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The effect of emotions, promotion vs. prevention focus, and feedback on cognitive engagement

Abstract*: The purpose of the study was to explore the role of emotions, promotion-prevention orientation and feedback on cognitive engagement. In the experiment participants had the possibility to engage in a categorization task thrice. After the first categorization all participants were informed that around 75% of their answers were correct. After the second categorization, depending on the experimental condition, participants received feedback either about success or failure. Involvement in the third categorization was depended on participants' decision whether to take part in it or not. Each time, before and after categorization, the emotional state was assessed. Results showed that promotion orientation predicted experiencing curiosity before the task, which in turn led to a higher cognitive engagement in the first categorization. Promotion and prevention orientation moderated the type of emotional response to positive feedback. Promotion orientation also predicted cognitive engagement after the feedback of success was provided. Generally results confirmed the positive effect of positive emotions as well as promotion orientation on cognitive engagement.*

Key words: *promotion, prevention, emotions, cognitive engagement, success and failure*

In this paper we attempt to analyze the contribution of emotions (their intensity as well as the type of emotions), situation (failure vs. success) and individual characteristics of motivational orientation (promotion vs. prevention) to the cognitive engagement. Firstly, it was assumed that cognitive engagement is a function of emotional appraisal shaped by one's motivational orientation, either promotion or prevention-focused. Secondarily, it was predicted that experienced emotions, that reflect evaluation of situation determined by these motivational orientation, mediate the relation between motivational orientation and cognitive engagement in a particular activity.

Emotions and action

One of the prominent functions of emotions emerges from the examination of their contribution to undertaking actions (Frijda, 2008; Johnson-Laird & Oately, 1992). First, behavioral tendencies (approach and avoidance) are automatically triggered by evaluation processes (Neuman, Föster, & Strack, 2013). According to Kolańczyk (2004), such automatic evaluation of a stimuli or a situation contains a dominant affective component, which relates to the valence of information extracted at the subliminal level. Therefore it occurs prior to semantic processing. This means that the meaning ascribed to the situation is largely based on an extracted positive or negative valence of information. Such processes serve mainly adaptive functions (Greenwald & Banaji, 1995; Izard, 1993; Neumann et al., 2013) as they allow people to grasp what is good and worth approaching, and what is bad and should be avoided (see Izard, 2009, the affective system of activation emotion). Emotion can be understood in this context as a source of basic information (Schwarz & Clore, 2003) as it refers to the individual's primary attitude towards a given situation or object, taking the form of appraisal of situation's or object's significance and the associated degree of pleasure and aversion for that individual (Frijda, 2008).

Secondly, emotions direct one's actions and activate particular action programs (Damasio, 1994; Frijda, 2008). To put it in another words "*the internal emotional signals have casual effects within the organism, preparing it psychologically for each general class of action*" (Johnson-Laird & Oately, 1992, p. 207). Such relation of emotions to action patterns is based on a cognitive evaluation of a situation, which occurs predominantly on an unconscious level and determines an appropriate course of action due to the activation of a particular repertoire of action specific

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for the given emotion (see the table 9.1, Oaltey & Jenkins, 1996, p. 253). The close relation of basic emotions to actions is also stressed by Izard (2009), who claims that experiencing a particular emotion activates a specific mode of cognitive processing and also certain behavioral tendencies, both corresponding to this prevailing emotion one has consciously in mind. For instance, curiosity motivates to explore and learn and guarantees engagement in the task.

Frijda (2004) connects emotions with actions through the notion of states of action readiness, which he ascribes to emotions in order to emphasize their motivational properties. Action readiness refers to being set for an action or achieving a particular aim (Frijda, 2012) rather than to performing some specific activity. Therefore it is related to the individual's degree and a kind of engagement in the world, and results in the capacity to spend time and effort in dealing with life demands (Frijda, 2012; Higgins, 2006). There are different action tendencies such as attending, moving forward or moving away (Frijda, 2012), all being elicited by different appraisal dimensions like those listed by Roseman (2008), Scherer (1984) or Smith and Ellsworth (1985). Joy, for instance, is related to the aim of enhancing engagement in the current situation. However, joy will transform into action only if from the individual's goal perspective it brings benefits and the action repertoire is available. As Frijda (2004, p. 158) underlined "*action follows only under certain conditions, including the presence and availability of an action repertoire, an equilibrium of the cost and benefits of action, and the presence of resources and motivation to consider the cost and benefits*". Accordingly, the process of transforming action readiness into a particular action involves processes of cognitive appraisal, which in turn are under the influence of individual goals appointing sensitivity to particular signals or events.

Appraisal processes, feedback and action

According to appraisal theories, it is the interpretation of events rather than events themselves that give rise to emotions (e.g., Scherer, Schorr, & Johnstone, 2001; Siemer, Mauss, & Gross, 2007; Smith & Lazarus, 2001). However, the relation between appraisals and emotions is conditioned by different factors. On the one hand, the latest studies clearly indicate that individual differences may moderate the relationship between evaluation and emotion (Kuppens & Tong, 2010; Kuppens, Van Mechelen, Smits, De Boeck, & Ceulemans, 2007; Tong, 2010). The appraisal of the very same situation done by different individuals will vary and thus will lead to the emergence of different emotions (for a review: Kuppens & Tong, 2010), because in each case such evaluation becomes individualized as it is done through a prism of ones goals (Dweck & Leggett, 1988), self-regulatory standards (Scholer & Higgins, 2008) and personality features, that define sensitivity to particular aspects of a given situation (Rusting, 1998).

On the other hand, in constructivist models of emotions it is asserted that there are events or scenarios that operate like prototype events that trigger particular emotion. Such event-emotion relation is founded on biological basis as well as on cultural history (Jasielska, 2013). Two kinds of events in particular – that is a success and a failure – seem to have very clear emotional connotation. The signal that is sent when subgoals are attained acts to prompt the individual to keep the same line of action. When a goal is not reached, a different emotion signal is sent (presumably taking a form of experiencing frustration or sadness), which encourages the individual to disengage from that goal. Furthermore, feedback provides information about the level of performance and indirectly about the likelihood of achieving success (Kluger & DeNisi, 1996; Łukaszewski, 2002). Besides it allows monitoring progress towards the achievement of the goal (Carver & Scheier, 1998) and regulates the effort invested in action (Venables & Fairclough, 2009). It is acknowledged that positive feedback increases engagement in action, while the negative one decreases active involvement. Results of research partially confirm this assertion (i.e. Boggiano & Barrett, 1985). Carver and Scheier (2011) claim that feedback about successful performance provided on the way to the goal attainment by means of inducing positive affect, may increase the effort invested in achievement of the objective and thus sustain the motivation for further action. However, the meta-analysis performed on 131 scientific papers by Kluger and DeNisi (1996) revealed that although positive feedback improved the average efficiency of performance, for example by defining more ambitious goals and increasing effort (Bandura, 1997; Williams, Donovan, & Dodge, 2000), it also had some negative effects as it was decreasing the effort in one third of the cases or led to cessation of the action as well. Moreover, it was found that the kind of feedback did not significantly differentiate the results obtained. Negative feedback most often led to the improvement of the performance, unless it was extremely adverse. According to Carver and Scheier's self-regulation theory (1998), negative feedback should result in the intensification of efforts in order to reduce detected discrepancy between the standard and the level of performance (negative feedback loop regulation). However, some people lower their standards in a response to negative feedback (downward goal revision following negative feedback) instead of increasing their efforts (Kluger & DeNisi, 1996; Williams, Donovan, & Dodge, 2000). Lack of the expected advantage of motivational effect of positive feedback may be due to the fact that positive feedback is treated as information about success – reaching the target level of performance, with which the individual is satisfied with and thus a withdrawal of effort and reduction of motivation to continue the task takes place (Wright & Brem, 1989).

One of the shortcomings of the studies analyzed by Kluger and DeNisi (1996) refers to the fact that the emotional response to feedback obtained was not controlled and such a reaction is a key mediating agent of feedback-performance relations (Ilies & Judge, 2005; Ilies, Judge, & Wagner, 2010), since feedback-standard comparison produces evaluation and emotional response, whose motivational properties shape further behavior (Carver &

Scheier, 1998; 2011). Another important element, which the meta-analysis performed by Kluger and DeNisis (1996) found to be absent, are the individual variables, which mediate the impact of feedback on performance and moreover play the role of moderators of emotional reaction to feedback. Results of studies done by Higgins and his collaborators (Föster, Grant, Idson, & Higgins, 2001; Idson & Higgins, 2000; Van-Dijk & Kluger, 2011) indicate, for instance, that promotion and prevention focus moderates motivational effect of the feedback on performance.

Promotion vs. prevention orientation

Promotion-focused and prevention-focused regulatory mode distinguished by Higgins (Higgins, 1997; Idson & Higgins, 2000; Scholer & Higgins, 2008) is a psychological dimension associated with sensitivity to feedback. It differentiates both, person's affective response to feedback (Higgins, Shah, & Friedman, 1997) as well as person's further engagement in the performance (Molden, Lee, & Higgins, 2008)

Promotion-focused regulation is associated with advancement needs, accomplishments and aspirations, while prevention-focused regulation emphasizes safety, responsibility and security needs (Higgins, 1997). Particular regulatory mode can be either situational (Crowe & Higgins, 1997) or chronically used and then it acquires the character of individual differences (Higgins, 1997). People guided by promotion-focused regulation put attention to profits and achieving positive results becomes the aim of their actions. On the other hand, those with prevention-focused regulation are vigilant to information about mistakes made and thus protecting oneself against error occurrence constitutes the purpose of their activity (i.e. they will protect themselves against threats and strive to ensure that there was no loss, Molden et al., 2008). Such variation in sensitivity to a particular type of information – gain vs. loss – will consequently lead to different levels of engagement in aim pursuit, depending on the type of feedback received.

Engagement in activity in prevention-focused individuals should increase after defeat, whereas in those promotion-focused after success (Higgins & Spiegiel 2004; Idson & Higgins, 2000; Scholer & Higgins, 2008). Van-Dijk and Kluger (2011) obtained similar results in an experimental study involving 131 participants. Their research confirmed the assertion that in situationally induced promotion-focused orientation, the positive feedback increases motivation far better than the negative feedback. In case of induction of prevention-focused orientation this relation is reversed. Namely, it is the negative feedback that increased motivation much more than the positive feedback. Aforementioned results gained additional confirmation in a recent study of Shu & Lam (2011) and Jarzebowski, Palermo, and Van de Berg (2012).

Engagement

We use the term of cognitive engagement as a construct concerning effort, persistence and concentration on a cognitive activity. As such, cognitive engagement is expressed in time spend and/or taken effort to deal with a particular activity or a situation (Frijda, 2012). We stress that one of the key features prompting individual's willingness or capacity to engage is the sensitivity to particular aspects of events resulting from individual's values, aims and needs. Therefore, engagement, especially when it is not motivated externally, occurs when the behavior meets personal goals or motivational orientations and is maintained by appropriate emotions. Frederickson (2001) presents a different approach to engagement. She distinguishes emotional engagement that stems from and is maintained by affective responses such as interest, excitement and stress. Such emotional engagement in the task might arise if the task is important for the individual. However the more important the task is, the greater the risk that it will induce anxiety (Podsakoff, LePine, & LePine, 2007).

The present study concerned a particular kind of engagement that is a cognitive one. It was assessed through a complex procedure, in which participants were to thrice engage in a categorization task involving pairing pictures.

Research objectives

The first aim of the study was to analyze emotional reaction to two different types of feedback. The first one was the positive feedback providing information that the task was done correctly in about 75%. This type of feedback is one of the most commonly used; it is positive but still leaves room for improving our level of performance. The second type of feedback was the feedback about success *vs.* failure. Depending on the experimental condition, participants were provided with information that they have performed better or worse than before. We predicted that emotional reaction evoked by feedback will depend on the previous emotional state as well as on promotion-prevention-focused orientation. It was expected that excitation and feeling pleased will be characteristic emotional responses to the first, positive feedback among promotion-oriented individuals. On the other hand, it was suspected that the prevention-oriented participants shall rather react to such feedback with calmness. Further, it was predicted that the feedback about success shall strengthen these emotional responses, whereas information about failure should result in feeling depressed if individuals are promotion-oriented, and in feeling tense or uneasy if a person is more prevention-oriented.

The second aim of the study was to verify the pure effect of emotions and promotion-focused and prevention-focused orientation, as well as the interaction between them on cognitive engagement in the task. We expected that promotion-oriented individuals would interpret the first positive feedback as a kind of information "you are on the right track, go on, it could be better" and as a consequence

they would be more cognitively engaged in the second categorization task. Individuals more prevention-oriented shall rather interpret such a feedback as "it is not bad, I did not fail, and there is no need to be more engaged".

The third aim of the study was to analyze how situational conditions like success and failure will modify the contribution of emotions and promotion-prevention-focused orientation in cognitive engagement in the task. As in the previous studies (i.e., Idson & Higgins, 2000; Pikuła & Wytykowska, in preparation; Shu, & Lam, 2011; Van-Dijk & Kluger, 2011) we expected that cognitive engagement will increase after failure in prevention oriented individuals, and after success among those promotion-oriented.

Method

Participants

One hundred and ninety senior secondary school students (108 women and 82 men; M_{age} = 18.6; SD = .27) participated in the study. Fourteen participants, who did not complete the scales (Asendorpf, 2010) were excluded from the final analyses.

Design and procedure

Participants were randomly assigned to one of three experimental conditions, each with a particular content of the feedback provided after the second categorization task: (1) success ("*you did better than before*"); (2) failure ("*you did worse than before*"); (3) control ("*you did the same as before*"). Initially participants were asked to complete three personality questionnaires – BIS/BAS scale and two other measures assessing promotion and prevention orientation – followed by an experimental, fully computerized procedure assessing experienced emotions, expectancy of level of performance and cognitive engagement. The procedure had a two-fold structure.

In the first stage, participants' emotions were assessed and right after the first categorization task begun. 15 pictures appeared on the right side of the computer screen. Participants were instructed to find as many correct pairs of matching pictures as they could. In order to pair two pictures, one had to double click each of them, one after another. Afterwards the paired pictures were to be named and participants were asked whether they want to continue making pairs or finish the task. When the categorization came to an end, participants obtained the first feedback – the same for all conditions, stating "*you were able to find X% of correct pairs*", where *X* varied randomly from the interval 74–77%.

In the second stage, participants' emotions were assessed again but before the second categorization task appeared on the screen, a measurement of expected level of performance in the second trial took place. The second categorization task was the same as the first one – only different set of pictures was used. When participants finished the task, they were again provided with feedback, this time different in every experimental group (success condition: *you did about X% better than before*; failure condition: *you did about X% worse than before*; control condition: *you did the same as before*; where *X* varied randomly from the interval 4–7%). The subjective meaning of this percentage interval was previously assessed in the pilot study and such variation was used to make the feedback more realistic.

In the third and the last stage of the experimental procedure, participants' emotions were assessed once again and right after the third categorization task begun, just as it was in the first stage. After receiving feedback emotions were assessed again. Then participants needed to decide whether they go to the third categorization or not. The decision time was recorded. Subsequently participants did the third categorization, after which emotions were assessed once more. The schema of the experiment is presented in Table 1.

Materials

Promotion vs. prevention orientation was measured using Polish version of Regulatory Focus Questionnaire (RFQ, Higgins, Friedman, Harlow, Idson, Ayduk, & Taylor, 2001; Polish version Pikuła, 2012). RFQ refers to orientations (i.e. anticipatory goal reactions) to new tasks or goals that are formed on the bases of subjective history of success or failure in promotion and prevention self-regulation. The questionnaire consists of eleven items divided into two scales. The first scale measures the promotion focus and consists of 6 items such as "*Compared to most people, are you typically unable to get what you want out of life?*" (a reversed item). The second scale measures the prevention focus and includes 5 items such as "*Did you get on your parents' nerves often when you were growing up*?". Participants are instructed to assess how frequently specific events actually occur or have occurred in their life using 5-point Likert scale from 1 (*never or seldom*) to 5 (*very often*).

In Polish version both scales have satisfactory reliability, for promotion scale α = .67, while for the prevention α = .82. Similar differences between Cronbach's alpha are observed in the original scale (Higgins et.al. 2001, p. 8). The mean score for the prevention scale was M = 3.40 (SD = .50). while for the promotion scale M = 3.33 (SD = .40). The promotion-prevention-focused orientation indicator was computed by subtracting the mean scores of the prevention scale from the promotion scale (this solution has been adopted from Higgins, Fiedman, Harlow, Idson, Ayduk, & Taylor, 2001; Kolańczyk, Bąk, & Roczniewska, 2013). The higher the score, the more promotion-focused the person is[1]. In some analysis this indicator was used as a three-level nominal variable created by subtracting half of the standard deviation (0.50 SD = .34) from the mean score (M = .0096). Such variable had three levels, in which 3 (N = 52) meant promotion orientation, 2 (N = 67) the balance between promotion and prevention orientation, and 1 (N = 51) indicated prevention orientation.

[1] We wish to thank an anonymous reviewer for suggesting us to build a single indicator of promotion-prevention-focused orientation.

Table 1. Experimental design

Variables measurement	• Individual variables measurement: • Emotions measurement (1)					
Stage I – task	• Pictures categorization 1 • Feedback – 74–77% of pictures paired correctly • Emotions measurement (2)					
Stage II – task	• Expectancy measurement: how do you think you will do in this phase • Pictures categorization 2					
	Feedback manipulation					
	You did about 4–7 % better than before **Group I Better performance**		You did about 4–7 % worse than before **Group II Worse performance**		You did the same as before **Group III Performance on the same level**	
	Emotions measurement (3)					
Stage III – decision whether to play further	Participants are asked to decide whether they go to the third categorization					
	YES	NO	YES	NO	YES	NO
	Pictures categorization 3					
	Emotions measurement (4)					

Individual differences in BIS and BAS sensitivity were assessed using BIS/BAS scale (Carver & White, 1994) in Polish adaptation by Wytykowska (Mueller & Wytykowska, 2005). Since this construct was not analysed in the presented paper, we have resigned from the extended presentation of the scale.

Emotions were assessed using a short scale based on the items used by Higgins, Shah & Friedman (1997). Eight emotions were taken into account – feeling depressed, tensed, uneasy, discouraged, exited, pleased, interested, and calm. Based on Carver and Scheier's self-regulation theory (1998; Carver, Sutton, & Scheier, 2000; Roczniewska & Kolańczyk, 2014) it was expected that feeling depressed will be a reaction to failure in promotion-focused individuals, while those prevention-focused will react in such circumstances with feeling tense or uneasy. In case of success, prevention-focused individuals will react with feeling calm and those promotion-focused will feel excited and pleased. Emotions of curiosity and discouragement have been introduced as emotions, which maintain and reduce engagement in the activity. Participants were asked to rate on the 6-point scale (*not at all, a little, moderate, quite much, much, very strong*) the extent to which they experience the abovementioned emotions at the time of measurement. The same scale was used four times, for all assessments of experienced emotions, each time with emotions presented in random order.

Expected of level of performance was measured on a 3-point scale, where 1 indicates "*I'll do worse*"; 2 – "*I'll do the same*" and 3 – "*I'll do better*". This variable was analyzed only as a predictor of cognitive engagement in the second categorization. Distribution of the expectancy showed that only 3% of the sample indicated that they expect to perform worse in the next categorization, 54% was expecting the same level of performance, while 43% expected to perform better. Due to this fact we excluded 3% of the cases and dichotomized the variable.

Pictures used in the experiment were either taken from the book (Horne & Wootton, 2010) or prepared by Pikuła and Kwiatkowska during the master seminar. Each out of 45 pictures (15 pictures for each set) presented a single item such as milk, cow, bicycle or piano. Since there was no rule provided how to categorize pictures, participants could have used some concrete rules as well as more metaphorical ones to come up with matching pairs. In order to strengthen their cognitive engagement in categorization, they were asked to name each created pair. The number of pairs created was an indicator of cognitive engagement.

Results

Emotional reactions to the first feedback. The modifying role of promotion-prevention focus orientation

First we analysed the correlations between promotion--prevention focus and emotions experienced before the beginning of the experiment. Results of correlation analysis showed that promotion orientation significantly and positively correlates with curiosity ($r_{(168)} = .248$, $p < .01$) and excitement ($r_{(168)} = .188$, $p < .05$), while negatively

with a feeling of unease ($r_{(168)}$ = -.174, $p < .05$). Prevention focus was not significantly related to any emotions. Thus, the type of orientation shapes the emotional attitude towards the task.

In order to check the contribution of the first positive feedback (*you were able to find around 75% of correct pairs*) in experienced emotions, along with taking into account promotion-prevention orientation, an analysis of variance with repeated measures was conducted with promotion and prevention orientation as between-subjects factor 3 (promotion; balance; prevention) and repeated measure for every emotion as a within-subjects factor. Due to the number of analysis, only statistically significant results will be presented.

Excitement. Analysis revealed a main effect of repeated measures $F(1,166) = 16.19$, $p < .001$; $eta^2 = .089$. Feedback increased the excitement level (M1 = 3.35), (M2 = 3.77). Analysis of simple effects of interaction of promotion-prevention orientation and repeated measure of excitement revealed that the level of promotion-prevention orientation differentiates the excitement level in the first measurement, before receiving feedback $F(2,166) = 5.65$, $p < .01$; $eta^2 = .064$. Participants with dominating promotion orientation were more excited (M = 3.75), than those with predominant prevention orientation (M = 3.00). What is more, feedback increased the level of excitement in participants with predominant prevention orientation $F(1,166) = 6.96$, $p < .01$; $eta^2 = .04$, (M1 = 3), (M2 = 3.48) and in those with balanced orientation $F(1,166) = 8.28$, $p < .01$; $eta^2 = .047$, (M1 = 3.30), (M2 = 3.77).

Uneasiness. Analysis revealed a main effect of repeated measures $F(1,166) = 10.9$, $p < .001$; $eta^2 = .062$. Feedback decreased the level of uneasiness (M1 = 2.34), (M2 = 2.00). Analysis of simple effects of interaction revealed that the decrease in feeling uneasy related to the whole group, but was statistically significant only in case of the group with prevention orientation $F(1,166) = 4.31$, $p < .05$; $eta^2 = .025$, (M1 = 2.36), (M2 = 1.96).

Curiosity. A main effect of repeated measures was observed $F(1,166) = 9.66$, $p < .01$; $eta^2 = .055$ and showed that the feedback increased the curiosity level (M1 = 4.27), (M2 = 4.61). Analysis of simple effects of interaction revealed that the level of curiosity significantly increased in group with prevention orientation, $F(1,166) = 5.37$, $p < .05$; $eta^2 = .031$, (M1 = 4.12), (M2 = 4.54).

Emotional reaction to the second feedback about success or failure. Modifying role of promotion-prevention orientation

Several three-way Anovas with repeated measures were conducted. Between subjects factors were feedback 2 (success *vs.* failure) and promotion-prevention orientation 3 (promotion *vs.* balance *vs.* prevention) while within subjects factor was single emotion measured before and after the feedback was provided. The dynamic of the emotional change was analysed between the second and the third measurement of emotions (see the schema of experimental design in Table 1). Only statistically significant results are presented.

Calmness. Results showed statistically significant simple effect of interaction between prevention orientation and the feedback of success for the calmness dynamic, $F(1,111) = 7.81$, $p < .01$; $eta^2 = .066$. In prevention-oriented participants calmness increased after the feedback of success was provided ($M_2 = 4.12$), ($M_2 = 4.54$).

Tension. The two-way interaction of feedback and the dynamic of tension was significant, $F(1,111) = 5.63$, $p < .05$; $eta^2 = .048$. Tension increased after the feedback of failure was provided ($M_2 = 2.50$), ($M_3 = 2.98$). Moreover, the three-way interaction was significant $F(2,111) = 3.27$, $p < .05$; $eta^2 = .054$. The analysis of simple effects showed that only within the group of prevention focus the tension increased after failure, $F(1,111) = 21.37$, $p < .001$; $eta^2 = .161$, ($M_2 = 240$), ($M_3 = 3.71$).

Feeling pleased. The two-way interaction of dynamic of feeling pleased and feedback was significant $F(1,112) = 3.97$, $p < .05$; $eta^2 = .05$. Feedback of success generally increased the level of feeling pleased ($M_2 = 3.60$), ($M_3 = 4.1$). The analysis of simple effects showed that feeling pleased increases ($M_2 = 4.10$), ($M_3 = 4.69$) after the feedback of success was provided mainly within the group of promotion-oriented subjects $F(1,112) = 3.73$, $p < .05$, $eta^2 = .04$.

The effect of emotions, promotion-prevention orientation and their interaction on cognitive engagement

To check how emotions, promotion-prevention orientation and their interaction predict cognitive engagement, hierarchical regression analyses were conducted. The first hierarchical regression analysis was conducted for the cognitive engagement measured as a number of pairs created in the first categorisation. For the regression analysis only these emotions were chosen, which were significantly related to the cognitive engagement. Therefore in the first step curiosity as predictor was entered. In the second step the promotion-prevention orientation was entered; while in the third step the interaction between them.

The results showed that curiosity is a significant predictor of cognitive engagement $\Delta R^2 = .101$, $F(1,164) = 18.408$, $p < .001$. These results indicate that curiosity promotes greater cognitive engagement (b = .318, $p < .001$). Promotion-prevention orientation occurs to be also a significant predictor of cognitive engagement that explains additional portion of variance $\Delta R^2 = .05$, $F(1,163) = 14.23$, $p < .001$. These results show that being more promotion-oriented might result in being more cognitive engaged (b = .318, $p < .001$). The interaction was not a statistically significant predictor $\Delta R^2 = .02$, $p = .491$. The summary of the results displays Table 2.

To explore the character of relationship between curiosity, promotion-prevention orientation and cognitive engagement a mediation analysis was performed. Because promotion-prevention orientation is a variable describing a relatively stable individual's attitude that promotes experiencing particular kind of emotions (for a review Scholer & Higgins, 2008) it was assumed that promotion-prevention orientation will be a predictor of engagement, while curiosity will mediate this relationship.

Table 2. Regression analysis evaluating the independent contribution of curiosity, promotion-prevention orientation, and their interaction to cognitive engagement in the first categorization

predictors	*B*	*SE*	*b*	*t*	*p*	ΔR^2
Step 1						.149
Curiosity (C)	1.12	.28	.29	3.92	.001*	
Promotion-prevention orientation (PP)	.87	.29	.22	3.03	.010*	
Step 2						.002
C × PP	-.18	.27	-.05	-.69	n.s.	

We tested a mediation model following the procedure described by Hayes (2012). The fourth model was used from the PROCESS macro (Hayes, 2012) and requested 10000 bootstrap resamples. The model is evaluated by comparing the direct effect (the effect X on Y) with the indirect effect (the effect of X on Y at the control of mediator) – a mediation index. If the indirect effect is significant then the mediation occurs. Results showed that the total effect model was statistically significant $F(1,164) = 12.04$, $p < .001$. As Figure 1 illustrates, the unstandardized coefficient between promotion and curiosity was statistically significant, as was the unstandardized coefficient between curiosity and cognitive engagement. The bootstrap unstandardized indirect effect was .95 and the 95% confidence interval ranged from .31 to 1.62. Since zero was not in the confidence interval we could conclude that the indirect effect was statistically significant. For the direct effect, the bootstrap unstandardized effect was .42 and the 95% confidence interval ranged from -.22 to 1.03, and since it included zero, it was statistically insignificant. The mediation effect is full since the direct effect is not significant while indirect effect as well as the total effect remain statistically significant (Hayes, 2012).

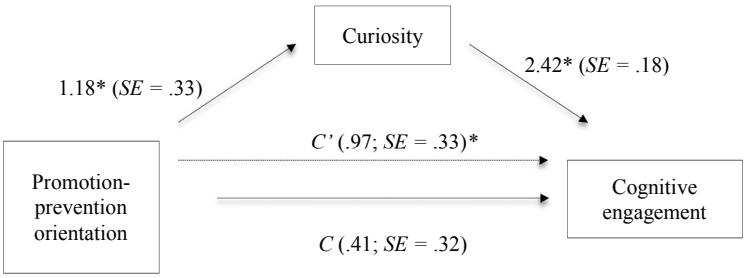
The second hierarchical regression analysis was conducted for the cognitive engagement measured as a number of pairs created in the second categorisation after the first positive feedback. Since before the second categorization participants estimated the expectation of success in the second categorization, the expectation of success has been entered into the model as a predictor, as well as the interaction between the expectation of success and emotion, and promotion-prevention orientation. For the regression analysis only these emotions were chosen, which were significantly related to the cognitive engagement. Again the curiosity occurs to be positively related to cognitive engagement $r = .343$, $p < .001$. In the first step the expectancy of success, curiosity, and promotion-prevention orientation were entered while in the second step we entered the interaction between promotion-prevention orientation and expectancy of success as well as between expectancy and curiosity. Neither the first model $\Delta R^2 = .03$, $F(3,162) = 1.49$, $p = .219$, nor the second one $\Delta R^2 = .006$, $F(5,160) = 1.49$, $p = .342$ were statistically significant. Results present Table 3.

These results presented in Table 2 indicate that neither the expectancy of successful performance, nor the curiosity or promotion-prevention orientation as well as their interactions allow predicting the cognitive engagement.

The effect of success and failure, emotions, and promotion-prevention on cognitive engagement

Cognitive engagement was measured as the number of pairs created in the third categorisation. Participation in the third categorization depended on individual decision whether to engage in another task or not. 117 participants decided to do the third categorisation. Since the present research focuses

Figure 1. The unstandardized coefficients in mediation model of curiosity for the promotion-prevention orientation on cognitive engagement. The figure displayed the full mediation effect



Note: * $p < .05$

Table 3. Regression analysis evaluating the independent contribution of expectancy, curiosity, and promotion-prevention orientation, and their interaction to cognitive engagement in the second categorization

predictors	*B*	*SE*	*b*	*t*	*p*	ΔR^2
Step 1						.03
Expectancy (E)	.26	1.14	.18	.23	n.s.	
Curiosity (C)	.70	.53	.10	1.31	n.s.	
Promotion-prevention orientation (PP)	.80	.54	.12	1.48	n.s.	
Step 2						.00
E × C	-.04	.56	-.01	-.07	n.s.	
E × PP	1.374	1.15	.12	1.20	n.s.	

on the impact of success or failure on cognitive engagement, analysis did not include the control group, in which the feedback informed, "*you did the same as before*". Thus the final analyses included 75 people, of which 35 were from a "success" group and 40 from a "failure" group.

To examine significant predictors of cognitive engagement the hierarchical regression analysis was conducted. In the first step the feedback about success, failure, curiosity, feeling pleased, and promotion-prevention orientation was entered, while in the second step the interaction between feedback and emotions as well as between feedback and promotion-prevention orientation. Results are shown in Table 4. While the first model was not statistically significant $\Delta R^2 = .05$, $p < .01$ $F(4,68) = .86$, $p = .50$, the second was $\Delta R^2 = .164$, $p < .01$ $F(7,65) = 2.48$, $p < .05$.

These results indicate that emotions as well as the promotion-prevention orientation predict cognitive engagement but these effects depend on the success or failure condition. To explore the nature of these interactions three moderation models were tested used the PROCESS macro (model 1) prepared by Hayes (2012) with 10000 bootstrap resamples. In the first moderation model the promotion-prevention orientation was a predictor, while the feedback was a moderator and cognitive engagement was the dependent variable. The model was significant, $F(3,69) = 2.74$, $p < .050$. The bootstrapped conditional effect presents Table 5.

Obtained results show, that after the feedback about success was provided, the promotion-oriented subjects were more cognitively engaged in categorisation.

In the second moderation analysis the predictor was feeling pleased, the feedback was the moderator, and cognitive engagement was the dependent variable. The

Table 4. Regression analysis evaluating the independent contribution of feedback of success or failure, curiosity, uneasiness, feeling pleased, promotion-prevention orientation, and their interaction to cognitive engagement in the third categorization

predictors	*B*	*SE*	*b*	*t*	*p*	ΔR^2
Step 1						.06
Feedback (S_F)	.93	.74	.15	1.32	n.s.	
Curiosity (C)	-.17	.94	-.03	-.17	n.s.	
Pleased (Pl)	.45	.88	.08	.51	n.s.	
Promotion-prevention orientation (PP)	1.13	.81	.17	1.41	n.s.	
Step 2						.16
S_F × C	-1.51	.76	-1.13	-1.99	.06	
S_F × Pl	1.77	.63	1.32	2.84	.05*	
S_F × PP	2.94	1.03	.30	2.49	.01*	

Table 5. Bootstrapped conditional effect of promotion-prevention orientation on cognitive engagement in the third categorization in the success and failure condition (resample 10000)

Experimental conditions	*Effect*	*SE*	*t*	*p*	*LLCI*	*ULCI*
success	3.91	1.53	2.55	.02*	.86	6.92
failure	-1.07	1.65	-.64	.52	-4.378	2.23

model of moderation was not significant $F(3, 69) = 1.93$, $p = .13$. The bootstrapped conditional effect presents Table 6.

Obtained results show that after the feedback of success was provided, feeling pleased fostered higher cognitive engagement, but only on the level of statistical tendency.

Discussion

The present study had three major research objectives. Firstly, it was developed to answer the question of how emotional reactions are shaped in response to feedback and whether they are dependent on promotion or prevention orientation. The second aim was to answer the question how emotions and promotion-prevention orientation influence cognitive engagement in the task. The third objective of the research was the analysis of the influence of feedback about success and failure, emotions, and promotion-prevention orientation, and the relations between them on cognitive engagement.

Obtained results revealed that emotions experienced before taking part in the experiment were determined by promotion focus, while prevention focus by no means differentiated emotions occurring before the task. The stronger the promotion focus orientation was, the more intense excitement and curiosity one experienced. Such pattern of results is consistent with findings from other studies, showing that eagerness is a particular emotion accompanying promotion-focused regulation during the activity, in which an individual might gain something, develop or move forward (Siegel & Higgins, 2001). It is an emotion that energizes actions and sustains engagement. Experiencing curiosity together with excitement at the same time is from the one side the effect of their close ties (Frijda, 2004), as both are placed at the same quarter in a Russell's circumplex model of emotions (Russell, 1980). Experiencing curiosity results in the increase of motivation and engagement in the exploration of the environment (Izard & Ackerman, 2000). Indeed such function of curiosity finds confirmation in the observed result of overall mediating role of curiosity in the level of engagement in the first categorization task.

Observed outcomes showed the moderating role of promotion-prevention orientation in shaping the emotional response to positive feedback (that is the one that does not clearly indicate whether the task has finished with success or defeat). Individuals with predominant promotion orientation reacted to positive feedback with an increase of excitement, whereas those prevention-focused reacted with a decrease of feeling of uneasy and increased curiosity. These findings are consistent with works of Higgins team (e.g., Higgins & Spiegel, 2004), as well as Kolańczyk (2004), who found that promotion focus is regulated by aim defined as *gains* or advancement and nurturance needs. In such self-regulation, information about positive effects of action evokes positive emotions supporting action. Reaction of excitement is almost synonymous with emotion of eagerness, which occurs as a dominating emotional state to find means of advancing success. Therefore, these results suggest that the obtained feedback has been taken "as a good fortune" by promotion-focused individuals, as the type of information processing operated by means of promotion-focused regulation is characterized by a concentration on those elements that support further activity and bring person closer to the goal (for a review see Scholer & Higgins, 2008).

Individuals with predominant prevention orientation reacted to positive feedback with a decrease of uneasiness and increase of curiosity. This result complies with defining the aim of action in "non-loss" prevention-focused regulation. Positive feedback provides information about achieving this goal – one managed to prevent the loss thus distress decreases (see also Carver & Scheier, 2011). What is interesting is that after the positive feedback was provided, prevention-focused individuals experienced increased curiosity. One may suspect, that the factor which enabled the appearance of this positive emotion was the described earlier decrease in anxiety. Individuals with promotion orientation approached the task with a higher level of curiosity just from the beginning, whereas in those prevention-

Table 6. Bootstrapped conditional effect of feeling pleased on cognitive engagement in the third categorization in the success and failure condition (resample 10000)

Experimental conditions	*Effect*	*SE*	*t*	*p*	*LLCI*	*ULCI*
success	2.06	1.09	1.87	.06[a]	-.14	4.21
failure	-.91	.87	-1.04	.30	-2.66	.84

focused this emotion "could", so to speak occur as they became assured that their task performance was not bad.

Feedback about success or defeat had an influence on experienced emotion. As expected, information about success was associated with the experience of being pleased. What is interesting we were able to detect only the prevention-specific emotional reactions to feedback but any effects of prevention orientation on cognitive engagement were not significant. Prevention-oriented individuals expressed calmness when confronted with successful feedback and tension in the face of failure. These results again confirm different emotional consequences of success in achieving goal for promotion and prevention orientation. Prevention-focused regulation is aimed at avoiding losses. When the regulatory standard cannot be achieved, such individuals react with increased tension, which is close to emotions of fear. On the other hand they calm down if they manage to protect against loss and failure, which is consistent with other research findings (i.e., Carver & Scheier, 1998; 2011; Roczniewska & Kolańczyk, 2014; Liberman, Idson, & Higgins, 2005; Scholer & Higgins, 2008). Relation, which was revealed in this study, between promotion orientation and experiencing emotions promoting flourishing (Fredrickson, 2001), confirms connections of this orientation with optimism and well-being, which were observed in other studies (Grant & Higgins, 2003). What is more, results of this study, by providing evidence that the emergence of emotions is dependent from promotion-prevention orientation, deliver further evidence that the individual predispositions shaping the appraisal processes, shape in a consequence a kind of an emotional experience (see also Kuppens & Tong, 2010).

Analysis of factors fostering cognitive engagement showed that curiosity and promotion focus were positive predictors of cognitive engagement in the first categorization. Furthermore, mediation analysis revealed, that curiosity is a much more significant predictor of engagement. This result confirms the role of curiosity in greater task engagement (Izard & Ackerman, 2005). Analysis failed to determine significant predictors of cognitive engagement in the second categorization, although curiosity proved to be a positively, but weak correlate of engagement. One of the factors explaining such occurrence might be the character of feedback. Although it was positive, it still left room for improvement, which could lead to blurring of differences in the level of engagement between more promotion-focused and more prevention-focused individuals. Such hypothesis finds also support in data discussed above regarding emotional reactions to positive feedback. Provided that curiosity and promotion orientation proved to be significant predictors of cognitive engagement in the first categorization, and after the first feedback curiosity significantly increased in prevention-oriented group, than all participants begun second categorisation with level of curiosity even enough so the feeling no longer was a differentiating factor.

The analysis of influence of feedback about success or failure on the level of engagement revealed that such feedback itself had no significant effect on the level of engagement. The result is not surprising in the light of described discussion about the motivational consequences of success and failure (for a review Kluger & DeNisi, 1996). The level of engagement in the third categorization turned out to be dependent on the feedback about success, emotion evoked by this information and promotion orientation. Feeling pleased was also related with a higher cognitive engagement in the last categorization. This result confirms findings from other studies, according to which positive emotions are associated with a greater cognitive engagement (Reschly, Huebner, Appleton, & Antaramian, 2008). Promotion orientation was also associated with a greater cognitive engagement after receiving feedback about success. Such finding is consistent with results of studies conducted by Higgins and collaborators (for a review see: Scholler & Higgins, 2008; Higgins & Spiegel, 2004). These findings also confirm the previous result obtained by Pikuła (2012) showing that the increase of engagement was dependent on promotion orientation but only after receiving information about success. In Pikuła's research the increase of engagement was dependent on prevention focus but only after feedback of failure.

The fact, that most of performed analyses revealed mainly an active role of promotion-focused orientation in shaping cognitive engagement as well as in emotional reactions, may be the result of how the experiment was structured. The first, positive feedback shaped the experimental situation as more promotion-regulation fitted. Hence, it demonstrates that certain individual characteristics begin to regulate behaviour stronger when the situation contains an element, to which a particular individual's characteristic is sensitive. The prevention-focused regulation manifested mainly in emotional domain in a manner consistent with how the emotional answer to achievement of goals or lack of accomplishment runs in case of prevention-focused regulation.

This is confirmed by Higgins's studies on regulatory fit (Scholer & Higgins, 2008), that is the situation, in which the regulatory characteristics of promotion and prevention orientations manifest themselves predominantly in situations compliant to regulatory standards of a given orientation (an opportunity of profit for promotion and a possibility to avoid a loss for the prevention).

In the previous study (Pikuła, 2012; Pikuła & Wytykowska, in preparation), the same experimental design was used but with one exception, payment for the categorization task. The results showed that the engagement in categorization was predicted mainly by the promotion and prevention focus. What is more, it may be assumed that emotions were ruled out from the regulation of the behaviour, as they were not significantly related to neither prevention or promotion focus, nor to the feedback provided or engagement in any of the three categorization tasks. This could suggest that when the motivation to maximize gains and minimize losses is activated by the possibility of earning or loosing money, participants might tend to ignore their emotions in order to achieve their aims. Situation, which may bring more tangible gains or losses, activates basic approach and avoidance

motivation. One decides to approach something if it enables to achieve a desired goal and maximize gains.

To sum up, the presented study revealed and confirmed the role of positive emotions in cognitive involvement and in shaping expectations regarding future outcomes. In addition, it replicated findings of Higgins and his collaborators and further provided evidence for acknowledging the crucial role individual characteristics play in shaping emotional reaction to situation.

Limitations and future research

In order to improve the quality of the study and broaden its scope, several steps could be undertaken. First, an assessment of emotional reactions could be more indirect in order to weaken the potential impact of social approval, embedded in the measurement of self-report type. Scale, which could provide more reliable information about the current mood, is IPANAT in Polish adaptation by Wróbel (2012). Additionally the assessment could be more extensive, taking into account several other, more or less complex affective states (such as restlessness, frustration, pride or hope), and allowing to examine the clarity of emotions, for example by means of taking time measurements.

Secondly, it would be worthwhile to control at different moments of the research (that is prior to the research, meanwhile and afterwards) participants' evaluations of how important the engagement in the experiment/categorization tasks is for them. Future research should also take into account gender and age differences in affectivity (Jasielska & Szczygieł, 2007; Szczygieł, 2007) which may influence cognitive engagement.

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