Extraversion vs. Introversion: Correlations with Impulsivity, Sensation, and Stimuli

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Author Note

This study was conducted by all of the students in lab section B of Psychology 130 at St. Olaf College, under the supervision of Professor Chuck Huff.
Abstract

Studies show that introverts are more sensitive to sensory stimuli than are extraverts (Eysenck & Eysenck, 1967). In an attempt to support this hypothesis, we conducted a lemon juice experiment to determine if introverts produced more saliva in response to lemon juice than extraverts. In addition, participants completed a variety of personality inventories, and correlations were conducted between extraversion and noise sensitivity, impulsiveness, and sensation seeking. Our results show a significant positive correlation between extraversion and sensation seeking, but failed to produce any other significant results.
Introduction

Do introverts have higher levels of arousal than extraverts? Does extraversion correlate with other personality traits such as impulsivity and sensation-seeking? Our lab activities sought to determine the answers to these questions. Previous research has found that extraverts produce less saliva in response to lemon juice than introverts do (Eysenck & Eysenck, 1967). This is evidently due to the greater amount of arousal of introverts.

The theory here chosen asserts that introversion is a product of cortical arousal, mediated by the reticular formation; introverts are habitually in a state of greater arousal than extravert's, and consequently show lower sensory thresholds, and greater reactions to sensory stimulation. (Eysenck & Eysenck, 1967)

Since introverts seem to be sensitive to sensory stimuli, our laboratory hypothesized that introverts would show greater salivary change in response to lemon juice than extraverts, as shown in claims made by Eysenck and Eysenck (1967). We also hypothesized that extraversion should correlate with a lower level of noise sensitivity, greater impulsivity, and higher levels of sensation-seeking. This would support the hypothesis that extraverts need greater levels of sensory stimulation than introverts, as impulsivity and sensation seeking are often associated with the desire for sensory stimulation. Introverts should have a higher level of noise sensitivity since their threshold for stimulation is lower. Several experiments and correlations were conducted to test our hypotheses, including a replication of a lemon juice experiment similar to that conducted by Eysenck and Eysenck (1967). Here, the amount of saliva produced was tested as the dependant variable in response to lemon juice. Correlations were produced according to responses on personality inventories.
Method

Participants

All participants were students currently enrolled in Psychology 130, History and Methods lab section “B” at St. Olaf College in Northfield, Minnesota. There were 22 participants total.

All participants were sophomores and juniors at St. Olaf College.

Apparatus and Materials

Participants were administered four personality inventories: the Big Five Inventory-44 (BFI-44), Barratt Impulsivity Scale-11 (BIS-11), Need Inventory of Sensation Seeking (NISS), and Noise Sensitivity Scale (NSS). The BFI-44 is a forty-four question inventory that measures extraversion, agreeableness, conscientious, neuroticism, and openness. The BIS-11 is a thirty question, 4-point Likert Scale that measures impulsiveness. The NISS is a seventeen question inventory that measures sensation seeking, and the NSS is a twenty question test that measures sensitivity to noise.

For the lemon juice procedure, students were each given a dish with two cotton swabs and a pipette, along with a dish filled with lemon juice.

Design and Procedure

All measures in the following experiments were recorded and collected anonymously; students were not required to share their results with any person.

Lemon juice procedure. Each student was given two cotton swabs, a dish, a pipette, and a dish filled with lemon juice. After taking a baseline weight (in grams) of a dry cotton swab in a dish, students completed a trial of their baseline salivation. Each participant placed a cotton swab underneath their tongues five seconds after swallowing. The participants let the cotton swab sit underneath their tongues for twenty seconds and then removed it, placed it in the dish, and
weighed the dish and swab. This baseline salivation weight was recorded in each participant’s lab notebook. Next, the students worked with a partner to determine their level of salivation when administered lemon juice. Each student had a partner pipette four drops of lemon juice onto the back of the tongue five seconds after swallowing. Five seconds after the lemon juice was pipetted onto their tongues, the students placed a clean cotton swab underneath their tongues for twenty seconds. During these twenty seconds, the students were instructed to think about grazing zebras. After twenty seconds, each student removed the cotton swab from under the tongue, put the cotton swab into the dish, and weighed the sample. This weight was recorded in the students’ lab notebooks. Students subtracted the baseline weight of the clean cotton swab and dish from each of their saliva measurements, and then subtracted the lemon juice trial saliva measurement from their baseline saliva measurement to determine the overall change in saliva production. This data was collected by the three preceptors for the lab. During the entire procedure, white noise was played in the room to reduce the effect of background noise on salivation.

**Personality Inventories.** Students scored the BFI-44, BIS-11, NISS, and NSS self-report measures according to the scoring instructions on the inventory sheets. Students recorded their data on sheets provided by the preceptors, and the preceptors collected the data and compiled it into the SPSS program. Students used SPSS to analyze the data, plotting the extraversion scale of the BFI-44 against the BIS-11, NISS, NSS results, and salivation change results, respectively. Pearson correlation coefficients and p-values were calculated with SPSS for extraversion compared to the three other personality inventories and salivation measures. All of this was completed according to instructions in the lab manual.
Results

The data was analyzed primarily to find the correlations between extraversion and the scores from the BIS-11, NSS, NISS, and salivation changes to determine if the hypothesis that extraverted people are more impulsive, more seeking of sensation, and less sensitive to noise is accurate. The values of extraversion were isolated from the rest of the scores from the BFI-44. Extraversion scores had a mean of 3.16 with a standard deviation of .67. BIS-11 impulsivity scores showed a mean of 55.14 with a standard deviation of 16.33. Sensation-seeking scores (NSS) had a mean value of 69.5 with a standard deviation of 14.41. Salivation change scores had a mean of .75 with a standard deviation of .43.

**Extraversion vs. Salivation Change**

When extraversion versus salivation change values were plotted, a non-significant positive correlation of $r = .281$ was found, with a non-significant $p$-value of .206 (Figure 1).

**Extraversion vs. Impulsivity**

When extraversion was plotted against the impulsivity scores (from the BIS-11), a small, non-significant correlation of $r = .024$ and a non-significant $p$-value of .915 were found (Figure 2).

**Extraversion vs. Sensation-Seeking**

A significant positive correlation was found when extraversion scores were plotted against sensation-seeking scores (from the NISS). The $r$-value was -.425, with a significant $p$-value of .048 (Figure 3).

**Extraversion vs. Noise Sensitivity**

When extraversion was plotted against noise sensitivity (from the NSS), a non-significant negative correlation was found of $r = -.076$, with a $p$-value of .75 (Figure 4).
Discussion

The results of our study failed to produce results consistent with most of the claims in our hypotheses. The only significant correlation found in our study was between extraversion scores from the BFI-44 and scores from the BIS-11, supporting the claim that extraversion is related to greater sensation seeking. Our claims that extraversion is related to greater impulsivity, less noise-sensitivity, and less salivation change in response to lemon juice were not supported by our study; however, some of these claims have been shown in other studies (Eysenck & Eysenck, 1967). The fact that our results show that extraversion is not related to impulsivity, noise sensitivity, and salivation change does not negate results made by other researchers. It is suspected that our results were not consistent with our hypotheses because of the small sample size in our study. This study may show different results if it was conducted with a larger sample size. Another matter that could have impacted our lack of significant correlations is that correlations of extraversion or introversion and salivation change, for example, are greater in people who are extreme on either extraversion or introversion (Eysenck & Eysenck, 1967). Our sample may have involved mostly people who scored moderately on extraversion and introversion, thus producing insignificant results. Other factors may have had an influence on salivation as well, such as the hydration level of the participants. A study that controls the hydration levels of the participants (i.e. by instructing that participants drink eight ounces of water a half an hour before the experiment) may eliminate that variable. When reproducing this study, one should be sure to use a large sample size and control for confounding variables such as hydration in order to get the best possible results.
References


Figure 1. The change in salivation (in grams) and extraversion scores were plotted for each participant. No significant correlation was found between extraversion and salivation change.
Figure 2. The extraversion and impulsivity scores from the BIS-11 were plotted for each participant. No significant correlation was found between extraversion and impulsivity.
Figure 3. The extraversion and sensation seeking scores from the NISS were plotted for each participant. A significant positive correlation was found between extraversion and sensation seeking, supporting the hypothesis that extraverts tend to seek sensation more than introverts.
Figure 4. The extraversion and noise sensitivity scores from the NSS were plotted for each participant.

No significant correlation was found between extraversion and noise sensitivity.