

Suggestibility as a personality trait: connections to information processing

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Abstract: This study aims to establish a connection between the *top-down* and *bottom-up* processing, and suggestibility as a trait. We used visual stimuli in a computer-based environment (N=199) when measuring the response times. Also, we studied the possible connection with rigidity in attitudes. In one of the STROOP interference conditions, the high suggestible subjects made significantly more errors than the low suggestible ones. The high suggestible women subjects made significantly more errors in reporting the similarity of meaning in a pair of linguistic stimuli, both physically and semantically identical; the same subjects made significantly more errors in reporting the similarity of meaning in a pair of linguistic stimuli, physically different, but semantically identical. We did not find any significant relationship between the scores for suggestibility and rigidity.

Keywords: suggestibility, information processing, top-down, bottom-up, rigidity

Introduction

Suggestibility

In the prestigious language dictionaries, being suggestible is still equivalent to being susceptible to influence (Robert, 1993; Pearsall, J. 2001). This attitude underwent changes in a very slow rhythm. Although, due to the early work of Binet (1900), we hold a solid perspective on suggestion, interpreted as *leading idea*, concepts such as hypnosis and suggestibility have been surrounded by myths, and scientifically tested quite late (Nurmoja, 2005; Rassin, 2001). Understanding the inconsistent conclusions of previous research, Gheorghiu (1982) concluded that *suggestibility* is a vague concept, and it is worth taken into consideration only from a differentially psychological perspective. Trying to establish a direction in the research of this concept, he will emphasize (1989, p.3) three great research fields in suggestion and suggestibility: *suggestion in the context of hypnosis*, *suggestion as a personality trait (suggestibility)*, *suggestion as a psychosocial phenomenon*. For Gheorghiu (2000, p.2) suggestibility is the mere “*ability to respond to suggestion, in the interaction with the individual differences of the disposition to react*”. Other definitions surprised, individually, various aspects (Pascalis, 1991; David, 2006). In fact, no definition will ignore the multidimensional character. Trying to solve the problem of this terminological ambiguity, Eysenck and Furneaux cited in Evans (1989, p. 145) mention three factors of the person’s suggestibility: *primary suggestibility*, *secondary suggestibility*, *tertiary suggestibility (prestigious)*. Although initially the classification made by the two authors was widely accepted, not all the studies carried out followed the same direction (Evans, 1989). For

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example, Gudjonsson (1989) speaks about the *interrogative suggestibility*, while Lundh cited by Gheorghiu (2000) recalls the *intentional* and *non-intentional suggestion*. Apter (1991) will consider suggestibility in the context of the *reversal theory*. This very ambiguity in discovering the dimensions of suggestibility influenced in a bottom-up manner the definitions given. In the attempt to recover the whole, Gheorghiu (in Pascalis, V.D, Gheorghiu, V.A., Sheehan, P.W. & Kirsch, I., 2000) is faced with the necessity to advance a new notion, that is, the notion of *suggestibility*. We notice the fact that not even the scientists have managed yet to find a consensus in defining this concept. Therefore, since suggestibility as a personal trait is the object of this paper, we will first look at *waking suggestibility* (Gheorghiu, 1989) delimiting the conceptual framework of hypnosis. In order to dispose of a term to use in our research, we will limit to the definition of suggestibility as an *individual trait of personal propensity to respond to suggestions*, subscribing to Gheorghiu's position (2000).

A necessary distinction was the dissociation from hypnosis. A series of observations and research has come to clear up this relationship. Gheorghiu (1989, p.3) states that "*suggestibility is but one of the possible hypnotic phenomena. It is neither an explicative concept, nor a dimension of hypnosis*". Studies show that if we can talk about a proximal type or a relation of inclusion between suggestion and hypnosis, we can also talk about suggestion outside hypnosis, and identify the necessary and sufficient conditions for hypnosis, other than suggestibility. Thus, we pose the following question: if hypnosis is a state, then suggestibility is a trait intensified by this state, without asserting that there is no suggestibility characteristic to the individual before inducing the trance. There are also similar positions in specialised literature (Hull cited by Gheorghiu, Netter, Eysenck, & Rosenthal. eds., 1989; Edmonston, 1989; Pascalis, 1991). Since there is self-hypnosis (Holdevici, 2004), the definition according to which hypnosis is exclusively produced in an interpersonal interaction could become inapplicable. Another unjustified intermission was produced between suggestibility and the placebo effect, aspect observed by Evans (1989). Several actions further invalidated the relationship suggestibility-placebo (Netter 1989; Milling, L.S., Kirsch, I., Allen, G.J., Reutenauer, E.L. eds., 2005; Gudjonsson 1989; Evans 1989). Trying to solve this dilemma, Lundh (2000) carried out a distinction between the placebo effects due to suggestion and placebo effects that are related to other causes.

A new track reminded by Eysenck (1989). The author makes a connection between the verbal interaction as a suggestion and the second signalling system theorised by Pavlov. On the other side, several comparisons and evaluations were carried out, in order to determine if there is any difference according to gender as far as suggestibility is concerned. The results are contradictory, with few confirmations, (Gheorghiu 1989; Netter 1989; Fellows 1979). Simultaneously, the relation of the age variable with suggestibility was one of the most widely studied.

According to most studies (Netter, 1989; Gheorghiu 1989; Bruck 1999), we can speak about a significant relationship existing between the two variables. The few studies concerned with the relationship between suggestibility and gender gave results that cannot be replicated (Gudjonsson, 1989; Netter 1989, Stukat cited by Gheorghiu et. al, 1989). Investigating the possible relations between suggestibility and the personality factors present in 16 PF, Gheorghiu (1982) comes to a few descriptive conclusions for the suggestible, respectively for the non-suggestible persons. Gudjonsson (1989) asserts that interrogative suggestibility correlates significantly with neurosis. Also, two studies of Gudjonsson (1989) show a significant negative correlation between suggestibility and self-esteem. Gheorghiu (1989) gathers several results concerning the relationship suggestibility – psychopathology, without finding any significant differences. On the other hand, Rhue and Lynn (1991) show that suggestibility is a characteristic relatively prominent in the individuals with multiple personality disorder. A difference was identified between anxiety as a state and anxiety as a trait, shown by Gudjonsson (1989), the first being more positively correlated with suggestibility than the latter. Riddley, & Clifford, (2006) demonstrate that the individuals that are in a higher state of anxiety presented a more reduced level of suggestibility than the subjects in a lower state of anxiety. The influence of a person’s suggestibility on the addictive behaviours was also studied (Glaus, 1975; Mirakami, Edelmann & Davis, 1996; Gudjonsson 2004; Netter 1989).

Information processing

The recognition of an object presupposes, in a final stage, its distribution in one of the categories which already in our memory (Atkinson, Atkinson, Smith & Bem, 2002). By studying the path of the sensorial information, it has been discovered that the perception of objects presupposes both a *bottom-up* and a *top-down* processing. The bottom-up processing is responsible for the transfer of the necessary and sufficient information from a stimulation present in order to recognise an object, and it is directed exclusively towards the input (Atkinson, 2002), supported by trait detectors (Hubel & Wiesel, 1963; Treisman & Gormican, 1988; Cave & Wolfe, 1989). The role of the “bottom-up” processing was also highlighted in Biederman’s model (1987). In perception, only ascendant processing is responsible for the identification of objects and building of an adequate representation. In the “top-down” processing, the processes are directed by the person’s culture and expectations, since some other information is put into motion, other than the Atkinson input type (2002). Many times, the context or the meaning plays the role of a perception catalyst, facilitating recognition and decreasing the need for ascending sensorial input. (Reicher, G. 1969)

The research also concluded that the meaning of a stimulus tends to be remembered more than its sensorial structure (Mandler & Ritchey, 1977). A similar mechanism was also recorded for the verbal stimuli. For instance, Posner (1969)

presented pairs of letters to his subjects. The subjects' task was to establish if the same letter appeared in the given pair. In case there was an identity of meaning, two situations were present: in the first case, the letters were identical, both semantically and physically (ex: **A A**); in the latter, the letters were identical only with respect to meaning: (ex **A a**). Posner discovered that the response time was significantly more reduced for the first case when the two letters forming a pair were presented simultaneously. *"This can be explained by the rapid deterioration of the sensorial component, the comparison being made only on the grounds of semantic characteristics."* (Miclea 2003, p.240)

In our study, we used this method of identifying the similarity of meaning both for the linguistic and image stimuli. The beginning of the hypothesis covers the detection of the semantic identity for the stimuli that are identical only with respect to meaning, but not to the physical characteristics. *Top-down* processes are also involved, since additional information is needed in order to decide if the two stimuli have the same meaning or not. On the other hand, the speed with which identity is detected for the stimuli having the same physical appearance depends on the speed of the bottom-up processing. Our study aims at discovering if there is any difference between the suggestible and non-suggestible persons with respect to their speed of processing information, in both directions.

In his classical study, J. Ridley Stroop continues and improves the experimental model of his predecessors as far as the interference or inhibition effect is concerned. Other researchers, show Stroop (1935), suggested that the processes involved in the two tasks (reading the word, respectively naming the colour) are different, each of them interesting at other levels. In his three experiments, the author investigates this relationship: the test of reading **colour names** written in different ink; the test of **naming the colours** in a series of squares of various colours and in a series of words where the written colour name was different from the colour of the ink used; the tests of naming the colours and reading the name of the colour studied from the perspective of the **repetition effect** over a couple of consecutive days. Indeed, the study showed that, if in the first experiment, the speed of identifying the two types of stimuli does not differ significantly, however in the latter experiment there is an obvious interference effect of the colour name on naming the colour. Moreover, it was shown that repetition decreased the response times (experiment 3).

In the present study we started from the hypothesis that, within the interference effect, when trying to name the colour, a top-down processing would be responsible for the inhibition. The meaning of the word has an effect on the task of identifying the colour. In the example given, if the task of the subject is to answer "YES" every time (s)he sees the colour red, as a colour, the "context" for presenting this colour in the form of a word that names another colour (green) will activate descending processing, responsible for the interference process. In this

case, the bottom-up processing ensures the identification of the colour red as colour, while the top-down processing interferes by detecting green as a word.

General hypotheses

In this study we tried to answer the following question: “Is there any difference between the high and low-suggestible subjects as far as information processing is concerned?” In our attempt to better understand suggestibility, we used the measurement of the response time, identified separately for various types of stimuli. We started from the hypothesis that a higher realisation speed for a task involving various types of stimuli equals a higher speed for a certain type of processing. In case one or another category of subjects reacts faster to semantic similarities, in meaning or physical characteristics, we will detect a new direction in the development of research in the field of suggestibility, with new possible answers.

Method

Participants

The subjects are represented by 217 students from the Faculty of Psychology and Education Sciences. A series of aberrant values were discarded, as well as a number of 18 subjects. The database submitted to processing thus counted **199** subjects.

Materials and procedure

To begin with, we formulated a general hypothesis: *There is a main effect of the level of suggestibility on the ways of information processing.* The test of the general hypothesis was carried out in two different parts of the experiment (A&B), with 6 repeated measurements each. Since the design is similar, we combine the results of the two parts. The subjects were asked to answer by “YES” or “NO” to two types of computerised tasks, using stimuli that do and do not require descendent information processing. In part “A”, in order to provoke the two types of processing, we used pairs of stimuli that presented or did not an identity from the semantic point of view, starting from the model (also extended to the image-stimuli) of Posner (1969), on the semantic codification of the stimuli. In part “B”, in order to manipulate the types of processing we used Stroop stimuli, inspired from J.R. Stroop’s princeps experiment (1935). In this case, we created situations in which the subject had to come up with the meaning of the word or the colour stimulation.

In order to measure the suggestibility level, we used the Suggestibility Inventory carried out in the study of González Ordi, H., Miguel-Tobal J.J. (1999). It was translated from Spanish with the help of some experts, and was pretested on a sample of 54 persons, for the calculation of the internal consistency of the scale. In the pretesting stage, we modified the Likert response scale from 5 to 6 points, in order to avoid a central tendency. The Alpha Crombach coefficient reached the

value of .85. The actual application of the questionnaire was computerised, in the same testing battery as the other measurements. The suggestibility score appears in a tabular output. In the measurement of the response times we also used a computerised program. This automatically exposes the stimuli on the screen in a random order. The randomised order changed for each run of the program. The average response times for every type of stimuli are shown in a tabular output (.csv file) at the end of this experiment.

Finally, we operated one last study, using a Rigidity Questionnaire, RAPH-Scale – (Rigidity of Attitudes regarding Personal Habits) created by Meresko, Rubin, Shontz & Morrow in 1954. The general hypothesis for this demarche is “*Is there a significant correlation between the level of suggestibility and the level of rigidity*”. The scale (Alpha-Crombach = 0.77) was introduced in the computerised battery.

For part “A”, we identified the following variables: V.I. 1: *The suggestibility level* (after applying the suggestibility test, deciles were used in the total results in order to separate the group of subjects with high suggestibility from the low-suggestible subjects (deciles 1 and 2, respectively 9 and 10); VI 2: *The physical and semantic characteristic of the pair of stimuli*. 20 pairs of stimuli were created for each modality of the variable, respecting the mentioned characteristics). Examples of stimuli we used can be seen in Figure 1 (physical identity, semantic identity-IF:IS); Figure 2 (physical difference, semantic identity - DF:IS) and Figure 3 (physical difference, semantic difference DF:DS).



Figure 1



Figure 2



Figure 3

Finally, a third variable was V.I. 3: The code of the *stimuli*: image, respectively a linguistic code. Each modality of the variable is represented by 30 pairs of stimuli of the type of those from figures 1, 2, 3. Combining the independent variables 2 and 3 generates 6 distinct types of stimuli that entails 6 different types of

measurement. The dependent variable was at the top-down and bottom-up processing speed, operationalized by the response time to the stimuli (for example: *a smaller RT for identifying the semantic identity for the stimuli DF:IS illustrates a greater presence of the top-down processing, and vice-versa.*) Thus, the research has a mixed plan, with an independent variable with two modalities and 6 repeated measurements.

In experiment “B” we operated with the following data: V.I.1: *the suggestibility level* (after applying the suggestibility test, the separation into terciles which are to be used to separate the group of subjects with high suggestibility from the group of subjects with low suggestibility), respectively V.I. 2: *The physical and semantic characteristic of the stimulus*. It is exposed through the following means: the red colour, other colours, the word “RED” written in black, the names of other colours written in black, and the names of other colours written in the corresponding colour. Each type of stimulus is represented 10 times. The dependent variable consisted from the top-down and bottom-up information processing speed, operationalized by the response time to the stimuli. A bigger RT for the response to the colour and to the names of other colours written in red shows a prevalence of the *top-down* processing and vice-versa: a smaller RT for the response to the name of the colour written in black shows a prevalence of *top-down* processing and vice versa. The research plan is mixed, with an independent variable with two modalities and 6 repeated measurements.

The testing battery is represented by a computerised program. It runs in the form of successive shots, requiring the interaction with the subject in front of the computer. Seventeen subjects per group were tested in the Informatics Laboratory of the Faculty. Only 17 out of 35 computers were used, in order to ensure an empty place between the subjects and to prevent other distracting factors. At the beginning, the subject was reassured that (s)he was not about to begin an intelligence or aptitude evaluation, and were asked questions about age and gender. Subsequently, the subject was announced that the test battery contained four distinct parts; the explanation concerning the content of each part appeared at the beginning of each section, so that the subject’s attention was focused on the present task. The four parts contain: part A with 6 repeated measurements, in which are presented the stimuli pairs with or without semantic and / or structural identity, part B with 6 repeated measurements with stimuli representing the colour or word (and combinations), the Suggestibility Inventory and RAPH Rigidity in Aptitudes Scale.

The subject is instructed that on the computer keyboard, the keys representing *right-arrow* and *left-arrow* signify the answers “YES”, respectively “NO” (see Figure 4). On the two keys, two labels indicate YES /NO. In part A, the subject is required to press YES, when the two images appear simultaneously on the screen are identical from the point of view of the meaning, and NO in the other cases. In part B, the subject is required to press YES when red appears on the screen either in the form of a word or as a colour. The access to the two keys is done either with

one or both hands. At the beginning of parts “A” and “B” there is one demonstrative exercise, in order to make sure that the subject understood the requirements of the task. The answers to the exercises have a feedback “Right” or “Wrong” and an explanation.

After solving the exercises, parts A and B are run. The stimuli appear on the screen and they are kept until the subject gives an answer. The response time is calculated as the time between the stimulus’ appearance on the screen and the pressing of one of the answer keys. After the subject’s answer, a short black flash appears and the next stimulus is exposed. For the two questionnaires in parts C and D, the subject can press the buttons representing the entities of the Likert scale, and “Next” after the decision. The results appear in an output file, in *.csv file format (comma separated values). The matrices obtained in this way were imported in SPSS for the calculation of the statistical indicators. The most frequently met statistical indicator was the test “t” for the meaning of the differences between the averages for independent samples. This corresponded to following some possible differences between the two independent groups, separated by the result in the suggestibility inventory. The results in the variable “Result in the suggestibility inventory” were separated into deciles. Therefore, the analysis classes were delimited into: *low suggestibility* subjects (results 43-66) and *high-suggestibility* subjects (scores 85-113).

Results

The normality of all the distributions obtained was confirmed with the Kolmogorov-Smirnov test. The analysis for comparing the averages was carried out in each case, for the four types of data we disposed of, for a certain category: RT for all the answers from the subject, RT for the correct answers from the subject, RT for the wrong answers from the subject, number of errors made. From the average comparison analyses, between the high and low suggestibility groups, we obtained a significant difference: the high suggestible subjects made significantly more errors in identifying the word “RED” written in black, than the low suggestible subjects ($t_{(67)} = -2.35$; $p < 0.03$). For the total number of subjects, all the other differences between the averages proved to be INSIGNIFICANT. Among all the 199 subjects, only 39 were men, which made the separate analyses based on gender impossible. In order to make a valid analysis in the case of women, it was necessary to expand the independent groups initially created. We used a division into two independent groups: *low-suggestible women subjects* (scores between 43 and 67) and *high suggestible women subjects* (scores between 83 and 113). The high suggestible women made significantly more errors in reporting the identity of meaning in a pair of linguistic stimuli, both physically and semantically identical ($t_{(70)} = -2.35$; $p < 0.03$); the same subjects made significantly more errors in reporting the identity of meaning in a pair of linguistic stimuli,

physically and identically different from the semantic point of view ($t_{(68)} = -1.92$; $p < 0.05$);

For the total number of women, all the other differences between the averages proved to be INSIGNIFICANT. As far as the RAPH rigidity scale is concerned, the results of the subjects in this instrument were not correlated with the instrument of suggestibility measurement. The difference between the group of high suggestible subjects and the group of low suggestible subjects with respect to rigidity in attitudes, measured with the RAPH scale, was also INSIGNIFICANT (5.7). An analysis of the differences among the averages between the two sexes, for the scores in the Suggestibility Inventory, confirms some of the previous research. There is a significant difference between men and women with respect to suggestibility, that is, women are significantly more suggestible than men ($t_{(197)} = -3.8$; $p < 0.01$). As far as the age of the subjects is concerned, we carried out a difference analysis between the tercile 1 and tercile 3 (on age distribution) with respect to the scores in the Suggestibility Inventory. The difference proved to be INSIGNIFIANT.

Discussion

The detailed statistical analysis contradicts for the most part the general hypothesis of a main effect of suggestibility on information processing. We were able to identify a few significant differences on the response times from the experimental items, but they are not. Considered separately, these differences follow the direction of our hypotheses. The scores in the suggestibility, respectively rigidity tests were not connected at all. As far as this last result is concerned, rigidity and suggestibility are most likely not related. This may be due to a somehow different sub layer. It is more likely that suggestibility is a background trait, connected more to the temperamental basis than to rigidity in attitudes, just as it is possible for the latter to be more trainable than the first one. In our study we managed to subscribe to the group of those who confirmed a higher score of suggestibility in women. As we recalled, this is still an unclarified issue, many studies still being contradictory. Obviously, a lack of conceptual uniformity is also involved. Every instrument for the suggestibility measurement uses another concept or tries to combine as efficiently as possible items representing the types of suggestibility discovered or still studied. We can also add our contribution to the debate concerning the gender differences in suggestibility. We could not confirm the initial discoveries of the predecessors (Gheorghiu, 1989), according to whom suggestibility decreases with age. With our result, we place our position, more on the sceptics side, stating that the difference is not, in fact, consistent. We did not detect any significant difference between the tercile 1 of age and the tercile 3, as far as the Suggestibility inventory is concerned.

Conclusions

A considerable number of studies were already carried out in trying to establish the nature of suggestibility and its place in personality. Connections with gender, age, traits such as neuroticism, intelligence, introversion/extroversion, or contextual variables such as drug consumption were also analysed. The results are rarely consistent, and this makes it even more difficult to evaluate the dimension of suggestibility by means of adequate and economic means. Although it was an enlivening idea, the connection between suggestibility and information processing is, for now, far from being completely understood. The few significant results obtained could lend themselves rather to influences of the experimental context than to a consistent connection between the two variables. There are two practical implications of the study: the study can suggest that the track of the relationship existing between suggestibility and information processing does not give any results, and the detailed analysis of the way in which research was carried out can provide important ideas on third factors connected to suggestibility. Anyway, a replication of the study would be welcomed.

Nevertheless, some limitations have to be mentioned. Firstly, the study we carried out used a group of subjects, and by no means a consistent sample, although the age distribution was normal. Secondly, the subjects were 217 students who had just finished an exam, lack of attention and slowness caused by fatigue. Thirdly, the Suggestibility Inventory used, although with good consistency, raises questions on the validity of the construct. Although it generates a total result, it was conceived on factors that try to detect some of the elements of suggestibility. It is possible that the scale measures hypnotisability rather than suggestibility. Because of the lack of instruments for this dimension, other tests using verbal items and motor or imaginative answers are difficult to apply. Fourthly, some of the items of the inventory seem socially undesirable, containing formulas of the type “*I am an easy to sway person*”, or “*I get carried away easily*”. Then, situations of distraction could deform the response time average, with no certainty that we eliminated this bias by deleting the aberrantly high values. Moreover, we could not ascertain the subjects’ total sincerity. We could only eliminate the data related to a number of errors showing either a superficial realisation of the task, or a misunderstanding of the instruction. One last observation would be the fact that we used “physically and semantically different linguistic items” in the category. These are letters that do not belong to the Romanian language. Although initially we thought that this would facilitate the answer “NO”, during the experiment we realised that the presence of these items sometimes created confusion.

For future research, it will be useful to study the relationship between suggestibility and attention, in all its forms. Some studies can be carried out in which independent groups are separated according to an interrogative suggestibility test, with a motor answer, studies that analyse a possible connection between

suggestibility and tolerance to ambiguity and research on a possible relation between suggestibility and situational anxiety.

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