052)	(0.145)	(0.252)	0.156	0.185
		Sig. (2-tailed)	0.045	0.782	0.438	0.171	0.351	0.265

Correlations

			1C	1D	WJ2	WJ3	WJ4	WJ5
Spearman's rho	E-I	Correlation Coeffic	0.076	(0.144)	(0.058)	0.158	(0.011)	0.106
		Sig. (2-tailed)	0.686	0.440	0.756	0.397	0.953	0.570
		N	31.000	31.000	31.000	31.000	31.000	31.000
	T-F	Correlation Coeffic	0.040	0.241	(0.022)	0.327	0.171	0.283
		Sig. (2-tailed)	0.829	0.191	0.908	0.073	0.359	0.122
		N	31.000	31.000	31.000	31.000	31.000	31.000
	S-N	Correlation Coeffic	0.211	0.162	0.011	0.233	(0.088)	0.551
		Sig. (2-tailed)	0.255	0.385	0.954	0.206	0.638	0.001
		N	31.000	31.000	31.000	31.000	31.000	31.000
	J-P	Correlation Coeffic	(0.137)	0.026	0.037	0.078	(0.063)	0.181
		Sig. (2-tailed)	0.462	0.889	0.845	0.678	0.736	0.330
		N	31.000	31.000	31.000	31.000	31.000	31.000
	1A	Correlation Coeffic	0.552	0.364	(0.422)	0.155	0.121	0.150
		Sig. (2-tailed)	0.000	0.025	0.008	0.353	0.469	0.370
		N	38.000	38.000	38.000	38.000	38.000	38.000
	1B	Correlation Coeffic	0.332	0.468	(0.308)	0.217	(0.086)	0.354
		Sig. (2-tailed)	0.041	0.003	0.060	0.190	0.606	0.029
		N	38.000	38.000	38.000	38.000	38.000	38.000
	1C	Correlation Coeffic	1.000	0.204	(0.243)	0.337	0.001	0.258
		Sig. (2-tailed)	.	0.220	0.142	0.038	0.994	0.118
		N	38.000	38.000	38.000	38.000	38.000	38.000
	1D	Correlation Coeffic	0.204	1.000	(0.255)	0.402	0.054	0.422
		Sig. (2-tailed)	0.220	.	0.122	0.012	0.748	0.008
		N	38.000	38.000	38.000	38.000	38.000	38.000
	WJ2	Correlation Coeffic	(0.243)	(0.255)	1.000	(0.379)	(0.163)	(0.250)
		Sig. (2-tailed)	0.142	0.122	.	0.019	0.329	0.130
		N	38.000	38.000	38.000	38.000	38.000	38.000
	WJ3	Correlation Coeffic	0.337	0.402	(0.379)	1.000	0.060	0.544
		Sig. (2-tailed)	0.038	0.012	0.019	.	0.723	0.000
		N	38.000	38.000	38.000	38.000	38.000	38.000
	WJ4	Correlation Coeffic	0.001	0.054	(0.163)	0.060	1.000	0.095
		Sig. (2-tailed)	0.994	0.748	0.329	0.723	.	0.571
		N	38.000	38.000	38.000	38.000	38.000	38.000
	WJ5	Correlation Coeffic	0.258	0.422	(0.250)	0.544	0.095	1.000
		Sig. (2-tailed)	0.118	0.008	0.130	0.000	0.571	.
		N	38.000	38.000	38.000	38.000	38.000	38.000
	WJ6	Correlation Coeffic	0.331	0.179	(0.256)	0.627	0.080	0.427
		Sig. (2-tailed)	0.042	0.282	0.121	0.000	0.633	0.008
		N	38.000	38.000	38.000	38.000	38.000	38.000
	WJ7	Correlation Coeffic	(0.263)	(0.108)	(0.153)	0.136	0.098	0.191
		Sig. (2-tailed)	0.111	0.519	0.359	0.415	0.557	0.252
		N	38.000	38.000	38.000	38.000	38.000	38.000
	11A	Correlation Coeffic	0.634	0.381	(0.269)	0.233	(0.092)	0.357
		Sig. (2-tailed)	0.000	0.018	0.102	0.159	0.583	0.028
		N	38.000	38.000	38.000	38.000	38.000	38.000
	11B	Correlation Coeffic	0.471	0.426	(0.260)	0.190	0.096	0.151
		Sig. (2-tailed)	0.003	0.008	0.115	0.253	0.565	0.366
		N	38.000	38.000	38.000	38.000	38.000	38.000
	12A	Correlation Coeffic	0.199	(0.080)	(0.128)	0.128	0.231	0.068
		Sig. (2-tailed)	0.232	0.633	0.444	0.444	0.163	0.685

Correlations

			WJ6	WJ7	11A	11B	12A	12B
Spearman's rho	E-I	Correlation Coeffic	0.219	(0.164)	0.118	0.126	0.363	0.054
		Sig. (2-tailed)	0.236	0.378	0.528	0.498	0.045	0.771
		N	31.000	31.000	31.000	31.000	31.000	31.000
	T-F	Correlation Coeffic	0.130	0.130	(0.127)	0.124	(0.052)	(0.004)
		Sig. (2-tailed)	0.485	0.485	0.496	0.507	0.782	0.982
		N	31.000	31.000	31.000	31.000	31.000	31.000
	S-N	Correlation Coeffic	0.382	0.163	0.150	0.196	(0.145)	(0.318)
		Sig. (2-tailed)	0.034	0.380	0.419	0.290	0.438	0.081
		N	31.000	31.000	31.000	31.000	31.000	31.000
	J-P	Correlation Coeffic	(0.092)	0.070	(0.007)	(0.116)	(0.252)	(0.168)
		Sig. (2-tailed)	0.622	0.709	0.968	0.534	0.171	0.365
		N	31.000	31.000	31.000	31.000	31.000	31.000
	1A	Correlation Coeffic	0.026	(0.243)	0.662	0.607	0.156	(0.120)
		Sig. (2-tailed)	0.877	0.141	0.000	0.000	0.351	0.472
		N	38.000	38.000	38.000	38.000	38.000	38.000
	1B	Correlation Coeffic	0.111	(0.101)	0.629	0.470	0.185	(0.082)
		Sig. (2-tailed)	0.508	0.545	0.000	0.003	0.265	0.627
		N	38.000	38.000	38.000	38.000	38.000	38.000
	1C	Correlation Coeffic	0.331	(0.263)	0.634	0.471	0.199	(0.127)
		Sig. (2-tailed)	0.042	0.111	0.000	0.003	0.232	0.449
		N	38.000	38.000	38.000	38.000	38.000	38.000
	1D	Correlation Coeffic	0.179	(0.108)	0.381	0.426	(0.080)	(0.212)
		Sig. (2-tailed)	0.282	0.519	0.018	0.008	0.633	0.202
		N	38.000	38.000	38.000	38.000	38.000	38.000
	WJ2	Correlation Coeffic	(0.256)	(0.153)	(0.269)	(0.260)	(0.128)	(0.111)
		Sig. (2-tailed)	0.121	0.359	0.102	0.115	0.444	0.507
		N	38.000	38.000	38.000	38.000	38.000	38.000
	WJ3	Correlation Coeffic	0.627	0.136	0.233	0.190	0.128	0.022
		Sig. (2-tailed)	0.000	0.415	0.159	0.253	0.444	0.897
		N	38.000	38.000	38.000	38.000	38.000	38.000
	WJ4	Correlation Coeffic	0.080	0.098	(0.092)	0.096	0.231	(0.042)
		Sig. (2-tailed)	0.633	0.557	0.583	0.565	0.163	0.801
		N	38.000	38.000	38.000	38.000	38.000	38.000
	WJ5	Correlation Coeffic	0.427	0.191	0.357	0.151	0.068	(0.203)
		Sig. (2-tailed)	0.008	0.252	0.028	0.366	0.685	0.223
		N	38.000	38.000	38.000	38.000	38.000	38.000
	WJ6	Correlation Coeffic	1.000	0.257	0.293	0.313	0.094	(0.019)
		Sig. (2-tailed)	.	0.119	0.074	0.056	0.574	0.908
		N	38.000	38.000	38.000	38.000	38.000	38.000
	WJ7	Correlation Coeffic	0.257	1.000	(0.177)	(0.027)	0.098	0.035
		Sig. (2-tailed)	0.119	.	0.288	0.872	0.558	0.834
		N	38.000	38.000	38.000	38.000	38.000	38.000
	11A	Correlation Coeffic	0.293	(0.177)	1.000	0.737	0.172	(0.148)
		Sig. (2-tailed)	0.074	0.288	.	0.000	0.301	0.374
		N	38.000	38.000	38.000	38.000	38.000	38.000
	11B	Correlation Coeffic	0.313	(0.027)	0.737	1.000	0.151	(0.129)
		Sig. (2-tailed)	0.056	0.872	0.000	.	0.365	0.442
		N	38.000	38.000	38.000	38.000	38.000	38.000
	12A	Correlation Coeffic	0.094	0.098	0.172	0.151	1.000	0.315
		Sig. (2-tailed)	0.574	0.558	0.301	0.365	.	0.054

Correlations

			12C	WJ13	WJ14	WJ15	WJ16	WJ17
Spearman's rho	E-I	Correlation Coeffic	0.364	0.453	0.213	0.332	0.075	0.167
		Sig. (2-tailed)	0.044	0.010	0.250	0.068	0.688	0.369
		N	31.000	31.000	31.000	31.000	31.000	31.000
	T-F	Correlation Coeffic	(0.052)	0.152	(0.284)	(0.035)	(0.013)	0.022
		Sig. (2-tailed)	0.781	0.414	0.121	0.853	0.943	0.906
		N	31.000	31.000	31.000	31.000	31.000	31.000
	S-N	Correlation Coeffic	0.025	0.269	(0.278)	0.214	0.157	(0.018)
		Sig. (2-tailed)	0.892	0.143	0.130	0.247	0.399	0.921
		N	31.000	31.000	31.000	31.000	31.000	31.000
	J-P	Correlation Coeffic	(0.349)	(0.199)	(0.015)	(0.265)	(0.068)	(0.019)
		Sig. (2-tailed)	0.055	0.283	0.937	0.150	0.716	0.920
		N	31.000	31.000	31.000	31.000	31.000	31.000
	1A	Correlation Coeffic	(0.012)	(0.021)	(0.021)	0.246	(0.113)	0.117
		Sig. (2-tailed)	0.945	0.900	0.901	0.136	0.499	0.484
		N	38.000	38.000	38.000	38.000	38.000	38.000
	1B	Correlation Coeffic	0.053	(0.101)	(0.254)	0.464	0.096	(0.046)
		Sig. (2-tailed)	0.754	0.548	0.123	0.003	0.566	0.784
		N	38.000	38.000	38.000	38.000	38.000	38.000
	1C	Correlation Coeffic	0.314	(0.116)	(0.001)	0.389	(0.096)	0.064
		Sig. (2-tailed)	0.055	0.488	0.996	0.016	0.568	0.702
		N	38.000	38.000	38.000	38.000	38.000	38.000
	1D	Correlation Coeffic	0.087	(0.207)	(0.035)	0.260	0.141	(0.238)
		Sig. (2-tailed)	0.602	0.213	0.835	0.115	0.399	0.150
		N	38.000	38.000	38.000	38.000	38.000	38.000
	WJ2	Correlation Coeffic	(0.256)	(0.154)	(0.175)	(0.437)	(0.256)	(0.076)
		Sig. (2-tailed)	0.121	0.355	0.292	0.006	0.120	0.649
		N	38.000	38.000	38.000	38.000	38.000	38.000
	WJ3	Correlation Coeffic	0.231	0.052	0.195	0.489	0.254	(0.093)
		Sig. (2-tailed)	0.163	0.755	0.240	0.002	0.124	0.579
		N	38.000	38.000	38.000	38.000	38.000	38.000
	WJ4	Correlation Coeffic	(0.202)	0.100	0.102	(0.061)	(0.004)	0.203
		Sig. (2-tailed)	0.224	0.548	0.541	0.717	0.983	0.222
		N	38.000	38.000	38.000	38.000	38.000	38.000
	WJ5	Correlation Coeffic	0.234	0.141	0.117	0.516	0.147	(0.145)
		Sig. (2-tailed)	0.157	0.399	0.483	0.001	0.379	0.383
		N	38.000	38.000	38.000	38.000	38.000	38.000
	WJ6	Correlation Coeffic	0.320	0.094	0.162	0.594	0.415	(0.062)
		Sig. (2-tailed)	0.050	0.575	0.330	0.000	0.010	0.712
		N	38.000	38.000	38.000	38.000	38.000	38.000
	WJ7	Correlation Coeffic	0.063	0.199	0.011	0.114	0.379	0.271
		Sig. (2-tailed)	0.707	0.230	0.949	0.494	0.019	0.100
		N	38.000	38.000	38.000	38.000	38.000	38.000
	11A	Correlation Coeffic	0.263	0.047	(0.087)	0.566	0.185	(0.076)
		Sig. (2-tailed)	0.110	0.778	0.603	0.000	0.265	0.648
		N	38.000	38.000	38.000	38.000	38.000	38.000
	11B	Correlation Coeffic	0.011	0.120	(0.131)	0.386	0.152	(0.098)
		Sig. (2-tailed)	0.947	0.474	0.431	0.017	0.363	0.557
		N	38.000	38.000	38.000	38.000	38.000	38.000
	12A	Correlation Coeffic	0.329	0.241	0.331	0.249	0.192	0.235
		Sig. (2-tailed)	0.044	0.145	0.042	0.132	0.249	0.155

		E-I	T-F	S-N	J-P	1A	1B
	N	31.000	31.000	31.000	31.000	38.000	38.000
12B	Correlation Coeffic	0.054	(0.004)	(0.318)	(0.168)	(0.120)	(0.082)
	Sig. (2-tailed)	0.771	0.982	0.081	0.365	0.472	0.627
	N	31.000	31.000	31.000	31.000	38.000	38.000
12C	Correlation Coeffic	0.364	(0.052)	0.025	(0.349)	(0.012)	0.053
	Sig. (2-tailed)	0.044	0.781	0.892	0.055	0.945	0.754
	N	31.000	31.000	31.000	31.000	38.000	38.000
WJ13	Correlation Coeffic	0.453	0.152	0.269	(0.199)	(0.021)	(0.101)
	Sig. (2-tailed)	0.010	0.414	0.143	0.283	0.900	0.548
	N	31.000	31.000	31.000	31.000	38.000	38.000
WJ14	Correlation Coeffic	0.213	(0.284)	(0.278)	(0.015)	(0.021)	(0.254)
	Sig. (2-tailed)	0.250	0.121	0.130	0.937	0.901	0.123
	N	31.000	31.000	31.000	31.000	38.000	38.000
WJ15	Correlation Coeffic	0.332	(0.035)	0.214	(0.265)	0.246	0.464
	Sig. (2-tailed)	0.068	0.853	0.247	0.150	0.136	0.003
	N	31.000	31.000	31.000	31.000	38.000	38.000
WJ16	Correlation Coeffic	0.075	(0.013)	0.157	(0.068)	(0.113)	0.096
	Sig. (2-tailed)	0.688	0.943	0.399	0.716	0.499	0.566
	N	31.000	31.000	31.000	31.000	38.000	38.000
WJ17	Correlation Coeffic	0.167	0.022	(0.018)	(0.019)	0.117	(0.046)
	Sig. (2-tailed)	0.369	0.906	0.921	0.920	0.484	0.784
	N	31.000	31.000	31.000	31.000	38.000	38.000

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

		1C	1D	WJ2	WJ3	WJ4	WJ5
	N	38.000	38.000	38.000	38.000	38.000	38.000
12B	Correlation Coeffic	(0.127)	(0.212)	(0.111)	0.022	(0.042)	(0.203)
	Sig. (2-tailed)	0.449	0.202	0.507	0.897	0.801	0.223
	N	38.000	38.000	38.000	38.000	38.000	38.000
12C	Correlation Coeffic	0.314	0.087	(0.256)	0.231	(0.202)	0.234
	Sig. (2-tailed)	0.055	0.602	0.121	0.163	0.224	0.157
	N	38.000	38.000	38.000	38.000	38.000	38.000
WJ13	Correlation Coeffic	(0.116)	(0.207)	(0.154)	0.052	0.100	0.141
	Sig. (2-tailed)	0.488	0.213	0.355	0.755	0.548	0.399
	N	38.000	38.000	38.000	38.000	38.000	38.000
WJ14	Correlation Coeffic	(0.001)	(0.035)	(0.175)	0.195	0.102	0.117
	Sig. (2-tailed)	0.996	0.835	0.292	0.240	0.541	0.483
	N	38.000	38.000	38.000	38.000	38.000	38.000
WJ15	Correlation Coeffic	0.389	0.260	(0.437)	0.489	(0.061)	0.516
	Sig. (2-tailed)	0.016	0.115	0.006	0.002	0.717	0.001
	N	38.000	38.000	38.000	38.000	38.000	38.000
WJ16	Correlation Coeffic	(0.096)	0.141	(0.256)	0.254	(0.004)	0.147
	Sig. (2-tailed)	0.568	0.399	0.120	0.124	0.983	0.379
	N	38.000	38.000	38.000	38.000	38.000	38.000
WJ17	Correlation Coeffic	0.064	(0.238)	(0.076)	(0.093)	0.203	(0.145)
	Sig. (2-tailed)	0.702	0.150	0.649	0.579	0.222	0.383
	N	38.000	38.000	38.000	38.000	38.000	38.000

* Correlation is significant at the 0.05 le

** Correlation is significant at the 0.01 le

		WJ6	WJ7	11A	11B	12A	12B
	N	38.000	38.000	38.000	38.000	38.000	38.000
12B	Correlation Coeffic	(0.019)	0.035	(0.148)	(0.129)	0.315	1.000
	Sig. (2-tailed)	0.908	0.834	0.374	0.442	0.054	.
	N	38.000	38.000	38.000	38.000	38.000	38.000
12C	Correlation Coeffic	0.320	0.063	0.263	0.011	0.329	0.353
	Sig. (2-tailed)	0.050	0.707	0.110	0.947	0.044	0.030
	N	38.000	38.000	38.000	38.000	38.000	38.000
WJ13	Correlation Coeffic	0.094	0.199	0.047	0.120	0.241	0.218
	Sig. (2-tailed)	0.575	0.230	0.778	0.474	0.145	0.188
	N	38.000	38.000	38.000	38.000	38.000	38.000
WJ14	Correlation Coeffic	0.162	0.011	(0.087)	(0.131)	0.331	0.114
	Sig. (2-tailed)	0.330	0.949	0.603	0.431	0.042	0.495
	N	38.000	38.000	38.000	38.000	38.000	38.000
WJ15	Correlation Coeffic	0.594	0.114	0.566	0.386	0.249	0.077
	Sig. (2-tailed)	0.000	0.494	0.000	0.017	0.132	0.647
	N	38.000	38.000	38.000	38.000	38.000	38.000
WJ16	Correlation Coeffic	0.415	0.379	0.185	0.152	0.192	0.248
	Sig. (2-tailed)	0.010	0.019	0.265	0.363	0.249	0.133
	N	38.000	38.000	38.000	38.000	38.000	38.000
WJ17	Correlation Coeffic	(0.062)	0.271	(0.076)	(0.098)	0.235	0.026
	Sig. (2-tailed)	0.712	0.100	0.648	0.557	0.155	0.877
	N	38.000	38.000	38.000	38.000	38.000	38.000

* Correlation is significant at the 0.05 le

** Correlation is significant at the 0.01 le

		12C	WJ13	WJ14	WJ15	WJ16	WJ17
	N	38.000	38.000	38.000	38.000	38.000	38.000
12B	Correlation Coeffic	0.353	0.218	0.114	0.077	0.248	0.026
	Sig. (2-tailed)	0.030	0.188	0.495	0.647	0.133	0.877
	N	38.000	38.000	38.000	38.000	38.000	38.000
12C	Correlation Coeffic	1.000	0.249	0.091	0.518	0.481	0.148
	Sig. (2-tailed)	.	0.131	0.587	0.001	0.002	0.377
	N	38.000	38.000	38.000	38.000	38.000	38.000
WJ13	Correlation Coeffic	0.249	1.000	0.262	0.226	0.427	0.102
	Sig. (2-tailed)	0.131	.	0.111	0.172	0.008	0.542
	N	38.000	38.000	38.000	38.000	38.000	38.000
WJ14	Correlation Coeffic	0.091	0.262	1.000	0.108	0.240	(0.145)
	Sig. (2-tailed)	0.587	0.111	.	0.518	0.146	0.386
	N	38.000	38.000	38.000	38.000	38.000	38.000
WJ15	Correlation Coeffic	0.518	0.226	0.108	1.000	0.402	(0.070)
	Sig. (2-tailed)	0.001	0.172	0.518	.	0.012	0.676
	N	38.000	38.000	38.000	38.000	38.000	38.000
WJ16	Correlation Coeffic	0.481	0.427	0.240	0.402	1.000	(0.110)
	Sig. (2-tailed)	0.002	0.008	0.146	0.012	.	0.511
	N	38.000	38.000	38.000	38.000	38.000	38.000
WJ17	Correlation Coeffic	0.148	0.102	(0.145)	(0.070)	(0.110)	1.000
	Sig. (2-tailed)	0.377	0.542	0.386	0.676	0.511	.
	N	38.000	38.000	38.000	38.000	38.000	38.000

* Correlation is significant at the 0.05 le

** Correlation is significant at the 0.01 le

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