The neural evidence of the reflected appraisal process as a main path for learning about one's self-knowledge of personality

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A B S T R A C T

Self-knowledge has been defined as the accurate self-perceptions about how one typically thinks, feels, and behaves, and awareness of how those patterns are interpreted by others. Previous research has noted that the introspection and the reflected appraisal processes are two main avenues for learning about the self and that self-knowledge might be fully realized through the use of reflected appraisal from close others. However, due to the methodological difficulty in linking people's ratings on a trait to their behaviors, accuracy research using a behavioral criterion is quite limited. The current work examined the main source of learning about one's self-knowledge by investigating the time course of attention deployment both in the process of introspection and that of reflected appraisal. Twenty-five college students were first asked to rate their impressions of their classmates as well as a familiar other using personality-trait adjectives. Their electrophysiological data were then collected using the event-related potential (ERP) technology while they judged to which extent (1) an adjective can describe the self, (2) an adjective can describe a familiar other, (3) they agree with an adjective that their classmates believe can describe the self, and (4) they agree with an adjective that their classmates believe can describe a familiar other. Our electrophysiological data showed that classmates' positive evaluation of one's own trait elicited larger P2 than the positive self-evaluation of one's own trait. Further, classmates' negative evaluation of one's own trait elicited larger late positive component (LPC) than the negative self-evaluation of one's own trait. Results suggest that people allocate more attention to the process of reflected appraisal compared to the process of introspection, which further suggests that the reflected appraisal process might be the main source in learning about one's self-knowledge of personality.

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1. Introduction

Make it thy business to know thyself, which is the most difficult lesson in the world.

-Cervantes (Don Quixote, Part II, Chapter 42).

As the opening quote from Cervantes suggests, the questions of 'who we are' and 'who we think we are' have been a prominent theme in various fields. Starting with the Oracle at Delphi, self-knowledge has been a great interest for many philosophers, including Socrates, Plato, and Descartes (Vazire & Carlson, 2010). Most of people have a powerful intuition that they are the best judges of their own personalities (Sedikides & Skowronski, 1995). They inevitably know who they are, what they think, and how they feel. However, increasing evidence has shown that people sometimes have mistaken views about how they behave and can be unaware of important aspects of their personality (Bollich, Johannet, & Vazire, 2011; Vazire & Carlson, 2011).

Previous research has noted two main avenues for learning about self-knowledge: intrapersonal approaches (e.g., introspection) and interpersonal approaches (e.g., reflected appraisal) (Bollich et al., 2011). The process of introspection involves looking inward and directly consulting own attitudes, feelings, and motives; the process of reflected appraisal involves looking outward and observing how others respond to oneself (Brown, 2007). Findings from the intrapersonal perspective have indicated that our thoughts and feelings can provide other people with valuable information about what we are like (Hixon & Swann, 1993). In other words, consulting one's own thoughts and feelings could yield meaningful self-knowledge. However, from the interpersonal perspective, since many traits can be judged accurately from people's physical appearance, Facebook profiles, or a brief interaction, others could make good use of these cues when inferring people's

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personality and do not require a personal account (Kenny & West, 2008).

In order to provide a framework to explain and to predict self-other asymmetries in accuracy, Vazire proposed a self-other knowledge asymmetry (SOKA) model, which assumed that the introspection process should be more accurate for traits low in observability (e.g., neuroticism), and the reflected appraisal process should be more accurate for traits high in evaluativeness (e.g., intellect) (Vazire, 2010). In a recent study, results were consistent with the SOKA model showing that the self was the best judge of neuroticism-related traits and that friends (other) were the best judges of intellect-related traits. However, results also showed that majority of students reported learning about their personality from others rather than learning from introspection or self-observation (Vazire, 2010).

Researchers are more and more interested in examining which path is the main source for learning about people's true selves (Bollich et al., 2011). Learning process is the act of acquiring new, or modifying and reinforcing, existing knowledge and may involve synthesizing different types of information (Schacter, Gilbert, & Wegner, 2010). Attentional models of associative learning suggest that allocation of attention to the new information is influenced by learning (Le Pelley, Haselgrove, & Esber, 2012). Evidence for the influence of such learned attentional processes is well-established in both humans and nonhuman animals suggesting that organisms learn to allocate more attention to some information than to others (Le Pelley, 2004). Along this line, learning about one's self-knowledge that follows the new information influences the amount of the attention that is paid to this information; furthermore, the amount of attention that is paid to the new information influences the rate of learning the associations between the new information and the existing self-knowledge. Therefore, if the reflected appraisal process is the main path for learning about our true self, we would predict that people would pay much more attention on the process of reflected appraisal compared to the process of introspection.

Due to the methodological difficulty both in linking people's rating on a trait to their behaviors and in matching levels specificity of predictor and criterion, accuracy research using a behavioral criterion is quite limited (Vazire, 2010). However, the development of electrophysiological technology provides us with another way to explore the process of learning self-knowledge. Electrophysiological studies on the neural processing of self-relevant cues have generally supported the view that both P2 and P300/LPC (late positive component) are indexes of attention to self-relevant stimuli (Mu & Han, 2010; Zhang, Guan, Qi, & Yang, 2013). The P2 is evoked about 200 ms post-stimulus and its amplitude is modified by the intensity of perceptual processing which requires attention allocation to function (Luck & Hillyard, 1994; Thorpe, Fize, & Marlot, 1996). The enhanced P2 effect during self-referential processing has been interpreted as reflecting a more general influence of self-relevance, possibly through increased arousal (ratings of arousal were generally increased in the self-relevant scenarios), which led to top-down attention amplification of early stages of visual words processing (Fields & Kuperberg, 2012). Later ERP components, such as P300 and LPC, were found to be enhanced when participants were engaged in higher-order cognitive operations related to selective attention and resource allocation (Gray, Ambady, Lowenthal, & Deldin, 2004). Studies on the neural mechanisms of explicit self-relevant processing have generally supported that P300 is an index of attention to self-relevant stimuli (Tacikowski & Nowicka, 2010).

The main objective of the present study was to investigate the time course of attention deployment both to the process of introspection and to the process of reflected appraisal. In the introspection task, participants were asked to judge to which extent an adjective can describe the self, whereas in the reflected appraisal task, participants were asked to judge to which extent they agree with an adjective that their classmates believe can describe the self. Since previous research suggested that self-knowledge might be fully realized through the use of explicit feedback from knowledgeable others (Bollich et al., 2011), we hypothesize that participants would allocate much more attentional resources to the task of reflected appraisal, compared to the task of introspection. In other words, the process of reflected appraisal would elicit larger P2 and LPC components than the process of introspection.

Another factor that might be considered in the study of self is the emotional valence (Moran, Macrae, Heatherton, Wyland, & Kelley, 2006). For most individuals, information about the self is associated with a positive valence. People always readily process positive feedback and refrain from processing negative feedback (Kappes, Oettingen, & Pak, 2012), which is often reflected in their behavioral response: faster responding to information consistent with the self-positivity bias, but slower responding to information that is inconsistent with the self-positivity bias (Watson, Dritschel, Obonsawin, & Jentzsch, 2007). Indeed, participants' behavioral response to valenced feedback is consistent with their self-serving bias, which refers to the tendency of people to attribute positive traits to internal, stable and global personal characteristic whereas negative traits are identified as unrelated to personal characteristics (Blaine & Crocker, 1993). On the one hand, given that positive feedback is judged to be favorable to the self and people process this information without hesitation (Audia & Locke, 2003), we would predict that processing others' positive feedback would be happened in the early stage and elicit a larger P2 than the processing of positive self-evaluation. On the other hand, since negative feedback is judged as being self-threatening and people tend to spend much more time on evaluation and self-regulation (Audia & Locke, 2003), we would predict that processing others' negative feedback would be happened in the late stage and elicit a larger LPC than the processing of negative self-evaluation.'

2. Method

2.1. Participants

We recruited 30 right-handed, healthy university students (16 males, mean age = 20.0 years, SD = 1.1) from Southwest University (Chongqing, China). Five participants were excluded due to few artifact-free ERP epochs, which resulted in a final dataset of 25 (13 males, mean age = 20.0 years, SD = 1.1). None had a history of neurological or psychiatric disorders, significant physical illness, head injury, or alcohol/drug abuse (participants' self-report). All participants had normal or corrected-to-normal vision. The study was approved by the local review board for human participant research and all participants gave their written informed consent before participating. Each participant was paid 50 RBM for completing the study.

2.2. Stimulus, procedure and tasks

A total of 336 personality-trait adjectives were selected from established personality trait adjective pools with each adjective consisting of two Chinese characters (Huang & Zhang, 1992). Half of the words were positive and the other half were negative.

In order to make participants believe that the personality trait adjectives used in the ERP recording session are the real evaluation of their classmates, a mock test was first applied to about 120 students in same classes. In the mock test, students were asked to rate their impressions on their classmates as well as on Xiang Liu (a well-known Chinese athlete) using the personality-trait adjectives. Participants were then randomly recruited from