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Negative Priming Processing in Schizophrenic Patients with High and Low Symptoms

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ABSTARCT

*The aim of this study was to have a comparison among the schizophrenic patients with high positive symptoms and schizophrenic patients with low positive symptoms and normal individuals in negative priming effect test. The findings indicate that the main effect of negative priming and interaction effect of group*hemisphere are not significant. However, it indicates that there is a significant difference among the groups in terms of the extent of negative priming. These findings confirm the assumption that processing reaction time of negative priming in schizophrenia significantly differs with normal persons. Also it can be concluded that negative priming in schizophrenic patients in acute stage decreased comparing to the chronic patients and normal group. Findings are discussed based on changes in dopaminergic system.*

Keywords: Negative Priming Processing, Schizophrenia

INTRODUCTION

Attention defect is the most important and the eldest defect in cognitive functions of schizophrenia patients. Distraction with irrelevant information is the most common part of attention defect in such patients. Limbic system disorders (particularly in Cepto-hypocampal system) cause disorder in cognitive inhibition. Hidden inhibition is disordered in schizophrenic patients but this effect is much lower in the patients under treatment comparing to those who are in acute or Hyper-dopaminergic phase [1, 2, 3, 4, 5].

Tipper in his studies in 1985 introduced a phenomenon named “negative priming effect” [6]. If an issue, which was already actively ignored as an intruder issue, is brought up as a target in the next phase (in a consecutive selection pattern), reply to the target will take longer time comparing to the time when such stimulus was not already provided. Tipper observed that such effect was resulting from inhibition with optional attention process. It meant that ignored information was not removed passively but some inhibition mechanisms were actively done on them. However, to produce negative priority effect, some certain requirements are needed. Prior stimulus should be successfully provided simultaneously with another stimulus (simultaneous selection). Furthermore, the next target (stimulus) should be chosen out of the competitive stimuli. Negative priming refers to longer reaction time to stimulus. It means when the stimulus, which was considered as an intruder stimulus in the first attempt and is provided as target stimulus in the next attempt, it makes the reaction time to the stimulus longer [6]. In general, in investigations on effect of negative priming, the reaction times to two provided stimuli are measured in a quick sequence. The first provision is named prior stimulus and the second one searching stimulus. Both these stimuli

include a target and a distracting factor. There are two types of searching stimuli: trial searching stimuli and neutral searching stimulus.

In trial searching stimulus, target (the second stimulus) is the previous stimulus which was already ignored and in neutral searching stimulus, target (the second stimulus) is different from the stimulus ignored in the in prior phase.
Negative priming effect takes place when there is a longer reaction time in trial situation comparing to control situation. In other words, reaction time in trial situation is less than reaction time in control situation when the numerical result is positive. Normal subjects have longer reaction time in trial situation and this is for transfer of inhibition function of intruder stimulus in the first attempt on target stimulus of the second attempt. The response of subject to this stimulus which was already ignored as an intruder stimulus is inhibited [7].

Of course, not all the subjects in such tests show "negative priming effect". Tipper and Baylis [8] showed that some individual differences existed in negative priming effect. By using cognitive errors questionnaire, they indicated that those who obtained high scores, had a significant decrease in the level of negative priority. The reaction time of schizophrenic patients when responding to trial stimulus shows no increase, which indicates (contrary to normal subjects) that inhibition processes have defects. This paper is aiming to have a comparison among the schizophrenic patients with high positive symptoms and schizophrenic patients with low positive symptoms and normal individuals in negative priming effect test.

MATERIALS AND METHODS

The statistical universe of this paper was all the patients who had referred to mental hospitals or clinics across Esfahan-Iran during 2011 and were diagnosed by researchers and based on DSM-IV criterions to schizophrenia. The studied groups were as follows:

- Group of schizophrenic patients with high positive symptoms (N=15)
They were chosen based on the psychiatrist diagnosis and clinical DSM-IV-based interview by researcher. The scores of these patients in terms of thinking disorder factor (positive symptoms) in brief psychiatry ranking test (E-BPRS), based on Overall, Hollister and Pichot scoring method [9] were above mean.

- Group of schizophrenic patients with low positive symptoms (N=15)
Clinical experts chose them based on the psychiatrist diagnosis and clinical DSM-IV-based interview. The scores of these patients in terms of withdrawal factor (negative symptoms) in brief psychiatry ranking test (E-BPRS), based on Overall, Hollister and Pichot scoring method [9] were below mean.

Normal control group (N=30)
They included individuals whose health was verified and confirmed through general health questionnaire (GHQ). They had received no psychiatry diagnosis. To make sure about lack of psychological problems in the individuals' personal history, their backgrounds and mental status were assessed and confirmed by the researchers through a primary diagnostic interview.

All the participants in the research should be had the following common features:
1) Lack of explicit vision defect or corrected vision and lack of color blindness,
2) Having verbal power to express colors,
3) Aged from 20 to 50,
4) Being right-handed,
5) Lack of first grade relatives affected by mental disorders in normal group,
6) Lack of any severe organic and physical sickness and brain concussion.

Negative priming test
The stimuli used were name of color and ink color. The ink color was chosen out of yellow, green, blue and red. The aim was calling the ink color not the color itself. In other words, when the word "red" was written by black ink, the aim was to say "black" and ignore the word "red". The test included 30 trial efforts and 30 neutral efforts. Since the test was designed to investigate about the additional priming, half of prior stimuli (15 trial efforts and 15 neutral efforts) were provided in the right visual part and the other half (15 trial efforts and 15 neutral efforts) in left p visual part. According to a random order in both visual situations, each effort included two parts:

1) Prior situation
2) Searching situation

1) Prior situation
In this situation the word Strop was presented within 1/10 of second in the left or right visual part. The internal angle of the word in the right or left part of central point of page was between 5 to 2.5 cm which remained in a horizontal state and the size of the words was 2.5 cm.

2) Searching situation
The second part took place 3 seconds later when Stroop word was seen in the middle of page. Here two situations were formed:

a) Trial situation in which the ink color of Stroop word was already foreseen by a word appeared in the prior situation. For instance, the word “red” which was written by blue ink was shown in the prior phase and then the word “green” was written by red ink in the searching phase.

b) Neutral situation: here the word of prior situation, could not predict the word and color of searching situation. For example, the word “green” written by yellow ink and shown in prior phase, was followed by the word “blue” written by red ink in searching phase.

Before any effort, the signs + and *o* are shown on the page in both sides of focus point and exactly where the words in prior phase are shown for a second and immediately then the word Stroop is appeared in the right or left part of the focus point in the prior phase and remains there for a 1/10 of second. After replying, the sign + appears in the middle for a second and then the word for searching situation appears and remains there until the subject replies. Computer measures the reaction time of subjects in searching situation and records the number of their errors.
Meanwhile, before commencing the main test, 10 efforts are given to the subjects. The subjects are told to quickly and properly mention the name and ink of the word once stimulus is provided and ignore the other information appearing on the page. After every reply, the reaction time and its authenticity are appeared on the page for feedback.

Method of performing test
At first, the tester makes a mutual relation with the subject and describes the method of test. The subject sits on a comfortable chair 60 cm away from the monitor. His chain is fixed in order to have a stable look. Then the test instruction is read to him. Ten efforts are performed by the tester to make subject familiar with the procedure. The subject is told “pay attention to the color of the words appearing on the screen and quickly mention just the color of the word appearing on the screen”. The replies were recorded by computer through a microphone connected to the computer. During the test, the tester will have an active presence in the room, watching the performance and responses of the subject and preventing him from replying carelessly or by random. The room should be in a good condition, enough lighted and free of noises. The dependant variable is subject's reaction time during the test which will be recorded by a microphone connected to the computer.

RESULTS

Standard mean and standard deviation of age and education of three groups are provided in table 1.

Table 1: Mean and standard deviation of age and education of three groups

Variables	Schizophrenia with high symptoms (N=15)		Schizophrenia with low symptoms (N=15)	Normal group (N=30)
Age	mean	37.7	38.9	36.9
	standard deviation	9.8	6.8	8.00
Education	mean	5.5	7.5	8.1
	standard deviation	3.5	3.2	3.6

In table 2, mean and standard deviation, extent of priming in the left and right hemispheres and total mean of hemispheres in the groups are inserted. As it is observed, the extent of negative priming in schizophrenia patients with high positive symptoms differs and is somehow less comparing to the ones with low positive symptoms and normal people.

To measure such differences, first a 3*2 factor analysis was done. In this analysis, the three groups of participants were considered as the external factor for the subject and dual negative situations (brain right and left hemispheres) as the internal factors of subject. The results of analysis are shown in table 3. The findings indicate that the main effect of negative priming and interaction effect of group*hemisphere are not significant. However, it indicates that there is a significant difference among the groups in terms of the extent of negative priming.

Table 2: mean and standard deviation in the left and right hemispheres and total in the groups

		Schizophrenia with high symptoms (N=15)	Schizophrenia with low symptoms (N=15)	Normal group (N=30)
Right hemisphere	mean	2	16.9	21.2
	standard deviation	15	15	11
Left hemisphere	mean	7.8	16	25.3
	standard deviation	15	15	15
Total	mean	4.9	16.4	23.3
	standard deviation	15	15	12

Table 3: 3*2 factor analysis

	Sum of Squares	df	F	P value
Negative Priming	462.052	1	2.044	0.157
Negative Priming* Error	72.781	2	0.322	0.809
	226.068	57		
Error	2503.569	2	7.821	0.0001
Total	320.122	57		

DISCUSSION AND CONCLUSION

The findings confirm the assumption that processing reaction time of negative priming in schizophrenia significantly differs with normal persons. The further researches have reported that schizophrenic patients have shown a different function in negative priming test comparing to the normal group [10, 11, 12, 13, 14, 15]. The mechanism of increase in distraction of schizophrenia patients has been attributed to insufficient function of attention inhibition processes [15]. Biological nerve studies have confirmed the main role of limbic system in making dopamine for attention inhibition [16].

Venablis [17] suggests that the ability to distinguish between the relevant stimuli and irrelevant stimuli interfered by hippocampus, is disordered in schizophrenic patients in acute stages. Likewise, dopamine antagonists increase inhibition [18] and dopamine agonists increase or remove inhibition [19]. In acute stage, when positive symptoms are prevailed, negative priming effect in schizophrenia is decreased which is related to hyper-dopaminergic [13].

The data of this research is in line with Park [20] and Tipper [21]. Park [10] reported decreased negative priming in schizophrenic patients in acute stage comparing to the chronic patients and control group. His findings indicated that the negative priming in schizophrenic patients would be gone during psychosis acute period. The patients with higher positive symptoms showed less negative priming but in the next 4 months, they showed normal amount of negative priming. The negative priming in the first relatives of such patients was decreased or gone as it was not among the persons with Schizotypy personalities [10, 22, 23]. Likewise, there were behavioral symptoms similar to positive symptoms in schizophrenia with a decrease in the extent of negative priority in such persons.

To mention some of the limitations of this research, we may come to this fact that the schizophrenic patients group of this research included a limited number of patients with particular age, gender and marriage status features which might not be a good and real representative of the disordered society. Controlling variables such as duration of being affected by the disorder and the level of medicine taken is suggested for the future researches.

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