

Personality Trait Identification - A Survey

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Abstract - Personality trait identification is of paramount importance. Personality Traits are stable over time. Individual's behavior naturally varies somewhat from occasion to occasion but there is a core of consistency which defines the true nature. Traits directly influence behavior. There are several methods for identifying traits. We provide an overview of this body of literature drawing out ample avenue for trait identification through hand writing and Psychometric analysis. Handwriting reveals the true personality including emotional outlay, fears, honesty, defenses and many others. A big five factor model is considered to find out individual differences.

Keywords - Graphology, Segmentation, Traits, Human behaviour, Psychology.

1. Introduction

Understanding [1] what makes people tick has become a key issue to everyone. This is particularly true when we are getting best out of people, allocate the right job to the right person and develop them. Yet, trying to understand people's inner motivations is notoriously uncertain science. Personality identification offers us one of the few routes into this world. The Big Five personality traits are five broad domains or dimensions of personality [2] that are used to describe human personality. Contemporary research into the Big Five model [3] looks to assess how enduring these traits are over time, the degree to which there is a genetic component to these traits, and how these traits are correlated to life outcomes such as school performance. All individual differences can be summarized by five uncorrelated dimensions of personality.

1. **Extraversion:** This trait includes characteristics such as excitability, sociability, talkativeness, assertiveness and high amounts of emotional expressiveness.
2. **Agreeableness:** This personality dimension includes attributes such as trust, altruism,

kindness, affection, and other pro-social behaviors.

3. **Conscientiousness:** Common features of this dimension include high levels of thoughtfulness, with good impulse control and goal-directed behaviors. Those high in conscientiousness tend to be organized and mindful of details.
4. **Neuroticism:** Individuals high in this trait tend to experience emotional instability, anxiety, moodiness, irritability, and sadness.
5. **Openness:** This trait features characteristics such as imagination and insight, and those high in this trait also tend to have a broad range of interests.

Correlation analysis is used to discover associations among measures. A strong association (high correlation) means people with one trait are likely to have second trait or that the measures may overlap. That is, they may, in part or wholly, be measuring the same trait or set of traits. All five factors show an influence from both heredity and environment. Openness shows 57% heritability while conscientiousness shows 49%, extraversion shows 54%, agreeableness shows 42%, and neuroticism shows 48%.

2. Psychometric Approaches to Identifying Traits

Psychometrics [4] is the field of study concerned with the theory and technique of psychological measurement, which includes the measurement of knowledge, abilities, attitudes, personality traits, and measurement. It involves two major research tasks, namely: (i) the construction of instruments and procedures for measurement; and (ii) the development and refinement of theoretical approaches to measurement.

2.1 Questionnaire Construction & Psychometrics

Contemporary views of traits are intimately related to the process of measurement and assessment necessary to identify basic personality dimensions. Composition of items must be easily understood and unambiguous, applicable to all respondents & unlikely to cause offence. It is important to check that items are not strongly contaminated by response sets or biases.

2.2 Psychometrics of Single scale

Any single scale must be satisfactory with respect to three essential criteria: reliability, stability & validity [5].

- i. Reliability refers to the accuracy with which the questionnaire measures the given quality.
- ii. Stability: Personality change slowly as the person grows older, but it is expected that stability of trait measure will be fairly high over periods of a year or more.
- iii. It must be shown that the measure actually does assess what it purports to be. The most straightforward approach to assess validity is the predictive validity or criterion.

iv. Psychometric of Multiple traits

The methods just described may be used to obtain a satisfactory scale for measuring a single trait, such as extraversion or agreeableness. Some of the Traits will be possibly correlated and it will be uncertain whether the traits concerned are genuinely distinct or simply different aspect of unitary trait. The technique most widely used for simultaneous identification of multiple traits is factor analysis [6].

3. Important Traits Theories

In 1936, psychologist Gordon Allport found that one English-language dictionary alone contained more than 4,000 words describing different personality traits. He categorized these traits into three levels:

- Cardinal Traits: These are traits that dominate an individual's whole life, often to the point that the person becomes known specifically for these traits. People with such personalities often become so known for these traits that their names are often synonymous with these qualities. Consider the origin and meaning of the following descriptive terms: Freudian,

Machiavellian, narcissistic, Don Juan, Christ-like, etc. Allport suggested that cardinal traits are rare and tend to develop later in life.

- Central Traits: These are the general characteristics that form the basic foundations of personality. These central traits, while not as dominating as cardinal traits, are the major characteristics you might use to describe another person. Terms such as *intelligent, honest, shy* and *anxious* are considered central traits.
- Secondary Traits: These are the traits that are sometimes related to attitudes or preferences and often appear only in certain situations or under specific circumstances. Some examples would be getting anxious when speaking to a group or impatient while waiting in line.

Gordon Allport an influential methodologist as well as theorist.

3.1 Highlights of Theory

- Personality is dynamic Adult motivation is different from children's [7].
- A few traits can explain behavior.
- Healthy personality is as important to understand as neurosis.
- Conscious values shape personality.

3.2 Characteristics of Personality Test

Basic assumption: If personality traits can be quantified, they can be measured.

- 1) Traits must be "scalable."
- 2) People can be "scored" on traits.
- 3) Scores are most meaningful when compared with norms.
- 4) People can describe themselves accurately.
- 5) Personality tests should be objective.
- 6) Objectivity is achieved through standardization.

3.3 Measures of Personality

Minnesota Multiphasic Personality Inventory (MMPI). Scales on MMPI initially devised to identify particular types of psychiatric patients. It is a self report inventories.

- i. Characteristics
 - a. Paper & Pencil
 - b. Easily administered to groups

- c. Require little training to administer to train
 - d. Often have good face validity.
- ii. Problems
- a. Easy to fake or give misleading information
 - b. Boring, Subject to carelessness or Sabotage.
 - c. Vulnerable to response sets.

The MMPI corrected for some of the problems of self-report inventories.

- 1) Lie Scale (L): A group of items, if all answered in a particular way, suggest examinee wanted to present him/her in a favourable/socially desirable manner. Unlikely all would be true.
- 2) Validity Scale (F): A group of items all infrequently answered in the scored direction. Each might reflect symptoms of a different disorder, and unusual that anyone would endorse all. If someone does, then they may not understand the items, or may be answering randomly.
- 3) Correction Score (K): A different set of items that perhaps captures a more subtle attitude on the part of the examinee. A high score may indicate "defensiveness," i.e., an unwillingness to acknowledge problems or concerns. A low score may indicate "faking bad."

4. Motivation for Identifying Personality Traits

A study by American Management Association [8] reveals that 39 percent of companies surveyed use personality testing as part of their hiring process.

Lawyers use personality testing for criminal behaviour analysis, litigation profiling, witness examination and jury selection. Employers can reduce their turnover rates and prevent economic losses in the form of people prone to thievery, drug abuse, emotional disorders or violence in the workplace.

5. Motivation for Automating Identification of Personality Trait

Flaws in the existing system of personality test are the important motivational factors.

- a) Self-report inventories often contain transparent questions, which mean subjects can figure out what

a psychologist wants to measure. Therefore, subjects can lie intentionally and fake personality traits they don't really have. Researchers who develop tests address this problem by including lie scales in tests, which provide information about the likelihood that a subject is lying, but it is not accurate.

- b) The social desirability bias can affect responses on self-report inventories. In other words, when filling out an inventory, people might state what they wish were true, rather than what is true. Test developers can minimize this bias by dropping questions that are likely to evoke it.
- c) People sometimes don't understand the questions on the test. Test developers try to address this issue by wording questions very clearly so that they have only one possible interpretation.
- d) People sometimes don't remember aspects of the experience they are asked about.

Additional problems are as follows.

While a significant amount of money is saved by crunching the interviewees down to the highest test scorers, the downside is that someone must score the tests. Even if the test is computerized, it takes time and money to create or choose the program that produces such a test. The test itself must be reviewed to determine what portions are most important to the company and available position. After applicants have completed the test, the employer must review the results to determine who to interview. An employer should carefully decide whether interviews or testing are the more costly way to evaluate potential employees, and weigh out the importance of profiling personalities via testing or face-to-face evaluations.

Thus there is need to find an alternate method to find personality identification.

6. Proposed Approaches

Easily accessible digital records of behavior, Face book Likes, can be used to automatically and accurately predict a range of highly sensitive personal attributes including: sexual orientation, ethnicity, religious and political views, personality traits, intelligence, happiness, use of addictive substances, parental separation, age, and gender[9].

Graphology [10] is a study of handwriting (1871) and it helps in revealing the character and personality of the writer including his (or) her strength, weakness, and abilities. As handwriting comes from the unconscious, it

contains a great deal of information, which can be useful for interpreting one's character. ELANE describes "Grap" as "Brain writing", the handwriting comes directly from the writer in a uniquely personal and individual way, irrespective of how the person has been taught to write; an expert graphologist understand the styles of the different countries and languages and make allowances for "taught" influences.

Handwriting Analysis or Graphology [11] is a scientific method of identifying, evaluating and understanding personality through the strokes and patterns revealed by handwriting. Handwriting reveals the true personality including emotional outlay, fears, honesty, defenses and many others. Professional handwriting examiners called graphologists often identify the writer with a piece of handwriting. Accuracy of handwriting analysis depends on how skilled the analyst is. Although human intervention in handwriting analysis has been effective, it is costly and prone to fatigue. A method has been proposed to predict the personality of a person from the baseline, the pen pressure, the letter 't', the lower loop of letter 'y' and the slant of the writing as found in an individual's handwriting. These parameters are the inputs to a Rule-Based [12] which outputs the personality trait of the writer.

7. Fundamentals of Handwriting Analysis

Basic Features of Handwriting

- Size and proportions
- General layout
- Direction of lines
- Degree of connection
- Regularity
- Rhythm (or evenness)
- Degree of broadness
- Speed of writing
- Form of letters
- Covering of space
- Shading
- Angle of writing (slope)
- Right and left tendencies
- Spacing
- Degree of attention
- Pressure
- Decoration/distortion

7.1 Is the Sample Valid

That is, has the style of the writing been affected by any external influences? E.g., an uneven writing surface; an

awkward writing position; or written on the move (in a car or train, etc.). You cannot analyze a sample that is not reliable. For the purpose of checking slope and coverage it is more difficult to analyze samples that have been written on lined paper.

7.2 Size

There are many aspects to the size of writing and alone it doesn't indicate many things. Size (and especially the relative size of letter parts) needs to be considered along with other factors. There are some simple indicators however. Small writing is generally a strong indicator of a detailed, technical personality. Large rounded and dominant central case (see the later explanation of 'cases') letters indicate a friendly and sociable personality.

7.3 Letter-Word Slope

Is there a consistent slope to the letters and therefore the words in the sample? Check by drawing lines through the up and downward strokes. Backwards slopes indicate an introverted personality; forward slopes are extraverted. Upright strokes indicate a personality who is motivated by factors other than people, (ie neither extrovert nor introvert). The degree of slope reflects the degree of extraversion or introversion. The degree of consistency of the slope (ie parallel strokes) indicates the degree of emotional consistency.

7.4 Line Slope

Writing which rises to the right shows optimism and cheerfulness. Sagging to the right shows physical or mental weariness. (This applies to signatures sloping-downwards also.)

7.5 Flow

One of the essential indicators, but like any other factor not to be used on its own. Generally, restraint is indicated every time the pen leaves the paper, and the converse applies. Gushing, eager, impulsive people have a more continuous flow of writing. Flowing writing has linked letters and sometimes linked words. Thoughtful, considered people will have fewer linked letters and no linked words. Artistic and conceptual people who like space and time around them will often have completely separated letters. (It follows that pressure at school on some children to 'write joined-up' - because the common view is that to do otherwise is 'not grownup' - is

unnatural and often counter-productive. In any event continuity of flow does not correlate to intelligence.)

7.6 Spacing

Space between words indicates social attitude to others. Close words are a sign of sociability. Large spaces between words indicate the person is comfortable alone, and may even distrust others. Spacing between letters shows artistic spatially aware character, (artists, etc.)

7.7 Decoration and Distortion

Don't confuse the two. Decoration is intended; distorted is malformed and unintentional. Both are different to unfinished letters, which is a different indicator. Decoration is generally a sign that the writer wishes to be noticed more than he or she is at present. Malformed letters indicate a variety of things which must be dealt with individually. Unfinished words can be a sign of intelligence and impatience.

7.8 Intelligence and Impatience

The three cases divisions of the personality.

An essential aspect to analyze is the bias of the writing towards upper, central and lower cases. The upper case is the area in which the extended up-strokes are found in the tall letters like b, d, f, h, l, t, etc. The central or middle case is the central region occupied by letters with neither long up-strokes nor long down-strokes, such as a, c, e, m, n, o, etc. Which obviously means that the lower case is the area occupied by the extended down-strokes of letters such as g, j, p, q, etc?

Idealism, Religion Philosophy

Upper

Imagination, Logic, Pragmatism

Central

Common-Sense, Instinct

Lower

Animal appetite, Physical force

Fig. 1 Handwriting Zones

The central case contains most of the writing. The upper and lower cases are those which extend above and below the central body of each letter. The three cases represent the three aspects of our personality. If it helps you to assess the relative dominance of the three cases draw a horizontal set of 'tram-lines' through some lines of

writing to mark the division between the three cases. Look at the relative dominance and extent of each of the cases.

Upper our 'higher' selves, and thinking about religion and philosophy Central our mental and social approach to life Lower our physical aptitudes and attitudes.

Look where the writing is mainly concentrated, and where the emphasis is; this is where the emphasis of the personality is too. Look for any encroachment from upper case to the line above or from lower case to the line below - it's a sure indication that the encroaching case is dominant. Also look at the central case to see if there is an upward or downward pull. An upward pull is best spotted if you see an arched pattern running through the central case. A downward pull is best spotted by seeing a pattern of troughs through the central case. The pull pattern in the central case also indicates the emphasis of the personality.

7.9 Attitude toward Environment

The position of the writing on a page within a margin frame shows how the potential employee regards his position or I space within the company framework.

Some other simple indicators

Large broad upper loops are a sign of emotion.

- Right-pulled lower loops show interest for the good of others.
- Left-pulled upper case shows a fondness for the past.
- Uneven upper loops show changeable satisfaction, or disillusionment.
- Full left-pulled lower loops show physical fulfillment.
- Closed 'e's and other small closed central loops show secrecy.
- 'Stand-alone' or properly formed 's's at word ends show independence.
- Word-end 's's where top of letter is formed into downward right loop show a yielding or cooperative nature.
- Angular central case is a sign of an interest in ideas rather than people.
- Rounded central case shows interest in people.
- Uncompleted case letters, e.g. 'a' s, 'b' s etc., (open when they would normally be joined loops) show a casual nature; very open shows propensity to gossip.

- Small writing is generally a sign of technical personality.
 - Loops in angular writing show a potentially difficult character.
 - ‘T’ cross strokes connecting a number of ‘t’s with a single line shows speed of thought (but not a guarantee of correct thinking).
 - Omitted ‘i’ dots and ‘t’ cross strokes shows forgetfulness or carelessness.
 - Position and style of ‘i’ dots show different things:
 - Directly above, close to and in line means exacting.
 - Ahead means active and thinking.
 - Flicked shows sense of humour.
 - Behind shows thoughtful.
 - Inconsistent (varying positions) means a distracted mind.

In general – One can try to build up a picture of the person. Analysing using as many different indicators as possible.

7.10 Connections

In American schools, writing is usually first learned by using the manuscript printed form. As the writer matures he learns the more sophisticated method of joining letter forms called cursive writing. The four most common connective forms are garlands, arcades, angles and thread. You will learn to recognize each type of form and how to interpret its use within the writing. None of us uses one connective exclusively. One form usually dominates and another is secondary. The other two forms of connectives may also be present to a lesser degree. Combinations of writing form reveal the personality in each writing, but only in part. You still must take into consideration the arrangement of the writing and the symbolism of margins, zones, spacing and slant.

7.11 GARLANDS

The most common form of connective between letters is the cup shape of the garland, curved at the bottom and open at the top. It can be found in all three zones, between letters, within letters, even at the beginnings and endings of words.

The garland is a soft, easily stroked connective depicting the writer who is receptive, compliant and easy going. He may be warm and sympathetic, empathetic and sentimental. He is open and responsive to the people and the environment around him. The writer who uses many garlands is often said to be "people oriented". He feels

before he thinks.

he thinks.

thinks.

EXAMPLE: I live at 1015 S. Skyway Blvd.
parents. I have a little brother.

Fig.2 Garlands

7.12 ARCADES

The arcade, or inverted garland, is shaped like an arch, curved on top and open at the bottom. M's, n's and h's are the most obvious arcade formations in the alphabet. You may also find arcades between letters especially in the connection between o, v and w and the letter which follows them.

Usually mixed with other connectives, the arcade is used by the creative personality. This writer is a constructive thinker, one who deliberates before making up his mind.

EXAMPLE: I am program Chairman

Fig. 3 Arcades

He may use this slow and deliberate action as a form of cautious control and self protection. There is a certain dignity and formality in the writer who uses arcades to a dominant degree.

7.13ANGLES

The speed and energy used by many writers often produces abrupt changes of direction which create an angle at the baseline and sometimes at the top of the letter. This sudden change of direction must also make a pause before the writing can proceed. An angle interrupts smooth flow of thought and action, and an abrupt manner is often the result. The writer who habitually uses angles is often analytical, tense and self disciplined. He usually can see more than one approach to a problem and therefore often has some degree of executive ability. He uses will power to direct and control his actions.

Fig 4 Angles

EXAMPLE: I am program Chairman

7.14 THREAD

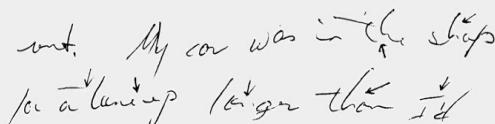
Thread is the least used of the connectives, and sometimes is the hardest to recognize. There are three general types of thread.

7.15 The Thinning of The Stroke Itself

You may need to use your magnifying glass to be sure you are looking at thread. It looks like a piece of thread that has been broken rather than cut cleanly. It "feathers" out with lessening pressure of the pen. Look for it between letters at the end of a word, and especially in i dots and t crosses that are made with speed.

Interpretation of Type 1 Thread indicates a writer who is in too much of a hurry to do a precise bit of work. He may complete the essentials of a job, but he evades responsibility by neglecting the finishing details. He loses interest quickly and goes on to the next thing. Impatience is a part of this writer's personality.

EXAMPLE:



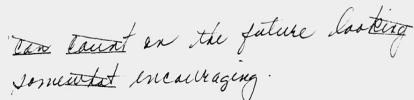
unt. My car was in the shop
for a tuneup longer than I'd

Fig.5 Threads

7.16 The Diminishing Size of Letters within A Word

As Type I thins out the individual stroke, Type 2 thins down the letters in a word. When a whole word or part of a word "threads" the first letters are larger than each successive letter, and MZ size progressively diminishes in a regular pattern. This type of thread is associated with a diplomatic personality, one who is capable of seeing the whole, broad picture of a situation. He elects to lessen the force of his personality as he evaluates the situation, and he uses tact and diplomacy to do so. He may even point out a different direction of thinking as his method of evading the present crisis.

EXAMPLE:



the last on the future lasting
seemed encouraging.

Fig.6 Diminishing size of letters

7.17 THE SINOUS STROKE

This third type looks like a spool of unravelled thread. You can see the undulations of the strand as it frees itself. This is a quick, fluid motion of writing combining

alternate garland and arcade formations. It can be found in all three zones but is most apparent in the MZ.

Interpretation of Type 3 Thread shows a real evasion expert. The sinuous strokes of his pen are as devious as the snake that slithers around obstacles. This writer seldom faces an issue, but rather misdirects or eludes the reality with clever language, slight of hand or a downright refusal to face facts.

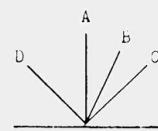
EXAMPLE:



their daughters were in
their female immorlugh

Fig.7 Sinuous Stroke

7.18 The SLANT of the writing indicates the Emotional Response. Letter slant can best be seen in letters containing upper loops: the b, d, h, l, k, and t. The more the letter slant leans toward the right, the more emotional response can be expected.

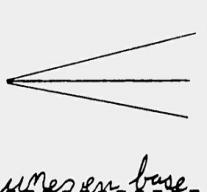


- A = self-reliant, independent
- B = compliant, outgoing
- C = emotional, garrulous
- D = reserved, cold, withdrawn

Fig.8 Slant

Most people write with a slight right slant (B). This shows a willingness to comply with company rules, an ability to get along with co-workers, and put up with the boss's idiosyncrasies. Writers with an extreme right slant can function well on the job, but might become hysterical under sudden emotional stress. Extreme left-slanted writers are sometimes antisocial, non-communicative, even defiant at times.

7.19 Baseline Slant = Goal Directiveness



- A = good goal direction
- B = optimism
- C = pessimism, fatigue
- D = moody, restless

Fig.9 Base Line Slant

Writing "uphill" reveals the applicant worthy of further Trait-match evaluation. He's optimistic, ambitious and cheerful. This is a good start, and, if the other traits bear up well under your scrutiny, a welcome addition to any office force or gang crew.

Writing "downhill" may be caused by a temporary depression, ill health, or physical fatigue. If this applicant has special skills necessary in your business, it would be wise to have him return on another day and obtain another sample of his writing. The first down slanted sample could be just a temporary discouragement from job-hunting. If the second sample has the same down slanted appearance, it is a warning of an ingrained pessimism which keeps this applicant on the job-seeking circuit.

The writer of a firm, straight, even baseline controls his moods, allowing him to go directly toward his goals without getting side-tracked.

While a very slight wave in the baseline is a common sign, an unusual up-and-down fluctuation identifies the moody individual. A ruler placed under the first and last letters in a line of writing is an excellent way to determine an uneven baseline. Be sure you need this person's talents desperately before hiring him. He may be a go-getter on his "up" days, but if he's in a "downer" mood, he probably won't even show up for work.

7.20 Spacing

Spaces in writing are just as important to the Trait match analyst as the writing itself. Spaces are found around the whole page of writing (the margin); in the amount of room that the letters take up (the letter size); in the generous or compressed usage of space between letters, lines, and words. All offer many clues to detect the occupational personality. A general rule-of-thumb is that the way in which a person uses space when writing indicates his use of space in his work. Check the application form. How did the prospect use the spaces within the blanks, boxes, or fill-ins? If he crowded the letters to the left, he's fearful of his future. If he pushed all the letters to the right, he's ambitious and eager for the job. If he couldn't contain his writing within the spaces provided, he's not a good judge of time and space.

7.21 Margin = Attitude toward Environment
 The position of the writing on a page within a margin frame shows how the potential employee regards his position or "I space" within the company framework.

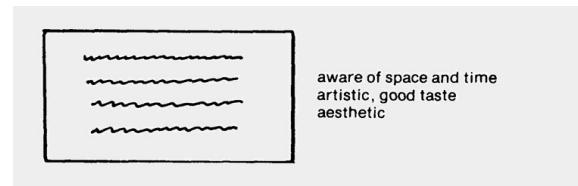


Fig.10 Well Defined Margin

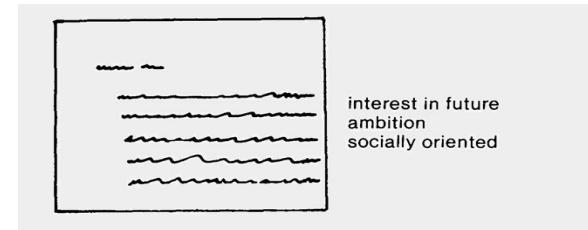


Fig.11 Wide Left Margin

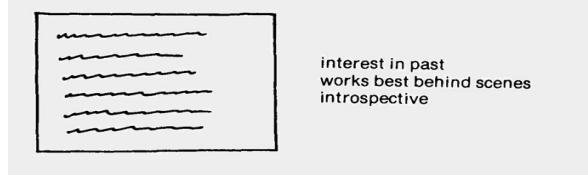


Fig.12 Narrow Left Margin

Picture frame margin (even, well-defined) Wide left margin (narrow right margin)

7.22 Letter Size

Every letter takes up space, too. Some letters extend into the upper area of the writing and are referred to as upper-zone letters: b, d, h, k, l, and t. The lower-zone letters are the g, j, p, q, y, and z. Most letters are found in the middle zone of writing. The size of the middle zone is the major factor considered in handwriting analysis. Almost all other signs are compared to it. *f* is the only letter that reaches all three zones.

Large writing and small writing refers to the middle-zone size, and are both easy to spot. Most people's script falls somewhere in between, however. This "average size" of writing is found in the sample of applicants who can fit into almost any kind of job situation for which they are qualified. Their uniqueness will be revealed in other writing features. Large writing indicates a person who will need plenty of space in which to operate. Don't try to put him behind a desk or in any small confining area.

7.23 LARGE MIDDLE ZONE (large writing) =
Demand for attention, Need for elbow room



Fig.13 Large Writing

Small writing reveals the individual willing to work behind the scenes. This writer can also stick with a detailed job for long periods of time.

7.24 SMALL MIDDLE ZONE (small writing)
= reserved intelligent, modest, unassuming ability to concentrate non-spotlight job.



Fig.14 Small Middle Zone

7.25. Upper-Zone Extensions = Philosophy of Life
The upper zone of writing holds the philosophy of life. It contains the writer's thought patterns including his ability to utilize abstract thinking in his daily routine. Most people push their letters to a moderate height into the upper zone showing their ability to think clearly about practical things. This writer fits nicely into a job where concrete ideas are required, as long as they are not too technical.

TALL UPPER-ZONE EXTENSIONS= abstract thinker, intellect philosophical mind.



Fig.15 Tall Upper Zone

Short upper-zone extensions are made by the writer who has short term goals, and is not idea-oriented.

SHORT UPPER-ZONE EXTENSIONS = practical, down-to-earth mechanical short-term goals.



Fig.16 Short Upper Zone Extensions

Lower-Zone Extensions = Physical and Sexual Drives
The prospective employee's interest in physical activity is the primary interest of many companies. The lower-zone extensions reflect the applicant's physical and sexual activity, as well as his concern for money and food. Large, full lower loops, especially when they extend far below the baseline, are made by the person who wants to live life to the fullest.

LARGE LOWER LOOPS= extreme physical drive sensual hungry and active.



Fig.17 Large Lower Loops

Long lower loops disclose the person needing plenty of space.

LONG LOWER LOOPS = strong physical drive

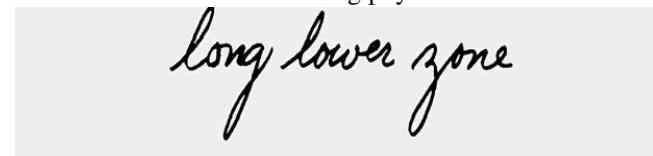


Fig.18 Long Lower Loops

Short lower loops expose the individual entirely disinterested in physical activity disinterested in physical possible laziness sedentary.



Fig.19 Short Lower Loops

"NON-LOOPS" (lower-zone extensions resembling sticks) stoicism simple tastes gets the job done



Fig. 20 Non Loops

7.26 Extreme Expansion =Self-Expansion.
 Expansion is the horizontal extension of letters and space, presenting a stretched appearance. Extreme expansion= need for room generosity freedom from supervision (works best alone) entrepreneur.



Fig. 21 Extreme Expansion

7.27 Extreme Compression = Self-Limitation. Compression is the squeezing of letters, words and spaces. Introversion ability to work in small spaces the office "tightwad"



Fig. 22 Extreme Compression

Spaces between Lines = Capacity for Thought Organization

7.28 LINES SEPARATED, EVENLY SPACED= clear thought able to organize work.

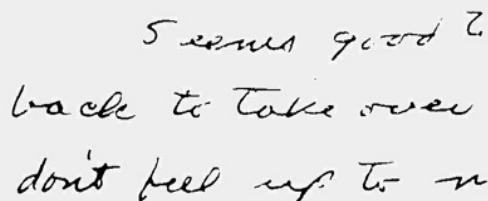


Fig.23 Spaces Between Lines

LINES CROWDED TOGETHER, OVERLAPPING LOOPS Confused thinking, poor organization of time and space, overly familiar.

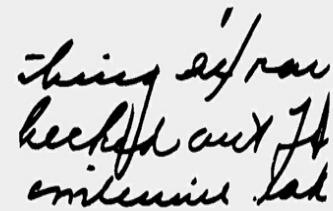


Fig. 24 Crowded Letters

Spacing between Words Spacing between words should be about the same width as the middle-zone letters. If spacing is consistent, it adds to the possibility of the writer being consistent. It is a positive trait for any job.

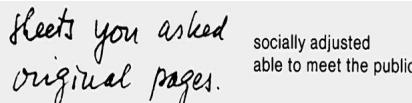


Fig. 25 Spacing Between Words

7.29 PRESSURE

Pressure measures the degree of intensity the employee will put into his work as well as his physical vitality and stamina. For instance, poets, speakers, politicians and ministers often have heavier writing pressure because they put emotion into what they have to say. The type of pen used will have some effect on the pressure. The soft-tipped pen can conceal the light-pressed writer. The Traltnatch analyst can tell this by turning the paper over and running his fingers over the back of the writing surface. If you feel or see the embossing caused by pressure from the pen, you are assured that the writer was using a ball point, not a soft- tipped pen and the pressure is genuine.

Pressure takes a certain amount of physical exertion, and the soft-tipped pen user enjoys the easy flow of ink over the page. Soft-tipped pens are a cop-out for physical labour. However, they are also used by artists and sensual people. Check with other Trait match signs to determine if the writer is lazy.
HEAVY PRESSURE=MEDIUM PRESSURE
 = perceptive, good memory conservative.

intense emotions
 strong sensual needs
 good health
 strong vitality
 realistic

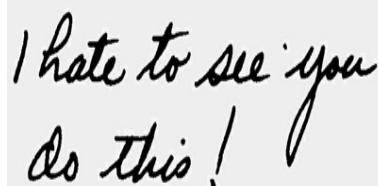


Fig.26 Heavy Pressure

MEDIUMPRESSURE= perceptive good
 memory conservative



Fig.27 Medium Pressure

LIGHT PRESSURE = gentle, cultural avoids confrontation sedentary prefers intellectual approach.

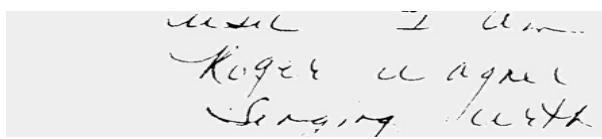


Fig.28 Light Pressure

7.30 SPEED

Speed is found in the flow of the writing and indicates speed of thought, action and perception. Additionally, writing that has few or no beginning strokes shows the stripping away of unnecessary details contributing to the applicant's efficiency in getting the job done. Note the T-crosses. If the cross is longer on the right side of the stem than on the left side, the writer is hurrying to complete his simple task of crossing the t. 1-dots which fall to the right of the stem also indicate speed.

FASTWRITING= alertness perceptiveness flexibility maturity rapid thinker.

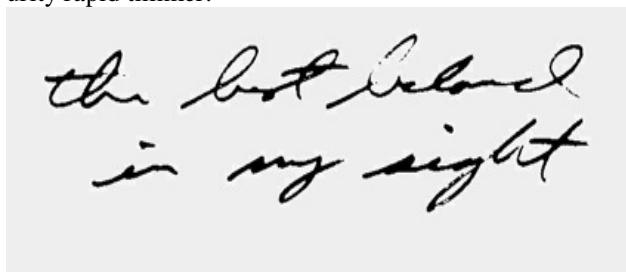


Fig.29 Fast Writing

SLOWWRITING = slow thinker, deliberate cautious thinker precision



Fig.30 Slow Writing

7.31 CLARITY

Clarity involves all of the basic factors of handwriting analysis in a positive way. It's a good idea to keep in mind that when clarity in a written sample is combined with-

- * A slight, right slant = interest in communicating with others;

- * Medium size writing = willingness to contact others

physically and mentally
 *Balanced expansion = reaching out to become involved.
 *Even margins = good sense of self-identity within the environment.
 *Good spacing between letters = generosity of time, money energy.
 *Good spacing between words = interest in social contacts.
 *Good space between lines = ability to think clearly and separate ideas.
 * Clear formation of letters = wish to impart information and consideration for others.

8. METHODOLOGIES

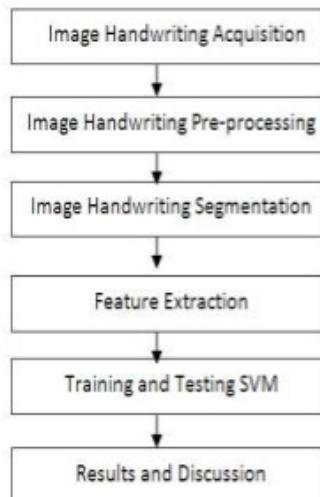


Fig 31. Block diagram of methodology

Hand Handwriting analyst called graphologist analyzes the handwriting on a piece of paper written by the individual writer which is very time taking. And the level of accuracy in the result is totally depending on the knowledge and experience of the graphologist. There were many works in this proposed field [12, 13, 14 and 15] which has three main steps: pre-processing, feature extraction, and Classification. Following the same to atomize the procedure the various steps needed to be followed as mentioned in Fig. 31

8.1 Image Handwriting Acquisition and Database

Handwriting image samples of different individuals are used in this research which is digitally collected by scanning the handwritings of 100 different writers. Each of them was asked to write a text document of simple 70-80 words in running hand. Most of the handwritings are cursive but few of them are printed handwriting. The samples were written on a plain paper without any margin.

8.2 Image Handwriting Pre-Processing

In pre-processing stage, the handwriting image is pre-processed to remove the noise by applying local thresholding and followed by resizing the sample to the correct orientation. The pre-processing involves opening of the digital image and then smoothing it. Opening removes the unwanted characters (dots, etc.) in the digital document. The next process is to segment the digital document in various segments, such as word segments, letter segments, and line segments. In Fig 32., the word segmentation in the document is shown clearly.

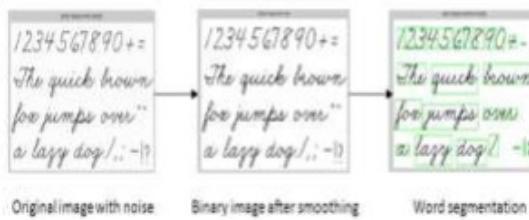


Fig 32. Image Handwriting pre-processing.

8.2.1 Image Handwriting Segmentation

In Handwriting image segmentation digital handwriting is segmented into three different types of segments, i.e. word segmentation, letter segmentation and line segmentation, each used for different processing.

1. Word Segmentation

This segmentation process is used to segment the words in digital handwriting document to calculate different features related to words indicating the disposition towards criticism, and towards argument.

2. Letter segmentation

Here segmentation is performed on each letters in the word in digital handwriting document of each individual. This segmentation is used in feature calculation related to letter for the prediction of the personality of individuals. Fig .33, shows the letter segmentation which is future used to calculate various slants in letters indicating the openness of sentiment and consequently of the intelligence.



Fig.33 Letter Segmentation after word segmentation

3. LinF

This line segmentation is used to find baseline features to judge the writer's emotional stability and dispositions in the baseline of the writing. Segmented image is then processed to calculate some numerical values mathematically to classify the personality of writer's on psychological factors.

8.2.3 Features Detection

Feature extraction is a technique of dimensionality reduction from a high dimensional input data. This reduced output data is a transformation of the high dimension input data represented as feature vector. In our case, features are the six important factors on which identification has been carried out of specific writer. These features are explained in more details below.

8.2.4 Skew Angle

Skew Angle and heights of three main handwriting zones [16]

Handwriting of a person can be defined by three main handwriting zones – upper zone, middle zone and lower zone. Hence, skew angle is the angle between the baseline and the x-axis. To compute the heights of the three main handwriting zones, the baseline is estimated using the method which is based on vertical histogram of pixels. However, this method works only for non-skewed text lines. Hence to estimate the baseline for skewed text lines, the angular histogram method is used instead. Therefore, the skew angle is computed by determining the best-fit line through the minima points.

8.2.4.1 Slant Angle

Slant of the handwriting can be defined as angle of characters with y-axis. For slant estimation a contour detection algorithm is used.

8.2.4.2 Width of the writing

Average width of the writing can be determined by finding row with maximum transition from black pixel to white pixel and vice-versa.

8.3 Classification Systems

There are many classifiers like Weighted Euclidean distance classifier, nearest neighbour classifier, Artificial neural Networks and Support Vector Machine.

8.3.1 Weighted Euclidean Distance (WED) Classifier

Representative features for each writer are determined from the features extracted from training handwriting texts of the writer. Then, for an unseen handwritten text block by an unknown writer (who has contributed training images), similar feature extraction operations are carried out. The extracted features are then compared with the representative features of a set of known writers. The writer of the handwriting is identified as writer K by the WED classifier iff the following distance function is a minimum at K.

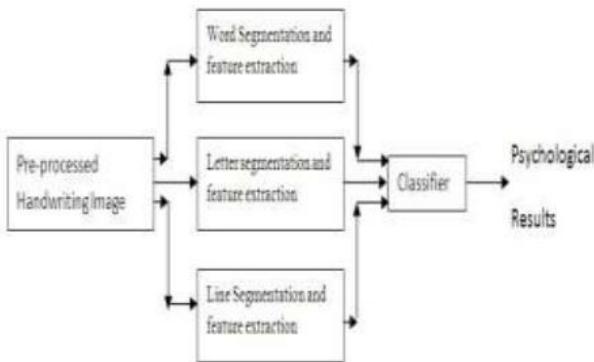


Fig. 34. Feature detection

$$d_k = \left[\sum_{j=1}^N (u_j - f_{kj})^2 \right]^{1/2} \quad (1)$$

Where $j = 1 \dots N$ (N is the number of the features considered). The writer is then assigned to the class R such that:

$$d_R = \min(d_k) \quad (2)$$

Where ($K=1 \dots$ no of classes).

8.3.2 Support Vector Machine

Support Vector Machines (SVM)[17] for the purpose of Classification and recognition can be used .Support Vector Machines are based on the concept of decision planes that define decision boundaries. A decision plane is one that separates between a set of objects having different class memberships. A Support Vector Machine (SVM) is a concept in statistics and computer science for a set of related supervised learning methods that analyze data and recognize patterns, used for classification and regression analysis. It have capability of learning is to achieve good generalization performance. Which

is objective of any machine, given a finite amount of training data by striking a balance between goodness of fit obtained on a given training dataset and the ability of machine to achieve error free recognition on all the dataset? The standard SVM takes a set of input data and predicts, for each given input, which of two possible classes forms the input. SVM training algorithm builds a model that assigns new examples into one category or the other. SVM utilized in pattern recognition is to construct a hyper-plane as the decision plane, which separates the positive and negative patterns with the largest margin. The process of rearranging the objects is known as mapping (transformation). Rearranging the object, using a set of mathematical functions, known as kernels. There are some common Kernel functions that include the linear kernel, the polynomial kernel and theradial basis function (RBF) and sigmoid [18]. We have obtained such multiclass SVM tool LIBSVM available at [19].We have used RBF (Radial Basis Function) kernel which is also common choice, in our recognition. RBF has single kernel parameter gamma (γ or γ). Additionally there is another parameter with SVM classifier called soft margin or penalty parameter (C).

SVM have proved to achieve good generalization performance by the use of concept of basis, without knowledge of the prior data [20].

9. Conclusions

This survey a probable solution to try to build up a picture of the person we are analysing using as many different indicators as possible. Also one can use other psychometric tests and systems to build up a multi-dimensional picture; the more perspectives you can use the better the analysis shall be. Trait theory is useful up to a point; there are many factors which contribute to the development of the human personality including biological factors, such as our basic DNA and social factors such as nurturing, culture, religious believes, and so on. There is a huge scope to find out the correlations of the factors that shape personality.

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