

Wegner, D., Erber, R., & Raymond, P. (1991). Transactive memory in close relationships. *Journal of Personality and Social Psychology*, 61, 923-929.

Whittlesea, B.W.A. (1993). Illusions of familiarity. *Journal of Experimental Psychology: Learning, Memory, & Cognition*, 19(6), 1235-1253.

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■ High and low suggestible subjects were compared in their ability to attribute meanings and to recognize both things and objects in relation to a composite figural pattern via cognitive integration of information. Figural stimuli with high and low number of attributed meanings were used. Two different kinds of instructions inducing opposite expectations were also used. One instruction suggested to subjects, plausibly that high levels of cognitive capacity support the attribution of a high number of meanings. The second instruction, in contrast to usual belief, suggested that a more efficient cognitive ability does not favour such a high number of meanings. The number of meanings and reaction time to the first attributed meaning were obtained. Split-plot ANOVAs were performed between high and low suggestible groups. The high suggestible group, compared to the low suggestible one, showed a higher number of attributed meanings for the stimuli suggested and produced high levels of meaning. High suggestible subjects, as compared to low ones, displayed shorter RT for figural stimuli in the condition suggesting a low number of meanings. Results support Gheorghiu's and Kruse's ambiguity-disambiguity theory wherein high suggestible persons, as compared to low ones, display higher ability in the attribution of meanings and clearer solutions to ambiguous stimuli.

In recent years the systematic study of the nature of suggestion and suggestibility and their relationship with other psychological phenomena (such as hypnotizability, absorption, imagery and imagination) has shown strong effects both from a theoretical and experimental point of view. Suggestibility is clearly a multidimensional phenomenon. Different theoretical and experimental approaches to the study of this phenomenon reflect different conceptions relating to the relationship between suggestion and

the other dimensions of mind (Eysenck, 1991). Interpretative difficulties in the definition of suggestibility arise from insufficient conceptual clarity and from inadequate experimental control and measurement of variables that describe it.

In contemporary research in this field it can be observed that the concept of hypnosis has "absorbed" the concept of suggestibility (Gheorghiu, 1989), the latter concept being used as a tool to understand the nature of hypnosis. For example, it has been pointed out that: (a) distortions in perception and memory can arise from suggestions in hypnotic state (Orne, 1966); (b) the activity of imagining related to suggestion makes easier the process of involvement during hypnosis (Spanos & Barber, 1974); and (c) the ability to respond to suggested situations and conditions is similar to the ability to be hypnotized (Tellegen, 1978/1979). Moreover, if suggestibility is a feature of the social situation rather than of the person, then this is a question that must be both explored and explained. For these reasons, as Gheorghiu (1989, p. 5-6) has pointed out, "We are uncertain, for instance, whether suggestion is a stimulation condition or a trigger for special forms of behavior, merely a context in which hypnosis can be produced, a method of deception and/or a placebo, a self-fulfilling prophecy, a dimension of personality, and so on". In his attempt to define a theory of suggestibility, Gheorghiu and Wallbott (1993) maintain the necessity to distinguish suggestibility from other complementary phenomena connected with it such as imagination (which is the "tendency to confound fiction and reality"), compliance with instructions (which is the "tendency to react in accordance with demands"), and involvement (which is the "tendency to get into a given situation or role"). Representative tests have to be constructed which highlight a specific reaction, so as to measure suggestibility, and clarify the nature of its different dimensions.

With respect to the phenomenon of suggestibility, imaginal processes, expectations, beliefs, but also focalization of attention, absorption, disposition of attitudes, and interactions all play a significant role. Nevertheless, it is not clear how individual differences in suggestibility influence cognitive activity during a variety of tasks involving mental imagery, attribution of meaning, or making creative use of memory information. A relevant question, pointed out by Fiedler (1989), which research should explore, is how can we determine the level to which suggestion influences the ongoing information processing at the level of stimulus processing, or response emission, or both.

Imagery is generally defined as a representation of schematic sensory impressions, which operates across all sense modalities. Nevertheless, some researchers consider imagery as a process of thought itself. Paivio (1971, p. 148), for example, says imagery is "a dynamic and transformable process without whose service 'pure' verbal thinking might be less flexible and creative than has been generally assumed". But also imagery is a symbolic representation of reality (Newell, Shaw, & Simon, 1964).

A number of studies, using a variety of cognitive tasks, have demonstrated that imagery involves the same mental processes as those engaged by real stimuli (see, e.g.,

Finke, 1979, 1980; Finke & Koslyn, 1980; Podgorny & Shepard, 1978). More specifically, it has been demonstrated that visual imagery involves multiple levels of information processing in the visual system which are comparable to what has been demonstrated and theorized to exist with real visual stimuli (Coren, 1975; Posner, 1978). But in the case in which the visual stimulus is ambiguous and the subject is required to give an interpretation of the stimulus, he/she must integrate all available informational input in order to attribute meaning. This mental activity involves a high level cognitive information processing, which has been proved to be strongly affected by suggestion.

This chapter reports work that tries to connect two approaches to cognitive functioning: individual differences in suggestibility, and human information processing under experimental conditions that affect visual perception. The present research examines the ability to attribute meanings of ambiguous pictorial stimuli in high and low suggestible subjects. Performance of high and low suggestible subjects was studied with respect to subject's expectancy. Assuming that the level of expectancy of the high suggestible persons is greater than that of low ones, the former should be more sensitive to suggestive cues than the latter. In particular, it was hypothesized that high suggestible subjects would show a more efficient ability to attribute meanings and faster reaction times to visual pictures than low subjects.

Method

Subjects

Twenty eight undergraduate psychology students (age range 18-26 yrs.) voluntarily participated in the study. The subjects were selected from a wide group of individuals on the basis of the Suggestible Sensory Group Scale (SSK-G; Gheorghiu, Koch, & Hubner, 1993). The SSK-G was administered to groups of four subjects, each by two expert instructors. Subjects were characterized as high suggestibles (N=17) when their suggestibility scores were up to 25% of the distribution on SSK-G scores. Low suggestible subjects (N=11) were characterized as those who scored bottom to 25% of the distribution on the SSK-G scores range. The following questionnaires were also administered: Vividness of Visual Imagery Questionnaire (VVIQ; Marks, 1973); Mental Imagery Questionnaire (QMI; Betts, revised by Sheehan, 1967); Visualizer-Verbalizer Questionnaire (VVQ; Richardson, 1977); Tellegen Absorbion Scale (TAS; Tellegen & Atkinson, 1974). These questionnaires have been shown to be good screening devices for determining who is capable of beneficially using imagery in perceptual tasks.

Materials

Six high ambiguous and six low ambiguous unusual figural stimuli were selected from a pool of 30 stimuli. The selection procedure consisted of asking an independent group of 15 people to identify the greatest possible number of things and objects in each stimulus: Six of them were classified as promoting a high number of meanings (high ambiguous figures), and six as promoting a low number of meanings (low ambiguous

figures). Figures were presented visually to subjects on a projection screen.

Procedure

Each suggestibility group was divided into two equal subgroups. One subgroup received instructions suggesting, plausibly, that high levels of cognitive capacity support the attribution of a high number of meanings (high expectancy: Instruction A). The other subgroup received instructions suggesting, in contrast with usual belief, that a more efficient cognitive ability does not favour a high number of meanings (low expectancy: Instruction B). Visual presentation of the stimuli was counterbalanced across subjects. Suggestion and Instruction were "between subjects" factors. Number of attributed meanings was a "within subjects" factor.

High and low suggestible subgroups who received Instruction A were told: "In the psychological research it has been shown that the ability to attribute many meanings to a figural stimulus increases with the growth of the cognitive ability of people. The aim of this experiment is to verify the validity of the following hypothesis: if the cognitive capacity is more remarkable the number of meanings attributed to the stimulus is higher. If this hypothesis is true we have to propose a new cognitive theory of human information processing. You must realize that your contribution is very important and fundamental".

High and low suggestible subgroups who received Instruction B were told: "In the psychological research it has been shown that the ability to attribute many meanings to a figural stimulus is independent of the cognitive ability of people. Nevertheless, experimental results have shown that if cognitive capacity decreases the number of meanings attributed to a figural stimulus increases. The aim of this experiment is to verify the validity of the latter hypothesis: that is, if the cognitive capacity is more remarkable the number of meanings attributed to the stimulus is lower. Whether this hypothesis is true we have to modify the cognitive theory of human information processing. You must realize that your contribution is very important and fundamental".

The task of subjects was to find meanings for each figure projected onto the screen and to push a button each time they identified a possible meaning. Time period for meaning attributions was fixed at 30 sec for each ambiguous figure. After this time, there was a pause of 10 sec and figures were then presented by tachistoscope exposure. The number of attributed meanings and the time employed for each stimulus meaning were recorded and measured by a computer.

Results

Self-report questionnaires

Correlation coefficients between imagery and suggestibility scores were computed. There was a significant relationship between SSK-G and VVIQ measures ($r=-.56$, $p<.001$), indicating that the level of vividness of visual imagery increased with the level of suggestibility. The correlation coefficients calculated between SSK-G and TAS

scores ($r=.20$), between SSK-G and VVQ scores ($r=.15$), and between SSK-G and QMI scores ($r=-.29$) were all not significant, ($p>0.05$). Using all the above-mentioned measures (VVIQ, VVQ, TAS, QMI) as predictors of SSK-G scores within a regression analysis, results showed that 38% of the total variance was explained by the predictors.

Behavioral results

Behavioral data analyses were carried out by ANOVA using the following $2 \times 2 \times 2$ experimental design: Suggestibility (high, low) \times Instruction (A, B) \times Ambiguity (high, low). The first two factors were "between" and the last factor was "within" subjects.

Statistical analysis on the number of attributed meanings evidenced two significant effects: (a) a main effect for instruction ($F(1,24)=8.43$, $MSe=1.24$, $p=.007$), and (b) a main effect for Meaning ($F(1,24)=41.84$, $MSe=1.44$, $p<.001$). The first effect indicated that Instruction A produced a significantly greater number of meanings than Instruction B ($M=17.20$ vs $M=14.29$, for A vs. B, respectively). The second effect indicated that highly ambiguous figures were inducing a higher number of meanings compared to low ambiguous figures ($M=16.12$ vs 12.83 , respectively). Finally, the Suggestibility \times Instruction interaction was also significant ($F(1,24)=5.92$, $MSe=1.48$, $p=.02$). This effect indicated that high suggestibles, compared to low suggestibles, displayed a higher number of stimulus meanings for Instruction A, while there were no suggestibility differences for Instruction B (see Fig.1). No significant effect for Suggestibility was found ($F(1,24)=2.04$; $MSe=1.34$, $p>0.05$).

The time required for the first attribution of meaning at the first stimulus presentation was measured and analysed by ANOVA. The following significant effects were obtained: Instruction ($F(1,24)=10.07$, $MSe=849$, $p=.004$); Ambiguity ($F(1,24)=14.90$, $MSe=848$, $p<.001$); Suggestibility \times Instruction \times Ambiguity ($F(1,24)=4.44$, $MSe=848$, $p=.04$).

Duncan's test for multiple comparisons showed that for ambiguous figures the reaction time of high suggestible subjects under instruction A was significantly faster than that obtained from low suggestible subjects. On the same figures, low suggestibles manifested a reaction time that was slower than that of high suggestibles subjects under instruction B (see Fig.2).

Discussion

Present data results provide evidence that level of suggestibility influences the subjects' attribution of meaning to ambiguous figures, the process requiring the recollection of information from semantic memory and the cognitive integration of this material. Furthermore, in this study a significant relationship between the visual dimension of vividness (VVIQ) and suggestibility (SSK-G) has been highlighted. This result may be explained by the fact that both tools measure similar cognitive activities.

In the study we did not obtain a significant relationship between absorption and suggestibility. This evidence supports the idea that cognitive processes underlying absorption and suggestibility are somewhat different. In the present research, however, we did

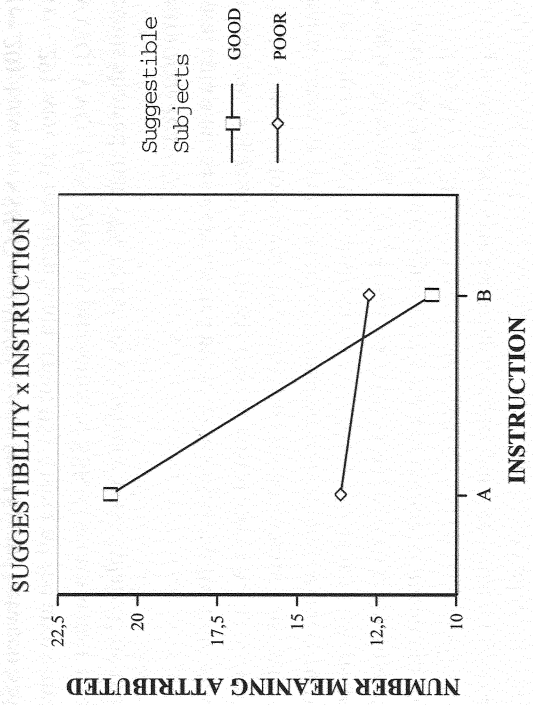


Figure 1: Significant interaction between suggestibility and instruction conditions ($p = .02$)

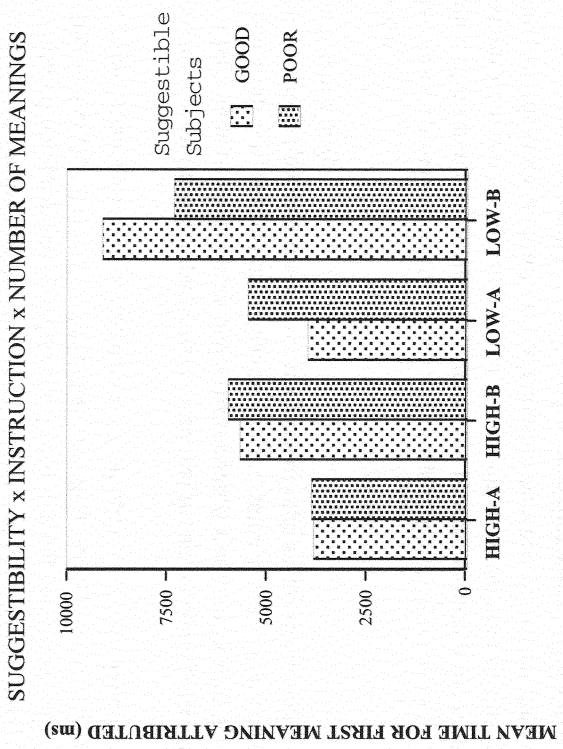


Figure 2: Response mean time for first attributed meaning to ambiguous stimuli in high and low suggestibles for high and low number of meanings elicited when the subjects received Instruction A and B ($p = .04$)

find significant differences between high and low suggestible subjects with respect to the different kinds of instructions. High suggestibles, compared to low suggestibles, were more sensitive to the influence of context, mainly for the common sense expectation induced by Instruction A. This result may be interpreted as indicating that high suggestibles consider context information in relation to specific characteristics of their own cognitive schemata (Gheorghiu, 1989).

These considerations are consistent with the longer time for attributed meaning detected in high suggestible subjects for Instruction B, since the number of attributed meanings decreases with the time required for the attribution.

In the study the subjects did not know the real aim of the experiment. They were told simply about possible effects of the experimental instructions. This kind of situation can be defined in terms of procedures that induce indirect suggestion (Gheorghiu & Rehyer, 1982). The suggestions given to the subjects for production of meanings influence also the efficiency of the power of imagination; high suggestible subjects are more imaginative than low suggestible subjects. This is consistent also with the significant relationship between SSK-G and VVIQ scores.

Intentionally giving information that is different from reality is, in fact, deception on the part of the person who is communicating that information. The relation among perception, imagination and deception that emanates from this research has been found previously (Davies, 1987). The problem of deception is associated with the issue of subjects possibly discovering the actual aim of the research. As Gheorghiu, Netter, and Tichi (1989) have argued, such a danger exists. The subjects who were more involved in the suggestion are probably also those who might have understood less than the others about the actual aims of the experiment. This result has theoretical implications. The tendency of the high suggestible subjects to be "good" subjects might depend on the characteristics of their personality, on their decision to take on a specific role in the experiment (e.g., the role of the "good" subject). Alternatively, they may not be aware of the deception and there is some other reason that motivates their reaction. Possibly, an uncritical acceptance by the highly suggestible subjects of the suggested information favoured in them a strong expectancy with regard to the experimental task. The role of expectancy in this research is thus important for future work. It could be hypothesized that the stronger the expectancy, the more efficacious is the deception of the person who is doing the communicating.

Kirsch (1994) has proposed an explanation of the relation between expectancy and deception saying that faith, trust, interpersonal relationship and motivation all modulate expectancy and suggestion. Moreover, if high suggestible subjects are more prone to deception in an uncritical way, maybe they are also more disposed to be persuaded. Certainly, the high suggestible subjects showed cognitive flexibility in this experiment by producing a higher number of meanings.

Cognitive flexibility is consistent also with Gheorghiu's and Kruse's (1991) ambiguity-disambiguity theory. Suggestion is considered by Gheorghiu as a cognitive strategy

tegy of a general kind, the principal function of which is to find explanations and clear solutions to ambiguous stimuli which are disorganized or chaotic (Kruse, 1989). Results obtained in this experiment evidenced that the attribution of meaning to ambiguous figures requires a higher order cognitive processing involving semantic memory in order to resolve uncertainty and disambiguity. The attribution of meanings characterizes a "top-down" elaboration and depends on the use of specific conceptual strategies. These strategies are based on the coherence between the perceptual structure of the ambiguous stimuli and the nature of the meanings extracted by semantic memory.

Conclusion

This chapter reports experimental findings which indicate that high suggestible subjects are better at attributing meaning to ambiguous figures than low suggestible subjects. In particular, the former compared with the latter group showed a "top-down", more efficient capacity to process information and extract meaning from semantic memory. Such a model also helps to explain how high suggestible subjects find solutions to ambiguity more easily.

The SSK-G seems to be a good test for evaluating individual suggestibility. In fact, high suggestible subjects, as measured by this test, were found to be more influenced by experimental instructions and treatments. In particular, suggestions were better accepted by the high suggestibles than by the low suggestibles.

Overall, results from the present study are in accordance with Georghiu's model of individual suggestibility which is premised on the assumption that suggestibility is a cognitive strategy for reducing ambiguity and resolving uncertainty. Additionally, present results provide quite firm evidence that suggestibility is also influenced by the context in which it is embedded.

References

- Coren, S. (1975). Subjective contours and apparent depth, *Psychological Review*, 79, 359-367.
- Davies, P. (1987). Conditioning and perception. In G. Davey (Ed.), *Cognitive processes and pavlovian conditioning in humans* (pp. 183-210). Chichester: Wiley.
- Eysenck, H.J. (1991). Is suggestibility? In J.F. Schumaker (Ed.), *Human suggestibility* (pp. 76-90). New York: Routledge.
- Fiedler, K. (1989). Suggestion and credibility: Lie detection based on content-related cues. In V.A. Georghiu, P. Netter, H.J. Eysenck, & R. Rosenthal (Eds), *Suggestion and Suggestibility: Theory and research* (pp. 223-335). Berlin: Springer-Verlag.
- Finke, R.A. (1979). The functional equivalence of mental imagery and errors of movement, *Cognitive Psychology*, 11, 235-264.
- Finke, R.A. (1980). Levels of equivalence in imagery and perception, *Psychological Review*, 87, 113-132.
- Finke, R.A., & Kosslyn, S.M. (1980). Mental imagery acuity in the peripheral visual field, *Journal of Experimental Psychology: Human Perception and Performance*, 6, 126-139.
- Georghiu, V.A. (1989). The development of research on suggestibility: Critical consideration. In V.A. Georghiu, P. Netter, H.J. Eysenck, R. Rosenthal (Eds), *Suggestion and Suggestibility: Theory and research* (pp. 3-55). Berlin: Springer-Verlag.
- Georghiu, V.A., Koch, E., & Hubner, M. (1993). *A group scale for the influence of suggestion on sensory judgments*. Paper presented at the 6th European Congress of Hypnosis, Vienna, August 1993.
- Georghiu, V.A., & Kruse, P. (1991). The psychology of suggestion. In J.F. Schumacher (Ed.), *Human suggestibility: Advances in theory research and application* (pp. 59-75). New York: Routledge.
- Georghiu, V.A., Netter, P., & Tichi, H.J. (1989). A test of sensory suggestibility, its dependence on experimental context, and its relation to other tests of deception. In K. McConkey, H. Bennet (Eds.), *Proceedings of the 24th International Congress of Psychology*, 3.
- Georghiu, V.A., & Rehyer, J. (1982). The effect of different types of influence of an "indirect-direct" form of a scale of sensory susceptibility. *American Journal of Clinical Hypnosis*, 24, 191-199.
- Georghiu, V.A., & Wallbott, H.G. (1993). *Suggestion and attribution of meaning: A cognitive and social psychological perspective*. Paper presented at the 6th European Congress of Hypnosis, Vienna, August 1993.
- Kirsch, I. (1994). *Hypnosis and placebo: response expectancy as a mediator of suggestion effects*. Paper presented at the Second Symposium on Suggestion and Suggestibility, Rome, 26-28 October.
- Kruse, P. (1989). Stabilität - Multistabilität: Selbstorganisation und Selbstreferentialität in kognitiven Systemen. *Delfin*, 6, 35-73.
- Marks, D.F. (1973). Visual imagery differences in the recall of pictures, *British Journal of Psychology*, 64, 17-24.
- Newell, A., Shaw, J.C., & Simon, H.A. (1964). The processes of creative thinking. In H. Gruber, G. Terrell, M. Wertheimer (Eds), *Contemporary approaches to creative thinking* (pp. 63-119). New York: Atherton Press.
- Orne, M.T. (1966). *The construct of hypnosis: Implications of the definition for research and practice*. Annals of the New York Academy of Sciences, 296, 14-33.
- Paivio, A. (1971). *Imagery and verbal processes*. New York: Holt.
- Podgorny, P., & Shepard, N.R. (1978). Functional representations common to visual perception and imagination, *Journal of Experimental Psychology: Human Perception and Performance*, 4, 21-35.
- Posner, M.I. (1978). *Chronometric explorations of mind*. Hillsdale, NJ: Erlbaum.
- Richardson, A. (1977). Verbalizer - Visualizer: A cognitive style dimension. *Journal of Mental Imagery*, 1, 109-126.
- Sheehan, P.W. (1967). A shortened form of Betts' questionnaire upon mental imagery. *Journal of Mental Imagery*, 23, 386-389.
- Spanos, N.P., & Barber, T.X. (1974). Toward a convergence in hypnosis research. *American Psychologist*, 29, 500-511.
- Tellegen, A. (1978/1979). On measures and conceptions of hypnosis. *American Journal of Clinical Hypnosis*, 21, 2-3.
- Tellegen, A., & Atkinson, G. (1974). Openness to absorption and self altering experiences ("absorption"), a trait related to hypnotic susceptibility. *Journal of Abnormal Psychology*, 83, 268-277.