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A Comparison of the Extroversion-Introversion Scale of the Mvers-Briggs Type Indicator to the Handwriting Traits Which Indicate Extroversion or Introversion: A Graphology Validity Study

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A Comparison of the Extroversion-Introversion Scale of the Myers-Briggs Type Indicator to the Handwriting Traits Which Indicate Extroversion or Introversion: A Graphology Validity Study

A Thesis

Presented to the

Department of Counseling and Guidance

and the

Faculty of the Graduate College

University of Nebraska

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

University of Nebraska at Omaha

by

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April, 1993

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Acceptance for the faculty Graduate College, University of Nebraska in partial fulfillment of the requirements for the degree Master of Arts, University of Nebraska at Omaha.

Committee

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Abstract

The primary purpose of this validation study was to determine whether there was a significant relationship between the extroversion-introversion scores on the Myers-Briggs inventory and the following graphometric characteristics: handwriting slant, midzone size, space between lines of writing, the space between words in writing, width of left margin, and width of right margin.

Subjects for the study were drawn from a course offered by the University of Nebraska at Omaha (UNO) counseling service. This course was designed for students who were uncommitted to a major. Most students were freshman. A total of 49 subjects were studied. Data were collected over a period of two semesters. Pearson correlation values were determined for the following handwriting characteristics: Wordspace r=-.30, midzone size r=-.23, space between lines r=-.17 right margin width r=-.17, left margin width r=-.15, and slant of letters r=-.09.

The results indicated the acceptance of the null hypothesis that there is no significant correlation between the Myers-Briggs scores and the handwriting measurements, except for distance between words which had a value of r=.30 (significant at the .05 level). In direct terms there was a probability beyond chance that a writer would be more extroverted as the distance between words decreased.

DEDICATED TO

CARMEN, MY LOVING AND SUPPORTING WIFE

ACKNOWLEDGEMENTS

Preparation for this thesis topic occurred over a period of eighteen months. Traditional library sources were somewhat limited when it came to any graphological topics. Handwriting analysts were contacted by phone throughout the United States ranging from Virginia to California. Most contacts were very congenial and helpful. A common theme erupted from all of these contacts. "Very little validation research has been done in graphology or handwriting analysis and there is a real need for such research."

Special thanks need to be given to several handwriting analysts who were especially helpful in this topic selection. Milton Moore, whose writings were utilized in this paper, was extremely helpful in narrowing down this topic. Several phone conversations with him concerning the Myers-Briggs Inventory and graphological characteristics resulted in my final topic selection. Mary Lynn Bryden of the Texas Institute of Graphological Sciences was especially helpful in providing names of prominent handwriting analysts who were of help to me.

Several special libraries were of some help in obtaining literature on graphology. They include: Handwriting Analysis Research Library, Robert E. Backman, and The American Association of Handwriting Analysts (AAHA) Library, Nancy Kowalski, Librarian.

The search for literature extended internationally and

included contacts with graphologists from Germany, South Africa, and Canada.

Several local handwriting analysts were also interviewed for suggestions concerning a thesis topic.

In general much of the literature published concerning handwriting analysis is not supported by any research and is difficult to utilize in a paper of this kind. It should also be noted that there are several different schools of handwriting analysis in the United States. Some disagreement does occur within the graphological community and a lot of information is not shared openly. Although the graphological group cannot be disclosed, the researcher will follow with an illustration. A phone call to an organization leader uncovered the fact that this group had amassed considerable data concerning certain graphological characteristics. When the researcher asked if any information could be made available he was told that he must take the organization courses (both time consuming and expensive) in order to access any information. In the interest of scientific research it seems unfortunate that such information couldn't have been shared. Obviously it would be beneficial to the graphological community if all literature and studies could be shared between all factions.

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Chapter 1

INTRODUCTION

Many universities in Germany have required training in graphology as part of the work for a doctorate of philosophy in psychology (Nevo, 1986). Germans regard graphology as a branch of applied psychology and graphologists are often consulted in vocational and medical diagnostic fields. In addition to psychologists many medical students study graphology in Germany. The Swiss regard graphology so highly that they use it more often than the Rorschach and other projective techniques (Roman, 1952).

Handwriting analysis has several advantages over other personality instruments: a sample of handwriting can be taken by a clerk without expenditure of professional time, it can be taken without the subject's knowledge what it is for, samples can be obtained over a long time period thus making the possibility of longitudinal studies, and it is much more difficult to fake a handwriting sample (especially if you do not know it is being analyzed) than it is to fake answers on personality tests (Nevo, 1986).

A validity study involving graphology can blaze new trails in personality assessment. Since handwriting is readily available from most clients it could be very handy in determining basic personality characteristics. A historical record of handwriting may be available when

longitudinal records of other assessments may be difficult to obtain. Graphology, in this instance could be instrumental in the longitudinal study of personality. Interest in studies of graphology has waxed and waned during the last 50 years. A series of many studies will be necessary to unravel the relationship of handwriting to personality. In the end, partial validity or no validity may be the result, but the potential use of graphology can only be determined if true scientific study of this topic occurs.

A personality assessment such as the Myers-Briggs Type Indicator (MBTI) has been generally accepted by the educational and psychological community as well as being well documented and researched. This makes such an instrument an ideal tool for comparison in a validity study of handwriting analysis. Graphology or handwriting analysis has been used for a considerable period of time. In general the scientific community is skeptical of handwriting analysis. This is due largely to the fact that very few validity studies have been undertaken in this field.

Three thousand American firms currently incorporate graphology into their selection systems (Nevo, 1986). States such as Iowa and Rhode Island have recently introduced legislation to limit the use of handwriting analysis in personnel selection without the writer's

permission. Counselors and personnel people can benefit greatly from handwriting analysis provided it is valid. Little validation of graphology exists and there is a great need for validation research of this topic.

Statement of the Problem

This study is considered a validation study. Its primary purpose was to determine whether there was a significant relationship between the extroversion-introversion scores of the Myers-Briggs and handwriting characteristics deemed to be indicators of extroversion and introversion.

Hypothesis

There is no significant correlation between the Myers-Briggs extroversion-introversion score and the following graphometric characteristics: handwriting slant, midzone size, space between words, space between lines of writing, width of left margin, and width of right margin. Correlations are considered significant if $p=<.05$.

Significance of the Study

Any validation study of handwriting analysis should interest counselors, psychologists, psychiatrists, medical personnel, and human resources people. No one validation study can prove the practicality of graphology in any of these fields, but a series of validity studies investigating different facets of graphology should aid any of these

individuals in deciding whether graphology should be utilized as another diagnostic tool. Since few validity studies of graphology have been attempted in the last few years it is hoped that such an investigation would spawn interest in other professionals to continue research in this area.

Assumptions

Since the Myers-Briggs Type Indicator (MBTI) is being used as the instrument to determine extroversion or introversion in a subject it is assumed that it is doing this accurately and that there is consistency with the MBTI over a period of time.

It is assumed that each writing sample received from the subjects is representative of the normal writing patterns and has not been purposely altered.

Limitations

Participants in the study were drawn from students enrolled in a college preparation course offered through the student counseling services of The University of Nebraska at Omaha (UNO). All students had not declared a major at the time of enrollment. Most students were college freshman. Inferences drawn from this study should apply only to this type of group.

Chapter 2

SURVEY OF THE LITERATURE

Jung, Extroversion, and Introversion

Since the Myers-Briggs Type Indicator is modeled after Carl Jung's four psychological functions of thinking, feeling, sensation, and intuition as well as the extroversion-introversion concept, it is only fitting that some of his ideas and definitions be noted. Jung stated, "Introversion and extroversion as a typical attitude, means an essential bias which conditions the whole psychic process, establishes habitual reactions, and thus not only establishes the style of behavior, but also the nature of the subjective experience. And not only so, but it also denotes the compensatory activity of the unconscious which we may expect to find" (Moore, 1988). Extroverts expend and propagate themselves in every way, whereas introverts conserve and defend themselves against the outside world. Individuals alternate between the two attitudes over time, however one normally predominates. Both attitudes cannot exist at the same time in consciousness. When we are behaving outwardly in an extroverted manner, our introverted side will be operating in the unconscious. The more extreme one attitude is in our conscious behavior, the less developed the other will be in the unconscious (Moore, 1988). Environmental circumstances may force one to take on

an attitude that is not natural, thus undermining the persons innate disposition. "As a rule," writes Jung, "whenever such a falsification of type takes place... the individual becomes neurotic later and can be cured by developing the attitude consonant with his nature" (Sharp, 1987). Instruments such as the Myers-Briggs and perhaps graphology can be very helpful in identifying incongruent behavior.

In deciding to which attitude the superior function belongs, one must observe which function is more or less completely under conscious control, and which functions are more random in nature. Diagnosing types can be difficult because the dominant conscious attitude is unconsciously compensated or balanced by its opposite. This explains why it can be difficult to establish one's own type especially if one has become bored with one's primary function (Sharp, 1987). One might speculate that crises such as divorce may make diagnosing personality even more difficult because a person may be trying to compensate too much.

Jung emphasizes that the inferior function or "shadow" is important. "In general the person whose 'shadow' is dormant gives the impression of being stodgy, lifeless. (i.e. The extrovert seems to lack depth while the introvert appears socially inept.)" This inferior function can be creative or destructive. Creative in the respect that it

represents aspects of oneself that are buried, and destructive from the standpoint that it's value system and motivations tend to undermine a person's conscious image of himself. As we grow and mature it is natural to suppress the unacceptable aspects of ourselves. Since they fall into the 'shadow', what is left is the persona. We tend to cover up our inferiorities with our persona. If overdone one will have more trouble with the unacknowledged side of the personality (Sharp, 1987). Obviously, counseling can help deal with these potential imbalances.

Jung writes, "We cannot in a long run allow one part of our personality to be cared for symbiotically by another." Yet this is actually what we do when we rely on friends, relatives, or lovers to carry out inferior attitudes or functions. Failure to allow some expression of our inferior attitude will cause one to become dull and boring. It should also be noted that a person's activities are not always a reliable indicator of their attitude type. For an example a party-goer may be an introvert living out his "shadow." The solitaire may be an extrovert who simply ran out of steam. The crucial factor in determining type is not so much what one does but why one does it (Sharp, 1987). "The inferior function is so close to the unconscious... and remains... undeveloped, that it is naturally the weakspot in consciousness through which the figures of unconsciousness

can break in." Introverts who fall into extroversion do so in almost a possessed manner, unable to stop. Exaggerated extroversion of this type is rarely found in true extroverts. On the other hand an introvert may become highly disagreeable, even arrogant, loud, and pushy but only after a sufficient stimulus of a number of drinks. To the casual observer picking personality types may at first seem simple, but as the previous paragraphs illustrate not all is what meets the eye. The bottom line is that an externally evaluated test, even if it is self administered is not a reliable guide to what is going on inside. "In the area of typology as with any attempt to understand one self, there is no substitute for prolonged self reflection" (Sharp, 1987).

Jung writes, "Introversion is normally characterized by a hesitant, reflective retiring nature that keeps itself to itself, shrinks from objects and is always on the defensive. Extroversion is normally characterized by an outgoing, candid and accommodating nature that adapts easily to a given situation, quickly forms attachments, and setting aside any misgivings, will often venture forth with careless confidence into unknown situations." Extroverts enjoy traveling, meeting new people, and seeing new places. Typical adventurers, they are the life of the party both open and friendly. Conversely the introvert is essentially

conservative preferring the familiar surroundings of home and intimate times with an inner circle of friends (Sharp, 1987). Being more intrapunative than extrapunative, introverts are more likely to look inward for causes of difficulties. Counselors should help individuals focus such attention on the fact that some problems are environment related. Introverts benefit from comments that help them clarify the concepts behind their actions. Long pauses with introverted clients can be expected, while they clarify what has been said internally (Myers-Briggs, McCaully, 1985). Extroverts admire introverts because of their detachment, reserve, and intensity. Introverts appeal to extroverts because of their attentive and non-competitive nature. The Myers-Briggs manual also indicates that extroverts write with little planning, whereas introverts have less problems writing, tend to write more, often alone, and tend to rewrite their drafts. Other descripters used in reference to extroverts are: sense of comfort in the environment, self regard, self-confidence, autonomous, socially adjusted, ability to face reality, ego strength, leadership dominance, assertiveness, venturesome, spontaneous, happy go lucky, gregarious, outgoing, relate well to others expressed affection, and like numbers of people. Interest scale correlations show extroverts to prefer marketing, recreation, leadership, guidance counseling, travel agent,

and elected public official. Extroverts like variety and action, tend to be quicker on tasks and dislike complicated procedures. They tend to be more interested in results and getting a job done, and how other people do it. Extroverts are more impulsive, like to have people around and communicate freely. Introverts on the other hand, like quiet for concentration, tend to be detail oriented, dislike generalities, have trouble remembering faces and names, do not mind working on long projects uninterruptedly, and are interested in the idea behind the job. Introverts gravitate to occupations such as mathematician, dentist, computer programmer, physicist, statician, and chemist (Myers-Briggs, McCaully, 1985).

Even when it comes to disease, extroverts and introverts have different tendencies. "The extrovert is primarily concerned with the object... He overlooks the fact that something is happening inside him. This unrealized effect can also influence the metabolism: liver troubles are typical and even the heart may be affected. The introvert becomes liable to sudden dangerous infections. The introvert who has to develop his extroversion is relatively liable to peptic ulcers. In extroverts, who should introvert, there is in my experience a danger of premature arteriosclerosis" (Sharp, 1987). Jung has indicated that the introvert is more liable to neurosis and

schizophrenia, and the extrovert to hysterical and manic-depressive disorders. Extroverts also show more susceptibility to hypnosis, crystal visions, and trances (Eysenck, 1970). Introverts are also prone to psychasthenia, a malady characterized by extreme sensitivities and great proneness to exhaustion and fatigue (Sharp, 1987).

For extreme extroverts a major part of counseling is to teach introversion. Since extroverts gain more insight from experience, counseling sessions are likely to be devoted to the previous weeks developments. Introverts are more likely to look inwardly for causes of difficulties. Counselors may have to help introverts focus on the fact that some problems have their source in the environment. In dealing with couples concerning extroversion-introversion issues, it needs to be noted that the extrovert needs sufficient external stimulation, and the introvert sufficient time alone. Studied aspects concerning marital satisfaction pointed out more problems between couples where the wife is extroverted and the man is introverted (Myers-Briggs, McCaully, 1985).

History of Handwriting Analysis

As early as 300 B.C. Aristotle noted, "Spoken words are the symbols of mental experience and written words are the symbols of spoken words. Just as all men have not the same

speech sounds, so all men have not the same writing" (Michaelis, Maze & Hodos, 1986). During the 1830's Abbe Flandrin and Abbe Michon started an extensive study of handwriting. After 30 years of study Michon collected thousands of handwriting samples and studied them. This resulted in his publication "Le Mysteries de le Criture" in 1872 and "La Mysteres Pratique de Grapholgique." His followers formed a group called Socite Graphologique which flourished up to the second world war. Michon's interest focused mainly on forms rather than the holistic attitude of later graphologists who came to read handwriting as crystallized expressive movement. Modern graphology utilizes both form and expressive movement. One of Michon's successors J. Crepieux-Jamin broke away from the "school of fixed signs" and shifted emphasis from the elements of handwriting such as t-bars, i-dots, hooks, and flourishes to the overall aspects of the handwriting. He believed that handwriting must be studied as a whole to which each trait contributes in varying degree and with varying emphasis. He also persuaded Alfred Binet to study the reliability of handwriting analysis. Affirmative results in regard to "respect" and to the graphic evidences of "honesty" and "intelligence" brought new esteem to graphology. Binet's experiments indicated that handwriting experts could distinguish between successful and unsuccessful persons with

an accuracy of 61-92%. He was also able to determine to considerable degree, the intelligence as well as the honesty of writers.

William Preyer, a professor of physiology, demonstrated similarity of handwriting in an individual whether the writing was produced by the right hand, the left hand, the mouth, or the toes. This coined the concept of "brain writing." Ludwig Klages maintained that there is a unity of character in all volitional movements of an individual. Handwriting is a permanent record of such a volitional movement. In addition to that it is easily measured and can be used for comparison to other samples at any time. He believed that each single movement reflects the writer's entire personality, the total of the writer's intellectual, emotional and physical tendencies. Klage's philosophy rejected the graphology of isolated signs. Rhythm plays an important part in Klage's system. Rhythm is similar to the reproduction of the same periods and measure is the mathematically exact replication of these periods. He defines harmony as an even distribution of the writing impulses with no flow disturbance. He also considered harmony to be a gauge for personal excitability of feelings. Harmony in handwriting corresponds to equanimity, and lack of harmony to excitability. Regularity is another important aspect. It refers to size, width, and the slant of the

handwriting. Klages also noted the degree of connectedness in writing. Positive interpretation of connectedness includes logical activity and a gift for synthesis, along with a dialectic deliberation and calculation. Negative interpretation may indicate lack of new ideas and the ability of the person to elaborate only on that which is present. Unconnected writing on the positive side, denotes a wealth of spontaneous ideas, intellectual initiative, practicality, and intuition. Negative interpretation indicates the tendency to be erratic, to lack logic, and the lack of consideration and common sense (Nevo, 1986).

In 1931 the Institute of Handwriting Research of Budapest instituted an eight year research project. Two hundred normal children, ranging in ages from 10-18 years, were tested twice a year for eight years. Several hundred maladjusted children, including left-handers, stutterers, deaf mutes, and children with asocial behavior were studied for comparison. Factors studied were writing speed, pressure, and continuity, using an instrument called a graphodyne. Girls were found to surpass boys of the same age in showing mature writing. Sex differences in speed and pressure were greatest when puberty started. Around the twelfth year the script becomes less pleasing and less regular, indicating a temporary confusion. By age 18 no differences were noted between the sexes. In her studies

with young children, Roman also noted that the scribble of one child can be easily distinguished from that of another (Roman, 1952).

A study by Allport and Vernon in 1931 was based on three assumptions: movement is expressive of personality, personality is consistent, and other expressive movements of an individual are consistent with one another. Allport found that individuals with an inhibited pattern of behavior show it in their gait, their writing, their gestures and expressions (Roman, 1952).

Saudek, another early investigator of handwriting, used a microscope, pressure board, and slow motion pictures to investigate script. His experiments included all nationalities and classes. One of his main contributions was the development of a table listing 14 traits "related to the law of movement." He also listed 10 general traits, any four of which when occurring in the same handwriting were to indicate dishonesty in the writer. Saudek also noted that signs of genuine handwriting more often appear at the end of words as well as the end of the page, line or sentence (Saudek, 1978).

Some analytical psychologists, especially Jung and his followers, made significant use of doodles as an aid to insight. Jung also noted that poor penmanship and ugly handwriting may indicate maladjustment, neurotic negativism,

or developmental disorder (Roman, 1952).

Findings and ideas of the early researchers are still being used by working graphologists today.

Projective Tests

Projective tests have been used as tools in psychology for some time. Some of these tests include: Rorschach, Holtsman and other inkblot tests, Thematic Apperception Test, Sneidiman Make a Picture and Story Test, and the Twitchell Allen Three Dimension Apperception Test. Expressive movement types include: Goodenough Draw-A-Person Test, House-Tree-Person Test (Buck), Myokinetic test (requires a blindfolded subject to draw different types of lines freehand in various planes), and handwriting analysis. "'Sign' interpretations (tying specific personality traits to exact details or signs in inkblots, drawings, or handwriting) have never validated well for any projective techniques, and it is often said that validity is always the clinician and not his tools." In general global validation has done best among these tests. Since signs may change in meaning as they interact with other signs, it is not possible to interpret in a consistant manner from subject to subject (Nevo, 1986).

In 1976 Michel indicated, "a vast amount of empirical research has shown that there is less consistency in behavior than these theories (i.e. personality theories)

would lead us to expect." Because behavior is situation specific it is not very useful to characterize people in broad terms (impulsive, dependent, etc.) because normal people will show significant variability in their behavior even across similar situations (Nevo, 1986). Nisbett and Ross noted, "the same trait can cause a whole range of different behavior and even opposing ones." Two different people even when put in the same situation, even if they possess the same trait, may respond differently. Some traits may be attributed to an individual without an actual indication of degree. For example, how do you "label" a person who is occasionally dishonest or occasionally original? Traits may also indicate latent dispositions that never occur because of a lack of opportunity, incentive, etc. (Nevo, 1986).

Graphology has neither been better nor worse validated than other projective techniques. This conclusion came after a study done with five graphologists who wrote one page summaries of ten different subjects. Original attempts of sign validation proved unsuccessful as it does in most projective techniques (Crumbaugh, Stockholm, 1977).

From a personal perspective the author realizes from experience that an analysis of one's handwriting can be very impressive. This might be explainable. "One powerful way to make strangers believe that you know all about them is to

give them a character reading composed of certain statements that though vague, contradictory, or universally true-are considered by just all people to be uniquely descriptive of themselves." In 1949, Forer did a study where he gave all people a general personality sketch which was supposed to be generated by a psychologist. In reality all people were given the same evaluation and on a 5 point scale that responded with an overall average of 4 in agreement with the sketch. Snyder indicated that in order to enhance a positive effect the client must be prepared in advance to believe that a reading is done uniquely for them, that a method of some repute be used, or that the validity of the method is accepted by the client. Hyman also suggested that in a personality sketch, 75% of the desirable items should be specific and 25% of the undesirable items seen as general. He also states this can be improved on if the reader can interact with the client and is sufficiently sensitive and observant. A favorite method is to begin with vague generalities and let the client reactions direct the truth (Nevo, 1986).

Some graphologists get so good at the techniques listed above that they genuinely believe in the validity of their analysis even in the absence of scientific evidence. The job of the researcher is to isolate some of the above techniques from any study.

Research Methods

"There is a tendency to believe that the validity of graphology must first be proved before it can gain access to the hallowed halls of the university. This view... is not only wrong but shortsighted. For in the first place up till now there has never been a clear comprehensible and irrefutable proof produced against handwriting analysis. Secondly... it is a socio-psychological fact that without the university, graphology has been called upon to judge individuals abilities..." (Lockowandt, 1988). Lockowandt described two models that could be used to validate handwriting. The first model (model 1a) is an attempt to find correlations between graphic characteristics and the criteria. No consideration is taken of the graphologist, his intuitions, his conclusions or his thinking process. The second model (model 1b) is validation at the interpretation level, drawing special attention to inner processes. Model 1a can be criticized because the choice of graphic characteristics is limited. It is possible that researchers may select handwriting characteristics which may be methodically easy to work with, but of little significance diagnostically. In model 1b it is up to the graphologist himself as to which characteristics will be chosen on the basis of graphological judgement." The disadvantage of such testing methods is that in the case of

negative results it is not clear whether these are due to the handwriting, the diagnostic instrument, or those assessing it. The greatest objection to such experiments is that they in fact simplify the reality of the graphologists diagnostic work too much..." (Lockowandt, 1988). Lockowandt suggests four considerations in the attempt of graphological validation: Attempts to validate shouldn't be made using internal criteria such as tests, and questionnaires since their very validity is questionable. Attempts to validate should be made using external criteria, whereby professional experts judgements of practice are best suited. The professional experts create an average judgement on the basis of the related graphological assessments. The correlation of both average assessments forms the measurements for validity. The communication between professional experts and the graphologist should be kept free of disturbing influences. When judgements do diverge and their is an absence of validity one should first look for possible errors in the transmission of communication and then recheck the experiment (Lockowandt, 1988).

There are at least four ways to design a graphological study. With the sorting method a graphologist examines a group of writing scripts and sorts them into bipolar categories. Sorts more accurate than chance indicate validity. When a graphologist uses the matching method an

attempt is made to match personality descriptions of individuals with samples of handwriting. With the ranking or rating method, the graphologist ranks or rates whole handwriting samples on a set of personality traits, correlations of these rankings with other scaled measures are the validating criteria (William, Berg-Cross, 1977). A fourth method, which will be referred to as the graphometric method involves measuring specific handwriting characteristics (i.e. slant, wordspace, etc.) and correlating these characteristics with specific personality traits. The first three methods are criticized on the following grounds: They provide little insight into the actual clues which graphologists use in holistic analysis, and they are weak in satisfying scientific requirements of objectivity. The fourth method meets the scientific objectivity requirement but tends to simplify one to one relationships with handwriting characteristics and their corresponding personality characteristics. The fourth method tends to ignore the interrelationships of many handwriting factors. One method in which both general aspects and specific traits can be studied at the same time is factor analysis. Through factor analysis groups of handwriting traits can be related to personality traits (Williams, Berg-Cross, 1977).

Methods of Graphological Measurement

In studying handwriting there are a number of considerations. Graphometric methods involve measuring such variables as letter height, line space, slant, word space, etc. Graphoanalysis on the other hand emphasizes stroke formation in the handwriting and attempts to integrate the many characteristics for an analysis. Holistic graphology looks more at the entire handwriting rather than individual strokes. From the standpoint of research, holistic methods may be the most difficult to study since validity has more to do with each individual practioner rather than the process itself. Therefore repeatability of holistic studies may be more difficult.

Mueller-Enskat worked for many years and published a series of books on handwriting psychology. Existing handwriting elements were arranged in a new methodical way, thus making diagnosis easier and more objective. Single handwriting elements are partially measured, partially evaluated, and are graded according to their descriptions and range. First, graphic elements of lesser complexity are considered. Measurements of variables such as size, width, and slant are compared to median values. Additional evaluations of the writing process including traits such as pressure, sharpness, and pastiness are considered. Additionally clear cut graphic elements which are recorded by estimating or counting are reviewed. Such variables

include simplification, ornamentation, and forms of connection. Also graphic elements of greater complexity such as regularity-irregularity, tempo, and left-right tendency are considered. Secondly, impression qualities are then evaluated. These include tension, rythym, originality, harmony, movement, and form (Nevo, 1986).

Graphological studies

Various approaches have been utilized in graphological studies. Classification of such studies can be difficult at times since they may fit in several categories on occasion. Four categories have been identified for the purpose of this paper. Category 1 includes graphology compared to personality inventories and intelligence tests. This type of comparison is quite popular because most personality and intelligence tests have undergone considerable scrutiny and have some established validity. Category 2 includes comparison of graphology to individual evaluations (usually professionals). Such studies must assume that the evaluators are competent. Category 3 includes the comparison of graphology to some type of measurement other than validated test instruments. Evaluations may include sales success or other company evaluation instruments. Again there is an assumption that the evaluation measurement is measuring what it is supposed to. Category 4 involves psychometric measurements and comparison to other evaluation

methods. This category could involve other categories at times. Psychometric measurements have a high reliability but tend to isolate personality characteristics from each other and lack any holistic approach.

Graphology, Personality Inventories, and Intelligence Tests

A study involving the Myers-Briggs Inventory and handwriting characteristics involving 32 subjects selected from 136 control subjects from International Graphoanalysis Society (IGAS) publications compared handwriting characteristics to the four major Myers-Briggs groups (Intuitive-Feeling(N-F), Intuitive-Thinking(N-T), Sensing Perceiving(S-P), and Sensing-Judgemental(S-J)). "The data affirms specifically the Myers-Briggs Type Indicator references to entirely different modi operandi between sensing and intuitive populations." Although the study had interesting comparisons no statistical probabilities were covered and no practical applications were suggested. It was noted that handwriting analysis is a projective technique contrasting with the Myers-Briggs which is a self-descriptive instrument. Also it was noted that in 1933 Allport and Vernon demonstrated that the nature of any holistic assessments modality is very difficult to validate and often eludes statistical grasps (Werner, 1983).

Four American Handwriting Analysis Foundation (AHAF) certified graphologists Lucia Callis, Jean Hartman, Dorothy

Hodos, and Geri Stuperich analyzed the writing of 30 members of a class of 123. Personality profiles were completed on 30 of the members by the graphologists. Twelve of the thirty returned to find results and all but one felt that the profile done by the graphologists was more accurate than the California Psychological Inventory (CPI) profile. "It seems clear, said Mr. Williams that students were decidedly more impressed with what graphology revealed including the negative comments." In addition, the graphologists were often able to identify key traits that the CPI does not cover (AHAF News, 1974). A study such as this although interesting has no statistical evidence and therefore is suspect.

A study by Moore and Gillaland involved Jungian attitudes and handwriting. Each student in the study was provided a description of Jungian attitudes and functions. Subjects were instructed to put their name on a piece of paper and note which of the attitudes affected their habitual behavior. They were also asked to note which one of the four functions (sensing, intuitive, thinking, perceiving) was primary. Subjects also took the Keirsy Temperament sorter and their scores were collected. Handwriting samples placed on 8 1/2 x 11 paper were analyzed by the two researchers. A comparison of the analysts findings with the subjects own as well as the test results

indicating the graphologists had predictions greater than chance level. The author of the study is convinced that Jungian psychological types can be identified by handwriting. None of the graphological signs for extroversion correlated significantly with extroversion scores from the inventory. Analyzing the data separately for both sexes did not change the results. Males printing capital letters were associated with low neuroticism. Writing capitals small was correlated with high lie scores (Moore, 1982). Moore was contacted by this researcher and much of his literature and advice were utilized in developing the thesis topic.

A study of the Thematic Apperception Test (TAT) and graphological personality profiles included five males and five females. Thirty-nine graduate students and 46 undergraduates judged the subjects using the 13 card TAT test. Four variables were studied: intellect, affect, traits, and adjustment. Interpretations were done by a TAT specialist. Handwriting samples of neutral content were analyzed by a professional graphologist and a personality sketch was written. Two sets of 5 profiles (TAT) and its analysis was assembled. The judges were asked to match the TAT profile, each denoted by a letter and the graphological analysis each indicated by a roman numeral. The two sets of analysis were labeled in a scrambled order. Judges were

told if they matched all five pairs correctly they would be awarded a five dollar bonus. Observed frequencies of correct matching were 19, 28, 19, 26, 16. Nine was the number of correct matches that would be expected on the basis of chance. In Set 2 (17, 11, 16, 10, 20) the number of correct matches that would be expected by chance was eight. The chi square significance for both sets of data was .001 (Klein, Harrison, Ross, LaMonaco, 1973).

A study involving graphology and the California Psychological Inventory involving 27 high school students reached the following conclusions: "Graphological analysis is not a generic description of a personality but it clearly distinguishes the diverse profiles. Observation was based on objective data from the graphic sign and not the personality of the graphologist. Graphology is able to show specific differences in personality." (i.e. It is possible to tell whether a writer is male or female.) Researchers did indicate that comparing a psychological test to graphology needs some refinement (AHAF News, 1974 4th Quarter).

A study involving the Myers Briggs Type Indicator rated graphological behavioral traits with the four MBTI clusters(SP, SJ, NT, NF). This involved 32 random selected employed residents. Although a number of relationships were indicated in this study, there was no statistical treatment

of the results. It was therefore difficult to draw any useful conclusions (Werner, 1983).

A study involving the Minnesota Multiphasic Personality Inventory (MMPI) and graphology yielded the following results. Graphological signs which were studied included droopy garlands and repressed anger (indicated by straight inflexible strokes, very heavy pressure on the t-bar, irregular pressure, and hooked stingers). All valid MMPI profiles with a t-score at or above 70 on the depression scale were included in this study. The control group included 20 valid MMPI scores below 70 on the depression scale. The graphologist was not aware of the MMPI score. The droopy garland indicator proved to yield significant results at $p=.001$. The repressed anger indicator also was significant at the $p=.001$ level. It was noted that although the handwriting indicators are statistically significant for depression, not everyone who has such indicators is depressed (Bryden, 1988).

Connective forms in handwriting were compared to results of the Edwards Personal Preference Schedule (EPPS). Five subjects were matched by people who knew them, to one of five (blind) graphologists. Total data indicated a significance of $p<.001$. Arcade linkage was predicted to represent a person who scores high on the autonomy subscale of the EPPS. Angular form scored high on the order

subscale. Mixed connectives had no predicted relationship (Lemire, 1981).

Lemke and Kirchner (1971) found 6 of 16 handwriting factors could be predicted by 5 of 10 personality factors. The concluded clues about personality could be deduced from handwriting (Parrish, 1988).

A study involving psychiatric groups and holocaust victims showed disturbed rythym and disturbance of form and space. The holocaust victim handwriting samples showed the highest frequency of deterioration and disorders. The Bender-Gestalt, Draw-A-Person, and Rorshach test were used in addition to the graphological assessment. The researcher stated, "... in this project the reliability and the validity of the psycho-graphological test stands out clearly amongst other psychological tests, producing the same if not more significant, statistical results" (Nevo, 1986).

A study involving the Guilford Zimmerman Temperment Survey (GZTS) and graphological traits concluded the following: The traits of ascendence, social interest, emotional stability, objectivity, thoughtfulness, and masculinity were proposed to be equally predictable by both graphological analysis and by the GZTS (Thein, 1972).

Correlation studies with the the 16PF test and graphological measurements showed the following tetrachoric correlations: left border size -.31 (personality variable

A), right border size -.41,(personality variable B) distance between lines -.31(personality variable M). A tetrachoric correlation of .38 would be required to refute the null hypothesis at the one percent level and .29 at the five percent level. Guilford points out that tetrachoric correlations are subject to standard errors at least half again the size of the standard errors of the standard product-moment correlations. Conservatively, no specific assertion can be made to the statistical significance of multiple correlations. This study not only identified positive correlations but also suppressor variables. For example, surgency (defined as enthusiastic, cheerful, and talkative) was best predicted by the width of the right border (r=.2), the height of the lower zone (r=.2) with a multiple correlation of .534. The prediction is enhanced by permitting the height of the upper zone letters to act as a suppressor. Surgency is also a variable in extroversion. The writing of surgent individuals also tends to be faster, have greater paragraph indenture depth, smaller distance between words, and a smaller number of total loops. The strongest symptom of surgency in this data was a smaller word distance span. Prensia (defined as sensitive, esthetic, tenderminded, and intuitive) was best predicted by middle zone height (r=.31), span of inclination (r=.31) and lower zone height plus upper zone height (r=.41). Distance

between lines also acted as a suppressor. Multiple correlation was .547. In general the results of this study tends to support the assertion of the Klages school of graphology which asserts that no single handwriting trait can be taken by itself out of context to predict a personality trait and conversely no personality trait manifests itself in but a single handwriting trait (Mann, 1961).

Specific signs especially those which are based on form structure show a positive, but weak, association with the writers intellectual level. Approximately 30 studies have been published using graphology in the diagnosis of intelligence. Gesell (1906) noted a correlation (perceived by layman) between the accuracy of handwriting and performance in school on one hand, and general intelligence on the other hand. Oinonen (1961) quoted by Wallner reported a correlation of .38 between intelligence as measured by a test of school readiness and quality of writing. Lockowardt (1980) found no indication that the judgement of children's handwriting by the teacher has any significance. Timm (1967) conducted a study comparing the Intelligence Structure Test and the Figure Reasoning Test and the "general intelligence" scale of the 16PF test to handwriting samples. There were 80 people in the sample and 84 writing variables studied. Twelve of these variables

were considered significant (Mields 1962, 1964). A correlation coefficient between graphological ratings of intelligence and the Weschler IQ varied in the range of .17 to .46 with a median of .33. Significant correlations between handwriting and intelligence do exist. Signs of form and formation are especially significant. Graphological assessment of Intelligence is never based on single signs, but on a group of signs grasped in an intuitive manner (Nevo, 1986).

Graphology and Individual Evaluations

Three graphologists, three graphic artists, and three lay persons analyzed biographies and attitude statements of 56 cadets in a parachuting course. The samples were written under stress (the first night jump) and also in a relaxed situation at the end of the course. The three groups of raters were asked to identify which script was written under stress and which under a relaxed state. All three groups failed to classify handwriting beyond chance level (Nevo, 1986).

A study involving three handwriting analysts and two counselors compared the rating of all five professionals. Handwriting samples of the subjects were all rated with the same rating sheets. Correlations between the ratings of the handwriting analysts and the counselors were as follows: Frankness = -.11, self confidence = .22, clarity of goals =

.53 (significant at .01), emotional control = -.5, and rigidity = .27 (Kimmel, 1966).

A study was conducted utilizing handwriting analysis and comparing it to structured personnel interviews. Of 180 validity coefficients calculated, only six were significant. Graphologists outperformed interviewers in statistically predicting concentration, independence, and neatness. Interrater reliability ranged from .24 to .92. The validity coefficient for graphologists was .10 and for interviewers was -.03. The validity coefficient for neatness was .57 (Parrish, 1988).

Kimmel and Werthheimer (1966) studied frankness, self confidence, clarity of goals, emotional control, and rigidity. Counselors of 22 subjects who knew them well rated them. Graphologists had substantial agreement on clarity of goals (Parrish, 1988).

At study by Keinan (1984) studied the predictor success in military officers training. Four of six graphologists, three of six psychologists, and none of the laypersons achieved a significant correlation between the predictor and the criteria (Parrish, 1988).

Fifteen hundred students were studied in Zurich. The experimental group showed scholastic difficulties. The study included a random sample of 20 copies of handwriting. The experimental group at a significant level showed more

scatter in the following variables: leftward tendency/rightward tendency, disorder of space, confusion of space, width of the left margin, differences in length, and meagerness/fullness. The experimental group also exhibited a wider right hand margin. The researcher noted that relatively small number of handwriting characteristics is sufficient to differentiate young people with scholastic difficulties. The matter in which writing space is utilized is of considerable significance. Close attention should be paid to both over-organization of space as well as disorder of space. Writing of the experimental groups also showed more covering strokes and more frequent retouching (Nevo, 1986).

A study by Frederick (1968) examined suicide notes. Detectives, secretaries, and graphologists were asked to identify suicide notes out of a group of four notes. Graphologists were significantly more successful than the others in identifying suicide notes beyond chance (Nevo, 1986).

Nevo and Halevi indicated that studies involving matching persons known to the scorer with graphological reports to have a probability greater than chance. However it was stated, "significant as the results of the matchings are, it does not seem that the validity of graphological analysis was proved to be very high. On the basis of these

findings, the practical application of graphology as a single diagnostic tool cannot in fact be recommended, too many misses are involved" (Nevo, 1986).

Graphology and Personnel Measurements

A five year study was conducted with 106 life insurance agents using the CSSP (character composite sales profile - which is a graphological report). The graphological report measured motivation, aptitude, and interpersonal skills. CSSP scores were then separated into ranges. At range zero through fifty, twenty eight agents were hired and two succeeded. At range fifty one through seventy three, sixty four agents were hired and sixteen succeeded. At range seventy four through eighty nine, fourteen agents were hired and ten succeeded. Seventy one percent of the successful agents were found in the most ideal score range. Correlations of .6 appear at the 74-89 range and -.98 at the 0-50 range. The researcher noted that because there was a very high accuracy of failure prediction this test may be used to concentrate on that aspect (Clayton, 1986).

Couve (cited in Alport and Vernon, 1967) studied employees of the Deutche Riechsbahn. Foreman rated employees on efficiency using a three point scale. A graphologist who rated the writing, agreed on ten of the twelve ratings (Parrish, 1988).

Sommeman and Kerran (1962) obtained correlation

coefficients of .47, .48, .44, and .36 in a study involving the comparison of graphologists ratings and company ratings of employees (Parrish, 1988).

Rhoda Wieser (1928) studied 1000 handwriting studies of criminals. Handwriting of 700 criminals was compared to the writing of 300 non-criminal professionals on the same education level. The characteristic differences lie in the dynamic movement of the middle zone. Criminal handwriting tended to show a softening dissolving tendency or a hardening straining tendency or both side by side. In criminal handwriting basic rhythm is weak and the greatest weakness in rhythm was found in the handwriting of murderers and of sex criminals. Non-criminals hardly ever displayed weakness of "basic rhythm" (Nevo, 1986).

Wing and Bradley in 1978 presented data showing that alcohol consumption had an effect on the size of cursive writing, on the increase in the average size of ticks and variability of tick size (Nevo, 1986).

Handwriting scripts of 60 employees in an industrial organization were analyzed by a graphologist on 13 job related items. The correlation between the graphological ratings and the subjective assessment of performance were highly significant for ten of the items. The scale items were understanding, perseverance, thoroughness, verbal expression, independence, discipline, interpersonal

relations, responsibility, honesty, leadership, initiative, motivation, and productivity (Nevo, 1986).

Klara Roman investigated the pressure factor in writing of 2,145 Hungarian school children of both sexes and various ages. Results showed that muscular strength had no bearing on the degree of pressure exerted in writing. It was pointed out that a significant correlation between writing pressure and inclination to purposeful activity, capacity for concentration, and endurance (Roman, 1952).

Graphometric Studies

Pascal concluded that certain aspects of handwriting are significantly correlated to certain aspects of personality. His study was graphometric in nature and involved 22 subjects and 36 personality variables. Twenty midzone letters which were not captials and no lower or upper projections and were not beginning or ending letters of a word, were measured. Distance between words was also measured. The researcher attempted to devise measures which would, as nearly as possible express the look of the handwriting in quantitative terms. Of the 39 handwriting variables only 22 had significant scatter for rank order. Handwriting variables which showed significant correlations at the one percent level were as follows: Upper projection-play, distance between words-play, midzone ratio-projectivity, width of stroke-excathection and harm

avoidance, distance of I-dot-infavoidance, balance of projection-abasement and dominance. Personality variables were taken from the book "Exploration in Personality". Handwriting variables were chosen arbitrarily (Pascal, 1943).

A trait sign study involving 685 fraternity and sorority members rated by 413 individuals yielded significant results. The traits studied included emotional stability, dominance, cultured mind, high strung temperament, and intelligence. All handwriting samples collected received absolute numerical values with respect to 22 selected handwriting signs. In general a sign value was measured at least 15 times. The following were identified as significant discriminating and corresponding traits: Upper zone height-cultured mind, lower zone height-intelligence, middle zone breadth-intelligence, upper zone breadth-intelligence, middle zone height divided by upper zone height-cultured mind, middle zone height divided by upper zone height-cultured mind, slant-intelligence, and total expanse-intelligence. Interrater agreement rated as follows: Distance between letters -.96, midzone breadth -.94, upper zone breadth -.99, and lower zone breadth .98. From an overall standpoint this study was considered inconclusive (Birge, 1954).

Studies Questioning Validity of Graphology

Several additional studies indicated graphology to be invalid. Super (1941) found a single graphologist advertising in a newspaper and had twenty-four students mail a handwriting sample for evaluation. The graphologist was unable to predict the vocational interest of the students as indicated by the students responses on the Strong Vocational Interest test (Parrish, 1988). Crider (1941) gave a battery of 13 tests to 18 subjects. Sixteen traits were measured and defined. Two graphologists rated each subject. Rank order correlations were very low and non-significant (Parrish, 1988). Rataeli and Klimoski correlated salespersons self-ratings for individuals to graphologists ratings of ten job related dimensions pertaining to real estate salespersons. All validity correlations were very low (Parrish, 1988). Zdep and Weaver did a study where graphologists rated 63 subjects on each of 13 personality traits believed to be necessary for success in life insurance sales. Their ratings were correlated with a criterion score based on the first year commission ratings and tenure on the job. All correlations were low or negative. They concluded that handwriting analysis may not be able to predict success on the job because success is not measured by the availability of desirable traits but by successful utilization of them (Parrish, 1988).

Graphology and Reliability

Although this study involved validity and not reliability, it is obvious that reliability is also an important concern. Therefore, several reliability studies will be referenced.

Fisher (1964) used one week interval correlations to test reliability in graphological scores. Reliability scored a correlation of .84. A study of interrater reliability by Binge (1954) using five graphometric indices in fifty scripts redone by another person indicated correlations ranging from .94 and .99. Kimball (1974) measured an interrater correlation of .9. The range of most reported reliabilities of graphometric measures is .70-.90, graphoimpressionistic is .40-.80, and graphodiagnostic is .30-.60. It was noted "when compared with projective techniques, the reliability of graphology does not seem inferior" (Nevo, 1986).

Crider (1941) had a graphologist rank each of 18 subjects on 16 different traits. One month later the rating was repeated with a correlations of .71-.94. An interrater agreement of .18 was indicated when two graphologists were compared (evaluating adults on 16 psychological traits). Keinan, Barok, and Ramati (1984) showed significant reliability of .21 through .37. Zdep and Weaver (1967) indicated significant reliability correlations on 13 traits of .50 through .86. Galbraith and Wilson (1964) compared

three judges and five personality traits and found a reliability correlation of .87 to .61. Binge (1954) studied five measurements (midzone breadth, upper zone breadth, lower zone breadth, and lower zone height). Correlations of .94-.99 were indicated (Parrish, 1988).

Since this study keys in on one facet of graphometrics and its validity as measured against the MBTI, previous studies involving validity were cited. A review of the literature pointed out some consistencies. Studies involving graphometrics tended to have low validity, validity varied considerably depending on the graphologists involved, multiple traits integrated by competent graphologists tended to be better predictors of personality, and although significant correlations may exist in a study they may not necessarily lead to practical application. Many studies agree that graphology should not be utilized as a sole method of evaluating an individual.

Chapter 3

PROCEDURES

Subjects

Participants in the study were drawn from students enrolled in a college preparation course offered through the student counseling services of The University of Nebraska at Omaha (UNO). All students had not declared a major and were utilizing the course to familiarize themselves with their skills and educational goals. All students taking the course completed the Myers-Briggs Type Indicator. Students were given extra credit for involving themselves in the study. Information was gathered over a series of two semesters and a total of 49 students were involved in the project.

Procedure

During the course, students that volunteered were given a form attached to a blank sheet of paper. The following information was included on the form:

RELEASE OF INFORMATION FORM

You are being asked to participate in a research project. If you are willing to participate please write (in cursive) a paragraph of 75 words or more. The paragraph may be autobiographical or you may choose such topics as the war in the Persian Gulf, your favorite sport, etc. By signing

your name to the bottom page you are agreeing to participate in this study and to release your Myers-Briggs test scores to the researcher. Confidentiality will be assured by using your social security number as the I.D., and not your name. Samples of your handwriting may appear in the appendices of the research project.

(use backside of sheet if necessary)

Instrumentation

"Jungian theory was taken into account in every question and every step of the Myers-Briggs Type Indicator (MBTI)" (Myers-Briggs, McCaully, 1985). In constructing the MBTI three assumptions were made: True preferences really exist, that persons can give an indication of the preference that combine to form type, either directly or indirectly, on a self report inventory, and that preferences are dichotimized and that two poles of preference are equally valuable. A forced choice format was used to minimize the bias of acquiescence and social desirability response sets. There was a necessity to keep the scales as uncorrelated as possible, otherwise a strong preference scale would distort the evidence for another scale. For types with sufficient numbers, samples were drawn from the upper and lower half of the students class. Priority was given to over and under achievers to lessen the difference in IQ between less competent students. The same keys were used for both sexes

because item analysis showed that both sexes item and popularity ratios were similar on extroversion-introversion(E-I), sensing-intuitive(S-N), and judging-perception(J-P) scales. A tie breaking formula was developed. This formula involves finding the difference between the points for each pole, doubling the difference, and adding a point if either introvert(I), intuitive(N), feeling(F), or perception(P) is the larger pole or subtracting a point if either extroversion(E), sensing(S), thinking(T), or judging(J) is the large pole. The logic behind adding a point to the I, N, P preferences is that they are less frequent in the population. If a person is that close to a preference there is probably some environmental response pressure form the majority preference. When the scoring form F was almost completed, the zero point on the E-I tended to have a shift to the extrovert pole. In order to correct the error, external evidence was needed to find the transition between introverts and extroverts. It was found that intelligence measures showed discontinuities that would locate the E-I division point. A large sum of 4000-5000 was needed to determine the differences (Myers-Briggs, McCaully 1985).

Reliability estimates for the MBTI vary somewhat. Internal consistency product moment correlations on the E-I index are .83. Actual test retest scores are significantly

different from chance. Validity was determined by comparing the MBTI to four other extroversion-introversion type tests. The results were:

1. Eysenck Personality Questionnaire E-I $r=.74$ $p<.001$
2. Jungian Type Survey E-I $r=.79$ $p<.001$
3. Omnibus Personality Inventory Social Introversion $r=.75$ $p<.001$
4. 16PF extroversion $r=.51$ $p<.001$

About 75% of the population is classified as extroverted (Myers-Briggs, McCaully 1985).

The MBTI was utilitzed in determining the extroversion or introversion level of the subject. Although each subject took the entire MBTI, only the extroversion-introversion was utilized for the study. The score on a scale is the difference between the sums of the weights. A person's E score is the sum of the weights for extroversion. The E-I score is the difference between E and I scores. The direction of this difference indicates which of the two categories is dominant (i.e. E score = 5, I score = 16 the E-I difference is I=11 and the person is classified as an introvert). The MBTI manual suggests interpreting scores in the following manner: 41 or greater - very clear (or 31> for the feeling pole) 21-39 - clear preference, 11-19 - moderate preference, and 1-9 - slight preference (Myers-Briggs, McCaully, 1985).

Myers-Briggs assessments were not given at the same time as the request for handwriting samples. Course instructors collected both the handwriting samples and Myers-Briggs scores and turned them into the researcher.

Initial determination of which graphometric characteristics to study was based on a monograph concerning graphology and the Myers-Briggs (Moore, 1988). The author Milton Moore was contacted by phone. When queried as to which graphometric measurements might best correlate with the Myers-Briggs he narrowed down the field to handwriting slant, wordspace, linespace, middle zone size, left margin size and right margin size. Further contacts were made with a graphologist in California, Paula Sassi, concerning how the graphometric measurements should be made. Suggested techniques for measurement were derived from an intermediate course text (Sassi, 1984).

Handwriting slant is almost universally considered a measure of how a person shows his or her emotions. The farther the handwriting slants to the right the more likely the person will be emotional and show it to others. A grapho-rule designed by Loyal Brush of Overland Park, Kansas was used to measure slant. Only letters such as t, h, d, and l were measured in order to stay away from nebulous slant measures found in thready writings. Slant was determined by drawing a line from the beginning of the

upsweep at the baseline to the uppermost portion of the letter and then using the grapho-rule to determine angle (See Appendix A). The grapho-rule numbers left slant letters 8, 7, 6, and right slant letters 1, 2, 3, 4, 5. Since this numbering system is not linear the numbering was restructured starting with the farthest left slant to be one and the farthest right slant to be seven. When enough handwriting was available 20-25 strokes were measured for slant, added up and averaged. The average score then was compared to the extroversion minus the introversion score on the Myers-Briggs Inventory. All graphometric measurements were compared to the E-I score. (For examples of measurement see Appendix A.)

Writing size can be very misleading and it is very important to determine how size is assessed. The researcher used middle zone size as an indicator based on Sassi's course manual (Sassi, 1984).

Middle zone letters include letters such as a, e, i, o, u, and middle portions of letters like p, d, b, c, g, h etc. The middle zone is measured in millimeters. A minimum of 20 different measures are taken based on words 5 letters long or longer. Measurements are scattered throughout the paragraph and then averaged. This measurement is critical because measurements such as wordspace and line space are relative to it. The size

average is than compare to the E-I value and a correlation is determined. (For examples of measurement see Appendix A.)

Measurement of wordspace was determined by measuring the distance from the end stroke of a word to the beginning stroke of the next word. A minimum of 20 different measurements were used. Word spacing was determined from as many different lines of writing as possible. A relative measurement of word distance was determined by dividing the average word space value by the average middle zone value (Relative word space= average wordspace/average middle zone size). (For examples of measurement see Appendix A.)

Line space is also determined on a relative basis by dividing the average line space by the average middle zone size. (RLS=average(LS)/average(mzs) where RLS=relative line space LS=line space and mzh=middle zone height). Since the amount of handwriting available limited the number of line space readings, fewer readings were taken than for the other space and size characteristics. In most cases 10 or more values were determined and averaged. (For examples of measurement see Appendix A.)

Left margin width was determined by drawing a line from the first word of the first full line of writing to the first word of the last line of writing and then following this line to its center and measuring the distance from the

left edge of the page to the marked section of the line. Right margin was determined by drawing a line from the last word from the first full line to the last word in the last full line in the paragraph. Because right margins tend to be much more irregular than left margins the researcher drew a right margin line which would best represent an average margin. This in itself was always a judgement call and would lead to some differences depending on who did the margin determination. Actual measurement was followed just as that of the left margin. (Details on this measurement are made available in Appendix A.)

Chapter 4

RESULTS

The raw data from this study can be found in Appendix B. Forty nine subjects completed the MBTI. Thirty of these subjects obtained a positive (E-I) score, indicating that they are considered extroverted. The sample included 61% extroverts. The MBTI manual reports that 75% of the general population is extroverted (Myers-Briggs, McCaully, 1985). Six of the extrovert scores were close to borderline (E-I) scores of 1, 1, 2, 3, 3, 3).

Table 1 shows the mean, median, standard deviation, and standard error of the handwriting characteristics which were measured. It should be noted that size, left margin, and right margin are measured in millimeters. Word space as well as line space are relative values determined by dividing word space (measured in millimeters) by word size and line space (measured in millimeters) divided by size. Percentage error for left margin and right margin was a bit higher than the other characteristics measured. This would be expected because less measurements were taken of these characteristics. The mean and median value for word space varied .4 standard deviations. This is explained by one handwriting sample that a rather large word space value of 4.1.

Table 1

Basic Descriptive Statistics

#values=49

	Mean	Median	Stand Dev	Stand Error
Slant	4.27	4.10	.87	.12
Wordspace	1.63	1.36	.68	.09
Size	2.38	2.43	.81	.11
Linespace	3.38	3.05	1.33	.19
L-margin	18.88	18.00	10.35	1.48
R-margin	18.76	18.00	11.72	1.67

Table 2 deals with the correlation coefficients between the various graphometric measurements and the E-I score on the MBTI. The correlation value of slant (r=.09) was somewhat surprising since it is almost universally accepted by graphologists that slant is an indicator of extroversion and introversion. Word space had a significant correlation of -.3001 which has a probability value of p=.0362. Since the relationship was inverse, one would expect greater extroversion as word distance decreased. Whereas this is a significant relationship, the statistics do not indicate a practical relationship. It would be hard to make any predictions based on these results. No other significant relationships were shown.

Table 2

Pearson Correlation Analysis
One to All : Independent(x) : comp (E-I)

Dependent(y)	r	p value
wordspace	-.3001	.0362 *
size	.215	.1466
linespace	-.1695	.2433
right margin	-.1692	.2451
lcft margin	-.1485	.1157
slant	-.09	.5386

* significant p<.05

Relationships of handwriting characteristics to each other are also noted in table 3. Size and linespace with a correlation of .85 indicates that larger writing tends to have greater spacing between lines. This correlation is unexpected since graphologists tend to believe that larger writing should indicate extroversion and that greater line spacing indicates introversion. The relationship of wordspace to linespace (r=.67) would be expected since greater wordspace should indicate introversion whereas greater linespace would also indicate introversion. Wordspace and size show a correlation of -.63. This relationship is also expected because according to theory closer wordspace indicates greater extroversion and greater word size is indicative of greater extroversion.

Table 3

Pearson Correlation Analysis
All to All

Independent (x)	Dependent (y)	r
e	comp	.988

continued Pearson Correlation All to All

independent(x)	dependent (y)	r
i	comp	-.988
e	i	-.95
size	lspc	.85
wspc	lspc	.67
size	wspc	-.63
slant	lmargin	-.42
wspc	e	-.31
lmargin	rmargin	.31
wspc	comp	-.30
wspc	i	.28
size	i	-.23
size	comp	.21
lmargin	i	.19
slant	rmargin	-.19
size	e	.19
lspc	i	.17
rmargin	i	.17
lspc	comp	-.17
rmargin	comp	-.17
size	lmargin	-.16
lspc	e	-.16
rmargin	e	-.16
lmargin	comp	-.15
slant	wspace	.12
wspc	rmargi	.12
lmargin	e	-.10
slant	comp	-.09
slant	i	.09
slant	e	-.08
lspc	lmargi	.07
wspc	lmarg	-.07
slant	lspc	.03
lspc	rmargi	.03
slant	size	.02
size	rmargin	.01

Table 4 shows frequency distributions of subjects scores for the characteristics studied. Of the characteristics listed only slant exhibited a distribution that resembles a normal distribution. Wordspace and linespace and right margin showed distributions skewed to

the right. Distributions of the composite score (E-I) were skewed to the left. This skew would be expected as it favors extroversion. A frequency distribution table was assembled in order to determine whether the handwriting characteristics were distributed normally. This information may be of use to further researchers in selecting which writing characteristics they would like to investigate.

Table 4

Frequency Distribution
Composite (E-I scores)

Range	# scores
-24 thru - 19.4	2
-19.3 thru - 14.7	3
-14.6 thru - 10	4
- 9.9 thru - 5.3	7
- 5.2 thru - .6	3
- .5 thru 4.1	6
4.2 thru 8.8	4
8.9 thru 13.5	6
13.6 thru 18.2	4
18.3 thru 22.9	10

Frequency Distribution
Right Margin (measured in millimeters)

Range	# scores
1 thru 6.6	6
6.7 thru 12.3	10
12.4 thru 18	11
18.1 thru 23.7	8
23.8 thru 29.4	8
29.5 thru 35.1	1
35.2 thru 40.8	2
40.8 thru 46.4	2
46.5 thru 52.1	0
52.2 thru 57.7	1

Frequency Distribution
Left Margin (measured in millimeters)

Range	# scores
2 thru 6.3	6
6.4 thru 10.7	8
10.8 thru 15.1	5
15.2 thru 19.5	8
19.6 thru 23.9	7
24 thru 28.3	3
28.4 thru 32.7	6
32.8 thru 37.1	5
37.2 thru 41.5	0
41.6 thru 45.9	1

Frequency Distribution
Line Space
(Relative value = line space (mm)/middle zone size (mm)

Range	# scores
1.59 thru 2.1	6
2.21 thru 2.62	11
2.63 thru 3.14	8
3.15 thru 3.66	8
3.67 thru 4.18	3
4.19 thru 4.70	5
4.71 thru 5.21	2
5.22 thru 5.72	2
5.73 thru 6.24	2
6.25 thru 6.76	2

Frequency Distributiom
Word Space
(Relative value = word space(mm)/middle zone size(mm)

Range	# scores
.68 thru 1.02	6
1.03 thru 1.37	20
1.38 thru 1.72	8
1.73 thru 2.07	7
2.08 thru 2.42	4
2.43 thru 2.77	2
2.77 thru 3.11	1
3.12 thru 3.46	0
3.47 thru 3.81	0

Range	# scores
3.8 thru 4.14	1

Frequency Distribution
Word size
(midzone size measured in millimeters)

Range	# scores
1 thru 1.36	6
1.37 thru 1.73	3
1.74 thru 2.1	10
2.11 thru 2.47	6
2.48 thru 2.84	9
2.85 thru 3.21	11
3.22 thru 3.58	0
3.59 thru 3.95	1
3.96 thru 4.32	2
4.33 thru 4.69	1

Frequency Distribution
Slant

Range	# scores
2.21 thru 2.64	1
2.65 thru 3.08	3
3.09 thru 3.52	3
3.53 thru 3.96	14
3.97 thru 4.4	9
4.41 thru 4.84	5
4.85 thru 5.28	8
5.29 thru 5.72	3
5.73 thru 6.16	2
6.17 thru 6.6	1

Chapter 5

DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

In general, the findings of this study indicate that there is no significant relationship between certain graphometric characteristics and extroversion or introversion. However, it should be noted that one measured characteristic, word space, did show a significant correlation with extroversion as measured by the MBTI. Mann in a study in 1961 noted that the strongest indication of surgency in his data was a smaller word distance span. (Surgency a component of extroversion, is defined as enthusiastic, cheerful, and talkative.) Although the correlation between word space and extroversion-introversion is statistically significant, it is too low to be of any practical significance. Slant of the handwriting and the extroversion-introversion score had a virtually no relationship at all. This was quite a surprise since most handwriting analysts maintain that right slanted writing tends to be more extroverted than left-slanted or neutrally slanted writing. Of the handwriting characteristics studied slant was the only one which exhibited a normal frequency distribution. Another unexpected relationship was the .85 correlation between size of midzone letters and space between lines of writing. According to theory a negative correlation would be expected. It must be noted that one to

one relationships may be difficult to show. It is generally accepted that everyone's handwriting is unique to them just like their personality is. It has been estimated that the chances of obtaining two identical writing specimens from different persons is less than one in 68 trillion (Parrish, 1988). In most cases it would be difficult to describe a personality in isolated sentences. A rather sophisticated monograph may be very descriptive of a personality, however. Keeping this in mind, the holistic approach to handwriting analysis probably has the best chance for significant results. Unfortunately any study involving the holistic approach to graphology may end up being a study of the capability of the practitioner rather than the method. It may be possible that handwriting analysis will always be more of an art than a science.

Many graphologists maintain that handwriting analysis is a projective technique which measures the subconscious more than the conscious. According to Jung diagnosing types can be difficult because the dominant conscious attitude is unconsciously compensated by its opposite. If this is true it could be possible that the MBTI is measuring the conscious attitude and the analysis of the handwriting characteristics is measuring the unconscious attitude. Under these circumstances little significant correlation would be expected.

It was mentioned in the acknowledgements that there is some disagreement within the graphological community. This is partially due to the fact that there are three approaches to handwriting analysis. The trait school advocates examining individual graphic signs which are thought to indicate specific personality traits. The Gestalt school advocates examining handwriting as a whole. This requires more judgement and intuition on the part of the graphologist. Graphoanalysis focuses on the objective interpretation of individual handwriting strokes while accepting Gestalt premise that people must be studied as the sum total of their atomistic parts (Nevo, 1986). Because there are several approaches to analysis, there is a difference of opinion on what handwriting characteristics match up with what personality characteristics. This results in a lack of standardization. Without standardization definitions vary and it is very difficult to do validity research.

Experimental Design

Several comments should be made concerning the design of the experiment. Graphometric variables were selected based on a recommendation from Milton Moore. The literature cited earlier referred to suppressor variables that could affect correlations. No suppressor variables were identified or measured. It is possible that if suppressor

variables would have been considered, more useful conclusions could have been reached.

If the definition of extroversion and introversion encompasses too many elements it may be necessary to identify each element and compare it to each handwriting characteristic. Extroversion can be broken down into smaller components. Mann in a 1961 study identified surgency as a component of extroversion. He also found that smaller distance word span in the handwriting increased the chance of finding surgency (enthusiasm, cheerfulness, and talkativeness).

Data were obtained through the university counseling service. A decision was made to use this department for the source of handwriting samples and MBTI test results because the MBTI is normally given to students in one of its courses. The great majority of these students were college freshman. The data collection method had several drawbacks. Data could be collected only once a semester. Most MBTI information was obtained at the end of the semester. The first contact made with the department was three-fourths of the way through the semester and few data were obtained. This resulted in waiting through a summer and collecting the data in the fall semester. Data were not obtained from the counseling department until December. Some of the MBTI scores were not collected resulting in a smaller sample than

was earlier expected. Time utilization during the data collection phase was thus poorly used. The second drawback using this group for a study is that it included a majority of college freshman. This may have resulted in inaccurate results. In 1964 Stricker and Ross found that type classifications had only moderate stability and indicator score distributions were not bimodal, so that the regression of variables on the MBTI scales did not change at the zero point. In the same report they rationalized that an unsatisfactory MBTI evaluation was understandable because their research subjects were college freshman, at an age when changes were comparably large (Werner, 1983). Since the MBTI was given to the student at a different time than the handwriting sample was collected it might be postulated that if college freshman were not consistent from week to week on how they would score on the MBTI, any comparison with handwriting collected on a different day may result in invalid conclusions.

Implications for Counseling

This study being a validity study involves establishing potential credibility of graphology as an instrument in establishing personality profiles. Because of the complexity of handwriting and the almost infinite number of permutations of handwriting characteristics, a great deal of

research must be completed before any answers are found. Basic studies such as this one should help point future researchers in directions that may prove more practical.

Graphology, if valid, has tremendous potential for the counseling community. Because a historical record of handwriting can be established with many individuals, longevity studies of various psychological problems could be studied with ease. For an example if the handwriting samples of schizophrenics or bipolar disorders could be studied from early childhood through adulthood, possible early diagnosis techniques could be developed. Since handwriting samples can be obtained easily it would be possible to develop a psychological profile without administering tests such as the Minnesota Multiphasic Personality Inventory (MMPI) which people may tend to be less candid with. The MMPI has a lie scale which may invalidate the score but an invalidated test is of little use to counselors and psychologists. Europeans consider graphology important enough to include it in their curriculum for doctoral candidates in psychology. Graphology has a much longer historical track record in Europe than it does in the United States. The emphasis in Germany, Italy, and France tends to be holistic graphology whereas the United States has a heavy emphasis on graphoanalysis, a method developed by Bunker in the 1930's.

An important part of validity studies involving graphology is the establishment of norms, so that there is consistency throughout the graphic community.

Three thousand American firms currently incorporate graphology into their selection systems (Nevo, 1986). Evidently a number of people are already convinced of the validity of graphology. Since career counselors are closely involved with such selection systems it behooves them to utilize as many methods as possible to optimize the selection system. The counseling community has much to gain and little to lose by encouraging additional research in graphology.

Comments

Both handwriting and personality are exceedingly complex. Not only are both dynamic but both each unique to every individual on this planet. The computer age may be the answer to studying such a complex subject. With the advent of super fast computers with gigabytes of memory it is no longer impractical to tackle a study with millions of permutations. Research correlating hundreds of handwriting characteristics can be done with relative ease by anyone who owns a state of the art computer system. Unfortunately many in the graphological community in the United States are not inclined to do research. Without any credibility established, handwriting analysis will always be classified

with such interests as astrology. Graphology may or may not have valid uses in psychology and counseling. The tools are now being made available to do sophisticated research. We no longer have an excuse to do nothing.

Many would argue that handwriting analysis is an art and not a science. Such an argument implies that the practitioner and not the method is more important. Research at this point tends to verify such an argument. However, because we have better instrumentation for statistical study and more sophisticated techniques, even the "art" side of graphology is open for potential study. Artificial intelligence computer programs coupled with sophisticated graphic and scanning technology will soon allow researchers to scan a handwriting sample into a computer, apply all known graphology techniques to the sample and produce a psychological evaluation based on the sample. Obviously the important consideration is to determine the validity of all previous graphological suppositions. Banks are currently developing systems that will be able to identify signatures on checks and documents. The technology is here, we should be using it for research on this topic.

Several states are taking graphology seriously. Rhode Island and Iowa have introduced legislation concerning the use of handwriting in personnel selection. Handwriting collected for selection purposes must be prefaced with a

warning that such handwriting will be analyzed. Some people maintain that handwriting is public domain. If it is being used to determine the future career of a person is it still public domain? Ethics questions will abound concerning the use of graphology. The researcher has interviewed graphologists who claim that they can identify alcohol and drug abusers in handwriting. Some graphologists maintain they can identify potential sexual abusers. These claims harbor potential abuse as well as potential use. If 3000 companies are using graphology for personnel selection we need to take graphology seriously. Valid or invalid graphology needs more research.

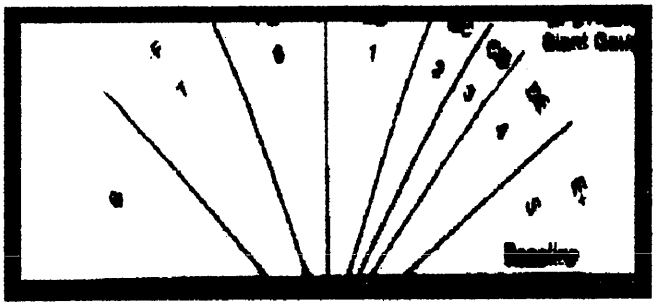
Recommendations

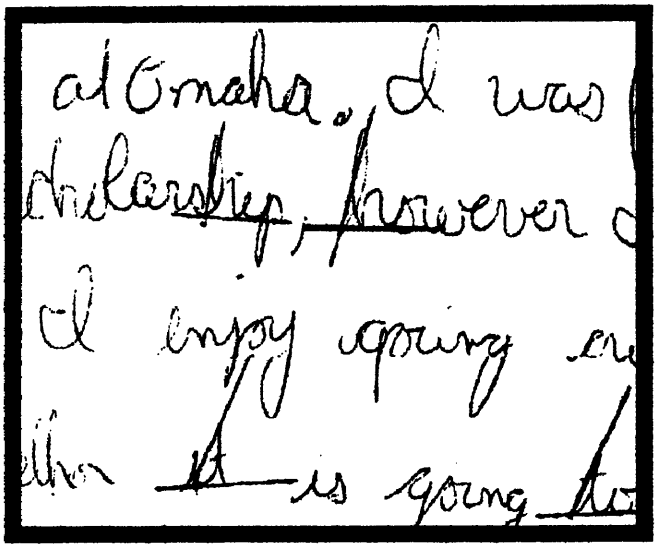
Standardization within the graphological community is poor at best. Research means very little if there is little agreement on definitions and relationships. Graphologists, graphoanlysts, and all handwriting analysts need to converse on this topic of standardization. Then they must establish guidelines on areas of agreement, define areas of disagreement, and establish studies to determine what guidelines are actually valid. Graphological groups must be willing to exchange research information freely.

Psychologists, graphologists, and computer specialists need to unite and research graphology. Enough research is available in the literature to indicate that some validity

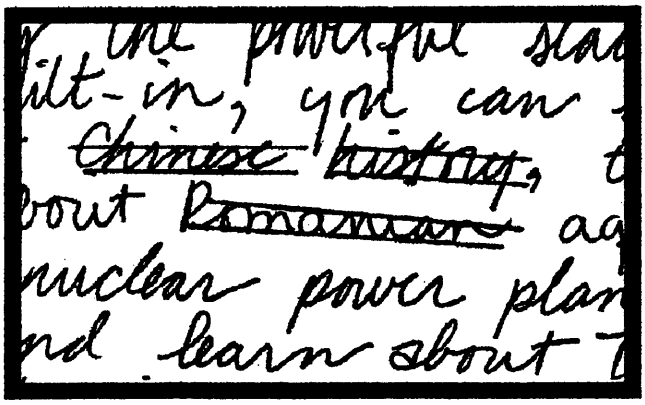
may exist for graphology. With a concentrated effort between the these three groups hopefully the debate over graphology may be settled. Secondly an emphasis on the practicality of graphological use should be emphasized. A correlation significant to the .005 level may mean the relationship is not random, but is the relationship practical? Each and every study on this topic can be invaluable in fitting a very complex puzzle together.

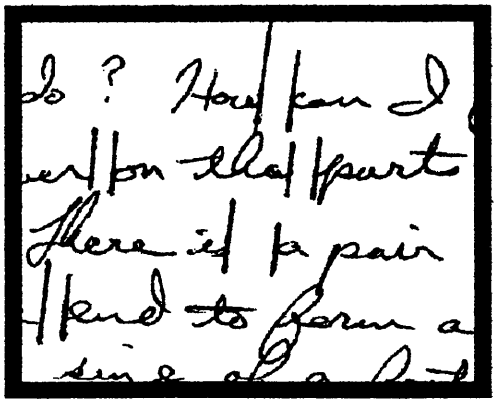
Appendix A





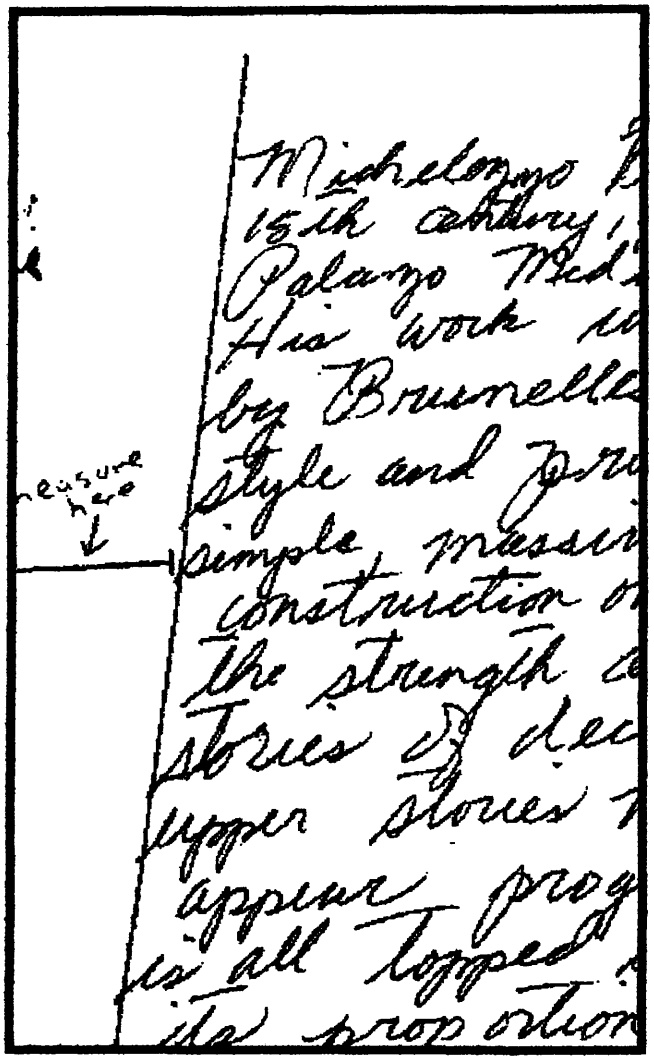
The slant gauge on the left provided by Loyal Brush of Overland Park, Kansas was used for determining letter slants. Letters such as t, l, h, and b were measured. Middle zone letters are somewhat difficult to measure if thready writing exists. The example below the gauge illustrates how measurement is done. A line representing a baseline is drawn. Then a line is drawn from the beginning of the upsweep of the letter to the top of the upsweep. The angle formed is measured and assigned a number. Brushe's gauge runs 8, 7, 6, 1, 2, 3, 4, and 5 going from extreme left slant to extreme right slant. The researcher reassigned numbers running 1, 2, 3, 4, 5, 6, 7, one being far left and 7 being far right slant. This made it easier to average values without confusion.





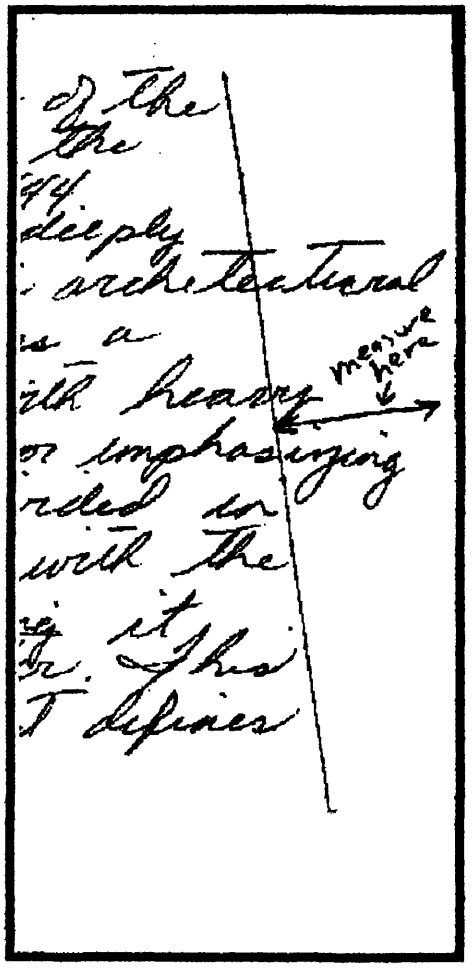
Size a critical measurement because it has an effect on the relative values of wordspace and linespace, is determined by measuring the middle zone of the writing (letters such as a, e, i, o, u, c, m, n, r, s, v, x, and z are completely midzone). Any other letters having midzone portiions are also used for size measurement. The example on the lower left shows that measurement is made from words 5 letters or longer. A minimum of 20 words are measured throughout the sample. On the lower right wordspace measurement is illustrated. Measures are taken from at least twenty locations and averaged.

Appendix A (continued)



Right margins are more difficult to measure because as a rule they are uneven. A line is drawn from the top end word to the last line and last word on the page. Some interpolation is required in drawing a line which represent-san average. Measurement is then made from the right edge of the paper to the line which was drawn.

When measuring the left hand margin a line is drawn from the beginning of the first word in the top lineto the beginning of the first word in the last line. Ordinarily left hand margins are reasonably straightand little interpolation is necessary. Once the line is drawn a measurement is taken half way down the line to the left edge of the paper.



Appendix B

Table 1

The following raw data were collected from the study and is sorted by the Extrovert-Introvert score. (E-I) Wspc stands for wordspace, lspc stands for line space, lmargin stands for left margin, rmarg stands for right margin, e stand for the extrovert score on the Myers-Briggs, i stands for the introvert score on the Myers-Briggs and comp stands for composite score (e-i).

slant	size	wspc	lspc	lmarg	rmarg	e	i	comp
3.74	3.13	1.33	2.09	21	18	1	25	-24
3.48	1.00	2.25	4.83	33	25	2	26	-24
5.54	2.25	3.39	4.1	6	18	5	22	-17
3.83	1.78	1.11	4.66	36	5	6	22	-16
4.33	1.75	2.41	4.26	14	27	6	21	-15
4.00	1.85	1.97	4.09	14	20	5	19	-14
5.00	1.95	1.67	3.73	23	20	8	18	-10
6.52	1.05	1.55	5.48	3	14	8	18	-10
4.72	3.05	1.16	1.96	33	37	9	19	-10
4.10	2.85	1.54	2.38	21	17	5	14	-9
5.74	1.43	2.46	6.21	31	10	10	19	-9
2.86	2.00	1.86	3.19	18	13	8	17	-9
3.80	1.15	2.06	5.57	25.5	29	9	18	-9
4.03	1.78	2.37	3.63	22	21	9	17	-8
4.15	1.75	2.34	4.32	27	20	8	16	-8
3.60	4.58	.92	1.76	2	27	7	13	-6
5.13	2.98	1.18	2.65	22	16	11	16	-5

slant	size	wspc	lspc	lmarg	rmarg	e	e	comp
3.42	1.85	1.95	3.5	16	9	11	15	-4
5.28	2.85	1.36	2.95	10	13	12	16	-4
4.86	4.08	.93	1.59	21	18	14	13	1
3.82	2.58	1.94	2.47	16	22	14	13	1
5.46	2.77	1.29	2.16	14	25.5	13	11	2
3.86	3.00	.88	2.88	19	25.5	14	11	3
3.48	1.33	3.01	5.88	31	7	14	11	3
4.26	2.80	1.62	3.01	34	22.5	15	12	3
3.85	3.05	1.19	1.8	33	42	17	12	5
4.69	2.83	1.18	1.9	16	27	16	10	6
4.90	2.20	1.32	3.2	4	12	18	12	6
4.34	1.20	4.10	6.70	10	45	15	8	7
3.82	2.63	1.33	2.52	4.5	14	18	9	9
2.21	1.98	1.28	2.94	45	57	19	10	9
5.20	2.13	2.01	2.85	8	10	17	7	10
4.88	2.58	1.04	3.05	3	6	18	8	10
3.78	2.13	1.67	3.33	20	19	19	6	13
4.07	2.90	1.25	2.04	29	32	19	6	13
4.48	2.97	1.23	2.17	30	8	21	6	15
4.10	3.08	1.31	2.11	10	8	20	5	15
3.75	1.03	1.26	6.34	27	40	21	4	17
4.84	2.68	1.12	2.35	16	7	22	4	18
5.42	2.05	1.68	3.39	9	20	23	4	19
4.44	4.00	1.19	2.07	18	28	23	4	19

slant	size	wspc	lspc	lmarg	rmarg	e	i	comp
5.84	1.63	2.48	4.52	10	5	21	2	19
3.71	2.95	.77	2.84	7	3.5	22	2	20
3.94	2.58	1.49	3.44	13	10	23	3	20
5.12	3.88	.83	1.67	12	14	23	3	20
2.65	2.43	.68	2.58	30	1	24	3	21
3.53	2.48	1.26	3.63	31	5.5	24	3	21
3.00	2.28	1.71	5.04	9	17	24	3	21
3.84	1.63	2.01	4.19	18	9	25	3	22

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