International Journal of Psychophysiology 97 (2015) 153–162

Contents lists available at ScienceDirect

International Journal of Psychophysiology

journal homepage: www.elsevier.com/locate/ijpsycho

Perfect error processing: Perfectionism-related variations in action monitoring and error processing mechanisms

Jutta Stahl [a,*], Manuela Acharki [a], Miriam Kresimon [a], Frederike Völler [a], Henning Gibbons [b]

[a] University of Cologne, Germany
[b] University of Bonn, Germany

ARTICLE INFO

Article history:
Received 3 December 2014
Received in revised form 3 June 2015
Accepted 4 June 2015
Available online 10 June 2015

Keywords:
Event-related potentials
Error processing
Action monitoring
Individual differences
Perfectionism

ABSTRACT

Showing excellent performance and avoiding poor performance are the main characteristics of perfectionists. Perfectionism-related variations (N = 94) in neural correlates of performance monitoring were investigated in a flanker task by assessing two perfectionism-related trait dimensions: *Personal standard perfectionism* (PSP), reflecting intrinsic motivation to show error-free performance, and *evaluative concern perfectionism* (ECP), representing the worry of being poorly evaluated based on bad performance. A moderating effect of ECP and PSP on error processing – an important performance monitoring system – was investigated by examining the error (-related) negativity (Ne/ERN) and the error positivity (Pe). The smallest Ne/ERN difference (error–correct) was obtained for pure-ECP participants (high-ECP–low-PSP), whereas the highest difference was shown for those with high-ECP–high-PSP (i.e., mixed perfectionists). Pe was positively correlated with PSP only. Our results encouraged the cognitive-bias hypothesis suggesting that pure-ECP participants reduce response-related attention to avoid intense error processing by minimising the subjective threat of negative evaluations. The PSP-related variations in late error processing are consistent with the participants' high in PSP goal-oriented tendency to optimise their behaviour.

© 2015 Elsevier B.V. All rights reserved.

1. Introduction

The trait *perfectionism* reflects the stable disposition to show error free performance. Different perspectives are employed in perfectionism research to conceptualize this trait, in particular, group-based models classifying types of perfectionists (e.g., Hamachek, 1978: normal perfectionism vs. neurotic perfectionism) and dimensional trait models of perfectionism (e.g., Frost et al., 1990; Hewitt and Flett, 1991). Frost et al. (1990) suggested six dimensions of perfectionism which are, at least partially, independent (see Frost et al., 1990). *Concern over mistakes* describes the tendency to equate errors with personal failure and represents the expectation of negative consequences such as negative evaluation by others. *Personal standards* reflects the demand of very high criteria to evaluate one's own performance. *Doubts about action* represents the characteristic of not being satisfied with the quality of one's own performance irrespective of the actual, objective outcome. The two dimensions, *parental expectations* and *parental criticism*, refer to the individual's mind-set regarding the impressions of extremely high parental demands and excessive criticism in case of imperfect behaviour. Finally, *organisation* describes the preference for order and precision.

Two perfectionism dimensions are crucial to reliably predict variations in behavioural tendencies related to performance and performance evaluation. By combining these key dimensions, *evaluative concern perfectionism* (ECP) and *personal standards perfectionism* (PSP), in their 2 × 2-model of perfectionism, Gaudreau and Thompson (2010, 2011, see also Gaudreau, 2013), their model amalgamates the advantages of the dimensional and the group-based approaches in ways that four perfectionism subtypes eventuate: *pure-PSP* (low concerns and high standards), *mixed perfectionism* (high concerns and high standards), *non-perfectionism* (low concerns and low standards), and *pure-ECP* (high concerns and low standards). Considering the dimensions separately, people with high ECP are often more anxious, show higher neuroticism scores, as well as avoidant coping styles, and they tend to develop depression and obsessive symptoms more frequently. Conversely, people with higher PSP show higher positive affect, higher conscientiousness, endurance, less external locus of control and active coping styles (for review see, Stoeber and Otto, 2006). In this context, the interactionist view of Gaudreau and Thompson's model (2010, 2011) made a valuable initial contribution by showing that high ECP participants benefit from high PSP as a kind of protecting factor compared to pure-ECP participants. Brand and Altstötter-Gleich (2008) further supported the benefit of an interactionist view by their finding

* Corresponding author at: Department of Psychology, University of Cologne, Pohligstr. 1, D-50969 Cologne, Germany. Tel.: +49 221 470 6289 (Office); fax: +49 221 470 5105.
E-mail address: jutta.stahl@uni-koeln.de (J. Stahl).

http://dx.doi.org/10.1016/j.ijpsycho.2015.06.002
0167-8760/© 2015 Elsevier B.V. All rights reserved.

that the ECP-by-PSP interaction was a better predictor for decision-making performance than the single traits.

As perfectionism comprises cognitive, emotional and motivational characteristics linked to performance and to the evaluation of its quality, we aimed at investigating the neurophysiological correlates of perfectionism-related variations in error processing using an interactionist approach. As individual behaviour cannot be free of errors constantly, it is an important question whether the different subtypes of perfectionists diverge in action monitoring and error processing.

2. Error processing

Error processing can be investigated by means of two dissociable components of the event-related potential (ERP), the *error (related) negativity* (Ne/ERN, Falkenstein et al., 1991; Gehring et al., 1993), and the *error positivity* (Pe, Falkenstein et al., 1991). Usually, the peaks of the two components can be observed at approximately 100 ms after an erroneous response with a *negative* medial–frontal scalp distribution (Ne/ERN), and at around 300 ms with a *positive* centro-parietal scalp distribution (Pe). Several studies showed that the two components are associated with partially distinct neural sources (e.g. Ne/ERN: anterior cingulate cortex; see Ridderinkhof et al., 2004; Pe: anterior cingulate cortex, posterior cingulate cortex, parietal, and insular cortices; Herrmann et al., 2004; Orr and Hester, 2012; Van Veen and Carter, 2002; Vocat et al., 2008).

Falkenstein et al. (1991) were the first to suggest that the Ne/ERN reflects the activity of an internal error-detection mechanism that responds to mismatches between representations of the actually given response and the required response (for further development, see also Gibbons et al., 2011). The underlying activity is mediated by the mid-frontal dopaminergic system by reinforcement learning processes (Holroyd and Coles, 2002). The Ne/ERN is also affected by more general action monitoring processes (e.g., Vidal et al., 2000), such as ongoing response conflict monitoring (Armbrecht et al., 2010; Stahl and Gibbons, 2007; Yeung et al., 2004), or force production monitoring (Armbrecht et al., 2012, 2013; De Bruijn et al., 2003). A component similar to the Ne/ERN with respect to topography and time course can be observed after correct responses (CRN, correct response negativity, Vidal et al., 2000). It is still debated as to whether the Ne/ERN and CRN reflect the same action monitoring process (Hoffmann and Falkenstein, 2010) or whether they constitute different mechanisms (Endrass et al., 2012).

As the Pe amplitude is higher when participants are aware of an error, as compared with when they are not, the Pe is interpreted as the neural correlate of conscious error processing (e.g., Nieuwenhuis et al., 2001; O'Connell et al., 2007). Moreover, the Pe amplitude correlates with indicators of post-error behaviour, which indicates a relationship to strategic response adaptation processes (e.g., Overbeek et al., 2005; see also Danielmeier and Ullsperger, 2011; Schroder and Infantolino, 2013). An accumulator model (Steinhauser and Yeung, 2010, 2012) describes the Pe amplitude as reflecting the accumulated evidence of error commission, which is required in a post-response decision concerning the correctness of a response.

3. Perfectionism and error processing

Considerable research on individual differences in error processing (including personality traits and clinical groups) has provided evidence of highly anxious individuals with higher Ne/ERN amplitudes in response conflict tasks (e.g., flanker task, and Stroop task). In a meta-analysis, Moser et al. (2013) reported a small-to-medium effect of anxiety on Ne/ERN. The authors considered studies that investigated error processing and general anxiety disorder (e.g., Weinberg et al., 2010, 2012), obsessive–compulsive disorder (Gehring et al., 2000; Zambrano-Vazquez and Allen, 2014), trait anxiety (Aarts, and Pourtois, 2010), and the behavioural inhibition system (Boksem et al., 2006). Although these groups differ in several aspects, they have anxious characteristics, especially anxious apprehension (i.e., worrying and rumination) in common. According to Moser et al.'s (2013) analyses, apprehension and the non-task related cognitive workload are the crucial characteristics explaining the relationship between anxiousness and error processing.

Interestingly, to date, no relationship between the concern-related perfectionism (ECP) and the Ne/ERN has been revealed (Pieters et al., 2007; Schrijvers et al., 2010; Tops et al., 2013). This is surprising since the concern over mistakes scale assesses the tendency of worrying about being poorly evaluated by others based on imperfect (erroneous) behaviour. Thus, according to Moser et al.'s (2013) theory a relationship would be expected. In a reply to Proudfit et al. (2013) comments on the study by Moser et al. (2013), however, the authors (Moser et al., 2014) stated that the concern over mistakes scale assesses several different aspects of anxiety-related characteristics, that is, not only worry-related anxiety. The three above-mentioned studies (Pieters et al., 2007; Schrijvers et al., 2010; Tops et al., 2013), however, demonstrated an effect of some perfectionism sub-traits on error-related ERP components. Pieters et al. (2007) used perfectionism as a moderator variable in a design contrasting anorexia nervosa patients with a healthy control group. In the healthy control group ($N = 19$), the authors observed a more negative Ne/ERN amplitude in healthy individuals with a higher overall perfectionism score (i.e., the sum of the Multidimensional Perfectionism Scale (FMPS) developed by Frost et al., 1990), but there was no such variation in the anorexia nervosa group ($N = 17$). The second study (Schrijvers et al., 2010) showed higher Ne/ERN amplitudes in individuals with higher doubts-about-action scores, and higher Pe amplitudes in participants with higher ECP scores (medicated participants with major depressive disorder; $N = 39$). In contrast to these studies, Tops et al. (2013) investigated the specific relationship between ECP and the three components [Ne/ERN, early Pe (150–350 ms), and late Pe (400–500 ms)] in 16 healthy participants and reported a positive relationship between ECP and late frontal Pe. However, the authors could not preclude that this effect resulted from an overlap of the stimulus-preceding negativity (i.e., feedback preceding), an ERP component which is a response to the anticipation of upcoming stimuli, with the Pe. The feedback stimuli (happy or disgusted faces for positive or negative feedbacks, respectively) were presented, on average, 565 ms after response onset. As these feedbacks may have had an ECP-related emotional arousing effect, the stimulus-preceding negativity could have been decreased in the crucial time period of the late Pe and, thus, could have resulted in a relative increase of late Pe for participants with high ECP. Remarkably, the Ne/ERN and the early Pe did not correlate with ECP in their study. None of the above-mentioned studies, however, accounted for an interaction of perfectionism sub-traits or other traits, although at least five decades of personality research show that related personality traits, such as anxiety and impulsivity interact (e.g., Reinforcement-Sensitivity theory; Gray, 1970; revised Gray and McNaughton, 2000). Therefore, we set out to investigate whether an interaction of ECP and PSP predicts variations in error processing better than the single trait dimensions.

4. The objective of the present study

From Moser and colleagues' (2013) study, we know that one general factor of anxiety (i.e., worrying) is related to the Ne/ERN. The authors, however, did not consider moderating the effects of other traits in their meta-analysis. This is not surprising as most of the contributing studies did not use an interactionist approach. Our study aimed to bridge this gap by including the ECP-by-PSP interaction (Gaudreau and Thompson, 2010) in our design and to account for some further restrictions of the previous studies (Pieters et al., 2007; Schrijvers et al., 2010), among them (medicated) clinical samples or small sample sizes that restrict the ability to draw general conclusions on personality traits and to reliably examine dimensional trait variations.

Download English Version:

https://daneshyari.com/en/article/929639

Download Persian Version:

https://daneshyari.com/article/929639

Daneshyari.com