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Enhanced visual performance in obsessive compulsive personality disorder

ZOHREH ANSARI[1] and JAVAD SALEHI FADARDI[2]

[1]*Iran University of Medical Sciences, Tehran, Iran*
[2]*Ferdowsi University of Mashhad, Mashhad, Iran*

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Visual performance is considered as commanding modality in human perception. We tested whether Obsessive–compulsive personality disorder (OCPD) people do differently in visual performance tasks than people without OCPD. One hundred ten students of Ferdowsi University of Mashhad and non-student participants were tested by Structured Clinical Interview for DSM-IV Axis II Personality Disorders (SCID-II), among whom 18 (mean age = 29.55; *SD* = 5.26; 84% female) met the criteria for OCPD classification; controls were 20 persons (mean age = 27.85; *SD* = 5.26; female = 84%), who did not met the OCPD criteria. Both groups were tested on a modified Flicker task for two dimensions of visual performance (i.e., visual acuity: detecting the location of change, complexity, and size; and visual contrast sensitivity). The OCPD group had responded more accurately on pairs related to size, complexity, and contrast, but spent more time to detect a change on pairs related to complexity and contrast. The OCPD individuals seem to have more accurate visual performance than non-OCPD controls. The findings support the relationship between personality characteristics and visual performance within the framework of top-down processing model.

Key words: Visual performance, visual function, visual acuity, visual contrast sensitivity, OCPD.

Javad Salehi Fadardi, Department of Psychology, Ferdowsi University of Mashhad, Mashhad, Iran. Tel: 00985118805867; e-mail: j.s.fadardi@um.ac.ir

INTRODUCTION

Vision includes various interactive capabilities to detect objects against a contrasting background (Loughman, Davison, Nolan, Akkali & Beatty, 2010). There are two related terms that need to be addressed here. The first two, THAT IS, visual function and visual performance have been used alternatively to address almost the same processes, including color discrimination, contrast sensitivity, depth perception, and attention at distance, visual acuity (Erickson, Citek, Cove *et al*., 2011; Iregren, Andersson & Nylen, 2002; Ricci, Cesarini, Groppo *et al*., 2008; Ricci, Romeo, Serrao *et al*., 2010). Visual performance, itself, refers to visual acuity and contrast sensitivity function (CSF). Visual acuity is defined as the ability to distinguish details and the shape of objects in a visual field (Coppens & van den Berg, 2004), and it refers to the ability of detecting the location of change, complexity, and size. Contrast sensitivity function is characterized by the ability to perceive small luminance contrasts (see Cimmer, Szendi, Csifcsak *et al*., 2006; Legge & Kersten, 1987; Legge, Kersten & Burges, 1986; Nasanen, Kaukiainen, Hero *et al*., 2005; Turner, 2005).

Visual perception has been considered as dominant modality in human perception (Shams & Kim, 2010) which, to some extent, has impacts on other modalities (e.g., tactile and auditory information). With regards to the influence of visual information upon other sensory inputs, in recent years, crossmodal interactions (i.e., the impact of non-visual sensory information on other sensory inputs) have been noted as more accurate theory of human perception (Schmiedchen, Freigang, Nitsche & Rubsamen, 2012; Shams, Iwaki, Chawla & Bhattacharya, 2005; Shams & Kim, 2010).

In addition to the effects that other sources of sensory information may have on visual performance, there is also growing evidence on the relationship of visual performance/function and personality, psychotic, and neurotic disorders. Gerstenberg (2012) referred to higher sensory-processing sensitivity (SPS) as a personality trait, and Ahadi and Basharpoor (2010) reported a positive relationship between SPS and anxiety symptoms and neurotic disorders. Different dimensions of visual performance have been studied in borderline personality disorder (Beblo, Saavedra, Mensebach *et al*., 2006; Stevens, Burkhardt, Hautzinger, Jurgen & Schwarz, 2004), schizotypal personality (Kent, Weinstein, Passarelli, Chen & Siever, 2006; ODonnell, Bismark, Hetrick, Bodkins, Vohs & Shekhar, 2006), compulsive and histrionic personality (Magaro, Smith & Ashbrook,1983), antisocial personality (Kosson,1998), and obsessive compulsive disorder (i.e., Obsessive-Compulsive Disorder (OCD); Kaplan, Dar, Rosenthal, Hermesh, Fuxd & Lubow, 2006).Therefore, personality can provide a platform for the study of relationships among emotions and expectations and visual performance (Magaro *et al*., 1983; Szymura & Necka, 1997; Zuber & Ekhemar, 1987). For example, Zeelenberg and Bocanegra (2010) found that emotions affect visual information processing. Loth, Gomez, and Happe (2010) reported that individuals' expectations can also have priming effects on their visual perception. Similarly, context can influence one's perception of an object due to one's past experience and prior knowledge; such effects are independent of or in addition to the intrinsic properties of the object itself (Loth *et al*., 2010).

Obsessive Compulsive Personality Disorder (OCPD) is characterized by a pervasive pattern of impairment of personality function (i.e., identity and self-direction), and deficit of interpersonal functioning (i.e., rigid perfectionism and perseveration; APA, 2012; Wetterneck, Little, Chasson *et al*., 2011). The OCPD characteristics are stable across time and situations. Although the findings suggest personality characteristics are related to visual performance, there was no experimental study addressing OCPD and visual performance. The present study was conducted to analyze the visual performance of OCPD people (i.e., visual acuity, contrast sensitivity). We hypothesized that OCPD people differ in their visual functions from non-OCPD people.

METHOD

Participants

Eighteen participants with OCPD (mean age = 29.55; *SD* = 5.26; 84% female) and 20 healthy controls (mean age = 27.85; *SD* = 5.26; female = 84%) were invited through study advertisements mounted on notice boards of various schools of Ferdowsi University of Mashhad and a few other educational/cultural organizations and institutions in the city of Mashhad. The study ad listed a cluster of OCPD characteristics, asking potential participants to volunteer for the study if they thought they meet at least one of the characteristics. Next, volunteers were interviewed by a clinical psychologist on the Structured Clinical Interview for DSM-IV Axis II Personality Disorders (SCID-II). For all participants, the exclusion criteria were a history of other psychological disorders, consuming psychedelic medications, uncorrected visual problems, or unwillingness to participate in computerized experiments. Participants who scored fewer than four on SCID-II, were assigned to control group and others with a minimum of five on the scale were assigned to the experimental group (see Table 1).

Measures

SCID-II. The SCID-II is a structured clinical interview for diagnosing Axis II personality disorders based on DSM-IV. According to the scale's manual, THE OCPD diagnosis cut-off point is meeting at least four (out of eight) characteristics of OCPD listed on the scale.

Table 1. *Means and standard deviations of number of correct responses calculated for visual performance for the experimental and control group*

	Group			
	Experimental		Control	
	M	*SD*	M	*SD*
Visual acuity				
Central location	2.83	0.38	0.80	0.41
Marginal location	1.66	1.02	0.25	0.71
Complexity	1.61	0.97	0.25	0.44
Size	2.50	0.78	0.65	0.67
Contrast sensitivity	2.61	0.60	0.85	0.74

Flicker task. Computerized neuropsychological tests for assessment of visual performance (e.g., contrast) have many advantages over traditional paper and pencil tests (Turner, 2005). The Flicker task was used for assessment of visual performances (i.e., visual acuity that includes localization of the visual stimuli (central vs. marginal) size, complexity, and contrast sensitivity.

Three trials were presented for each of the five visual performance components in a randomized order. For each component, the dominant aspect was augmented to minimize its overlap with other aspects. For example, in the pictures addressing location the change comprised partial addition or omission of an object at the center or corner of the frame against a relatively simple background (Figs. 1 and 2).

When change in size was concerned, only part of an object changed in its diameter (Fig. 3). Change in contrast entailed changes in the illumination of one part of the picture (Fig. 4). Changes in complexity comprised partial addition or omission of an object against a complex, noisy background (Fig. 5).

Therefore, each trial consisted of two picture stimuli: one original and one changed from the original. The two stimuli were separated by presenting one blank page for 80ms. The participant's task was to detect the changing element across the two photos by pressing the spacebar on the keyboard and naming the nature of the change. When the spacebar was pressed, the computer recorded the repetitions within each trial and the time elapsed from the beginning of a trial. The experimenter recorded the accuracy of verbal reports. Each trial could repeat itself unlimited until the participant pressed the spacebar on the keyboard. The flicker task was run using a PC Laptop with a standard 15" display.

Procedure

The study design was approved by the ethics committee of Department of Psychology, Ferdowsi University of Mashhad. Prior to the study, all participants gave their informed consent. Participants could ask any questions prior to the experiment, and they could freely withdraw from the experiment at any time without any penalty. Their participation in the study was voluntary. The clinical interview and visual tasks were administered with the participants individually in a quiet, normally illuminated experimental room. They were instructed to keep 40cm apart from the display. The spent time was about 20 minutes for each individual. In order to get familiar with the task, each participant was given practice trials before the actual experiment. At the end, they were debriefed about the study goal; they were thanked for their participation, and dismissed.

RESULTS

For each participant we computed two indicators: the scores of visual performance and visual acuity and the reaction time for all

Fig. 1. The changed part is related to visual acuity (central).

Fig. 2. The changed part is related to visual acuity (marginal).

Fig. 3. The changed part is related to visual acuity (size).

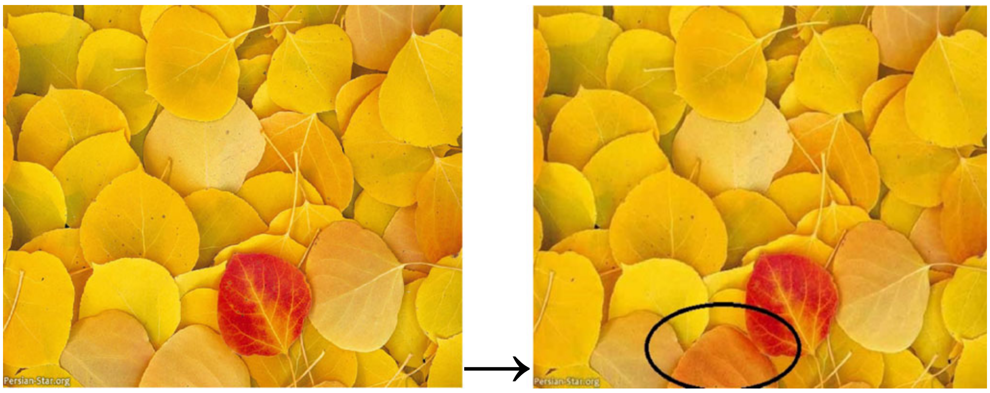

Fig. 4. The changed part is related to contrast sensitivity.

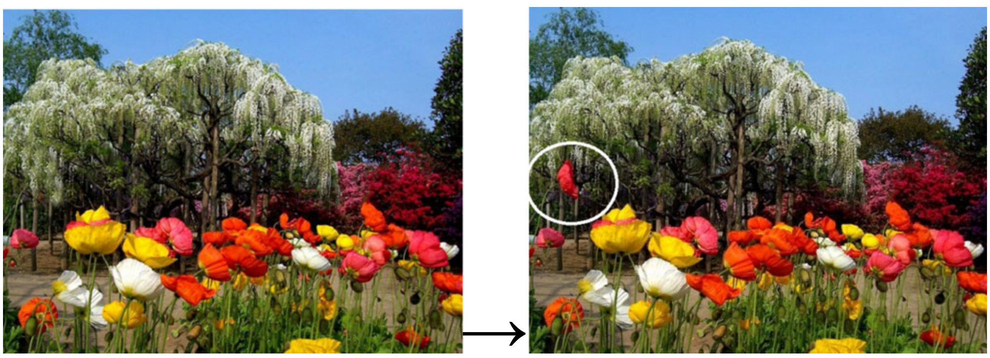

Fig. 5. The changed part is related to visual acuity (complexity).

sub-tests. To determine whether the two groups were different on their visual performance a multivariate analysis of covariance (MANCOVA) was conducted. In the MANCOVA model, dependent variables were those measuring visual acuity (i.e., location: central and marginal; complexity; size) and contrast. The independent variable was group (experimental vs. control) and age and entered into the model as a covariate. The results showed that age did not have a significant effect, Wilks' Lambda; F (5, 31) = 1.25; $p > 0.05$; $\eta^2 = 0.16$); however there was a significant effect for group in the model, Wilks' Lambda; F (5, 31) = 8.71; $p < 0.05$; $\eta^2 = 0.58$). Tests of between subjects effects revealed that there was a significant difference between the two groups in terms of two of the indices of visual acuity: (a) complexity, F (1, 38) = 37.65; $p < 0.001$; $\eta^2 = 0.52$; (b) size, F (1, 38) = 12.50; $p < 0.01$; $\eta^2 = 0.26$; and visual contrast, F (1, 38) = 10.99; $p < 0.01$; $\eta^2 = 0.23$. On all significant differences the OCPD group showed a better performance. There was no significant effect for group on the visual location indices (i.e., central vs. marginal).

DISCUSSION

In previous research, some aspects of visual performance (i.e., visual inhibition) have been tested in assessed in OCD patients (see, Hartston & Swerdlow, 1999; Kaplan *et al*., 2006; Swerdlow, Hartston & Hartman, 1999). However, this is the first study to investigate visual performance in OCPD individuals as far as it relates to visual acuity (central location, marginal location, complexity size) and contrast sensitivity. Our results showed that, compared with people without OCPD, those with OCPD showed increased visual performance in complexity and size (i.e., subtypes of visual acuity) and contrast sensitivity; that is, there was no difference between the two groups in terms of their visual acuity in recognition of the local of the changed part of the scenes whether central or marginal. Our results support Magaro *et al*.'s (1983) study who over three decades ago reported that OCPD participants performed significantly better than participants with other personality disorders on some visual tasks (e.g., scanning); the authors attributed this to the OCPDs having a more focused attentional style. However, our findings may challenge those of Maynard and Meyer (1996) who reported that personality factors may not influence procession of visual information, specially, at an early stage.

OCPD individuals' quality of visual performance is influenced by a predisposition for details, which, in turn, could be accounted in support of theories of top-down processing in sensation and perception. Top-down processing states that individual's expectations, knowledge and past experiences can influence the dynamics of their sensory perceptions (Loth *et al*., 2010). However, from a neuropsychological viewpoint, it remains unclear at what level of visual perceptual processing (from retina to the activation of dorsal and ventral visual stream), OCPD individuals acquire the ability of intensified perception of the given stimuli and what mechanisms mediate it.

It remains for the future investigations to shed light on whether the severity of OCPD symptoms might reinforce some visual performance aspects, what the fundamental neural pathways and neurotransmitters for such reinforced visual processing are, and to what extent top-down processing can modify visual performance. We also recommend comparing various personality types and people with other psychopathologies on their visual sensitivity for details.

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