A Study on the Role of Personality and Associated Factors on Individual's Stylistic Choices

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Abstract

Literature suggests that extroversion and introversion are concepts that are indispensable to all comprehensive models of personality, be it in the Big Five model, Carl Jung's analytical psychology, and the Myers-Briggs Type Indicator model. Moreover, previous researches have also suggested that an individuals' personality will determine his/her stylistic choice. But the studies were limited in their approach as they have treated self-reports as measures of the ground truth. Hence, the objective of the present study is to explore the role of personality (especially extroversion and introversion type) and other associated factors with their stylistic usage of positive emotion words. To avoid participant bias, the researchers collected data through multiple modes. These consisted of administrating a standard personality test and a questionnaire with image prompts to 89 individuals aged 18-24. The tool used in the present study was Linguistic Inquiry Word Count (LIWC2015). The study shows a significant strength of correlation between extroversion and the usage of positive words. The research also examines the relationship between extroversion and the usage of negative words, big words, articles, along with the word count and tone.

Keywords: Big Five; Extroversion; Introversion; Word Usage; Positive Words; Negative Words; Articles; LIWC2015

1. Introduction

Researchers have defined extroversion as the propensity to enjoy positive experiences (Chen et al 2020, and John et al 1999) and social interaction (Chen et al 2020, Gill 2002, and Wilt 2009). Extroversion is one of the main characteristics of many personality estimation models, including the Big Five. The other Big Five traits are agreeableness, openness, conscientiousness, and neuroticism. The model assumes that introversion is the mere opposite of extroversion. If the assumption is valid, introversion will be the dispositional tendency to avoid positive experiences and social situations. In the 2000s, researchers discovered a sixth personality dimension, which formed a new model of personality called HEXACO.

The distinct factor is called "honesty-humility", a constituent of moral character. The other traits of HEXACO are all variations of the Big Five personality measures.

The Ten-Item Personality Inventory (TIPI) is the test used in this study. TIPI briefly assesses the Big Five traits, drawing on their labels, but the definitions may also correlate closely with the HEXACO personality traits.

Language can and should be characterized. The analysis of oft-overlooked patterns speaks of the social role of language and the complex ways it is changing (e.g., due to globalization). Similarly, James W. Pennebaker, Cindy K. Chung, Joey Frazee, et al. in 2014 examined 50,000 essays submitted by 25,975 college candidates. They described a phenomenon wherein using categorical language predicted more academic success but not dynamic language. In contrast, Kibeom Lee and Michael C. Ashton (2016) investigated the HEXACO-100's psychometric qualities among undergraduates. The self-reports revealed significant gender differences, as well as striking self-observer agreement. After eliminating precedent for bias, people were often honest to a fault.

Jacob B. Hirsh and Jordan B. Peterson (2009), for example, led ninety-four undergraduates through an automated test to track their history and plans. They linked every one of the Big Five traits with the theoretically associated word usage trends. Through this exercise, they confirmed that personality and language were closely related. Similarly, a study demonstrated, "Extraverts produce texts with more words…whilst the reduced concreteness of Extravert language is a novel finding (Gill 2002)." A higher degree of abstract interpretation distinguished the linguistic styles of extroverts.

At the same time, introverts preferred to stick to concrete details according to Camiel J. Beukeboom, Martin Tanis, and Ivar E. Vermeulen, 2013. Their finding indicated that extroverts make stylistic decisions that form their content, distinguishing it from that of introverts. James W. Pennebaker, Matthias R. Mehl, and Kate G. Niederhoffer investigated the relationship between pronouns, prepositions, conjunctions, auxiliary verbs in speech and emotional condition, social identity, and cognitive styles in 2002. Ryan L Boyd and James W Pennebaker in 2017 contrasted conventional personality tests to greater-detail language-based tests. They discovered that the latter could be more suitable for capturing or modelling lower-level personality processes. These lower-level (subconscious) mechanisms had an inextricable link with significant and objective behavioural outcomes. Extroversion and introversion as a continuum instead of a binary yielded richer results. The observation was accurate, particularly in second-language settings. Personality can have a close correlation to vocabulary and speaking accuracy. Jiayu Chen, Lin Qiu, Moon-Ho Ringo Ho, and other Nanyang Technological University (NTU) researchers conducted a meta-analysis in 2020 that included 82,132 participants from 20 different types of studies. The usage of positive emotion and social process terms had strong links to extroversion. However, based on their research,

Ryan L Boyd and James W Pennebaker in 2017 have shown the need to eliminate self-reports due to their limitations. Accepting self-reports entails accepting bias and inaccuracy on the part of the participants.

The Big Five traits can sometimes point to issues of a person's mental health. In 1965, Eysenck related personality concepts like introversion and extroversion with neurosis. Instead of using categories to diagnose personality disorders, R. R. Mccrea and Paul T. Costa (1992) proposed the Axis II. It could both characterize personality in five traits and diagnose personality-related mental issues (Costa, 1992).

Individual differences in personalities can also measure interpersonal and relationship happiness utilizing the five major domains stated before. Mohsen Amiri, Farzad Farhoodi, Nasrin Abdolvand, et al. (2011) did a study to investigate the impact of Big Five personality traits and communication styles on married students' marital satisfaction in public universities in Tehran (Mohsen Amiri et al, 2011). The most important predictor that hurt the quality of marital life was neuroticism. In contrast, openness, conscientiousness, extroversion, and agreeableness had a positive impact on marital success.

All in all, there arises a need for better and robust tools for personality estimation for applications such as:

- Screening candidates for the workplaces and the educational institutes of the future
- Evaluating an individual’s mental state and health
- Examine the quality of interpersonal and relationship satisfaction between parents, children, partners, friends, coworkers, etc.

Extroversion and introversion, along with other holistic markers of personality, must be thoroughly investigated. With knowledge of these concepts, one can know where an individual belongs and nurtures and aligns themselves to their external environment.

1.1 Research questions and Hypotheses Formulation

What is the personality of a typical extrovert? Does personality of an individual affect his/her words choice? Does gender have any effect on stylistic choice? To answer this questions, we must examine how stylistic choices reveal individual’s personality.

1.1.1Desired Usage of More Words

Extroverts speak faster, louder, and more often, with fewer pauses and hesitations; they have higher speech rates, shorter silences, a higher language production, a lower type/token ratio, and a less formal language, while introverts use larger vocabularies (Jean-Marc and Adrian 2021, Oberlander and Gil 2001, and Scherer K.R., 1979). The more difficult the task and the higher the level of anxiety, the easier it is to distinguish between introverts and extroverts (Jean-Marc and Adrian 2021).

H1: There is an impact of extroversion on the usage of more words.

1.1.2 Desired Usage of Positive Words

The more positive emotion terms (e.g., happy, love, good) people use, the more optimistic their personalities. Extroverts usually fall into this category (Chen 2020). Conversely, the researchers also consider that introverts will display the dispositional tendency to use more negative words.

H2: There is an impact of extroversion on the usage of more positive words.

1.1.3 Desired Usage of Fewer Articles

The three article words, a, an, and the, account for a significant portion of our vocabulary. People who often use articles in their speech are more concrete and impersonal in thinking. According to previous studies, introverts tend to use more elaborate constructions, including more words per sentence, articles, and negations (Beukeboom, 2013).

H3: There is an impact of extroversion on the usage of fewer articles.

1.1.4 Desired Usage of Small Words

Previous research links the use of bigger words (more than six letters) negatively with extroversion (Chen 2020). People who use more big words are less emotional, and they're often psychologically distant or detached.

H4: There is an impact of extroversion on the usage of small words, i.e., shorter than six letter.

2. Method

2.1 Study 1

2.1.1 Sample / Participants

For this present study, the researchers collected data from participants in the 18-24 age group. The sample consisted of Indians or Indian diaspora who had spent a significant chunk of their life or childhood in India. A two-part survey targeted potential respondents through college networks and Facebook, LinkedIn, and Reddit. The survey also asked participants to willfully and explicitly volunteer to screen out inattentiveness. Additionally, to eliminate bias, respondents read through a notice asking them to ensure they were not stressed, sleep-deprived, or distracted. The final sample size used in this study was *n*=210.

2.1.2 Data collection procedures

The questionnaire served two essential purposes of collecting basic demographic information of the participants and providing a brief assessment of their personality measures through the TIPI. These objectives were instrumental in designing this survey. Study 2 was a differential language analysis. The data had to be collected beforehand to correlate the language patterns with gender, age, native place, and employment status. The next section of the first survey used the TIPI to briefly and quantitatively assess the Big Five and HEXACO domains (see Fig. 1). The test and the scoring procedures are adapted from Sam Gosling's website at the University of Texas. In 2003, Gosling et al. provided information on the means (averages) and standard deviations (SDs) for each Big Five trait (on a sample of 1,813 adults). This statistical data helped predict where individuals were on the extroversion-introversion continuum. The TIPI has reached adequate convergent and discriminant validity levels, test-retest reliability, and patterns of external correlates (Gosling et al., 2013). It features ten elements and a 7-point bipolar rating Likert scale. For example, if the trait is labelled "Conventional, Creative", the participants have seven options to choose from, with one representing "Disagree Strongly" and seven representing "Agree Strongly." Phrasing these items as broad trait descriptions helped obtain high validity. The study also used carefully selected terminology to prevent social desirability issues, as suggested by Bäckström et al., 2009. It is worth mentioning that although the researchers only calculated the extroversion

and openness scores, the rest of the items helped assess acquiescence bias and check for errors (Gosling et al., 2013).

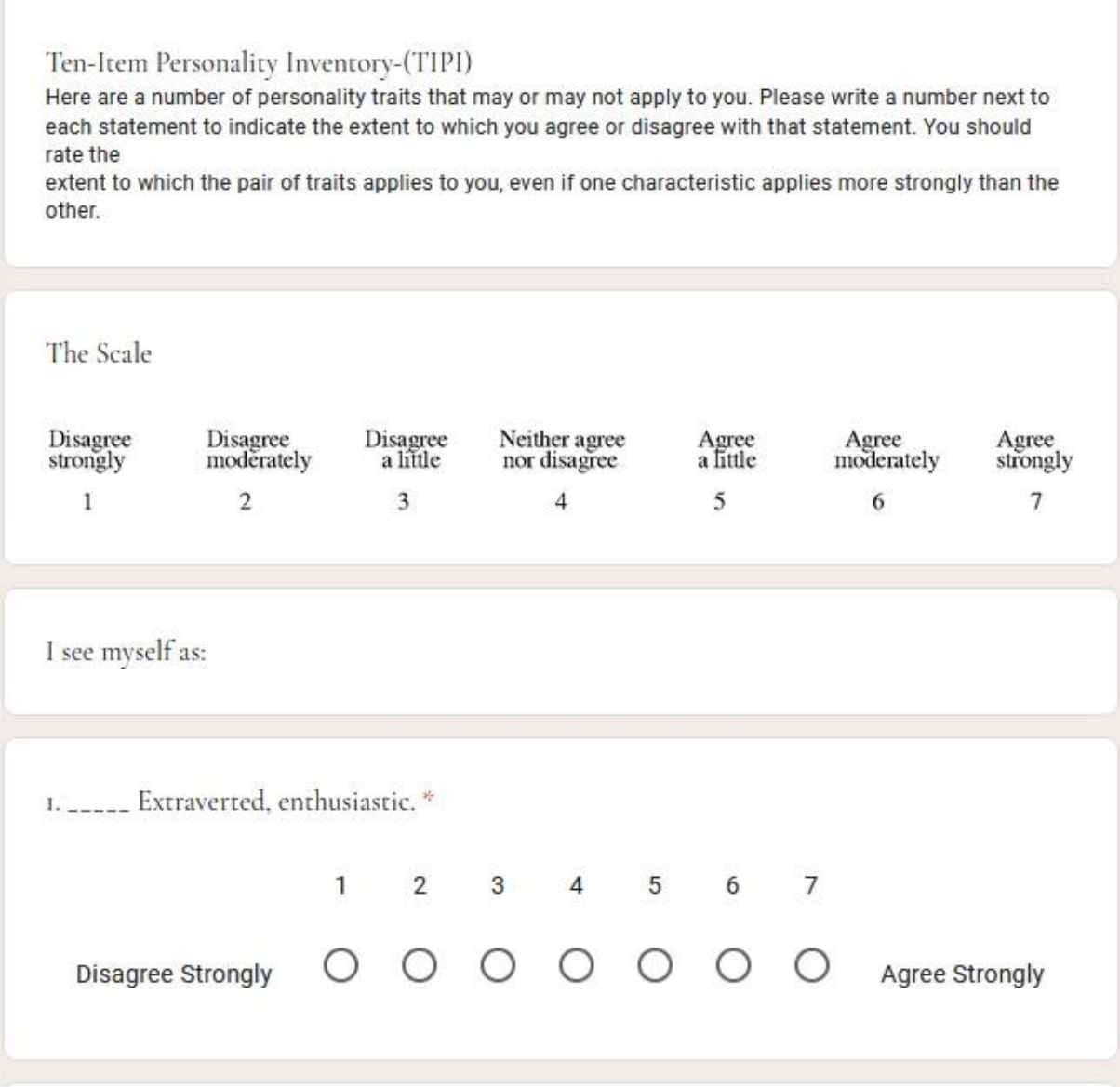

Figure 1. Big-Five Self-Ratings (Study 1, India)

As mentioned before, Study 2 aimed to analyze patterns in written text. Hence, the researchers decided to use the LIWC2015, representing the gold standard in computerized text analysis. LIWC stands for "Linguistic Inquiry and Word Count", with LIWC2015 being the latest evolution. The LIWC2015 is more accurate, easy-to-use, and with a broader range of social and psychological insights than previous versions. Hundreds of studies have

validated it. The framework and default dictionary of the LIWC2015 is also well-defined (Pennebaker et al, 2022).

2.2 Study 2

2.2.1 Sample / Participants

Respondents of the first survey were offered to participate in the second survey to access deeper personality insights. Unfortunately, due to the exponential rise of COVID-19 cases in India, the dropout rate was high. *n*=99 participated; unsuitable responses were rejected leading to *n*=89; Gender: 44.94% female; Age: *M*= 20.67, *SD*=1.368195662, *Min*=18, *Max*=24; Native place: 5.62% Andhra Pradesh, 6.74% Bihar, 22.47% Chhattisgarh, 2.25% Jharkhand, 1.12% Karnataka, 3.37% Madhya Pradesh, 8.99% Maharashtra, 2.25% Non-Resident Indians (NRIs), 2.25% Punjab, 7.87% Rajasthan, 2.25% Tamil Nadu, 2.25% Telangana, 1.12% Unspecified, 25.84% Uttar Pradesh, 5.62% West Bengal; Occupation: 1.12% Dancer, 1.12% Manager, 2.25% Marketer, 2.25% Medical, 1.12% Researcher, 80.90% Student, 7.86% in Tech roles, 3.37% Unemployed.

2.2.2 Measures

In 1960, Uma Chowdhury first proposed the Indian modification to the Thematic Apperception Test. The researchers chose five image prompts to aid in and facilitate the TAT differential language analysis. Card I, card II, card VI, card VII addl., and the special blank card were used for the survey. After some observation, the cards came into three distinct categories: Ambiguous (card I, card II, and the blank card), Mental diagnostic (card VI), and Negative (card VII portrays the theme of cheating). Naturally, the image-prompt responses also fell within these categories.

The steps taken to prepare the data were:

- Separation of each text bit into a file containing a short story
- Grouping of the image prompt responses into a file corresponding to a single participant
- Data normalization/spell check
- Naming of files according to a clear, representative protocol
- De-identification of data wherever needed
- Formatting of files for LIWC2015 (.txt)

Controls

The researchers included age, gender (female=1), occupation, and native place as exogenous covariates. One-hot encoding was applied to the native place to eliminate the textual categories. The method increased the overall dimensions to *n*=29.

3. Results and Discussion

3.1 Desired Extrovert Stylistic Choices (Study 1 And 2)

As hypothized, the researchers expected extroverts to have a higher word count (H1), increased usage of positive emotion words (H2), fewer negative words (H2), fewer articles (H3), and fewer big words (H4). To test for this, we compared the LIWC2015 analysis dimensional scores for the image prompt response files (n=89 each for the three categories resulting in n=267) with the self-ratings of the respondents. These factors combine to create a particular reluctance in writing long answers, even for extroverts (r=-0.06). Words per sentence, as expected, were found to have a significant negative correlation with extroversion (r=- 0.13). A few opted to send voice notes, leading to excessive and inconsistent speech production; and English mixing with various regional language(s).

3.2 The Correlation of Extroversion and Openness to Stylistic Choices (Study 1 And 2)

The researchers argued that extroverts tend to use more positive words and a more significant number of compliments (hypothesis 2b). Moreover, we expected that extroverts would use positive words unless they were depressed (card VI) or unfavourable towards the theme of cheating (card VII addl.). We especially expected the female gender to react unfavourably to the latter card by increasingly using negative emotion words (Uma Chowdhury 1960).

The correlation between extroversion and the usage of big words (greater than six letters) is negative (r=-0.03). Positive emotion words and extroversion had significant relations across all three categories (r=0.07 for the negative, r=0.13 for the ambiguous, and r=0.18 for the mental diagnostic). The usage of negative emotion words and extroversion was weakly correlated (r=0.04 for the negative, r=0.05 for the ambiguous, and r=0.11 for the mental diagnostic). Extroverts that were depressed due to the pandemic would ideally display their feelings of loneliness, abandonment, and detachment in their answers to Card VI. However, a surprising number connected the image to political turmoil and instability ("The bombings had finished weeks earlier but the canals of Kashmir were still isolated"). Several also used their blank cards to speak of politics, fear of death and destruction during the COVID-19 pandemic ("Place where no religion no hate exists a room where no minister is greedy for fame or money they just want to save this country from the pandemic"). Similarly, usage of positive words had a bearing on the openness to experience (r=-0.002 for the ambiguous,

r=0.03 for the negative, and *r*=0.17 for the mental diagnostic). Negative emotion words were either weakly correlated with openness to experience (*r*=-0.02 for the negative, *r*=0.05 for the mental diagnostic, and *r*=0.05 for ambiguous). Interestingly, the usage of articles was weakly correlated with extroversion and openness to experience (*r*=0.03 and *r*=0.06). A possible explanation could be that the syntax of many Indian languages is such that the speaker often omits the article. The respondents who had not acquired English proficiency missed articles in places where they were deemed necessary and vice versa. On the surface, these findings seem to confirm the high correlation between extroversion and openness to experience (*r*=0.41). The 18-24 age group of Indians pride themselves on their open-mindedness and love of liberal policies. The emphasis on being open-minded and liberal, particularly in social circles, cause both introverts and extroverts to routinely self-identify as being open to experiences.

Finally, in the context of gender, females were less likely to use positive words to describe card VII (*r*=-0.11) as it featured themes of cheating and arguments. Females were also more likely to use negative emotion words to describe the same (*r*=0.07). Astoundingly, there was a strong correlation between extroversion and being a female (*r*=0.27). To compete with the male-dominated workforce, females often adopt aggressiveness and extroversion. Similarly, a correlation existed between belonging to the female gender and openness to experience (*r*=0.18). Fig. 1 shows the Big Five Self-Ratings in Study 1. In the figure, the average extroversion score is 4.44, with a standard deviation of 1.45. Similarly, the average open-mindedness score is 5.38 with a standard deviation of 1.07 (Gosling et al., 2003).

3.3 The Regression Analysis

To test whether the extroversion-positive words congruence is the most significant, we carried out the regression analysis of the extroversion score with five variables while controlling for socio-demographics (Age, gender, profession, native place). The five consisted of words per sentence, big (greater than six letters) words, positive emotion words, negative words, and articles. Out of these, gender, profession, and native place consisted of categorical, textual data. This data was encoded using one-hot encoding. Although the encoding was satisfactorily able to represent every data category, it also increased the overall dimensions. Hence, the total number of variables was twenty-nine. The researchers used simple R commands in RStudio for linear regression of the extroversion score against the twenty-nine variables.

As expected, being a female and using positive emotion words strongly predicted extroversion (β=0.30, p< 0.001 and β=0.11, p<0.1). This result corroborates hypothesis 2b. Furthermore, the study found the control variables to be a strong predictor of extroversion. Age contributed positively to extroversion levels (β = 0.17, p< 0.05) while being unemployed

(β=-0.24, p< 0.05) or working in the tech field (β=-0.26, p< 0.1) did not. Surprisingly, according to the results, researchers were more extroverted (β=0.16, p≈0.05), while marketers were not (β=-0.22, p< 0.05) displaying a surprising crossover of personalities. The professionals in the IT and research industries were once widely believed to be introverted. However, the glamorous lifestyles enjoyed by many of them suggest a gradual shift in attitudes. The residents of the state of Tamil Nadu broadly had a positive outlook (β=0.20, p< 0.01). Conversely, those from the states of Jharkhand and West Bengal appeared to be less positive and social (β=-0.21, p< 0.01 and β=-0.20, p< 0.1). Table 1 displays the regression results for Study 1 and Study 2.

The model was statistically significant with a p-value of 4.99E-11, a multiple R2 value of 0.35 (35%), and an adjusted R2 value of 0.27 (27%).

Table 1. Regression analysis results (Study 1 and 2, India)

Variable (predictor)	β	$Pr(>\|t\|)$
Age	0.17	0.014*
Gender	0.30	3.04E-06***
Working in Tech	-0.26	0.085**.**
Being unemployed	-0.24	0.039*
Working as researcher	0.16	0.050*
Working as marketer	-0.22	0.035*
Living in Jharkhand	-0.21	0.006**
Living in Tamil Nadu	0.20	0.009**
Living in West Bengal	-0.20	0.054**.**
Usage of positive words	0.11	0.062**.**
Usage of negative words	0.06	0.291

Note: Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1.

4. Conclusion

Extroverts were more likely to use positive words consistently for all three categories of images, namely, the ambiguous (r=0.13), the mental diagnostic (r=0.18), and the negative (r=0.07). Positive word usage strongly predicted extroversion (β=0.11, p<0.1). The result

matches the results from Chen et al. (2020). Hypothesis 2c, the tendency of extroverts to use fewer words per sentence, appeared to be accurate on correlation (r=-0.13 for more words per sentence) but was not among the most significant factors according to regression. Hypothesis 2d, the desired usage of shorter words (r=-0.03 for big words), fared similarly. Surprisingly, the frequency of negative emotion words and extroversion were weakly but positively correlated (r=0.04 for the negative, r=0.05 for the ambiguous, and r=0.11 for the mental diagnostic). The results seem to suggest that the extroverts struggled to keep or maintain positive mental health during the pandemic. Although the females reported higher extroversion scores (Study 1), they were more likely to use negative words (r=0.07) to describe Card VII and less likely to use positive words (r=-0.11). Uma Chowdhury's findings (1960) support these claims.

The regression analysis findings were even more surprising since they called into question previously-known knowledge of extroversion predictors. Although the researchers expected extroverts and introverts to gravitate toward and flourish in different sectors, they discovered that being in the research area (β=0.16, $p\approx$0.05) is a strong predictor of extroversion in the Indian setting, whereas those in the marketing profession (β=-0.22, $p<$ 0.05) are more introverted. According to the model, tech professionals (β=-0.26, $p<$ 0.1) and those unemployed (β=-0.24, $p<$ 0.05), were more likely to be introverted. In India, while Tamil Nadu residents were more extroverted (β=0.20, $p<$ 0.01), residents of Jharkhand (β=-0.21, $p<$ 0.01) and West Bengal (β=-0.20, $p<$ 0.1) were not. Extroversion increased with age (β=0.17, p<0.05). Finally, gender was a strong predictor of extroversion (β=0.30, $p<$ 0.001 for females).

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