



## SIGNIFICANT DIFFERENCES BETWEEN INTROVERT AND EXTROVERT PEOPLE'S SIMPLE REACTION TIME IN CONFLICT SITUATIONS

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### Abstract

*This study investigated the simple reaction time and the reaction time during a conflict of introverted and extroverted persons, looking to prove that there are significant differences in terms of reaction time between these two categories of people. 60 people of which 30 extroverted and 30 introverted completed the International Personality Item Pool test extraversion scale and were tested at the Complex Senzo-motorial Tester (CST-2). The conflict situation was created with red and green color stimuli. The research findings are also supported by previous researches which show that there are significant differences between introverts and extroverts regarding simple reaction time, and reaction time to a conflict to the color red and green, with a significantly higher reaction time for introverts than extraverts, but with significantly fewer mistakes. On the other hand, extraverts responded better to external stimuli, but are more likely to make mistakes in extreme situations, situations that can be created by themselves.*

**Keywords:** *extraversion, introversion, Big Five Markers, reaction time, conflict situation*

### 1. INTRODUCTION

Reaction time is one of the most studied concepts in psychology because it is a concept with many features found in relation with many characteristics of individuals. When one knows enough aspects of a person's reaction time,

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inferences can be made in what concerns those people's psychomotor skills, decision-making ability, assertiveness and cognitive processes.

Therefore, psychological research is important to study individual differences in reaction time and its relation with other variables. Reaction time has been studied many times in relation to personality (Hagger-Johnson, Shickle, Roberts, & Deary, 2012; Carlozzi et al., 2010) to determine the nature of the relationship between these two concepts.

Personality is a dynamic organization within the individual of those psychophysical systems that determine a unique adjustment to its environment (Barrick & Ryan, 2003). Personality traits are conceptualized as stable characteristics different for each person explaining individual predispositions to certain patterns of behavior, cognitions and emotions (Hogan, Hogan, & Roberts, 1996 cit. in Bidjerano & Yun Dai, 2006).

Raymond Cattell used traits to predict behavior. He defines personality "that fact that it allows a prediction of what a person will do in a given situation" and later in defining personality traits: "what a person will do when faced with a defined situation" (Cattell, 1979, cit. in Cloninger, 2009).

Big Five is a hierarchical model based on personality traits. Personality traits are often defined as long-term dimensions of individual differences in tendencies toward other patterns of thoughts, feelings and actions (McRae & Costa, 1990 cit. in Costa & Widiger, 2002). The five personality traits include neuroticism (N), extraversion (E), Conscientiousness (C), Agreeableness (A) and Openness to experience. Of the five dimensions we use only extraversion in the present study. Extraversion refers to the quantity and intensity of interpersonal interaction, the preferred level of stimulation needed to stimulate the desire to feel happy. People with high scores on extraversion tend to be sociable, active, talkative, upbeat, fun and affectionate, whilst introverted people tend to be more reserved, sober, distant, independent, and quiet (Costa & Widiger, 2002). Extraversion describe active, sociable and assertive people, people willing to communicate (McCabe & Fleeson, 2012).

The concept of extraversion is part of many theories. Starting from Eysenck's theory (1967) we can say that introverts have a higher level of excitation than extraverts. Furthermore Gray (1967 cit. in Gupta & Nicholson, 1985) proposed that introverts have weaker nervous systems than extraverts.

Donders made one of the first experiments with reaction time starting from simple experiments timing the period between when the light appears until the subject presses the button. Although the experiment was relatively simple, he discovered the importance of reaction time in psychology. Donders concluded that reaction time "of choice" in situations of conflict must include two steps: choosing discrimination between stimuli and response. With time Wundt and Donders concluded that reaction time is longer when there are more possible events meaning more stimuli (Mook, 2009)

Brebner & Cooper (1974) said in a 1974 study that extraverts make more mistakes than introverts regarding reaction time, the explanation being that extraverts can generate an inhibitory response to continuous response task, or that the level of excitability is higher than in the case of introverts. In another study, Casal, Caballo, Cueto & Cubos (1990) show that there is no significant difference in reaction time between introvert and extrovert, the relationship being moderate.

Anitei, Chraif, Schuhfried and Sommer (2011) show that reaction time has an important role when it comes to extreme situations in traffic and subject involvement in critical moments decisions.

## **2. METHODOLOGY**

### **2.1. OBJECTIVE OF THE STUDY**

Starting from previous findings we expect to be a significant relation between reaction time differences of extroverts and introverts and mistakes in their red and green color. Theoretically, people who score higher in extraversion have a better response time than introverts, but make more mistakes in red and green colors, thus being significantly differences from introverts.

### **2.2. HYPOTHESIS**

1. People with high scores on the extraversion factor are expected to have a simple reaction time and less conflict situation, but more simple mistakes in red and green colors.

2. Persons with low scores on the extraversion factor are expected to have a simple reaction time and higher conflict situation, but fewer simple errors in red and green colors

### **2.3. PARTICIPANTS**

In this research 60 people took part (30 introverts,  $M = 20.1$  years old,  $SD = 2.91$  and 30 extroverts,  $M = 20.78$ ,  $SD = 4.97$ ), students of first year at the Faculty of Psychology and Educational Sciences.

### **2.4. INSTRUMENTS**

We applied the Goldberg Big Five Markers Questionnaire, the short form of the NEO-PI Personality Questionnaire-R, by Costa & McCrae. Big Five Markers consists of 50 items assessing five facets of personality: neuroticism, Extraversion, Agreeableness, Openness to experience, Conscientiousness.

The five personality factors were assessed with the IPIP questionnaire consisting of 50 items (Goldberg, 1999). Each factor contains 10 items, each with 5 response options (1 = does not characterize me at all, 5 = always characterizes me). The first factor, emotional stability consists of items that measure changes in mood states (eg, always relaxed, angry quite often) and has a Cronbach Alpha coefficient of .86.

The second factor is extraversion composed of items that assess the degree of sociability and energy level of activities, with an internal consistency of .87. The third factor is openness to experience and measure the degree to which people are interested in new things, abstract ideas and values (eg, I have a rich vocabulary, it is hard to understand abstract things) and has an internal consistency of .84.

The next factor is agreeability and it measures the extent to which anyone is interested in other people, empathetic, attentive to the needs and feelings of others (eg, Interested in people, sometimes offensive towards others) with a Cronbach Alpha coefficient of .82. The last factor is conscientiousness, which measures the degree to which people are organized, follow the rules (always prepare carefully, leave things scattered) and has an internal consistency of .79.

*Complex Sensomotorial Tester (CST-2)* apparatus with microprocessor control unit is a modern design that can be used to test simple reaction time (TR), choice, and complex decision (selection), as well as accuracy and rapidity and coordinate perceptual capabilities (auditory and visual) and response (hand and foot) and for testing simulated conflict situations. The Complex Sensomotorial tester can be used especially in the testing (on different levels) of drivers. With it we can investigate psychosocial characteristics of individual behavior in conflict situations that require decision-making components of personality.

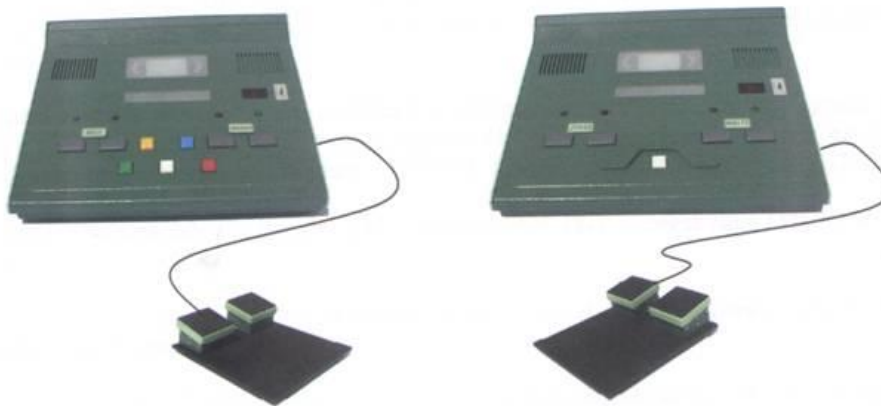


Fig. 1 Complex Sensomotorial Tester

## 2.5. PROCEDURE

All participants in the study were informed in advance about the nature of testing and research. Those who agreed were tested and completed the Big Five Markers personality-extraversion scale questionnaire. Before completing the questionnaires, participants were informed about how to use the device, and they were asked to complete the test as honestly as possible. Testing was carried out in the experimental laboratory of the Faculty of Psychology and Educational Sciences, University of Bucharest. The data collection process did not require the name of attendees.

## 2.6. EXPERIMENTAL DESIGN

In this study extraversion and introversion are independent variables and the dependent variables are the color red reaction time, reaction time to green, errors to red, mistakes in green.

## 3. RESULTS

According to the table below, a significant difference between the average simple reaction time between introverts and extroverts is registered. On the first pair we can say that on the testing without conflict introverts obtained higher scores, which means more time compared to extroverts ( $t(60) = -8.69, p < .000$ ).

Table 1. Means and standard deviations (age, extraversion, introversion)

Variable	M	SD
Introverts Age	19.66	0.80
Extroverts Age	19.83	0.74
Extraversion	34.36	4.97
Introversion	20.16	2.91

Pairs 2 and 3 refers to the color conflict test in red and green, and here we see significant differences between introverts and extroverts, two pair had a shorter reaction time than introverts ( $t(60) = -6.75, p < .000$ ), and pair three introverts had a better time than extroverts ( $t(60) = -5.4, p < .000$ ).

Table 2. Means, standard deviations and T test value for conflict reaction time

Variable	Extroverts		Introverts		T
	M	SD	M	SD	
Total testing time	112.93	(11.96)	138.96	(13.18)	-8.69**
Reaction time red	8.24	(4.19)	10.06	(4.35)	-6.75**
Reaction time green	11.93	(3.92)	14.00	(3.56)	-5.43**
Red errors	2.93	(1.36)	0.56	(0.93)	7.48**
Green errors	3.00	(1.64)	1.36	(1.18)	4.94**
Singular errors	3.53	(1.69)	1.66	(1.15)	6.10**
Total errors	8.00	(6.76)	4.66	(3.66)	4.78**

On pairs 4 and 5 we can say that there are significant differences in both pairs extraverts having significantly more mistakes than introverts, pair 4 ( $t = 7.48$ ,  $p < .001$ ) and pair 5 ( $t = 4.94$ ,  $p < .001$ ). In pair 6 a statistically significant difference can be observed, allowing us to say that extraverts have committed several mistakes in simple testing than introverts ( $t = 6.10$ ,  $p < .001$ ) and for pair 7 we can say that extraverts have more total errors than introverts ( $t(60) = 4.78$ ,  $p < .001$ ).

#### 4. CONCLUSION

This paper aimed to explore reaction time in extraverts and introverts in responding to conflict situations, that of choosing between red and green stimuli. As predicted, introverted people respond significantly slower than extroverted people, but the number of errors is lower.

Thus, the above results are supported by other previous research (Brebner & Cooper, 1974) differences between extroverts and introverts are significant both for simple testing as well as testing in conflict to the color red and green. Brebner & Cooper (1974) have postulated that the high level of excitability of extroverts' nervous system makes them more susceptible to errors than introverts, having a faster reaction time than introverts, whilst making more mistakes, a fact supported by this study.

Although some studies show no significant differences between introverts and extroverts, this study proves that in the group we tested there were differences. Greater reaction time for introverts is due to lower excitability, but this more than compensates by making fewer mistakes in situations of conflict and in simple testing.

Higher reaction time for introverts is due to their interior focus, introverts are fearful, fear of failure makes them more cautious, resulting in a low mistakes, but a bigger time to think. Reaction time to a conflict to the colors red and green depends on the ability of individuals to make a decision in a very short time.

Extraverts in terms of reaction time, respond more quickly, but are prone to more mistakes because they're attention is focused outward, their ability to concentrate is relatively lower than of the introverts, but have a better response capacity.

One of the limitations of this study is the test group, using a relatively small sample, consisting of students in the experimental psychology laboratory. Complex sensomotorial tester testing time can be considered another limit, because we talk of a relatively large time frame, between 15 and 25 minutes, so that many students did not want to participate in the study because of the high testing time.

The findings of this study are that in extreme situations encountered in everyday life, introverts have a longer response time to external stimuli, for example, extreme situations in traffic, but are more cautious and try to avoid these situations without making mistakes and we can say that more extreme situations

are due to other stimuli and not to their mistakes. On the other hand, extraverts responded better to external stimuli, but are more likely to make mistakes in extreme situations, situations that can be created by themselves.

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## REZUMAT

Acest studiu investighează timpul simplu de reacție pe durata unei situații conflictuale la nivelul introverților și extraverților pentru a evidenția diferențele semnificative dintre aceștia. 60 de persoane, 30 extraverți și 30 introverți, au completat un inventar de extraversion bazat preluat din baza de item International Personality Item Pool și au fost testați cu ajutorul Testului Complex Senzomotorial (CST-2). Rezultatele, susținute de studii anterioare, arată diferențe semnificative între introverți și extraverți în ceea ce privește timpul simplu de reacție, dar și timpul de reacție pentru conflictul dintre culoarea roșie și cea verde, introverți înregistrând timpi de reacție semnificativ mai mici, dar și mai puține greșeli.