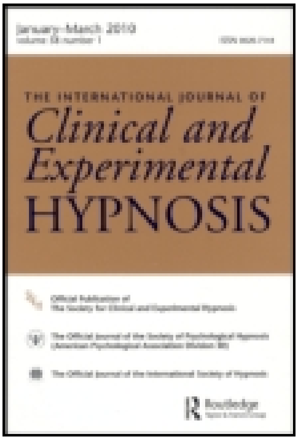

International Journal of Clinical and Experimental Hypnosis
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/nhyp20

Flexibility in Processing Visual Information: Effects of Mood and Hypnosis

Violeta Enea [a] & Ion Dafinoiu [a]

[a] Alexandru Ioan Cuza University of Iasi, Romania

Version of record first published: 15 Nov 2012.

To cite this article: Violeta Enea & Ion Dafinoiu (2013): Flexibility in Processing Visual Information: Effects of Mood and Hypnosis , International Journal of Clinical and Experimental Hypnosis, 61:1, 55-70

To link to this article: http://dx.doi.org/10.1080/00207144.2013.729435

Intl. Journal of Clinical and Experimental Hypnosis, 61(1): 55–70, 2013

ISSN: 0020-7144 print / 1744-5183 online
DOI: 10.1080/00207144.2013.729435

FLEXIBILITY IN PROCESSING VISUAL INFORMATION: *Effects of Mood and Hypnosis*[1]

Violeta Enea and Ion Dafinoiu[2]

Alexandru Ioan Cuza University of Iasi, Romania

Abstract: This quasi-experiment using a real/simulator model investigated differences in cognitive flexibility in high and low hypnotizable participants. Using the variables of hypnotizability (low/high), consciousness (nonhypnotized/hypnotized), mood (happy/sad), and visual-information processing (global/local), reaction times and target detection paradigms of the subjects were evaluated during both nonhypnotic and hypnotic states. Flexibility in cognitive processing was operationalized as the ability to overcome the typical global precedence and answer quickly about the nonprevalent local features. It was observed that the low hypnotizable participants were not influenced in their preference for the global or local dimension by any manipulated variable, whereas the high hypnotizables were more flexible.

Flexibility and rigidity are two controversial and intensely studied constructs in the field of psychology. The meta-analysis carried out by Schultz and Searleman (2002) points out the variety of psychology subfields concerned with those terms. These concepts have also been studied in the field of hypnosis.

Many studies have shown the "instrumental" value (Barnier, 2002) of hypnosis as a method of researching phenomena such as functional blindness (Bryant & McConkey, 1990), voluntary motor control (Haggard, Cartledge, Dafydd, & Oakley, 2004; Halligan, Athwal, Oakley, & Frackowiak, 2000), color processing (Kosslyn, Thompson, Costantini-Ferrando, Alpert, & Spiegel, 2000), delusions (Barnier et al., 2008; Burn, Barnier, & McConkey, 2001), and auditory hallucinations (Szechtman, Woody, Bowers, & Nahmias, 1998). In the field of hypnosis, cognitive flexibility is defined by Crawford (1989) as the degree to

Manuscript submitted June 14, 2011; final revision accepted January 11, 2012.

[1]This work was supported by the Sectoral Operational Programme for Human Resources Development though the project "Developing the Ability for Innovation and Research Impact Increase Through Post-Doctoral Programmes." POSDRU/89/1.5/S/49944, Alexandru Ioan Cuza University of Iaşi.

[2]Address correspondence to Violeta Enea, Department of Psychology, Faculty of Psychology and Education Sciences, Alexandru Ioan Cuza University of Iasi, 3 Toma Cozma Street, Romania. E-mail: violeta.enea@uaic.ro

which an individual disposes of and uses one of the many available types of strategies or styles of processing the information during the various tasks, as well as in various states of consciousness. Crawford studied the way in which the various differences in hypnotic responsiveness moderate memory, attention, the capacity of solving problems, other cognitive processes, affectivity, as well as the differences in the accompanying neurophysiologic changes. The results of her research have shown numerous differences among high and low hypnotizable subjects. Among these, we are extremely interested in the fact that subjects with a high degree of hypnotizability demonstrate a greater facility in changing cognitive strategies. Hypnotically responsive individuals have shown increased performance during hypnosis on a task of successive discrimination that required detection of the differences between pair images. It was discovered that, although the high and low hypnotizable subjects had the same results while not hypnotized, during hypnosis only the high hypnotizable subjects showed significant increases in performance. Thus, Crawford noticed that low hypnotizable subjects used detail-oriented strategies both while not hypnotized and while hypnotized, while the highly hypnotizable subjects reported a significant orientation toward more imaginative and holistically oriented strategies during hypnosis.

Also, it was observed that high hypnotizability is associated with an increased performance in information-processing speed (Friedman, Taub, Sturr, & Monty, 1987; Ingram, Saccuzzo, McNeill, & McDonald, 1979; Saccuzzo, Safran, Anderson, & McNeill, 1982).

Recently, researchers of different theoretical backgrounds have explored differences between high versus low hypnotic ability with mixed results. Gruzelier and Warren (1993) and Aikens and Ray (2001) found that participants with high hypnotic ability performed better on the Wisconsin Card Sorting Test, as compared to participants with low hypnotic ability, whereas Jamieson and Sheehan (2004), using Stroop task behavioral performance to measure aspects of anterior-mediated supervisory attentional function, reported an impaired performance on tasks for high susceptible individuals during hypnosis. For some researchers, highly hypnotizable subjects demonstrate greater cognitive flexibility after a hypnotic induction than do lows (Crawford & Allen, 1983; Crawford & Gruzelier, 1992), whereas from a dissociated-control perspective an induction decreases the cognitive flexibility of highly hypnotizable persons (Jamieson & Woody, 2007; Woody & Sadler, 2008).

The controversies related to the influence of emotions on the way in which individuals process information are known in the psychological literature. The studies that did not involve hypnosis have shown that positive emotions lead to a greater flexibility in cognitive processing (Baumann & Kuhl, 2005; Dreisbach & Goschke, 2004). Using a target-detecting paradigm, Baumann and Kuhl showed that positive affect is associated with an increase in cognitive flexibility. They defined flexibility in cognitive processing as the ability to overcome global precedence and to answer faster to the nonprevalent (local) features when the task requires it.

Regarding visual-information processing, research (Fiske & Taylor, 1991; Navon, 1977) indicates that global features are processed before local ones, so that focusing on the "forest" is a much more accessible strategy than focusing on the "trees." Referring to the role of mood in global processing, versus local processing, it has been observed that a good mood promotes global focusing, while a bad mood promotes a focus on the local dimension (Gasper & Clore, 2002). An increase in affect intensity, according to Gasper (2004), is associated with faster response time, whether the mood is good or bad. A bad mood decreases global processing compared to a good mood only when the feelings seem to be relevant for the task and when the answer criterion is ambiguous, but not when the feelings seem to be irrelevant or when the criterion is clear.

Most hypnosis studies that have taken emotions into consideration were aimed at the efficiency of hypnotic suggestions in inducing emotional numbing (Bryant & Fearns, 2007; Bryant & Kapur, 2006; Bryant & Kourch, 2001; Bryant & Mallard, 2002; Sebastiani, D'Alessandro, Menicucci, Ghelarducci, & Santarcangelo, 2007). Nevertheless, from what we know, flexibility has not been investigated in visual-information processing with a certain emotional background.

Objectives

Starting from the results of previous research, the aim of this study was to investigate the impact that hypnosis—interacting with other variables—can have on the cognitive flexibility. The study's hypotheses were:

- *Hypnotic state, emotions, and the visual-information-processing dimension influence the cognitive flexibility of the highly hypnotizable participants.*
- *We assume that, due to the use of the real-simulator paradigm, besides the emotions and the information-processing dimension, the cognitive flexibility of the low hypnotizable participants will also be influenced by hypnosis.*

Method

Design

The independent variables are (a) level of hypnotizability with two levels: high and low hypnotizable; (b) type of consciousness states with two levels: nonhypnotic and hypnotic states; (c) type of mood induced with two levels: positive and negative; (d) visual-information-processing dimension with two levels: global and local.

The dependent variables are (a) reaction time (RT), measured in milliseconds; (b) error rate, expressed in percentages from the total number of answers; (c) flexibility in cognitive processing. This flexibility may be manifested by (a) an increased ability to shift focus to the nondominant (local) stimulus (reversing the typical precedence of global over local processing observed during a nonhypnotic state) and response latencies would be significantly reduced to local targets than to global targets or (b) a decreased flexibility as indicated by increased latencies to local targets while not slowing latencies to global targets.

Participants

A total of 36 undergraduate psychology students selected from almost 300 students from the Alexandru Ioan Cuza University of Iaşi, Romania, were tested in a 2 (hypnotizability: high/low) × 2 (consciousness: unhypnotized/hypnotized) × 2 (mood induced: positive/negative) × 2 (information-processing dimension: global/local) mixed-model analysis of variance (ANOVA). The students participated in return for credit toward their psychology course. Selection was based on their performance on the Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A; Shor & Orne, 1962) and the Stanford Hypnotic Susceptibility Scale, Form C (SHSS:C; Weitzenhoffer & Hilgard, 1962). The high hypnotizable participants scored from 8 to 12 on the HGSHS:A ($M = 8.94$, $SD = 1.08$) and from 8 to 12 on the SHSS:C ($M = 9.35$; $SD = 1.27$). The low-hypnotizable participants scored from 0 to 4 on the HGSHS:A ($M = 2.50$; $SD = 1.26$) and from 0 to 4 on the SHSS:C ($M = 1.65$, $SD = 1.11$).

After eliminating an extremely slow response time of less than 3400 ms and a highly hypnotizable participant who completely ignored the global dimension, only 17 high hypnotizable (17 women, *Mdn* age $= 25.82$, $SD = 8.76$) and 17 low hypnotizable participants (15 women, 2 men, *Mdn* age $= 23.94$, $SD = 4.60$) were kept in the study.

Materials

The material we used for the global-local shape task was based on that used by Baumann and Kuhl (2005) and Derryberry and Reed (1998), which consisted of patterns composed of geometrical shapes made of smaller geometrical figures (Figure 1).

Overall, there were 160 patterns, 40 patterns for each of the four target shapes (circle, diamond, square, and triangle), 10 of which had the target shape on the global dimension, 10 with the target shape on the local dimension, and 20 without the target shape.

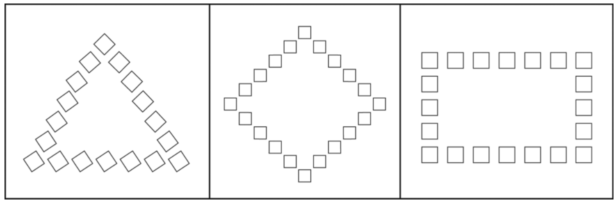

Figure 1. **In the global-local shape task, the target shape rhombus is to be found in the left item on the local dimension, in the central item it is on the global dimension, and in the right item, it is neither on the local dimension nor on the global one.**

Procedure

The quasi-experimental design used Orne's real-simulator paradigm (1979), within which the low hypnotizable participants represented the quasi-control group and were trained to simulate the behavior of a highly hypnotizable participant. The (real) highly hypnotizable participants and the (simulating) low hypnotizable ones were induced by means of an Elman rapid induction technique (James, 2002).

During hypnosis, the participants were asked to recall and narrate an autobiographical event that made them feel "happy and optimistic" (Schwarz & Clore, 1983). The level of the positive mood was evaluated on a scale from 0 (*unhappy*) to 10 (*very happy*). A similar approach was used to induce a negative mood, but the requirement was to narrate an autobiographical event that made them feel "sad and pessimistic" (Schwarz & Clore, 1983). The intensity of the negative mood induced was evaluated from a scale from 0 (*happy*) to 10 (*very unhappy*). The participants were trained to select a relevant mental image from each autobiographical event to help them maintain that level of affect during the task. Mood intensity was assessed every 10 patterns presented because throughout the task development there was a tendency for the mood intensity to fade. If the mood intensity after the presentation of the patterns was lower than during the event narration, the participants were required to increase the mood level back up to the initial level by focusing attention on the relevant mental image of the event.

Two target shapes were presented for each type of mood. The participants were told: "The target shape is the circle [diamond, square, or triangle]. Please answer by yes or no if this figure matches the drawing I am going to show you." Then, all the drawings containing the shapes were presented. The presence of one of the target shapes on one of the perceptive dimensions (global or local) was correctly indicated by an affirmative answer and its absence by a negative answer.

The development of the quasi-experiment in hypnosis involved the following stages: (a) inducing hypnosis (according to the procedure described); (b) focusing, through recollection and narration, on the autobiographical events to manipulate the emotional state; (c) assessing the mood level; (d) selecting the anchor mental image to preserve the emotional state; (e) requesting that the subject open his or her eyes and preserving the self-induced emotional state (positive/negative); (f) presenting the patterns and reevaluating the intensity of the emotional state every 10 patterns presented; (g) suggesting to close the eyes; (h) suggesting abandoning the previous emotional anchor; (i) suggesting deepening the trance; (j) repeating Stages b through h for the experimental condition of the alternative emotional state (positive/negative); (k) finalizing the experiment with a standard deinduction procedure.

In the nonhypnotic condition, the emotional state was manipulated the same as in the hypnotic state, except that the participant wrote—for 10 minutes—the same positive/negative autobiographical event from the hypnotic condition. Similarly, the mood intensity was assessed and the initial level of the mood was preserved with the selected anchor image.

The order of nonhypnosis/hypnosis and positive mood/negative mood was counterbalanced. Reaction time was measured with a digital chronometer without the subjects' knowledge. The interval between the stimuli was variable (500–1000 ms). The participants kept the sheets of paper on which they wrote their narrative events.

The experimental session lasted almost 1.5 hours.

Results

Response Latencies

In the *real* (high hypnotizable) participants, a 2 (consciousness) × 2 (mood) × 2 (target dimension) ANOVA revealed a significant main effect of the state of consciousness, $F(1, 16) = 5.41$, $p < .05$, $\eta^2 = .25$, indicating that overall RTs were faster in hypnosis than nonhypnosis (see Table 1). There were also two significant interactions. It is notable that the Consciousness × Mood interaction was significant, $F(1, 16) = 24.17$, $p < .001$, $\eta^2 = .60$, indicating that, whereas overall RTs in the nonhypnotic state were faster in the positive (1681 ms) than in the negative mood (2034 ms), overall RTs in hypnosis did not differ in the two affective states. More important, there was a significant Consciousness × Dimension interaction, $F(1, 16) = 22.57$, $p < .001$, $\eta^2 = .58$. Consistent with our expectations, during hypnosis the response latencies to local targets (1641 ms) were significantly reduced compared to global targets (1781 ms). That is, the hypnotic induction facilitated a shift to the nondominant (local) response and increased flexibility in cognitive processing. During the nonhypnotic state, partially consistent with the global-precedence assumption, highly hypnotizable participants responded faster to global than local targets, even if not significantly

Table 1
Mean RT (ms) for the Correct Target Detections and Mean Error Rate (%) as a Function of Hypnotizability, Consciousness, Mood, and Target Dimension

	Nonhypnotic state		Hypnosis	
Group of participants	Latencies	Error rates	Latencies	Error rates
Simulator (low hypnotizable)				
Negative				
Global	1599_a	10	1537	13.53
Local	1697	21.65_a	1482	16.76
Positive				
Global	1482	6.06	1577	10.59
Local	1465	15.29_b	1532	20.88
Real (high hypnotizable)				
Negative				
Global	$2011_{a,b,e}$	1.76	$1728_{d,e}$	4.41
Local	$2057_{b,f}$	4.12_a	$1574_{d,f}$	2.65
Positive				
Global	$1675_{c,g}$	5.88	1835_g	5.59
Local	1687_c	1.47_b	1707	4.41

Note. Means that share subscripts (italics) differ at $p < .05$ using a Bonferroni correction. (For example, in the simulating participants the response latencies to global targets in the negative mood (1599_a) were significantly reduced compared to the same condition (2011_a) in the real participants.)

faster (see Figure 2). All other main and interaction effects were nonsignificant, including the interaction between Consciousness × Mood × Dimension (Fs < 0.19, ps > .065).

In the simulating subjects (low hypnotizable), a 2 (consciousness: nonhypnotic state/hypnosis) × 2 (target dimension: global/local) × 2 (mood: positive/negative) ANOVA with repeated measures of the response latencies for correct target detections yielded no significant main or interaction effects, including the interaction between Consciousness × Dimension × Mood (Fs < 1.33, ps > .27). The low hypnotizable individuals were neither significantly influenced by hypnosis nor by the affective mood in perceiving the global/local features (see Table 1).

A 2 (hypnotizability: high/low) × 2 (consciousness: nonhypnotic state/hypnosis) × 2 (mood: positive/negative) × 2 (target dimension: global/local) mixed-model ANOVA of the response latencies for correct target detections showed that the response latencies were significantly reduced in the positive (1620 ms) versus the negative mood (1711 ms), $F(1, 32) = 4.31$, $p < .05$, $\eta^2 = .119$. Also, the interaction remained significant between Consciousness × Mood, $F(1, 32) = 20.87$, $p < .05$, $\eta^2 = .395$, and Consciousness × Dimension, $F(1, 32) = 6.27$, $p < .05$, $\eta^2 = .164$; all other main and interaction effects were nonsignificant,

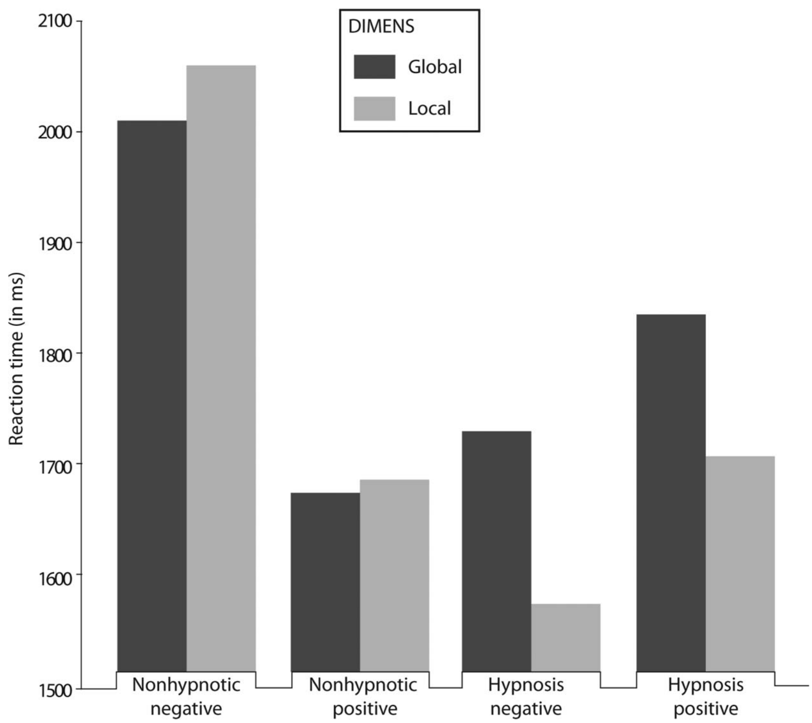

Figure 2. **The cognitive flexibility of the high hypnotizable participants is influenced by hypnosis: From global precendence in the nonhypnotic state, they pass to the faster processing of the local features in the hypnosis.**

including the interaction between Hypnotizability $\times$ Consciousness $\times$ Mood $\times$ Dimension (Fs < 3.34, ps $> .077$). Unexpectedly, the main effect of hypnotizability was nonsignificant, $F(1, 32) = 2.10$, $p = .157$, $\eta^2 = .062$, which means that overall, between high and low hypnotizable individuals no significant differences were indicated during the experiment.

There was a negative relation between the intensity of the positive emotions during the nonhypnotic state and the response time to local targets ($r = -.52$, $p < .05$), which means that, during the nonhypnotic state, the high hypnotizable participants that reported an increased intensity in positive emotions processed the local information faster. Therefore, this confirmed the results of other researchers (Gasper, 2004) who found a relationship between intensity of the emotions and a faster response. For the other experimental conditions, there were no correlations between the response time and the self-reported intensity of the emotions, and, therefore, we cannot generalize this finding.

The comparisons based on the emotional intensity criterion indicated that, in hypnosis, the high hypnotizable participants experienced significantly more intensely both the positive event ($M_{pos} = 8.92$, $SD = 0.46$) and the negative one ($M_{neg} = 8.65$, $SD = 0.48$), compared to the low hypnotizable participants ($M_{pos} = 8.51$, $SD = 0.65$; $M_{neg} = 8.09$, $SD = 0.62$), $t(32) = -2.11$, $p < .05$ (for the positive event), respectively, $t(32) = -2.65$, $p < .05$ (for the negative one). In the nonhypnotic state, there were no significant differences between the low and high hypnotizable participants concerning emotional intensity.

In hypnosis, the highs experienced the positive event ($M = 8.92$, $SD = 0.46$) and the negative one ($M = 8.65$, $SD = 0.48$) significantly more intensely, $t(16) = -2.79$, $p < .05$ (for the positive event), $t(16) = -2{,}11$, $p < .05$ (for the negative one), respectively, than in the nonhypnotic state (for the positive event: $M = 8.52$, $SD = 0.77$; for the negative one: $M = 8.17$, $SD = 0.86$).

Nevertheless, in lows, the intensity with which they experienced both events in the nonhypnotic state did not differ significantly from the intensity in hypnosis (ps > .05).

Error Rates

A 2 (hypnotizability: high vs. low) × 2 (consciousness: nonhypnosis vs. hypnosis) × 2 (mood induced: positive vs. negative) × 2 (information-processing dimension: global vs. local), mixed-model ANOVA of the error rates yielded an effect of the interaction between Hypnotizability × Mood, $F(1, 32) = 5.32$, $p < .05$, $\eta^2 = .143$, and an effect of the interaction between State × Mood × Dimension, $F(1, 32) = 4.32$, $p < .05$, $\eta^2 = .119$; all other main and interaction effects were nonsignificant (Fs < 2.09, ps > .061). Generally, the error rates differed significantly between the highs and lows, $F(1, 32) = 6.84$, $p < .05$, $\eta^2 = .176$; the low hypnotizable participants were generally wrong by 10% more than the high hypnotizable participants. These were small effects. More precisely, the low hypnotizable participants were wrong significantly more than the high hypnotizable ones during the nonhypnotic condition in perceiving the local features in positive mood, $F(1, 32) = 4.40$, $p < .05$, $\eta^2 = .121$, but also in negative mood, $F(1, 32) = 4.701$, $p < .05$, $\eta^2 = .128$ (see Table 1). Nevertheless, in hypnosis, the error rates did not differ for the two groups of participants (Fs < 3.06, ps > .09).

Discussion

Research has proven that hypnosis per se has an effect on performance improvement (regarding memory, learning) only if accompanied by suggestions.

In this quasi-experiment, we did not use suggestions during hypnosis nor were the participants informed on how important the reaction time was, and, nevertheless, the visual-information processing differed during hypnosis for the high hypnotizable participants. It has been observed that hypnosis influences the cognitive flexibility of high hypnotizable subjects. The hypnotic induction increased cognitive flexibility as indicated by the ability to overcome the typical global precedence during a nonhypnotic state and to answer rapidly to the nondominant (local) features during hypnosis. The typical precedence of global over local processing observed during the nonhypnotic state was reversed during hypnosis. These results of the present study are broadly consistent with Crawford's and Gruzelier's theoretical positions and inconsistent with the dissociated control perspective.

Error rates were analyzed to rule out an alternative interpretation of response latencies in terms of a speed-accuracy trade-off (Baumann & Kuhl, 2005). The results do not support a speed-accuracy trade-off interpretation of the short response latencies to local targets observed during hypnosis in the highly hypnotizable participants.

The negative emotions experienced with a significantly increased intensity during hypnosis by the high hypnotizable individuals determine an excessive focus on the local features (on trees), obstructing the perception of the global features (the forest). The high hypnotizable participants asserted that in passing from the negative to the positive event, they had to make some effort because of the persistence of the detailed negative images.

The results partially confirm the focus level hypothesis (Clore, Gasper, & Garvin, 2001), which suggests that mood guides the type of information that individuals tend to observe; those in a positive mood focus more on global information and less on local, as compared with individuals in a bad mood. This hypothesis derives from the action identification theory (Vallacher & Wegner, 1987), according to which, when a situation becomes problematic, individuals switch focus from the abstract, global, general level of thinking to focusing on more local, specific details, which may help them solve that problem. Similarly, when a sad mood signals something problematic, individuals switch focus from a global level to a more local one (Gasper, 2004). In the same way, because of a decrease in critical sense during hypnosis, a negative emotional state—as a sign of a problematic situation—leads to a significant shift in focus from global to local in the highly hypnotizable participants.

Increases in the emotions intensity were associated only partially with faster reaction times, but a sad mood decreased global processing as compared to a happy mood, possibly because feelings emerged as being relevant for this task (Gasper, 2004). The highly hypnotizable participants experienced in hypnosis the positive and negative event altogether with a significantly higher intensity than the simulators as other studies have shown (Barnier & McConkey, 2004, 2005, p. 46): "highly hypnotized individuals become very involved in their experiences." It is precisely this involvement that makes hypnotherapeutic interventions ideal for disorders with a traumatic etiology.

Our research confirms the study results of Friedman et al. (1987), who concluded that during hypnosis the high hypnotizable participants, as a group, registered performances superior to those during the nonhypnotic state as regards to the visual-information-processing speed. Research indicated that during the nonhypnotic condition, the right cerebral hemisphere deals more with global processing, whereas the left hemisphere deals more with local processing (Styles, 2005). During hypnosis and in a negative emotional state, highly hypnotizable individuals tended to process local features more easily and to have more difficulty processing the global ones.

The neurophysiological studies (Gruzelier, 1998; Gruzelier et al., 2004) noted that hypnosis involves dissociations in cognitive processes and disconnections among different parts of the brain through selective inhibition and process stimulation. Also Gruzelier (2006) considers that the cognitive, affective, and neurophysiological flexibility of the highly hypnotizable participants includes superior abilities of absorption, creativity, dissociation, attention, and preservation of the imagery's lively character. At a cerebral level, the cognitive flexibility is translated by neuronal efficiency, but Gruzelier (2002) claims that a highly flexible neuronal system may be, in certain circumstances, vulnerable to pathology both through internal imbalances and sensitivity to psychological stressors.

As we highlighted in one of our previous studies with teenage participants (Enea & Dafinoiu, 2008), this research does not show significant differences between the high hypnotizable participants and the low hypnotizable ones during hypnosis, but, in this case, the real-simulator paradigm was used, and the explanations may thus be completely different.

In the real-simulator paradigm (Orne, 1979), the low hypnotizable participants are trained by an experimenter to try to deceive a second experimenter by making him or her believe that they are in fact hypnotizable. We needed this paradigm to keep the experimenter blind to the participants' level of hypnotizability. In the absence of this paradigm, and applying a technique for rapid induction, participants would have revealed their level of hypnotizability. The simulators succeeded in doing this because during trance induction the simulators reacted adequately to suggestions without betraying their real hypnotizability level. Then, the mood intensity reported during hypnosis, although statistically significantly different, was still difficult for the experimenter to identify whether it belonged to a real participant or to a simulator, as the values were very close (M_{pos} = 8.51, SD = 0.65 and M_{neg} = 8.09, SD = 0.62 for the simulators; M_{pos} = 8.92, SD = 0.46 and M_{neg} = 8.65, SD = 0.48 for the real participants). Also, during the nonhypnotic condition, there are no significant differences between the two groups. The second hypothesis we wanted to test was whether the simulators would be able to predict how a highly hypnotizable participant would react under hypnosis in a target detection paradigm, but the hypothesis was not confirmed. The participants were not aware of the importance of the reaction time and, consequently, as the postexperimental interview showed, it was not simulated. In order to avoid difficulties in interpreting the results, we consider that the use of Orne's paradigm should be restricted solely to experiments involving hypnotic phenomena and whose simulation type can be easily intuited by the low hypnotizable participants. The question "Can we really be certain that simulators were responding in a way that they thought highs would respond, or were they just doing whatever the hypnotist told them to do?" (Kihlstrom & Barnier, 2005) remains rhetorical.

If the design had not allowed within-subjects comparisons, we might have erroneously assumed, in the absence of the differences between the two participant groups, that hypnosis did not have a different effect on the high hypnotizable participants as compared to the low hypnotizable ones. Moreover, researchers (Hilgard & Tart, 1966, as cited in Barabasz & Barabasz, 1992) long ago opted for within-subjects designs to minimize the risks of a Type II error.

In this research, the low hypnotizable participants were not influenced by any of the manipulated independent variables, but they invariably answered irrespective of the state of consciousness, the affective state, or the visual-information-processing dimension. This tendency of the low hypnotizable participants to answer every time may be seen as proof of perseverance but also as proof of self-oriented perfectionism. The distinctive features of self-oriented perfectionism are the strong motivation of being perfect, maintaining unrealistic standards, compulsive struggling, and the all-or-nothing/total success or failure type of thinking (Hewitt & Genest, 1990). Ferrari and Mautz (1997) noted that there is a positive correlation between self-oriented perfectionism and motor-cognitive rigidity. Nevertheless, we cannot make with certainty such an inference, and the Test of Behavioral Rigidity (TBR)–which measures flexible attitude, psychomotor speed, and motor-cognitive rigidity (Schaie & Parham, 1975)–remains only a perspective for future research, as does verifying the correlations between experiment and test results. It would be interesting to apply a task involving the comparison of two figures with only one target figure (Gasper, 2004) and to compare the nonhypnotic state results with the hypnosis results.

From a theoretical point of view, this study completes the specialized literature regarding cognitive flexibility.

In interpreting the results, due account should be taken of all the research limits, among which the most important are the absence of an induction cassette and a computer task presentation, which could have ensured a uniform application. Any study involves compromises, and for this research ours were the sample size and the use of a fast induction technique.

References

Aikens, D., & Ray, W. J. (2001). Frontal lobe contributions to hypnotic susceptibility: A neuropsychological screening of executive functioning. *International Journal of Clinical and Experimental Hypnosis*, *49*, 320–329.

Barabasz, A. F., & Barabasz, M. (1992). Research designs and considerations. In E. Fromm & M. R. Nash (Eds.), *Contemporary hypnosis research* (pp. 173–201). New York, NY: Guildford.

Barnier, A. J. (2002). Remembering and forgetting autobiographical events: Instrumental uses of hypnosis. *Contemporary Hypnosis*, *19*, 51–61.

Barnier, A. J., Cox, R. E., O'Connor, A., Coltheart, M., Langdon, R., Breen, N., & Turner, M. (2008). Developing hypnotic analogues of clinical delusions: Mirrored-self misidentification. *Cognitive Neuropsychiatry*, *13*, 406–430.

Barnier, A. J., & McConkey, K. (2005). Defining and identifying the highly hypnotizable person. In M. Heap, R. J. Brown, D. A. Oakley (Eds.), *The highly hypnotisable person: Theoretical, experimental and clinical issues* (pp. 30–61). Retrieved from http://www.eBookstore.tandf.co.uk (Original work published 2004)

Baumann, N., & Kuhl, J. (2005). Positive affect and flexibility: Overcoming the precedence of global over local processing of visual information. *Motivation and Emotion*, *29*, 123–134.

Bryant, R. A., & Fearns, S. (2007). Taking the feeling out of emotional memories—A study of hypnotic emotional numbing: A brief communication. *International Journal of Clinical and Experimental Hypnosis*, *55*, 426–434.

Bryant, R. A., & Kapur, A. (2006). Hypnotically induced emotional numbing: The roles of hypnosis and hypnotizability. *International Journal of Clinical and Experimental Hypnosis*, *54*, 281–291.

Bryant, R. A., & Kourch, M. (2001). Hypnotically-induced emotional numbing. *International Journal of Clinical and Experimental Hypnosis*, *49*, 220–230.

Bryant, R. A., & Mallard, D. (2002). Hypnotically induced emotional numbing: A real-simulating analysis. *Journal of Abnormal Psychology*, *111*, 203–207.

Bryant, R. A., & McConkey, K. M. (1990). Hypnotic blindness and the relevance of attention. *Australian Journal of Psychology*, *42*, 287–296.

Burn, C., Barnier, A. J., & McConkey, K. M. (2001). Information processing during hypnotically suggested sex change. *International Journal of Clinical and Experimental Hypnosis*, *49*, 231–242.

Clore, G. L., Gasper, K., & Garvin, E. (2001). Affect as information. In J. P. Forgas (Ed.), *Handbook of affect and social cognition* (pp. 121–144). Hillsdale, NJ: Lawrence Erlbaum.

Crawford, H. J. (1989). Cognitive and physiological flexibility: Multiple pathways to hypnotic responsiveness. In V. A. Gheorghiu, P. Netter, H. J. Eysenck, & R. Rosenthal (Eds.), *Suggestion and suggestibility: Theory and research* (pp. 155–168). Berlin, Germany: Springer-Verlag.

Crawford, H. J., & Allen, S. N. (1983). Enhanced visual memory during hypnosis as mediated by hypnotic responsiveness and cognitive strategies. *Journal of Experimental Psychology: General*, *112*, 662–685.

Crawford, H. J., & Gruzelier, J. (1992). A midstream view of the psychoneurophysiology of hypnosis: Recent research and future directions. In E. Fromm & M. R. Nash (Eds.), *Hypnosis: Research developments and perspectives* (pp. 227–266). New York, NY: Guilford.

Derryberry, D., & Reed, M. A. (1998). Anxiety and attentional focusing: Trait, state and hemispheric influences. *Personality and Individual Differences*, *25*, 745–761.

Dreisbach, G., & Goschke, T. (2004). How positive affect modulates cognitive control: Reduced perseveration at the cost of increased distractibility. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *30*, 343–353.

Enea, V., & Dafinoiu, I. (2008). Posthypnotic amnesia and autobiographical memory in adolescents. *Journal of Cognitive and Behavioral Psychotherapies*, *8*, 201–215.

Ferrari, J. R., & Mautz, W. T. (1997). Predicting perfectionism: Applying tests of rigidity. *Journal of Clinical Psychology*, *53*, 1–6.

Fiske, S. T., & Taylor, S. E. (1991). *Social cognition*. New York, NY: McGraw-Hill.

Friedman, H., Taub, H. A., Sturr, J. F., & Monty, R. A. (1987). Visual information processing speed in hypnotized and nonhypnotized subjects. *Journal of General Psychology*, *114*, 363–372.

Gasper, K. (2004). Do you see what I see?: Affect and visual information processing. *Cognition and Emotion*, *18*, 405–421.

Gasper, K., & Clore, G. L. (2002). Attending to the big picture: Mood and global vs. local processing of visual information. *Psychological Science*, *13*, 34–40.

Gruzelier, J. (1998). A working model of the neurophysiology of hypnosis: A review of the evidence. *Contemporary Hypnosis*, *15*, 3–21.

Gruzelier, J. (2002, April). New insights into the nature of hypnotisability. In *Beyond and Behind the Brain, 4 Bial Symposium* (pp. 275–292). Porto, Portugal: Fundacao Bial.

Gruzelier, J. (2006). Frontal functions, connectivity and neural efficiency underpinning hypnosis and hypnotic susceptibility. *Contemporary Hypnosis*, *23*, 15–32.

Gruzelier, J., De Pascalis, V., Jamieson, G., Laidlaw, T., Naito, A., Bennett, B., & Dwivedi, P. (2004). Relations between hypnotisability and psychopathology revisited. *Contemporary Hypnosis*, *21*, 169–175.

Gruzelier, J., & Warren, K. (1993). Neuropsychological evidence of reductions on left frontal tests with hypnosis. *Psychological Medicine*, *23*, 93–101.

Haggard, P., Cartledge, P., Dafydd, M., & Oakley, D. A. (2004). Anomalous control: When "free-will" is not conscious. *Consciousness and Cognition*, *13*, 646–654.

Halligan, P. W., Athwal, B., Oakley, D. A., & Frackowiak, R. S. J. (2000). Imaging hypnotic paralysis: Implications for conversion hysteria. *Lancet*, *355*(9208), 986–987.

Hewitt, P. L., & Genest, M. (1990). The ideal self: Schematic processing of perfectionistic content in dysphoric university students. *Journal of Personality and Social Psychology*, *59*, 802–808.

Ingram, R. E., Saccuzzo, D. P., McNeill, B. W., & McDonald, R. (1979). Speed of information processing in high and low susceptible subjects: A preliminary study. *International Journal of Clinical and Experimental Hypnosis*, *27*, 42–47.

James, T. (2002). *Hypnosis: A comprehensive guide*. Trowbridge, Wiltshire: Cromwell.

Jamieson, G. A., & Sheehan, P. W. (2004). An empirical test of Woody and Bowers's dissociated-control theory of hypnosis. *International Journal of Clinical and Experimental Hypnosis*, *52*, 232–249.

Jamieson, G. A., & Woody, E. (2007). Dissociated control as a paradigm for cognitive-neuroscience research and theorizing in hypnosis. In G. A. Jamieson (Ed.), *Hypnosis and conscious states: The cognitive-neuroscience perspective* (pp. 111–129). Oxford, United Kingdom: Oxford University Press.

Kihlstrom, J. F., & Barnier, A. (2005). The hidden observer: A straw horse, undeservedly flogged. *Contemporary Hypnosis*, *22*, 144–151.

Kosslyn, S. M., Thompson, W. L., Costantini-Ferrando, M. F., Alpert, N. M., & Spiegel, D. (2000). Hypnotic visual illusion alters color processing in the brain. *American Journal of Psychiatry*, *157*, 1279–1284.

Navon, D. (1977). The forest before trees: The precedence of global features in visual perception. *Cognitive Psychology*, *9*, 353–383.

Orne, M.T. (1979). On the simulating subject as a quasi-control group in hypnosis research: What, why and how. In E. Fromm & R. E. Shor (Eds.), *Hypnosis: Developments in research and new perspectives* (2nd ed., pp. 519–565). New York, NY: Aldine.

Saccuzzo, D. P., Safran, D., Anderson, V., & McNeill, B. (1982). Visual information processing in high and low susceptible subjects. *International Journal of Clinical and Experimental Hypnosis*, *30*, 32–44.

Schaie, K. W., & Parham, L. A. (1975). *The test of behavioral rigidity*. Palo Alto, CA: Consulting Psychologists.

Schultz, W. P., & Searleman, A. (2002). Rigidity of thought and behavior: 100 years of research. *Genetic, Social and General Psychology Monographs*, *128*, 165–207.

Schwarz, N., & Clore, G. L. (1983). Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states. *Journal of Personality and Social Psychology*, *45*, 513–523.

Sebastiani, L., D'Alessandro, L., Menicucci, D., Ghelarducci, B., & Santarcangelo, E. L. (2007). Role of relaxation and specific suggestions in hypnotic emotional numbing. *International Journal of Psychophysiol*ogy, *63*, 125–132.

Shor, R. E., & Orne, E. C. (1962). *Harvard Group Scale of Hypnotic Susceptibility*. Palo Alto, CA: Consulting Psychologists.

Styles, E. A. (2005). *The psychology of attention*. Florence, KY: Psychology.

Szechtman, H., Woody, E., Bowers, K. S., & Nahmias, C. (1998). Where the imaginal appears real: A positron emission tomography study of auditory hallucinations. *Proceedings of the National Academy of Sciences*, *95*, 1956–1960.

Vallacher, R. R., & Wegner, D. M. (1987). What do people think they're doing?: Action identification and human behavior. *Psychological Review*, *94*, 3–15.

Weitzenhoffer, A. M., & Hilgard, E. R. (1962). *Stanford Hypnotic Susceptibility Scale, Form C*. Palo Alto, CA: Consulting Psychologists.

Woody, E., & Sadler, P. (2008). Dissociation theories of hypnosis. In M. R. Nash & A. J. Barnier (Eds.), *The Oxford handbook of hypnosis* (pp. 81–110). Oxford, United Kingdom: Oxford University Press.

Flexibilität in der Verarbeitung visueller Informationen: Effekte von Gemütszustand und Hypnose

Violeta Enea and Ion Dafinoiu

Abstrakt: In diesem quasi-Experiment untersucht ein Realität versus Simulator-Modell Unterschiede in der kognitiven Flexibilität in mehr und weniger hypnotisierbaren Teilnehmern. Die Denkmuster der Teilnehmer wurden mittels der Variablen der Hypnotisierbarkeit (niedrig/hoch), Bewußtseinszustand (nicht hypnotisiert/hypnotisiert), Gemütszustand (fröhlich/traurig), Verarbeitung visueller Information (global/lokal), Reaktionszeiten und Zielerfassung sowohl im nicht-hypnotisierten als auch im hypnotisierten Zustand erhoben. Die Flexibilität in kognitiver Verarbeitung wurde als die Fähigkeit operationalisiert, typische globale Rangordnungen abzulegen und schnell auf die hintanstehenden örtlichen Funktionen zu antworten. Es konnte beobachtet werden, daß die weniger hypnotisierbaren Teilnehmer durch eine beliebige manipulierte Variable

nicht von ihren Vorlieben bezüglich globaler oder örtlicher Dimensionen beeinflußt wurden, wohingegen die eher hypnotisierbaren flexibler waren.

Stephanie Reigel, MD

La flexibilité dans le traitement de l'information visuelle: les effets de l'humeur et l'hypnose

Violeta Enea et Ion Dafinoiu
Résumé: Cette quasi-expérience, effectuée à l'aide d'un modèle réel et d'un simulateur, a cherché à démontrer les différences de flexibilité cognitive entre des participants hautement hypnotisables et des participants faiblement hypnotisables. À l'aide de variables relatives à l'hypnotisabilité (haute/faible), à l'état de conscience (non hypnotique/hypnotique), à l'humeur (joyeuse/triste) et au traitement de l'information visuelle (globale/locale), les paradigmes de temps de réaction et de détection de la cible des sujets ont été évalués en état hypnotique et en état non hypnotique. La flexibilité du traitement cognitif a été opérationnalisée comme étant la capacité de surmonter la préséance typique de l'aspect global et de réagir rapidement aux caractéristiques locales, non prévalentes. Il a été observé que les préférences des participants faiblement hypnotisables pour la dimension globale ou locale n'étaient influencées par aucune des variables manipulées, alors que celles des participants hautement hypnotisables étaient plus flexibles.

Johanne Reynault
C. Tr. (STIBC)

Flexibilidad en el procesamiento de información visual: Efectos del estado de ánimo e hipnosis

Violeta Enea y Ion Dafinoiu
Resumen: Este cuasi-experimento usó un modelo real de simulación para investigar las diferencias en la flexibilidad cognitiva de participantes altamente y poco hipnotizables. Usando las variables de hipnotizabilidad (bajos/altos), conciencia (hipnotizado/no hipnotizado), estado de ánimo (feliz/triste), y procesamiento de información visual (global/local), los tiempos de reacción y paradigmas de detección de objetivos de los sujetos se evaluaron tanto en estados hipnóticos como no hipnóticos. La flexibilidad en el procesamiento cognitivo se operacionalizó como la habilidad para superar la precedencia global típica y responder rápidamente sobre las características locales no prevalentes. Se observó que los participantes poco hipnotizables no estuvieron influenciados en su preferencia por la dimensión local o global por ninguna de las variables manipuladas, en cambio, los altamente hipnotizables fueron más flexibles.

Omar Sánchez-Armáss Cappello, PhD
Autonomous University of San Luis Potosi, Mexico