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Researchers describe impaired self-face recognition in those with major depressive disorder

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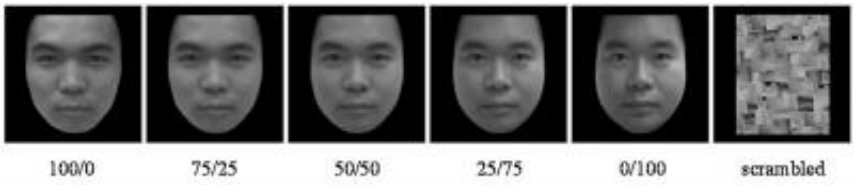

These gradient faces were created by blending the features of self-face and stranger face at intervals of 5% successively; the scrambled pictures involved ingredients of both self-face and unfamiliar face. Credit: Science China Press

Neuropsychological impairment has long been established as a fundamental characteristic of depression, but a specific pattern of impairment that is widely recognized has not been summarized. Professor Jia Hongxiao and his group from the Beijing Anding Hospital, Capital Medical University, explore major depressive disorder (MDD) from the perspective of neuropsychology. They found that the self-serving bias and self-recognition bias were impaired in individuals suffering from MDD compared with a control group. This research lays the groundwork for further study on the etiology and pathological mechanisms of major depressive disorder. They outlined their findings in a study, entitled "Neuropsychological impairment: disturbed self-processing in patients with major depressive disorder," that was published in the *Chinese Science Bulletin*.

Impairments, including cognitive dysfunction, are fundamental features of major depressive disorder, but it has been difficult for specialists to construct a universally accepted pattern of specific cognitive impairment in this area. Many studies report evidence for cognitive bias (i.e., an excessive focus on the self or negative stimuli) in depressed or dysphoric individuals compared with non-dysphorics. One researcher posited that there might be three characteristics of abnormal self-conception in depression: increased self-focus, attribution of negative emotions to one's own self and increased cognitive processing of the self.

We hypothesize that individuals with major depressive disorder suffer from abnormal self-processing based on theories of self and self-abnormality in depression.

It is believed that the ability to conceptualize the self is unique to human beings. Self-awareness can be determined by the composition of specific information for individuals, for example, by identifying oneself in a mirror. The self-face symbolizes distinct self-characteristics of humans and represents a type of special social stimulus. Self-face processing plays a vitally important role in the study of complex conceptions of self.

Some researchers have proposed that self-face recognition might help in the understanding of processing self-related information relative to other types of cognitive processing. The ability to identify one's own face is generally defined as self-face recognition (SFR), which is considered to be an indicator of self-awareness. The present study is the first to use this paradigm to explore self-face recognition abilities in depressed patients.

A total of 18 depressed patients and 20 healthy subjects participated in this experiment. We used a digital camera to take pictures of all participants under controlled conditions. All pictures were frontal views of participant faces and were processed using Adobe Photoshop CS

software. Morphed faces were generated using photo-morphing software. We mixed the features of any two of the three types of faces (self-face, famous face and stranger face) along 5% intervals. In addition, images from each task condition were randomly combined into four "mosaic" images (scrambled faces) for use as control images in one task (as shown in the Fig. 1). Finally, the test sequence of the three specified tasks was random and participants were instructed to make a two-alternative forced-choice to identify the identity of morphed faces.

The percentage of morphing at the switching point was defined as a threshold in the task based on the judgment of morphing faces in different tasks for participants. It can be used to measure the recognition ability for one face relative to the other. Face identification accuracy across groups was analyzed using repeated-measure ANOVA. There was a significant main effect of the group ($P = 0.01$). The main effect of the task was not significant ($P = 0.683$) and a non-significant interaction effect between the group and types of bias ($P = 0.282$) was also found. In order to examine which component process of SFR (self-processing, familiarity processing or self-recognition processing) was selectively impaired in depression, subsequent independent t-tests further revealed that the self ($P = 0.012$) and self-recognition bias ($P = 0.035$) observed in self-famous and self-recognition tasks for patients were significantly greater than that for the healthy controls. In contrast, there was no significant difference between the two groups in the famous-stranger task ($P = 0.378$). Paired t-tests were used to compare performance thresholds during each task type between non-medicated and medicated patients. The results showed that there were no significant differences between the three tasks ($P = 0.207$; $P = 0.872$; $P = 0.885$).

Experimental results indicate that the performance of face recognition in depressed patients was significantly worse than healthy subjects in both the self-famous and the self-stranger task, and that this impairment cannot be attributed to medication status. In line with the clinical

characteristics of depression, depressed patients have excessive self-focus and increased sensitivity to the self-face compared to other faces, regardless of face familiarity. This abnormal self-bias may be explained by clinical characteristics of MDD that most patients are autistic and focus more on self-entanglement such that they are unable to shift their attention to the outside world. Taken together, these conclusions suggest that MDD patients usually concentrate on self-perception first and generally regard the perceptual activity of the inner self as more important than the external world.

Similar findings have emerged using other measurements of self-abnormalities, such as autobiographical memory (AM) studies. The tendency of memory recall for MDD was for general non-specific memories (over-generality) rather than for specific events and these AM deficits might be trait-like markers for MDD. In addition, we reviewed related literature and found a neural basis to support the conclusion of self-disorder in MDD. The consistency of brain regions in depression and self-related processing supports our hypothesis that self-processing is impaired in MDD.

We believe that there might be a behavioral level of impaired self-processing in MDD from the view of face recognition. This research provides a new perspective for further study on the etiology and pathology of MDD. Future studies might rely on more empirical research to explore which level of self-processing is altered in major depressive disorder. Studies involving a combination of domains, such as neuropsychology, electrophysiology and fMRI, will likely enrich understanding of the etiology of major depressive disorder.

Provided by Science China Press

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