

# How do we process feedback? The role of self-esteem in processing self-related and other-related information

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## ABSTRACT

This study was designed to investigate the effect of the level and stability of self-esteem on self-referent vs. other-referent feedback recall and to determine which of the opposed self-concept motives, self-enhancement or self-verification, will prevail in adolescents with certain type of self-esteem. In a between-subjects experimental design, 450 high school graduates and freshmen were randomly assigned to a self-referent task ( $n = 230$ ) or other-referent task ( $n = 220$ ) and their self-esteem was measured by repeated administration of the RSE scale. After personality and cognitive ability test, participants in a self-referent task were presented with a bogus feedback which consisted of statements that described a specific positive or negative behavior that one is likely to do. Participants in the other-referent received the same information, but relating to an unknown person. Memory was tested on a surprise free recall task. Findings confirm preferential processing of self-related information, i.e. self-reference effect, regardless of valence and content-related domain of feedback. Participants in self-referent condition also showed better recall of positive than negative personally relevant feedback, regardless of their self-esteem stability or self-esteem level. However, interaction of self-esteem level and self-esteem stability was significant, but its effect was relatively small.

## 1. Introduction

Self-concept and self-esteem are at the core of psychology as a scientific discipline whose goal is to explain human behavior and hence are the most widely studied constructs in psychology (Trzesniewski et al., 2003; Donnellan et al., 2011; Tomas & Oliver, 1999). Self-concept encompasses an individuals' beliefs of what kind of person one is, what kind of person one wants to become, and what ones' opportunities are in life. These beliefs have direct implications on behavior, motivation, emotional experience, processing feedback from the environment, and thus also on relationships with other people. Self-esteem refers to the degree to which these self-beliefs reflect value and self-acceptance, i.e. it reflects an individual's attitude towards their own person. While high self-esteem implies self-respect, low self-esteem implies self-dissatisfaction. Thus, it is expected that self-esteem will affect the way people process information about themselves.

We are all confronted every day with feedback on how our environment sees us. Whether it is by our parents, peers, friends, teachers or business colleagues, people from our environment largely determine how we see ourselves. As our cognitive capacity is limited, in cognitive

processing of everyday feedback we are guided by various biases imposed on us by our desires and needs, i.e. self-motives. Thus, we try to fit the information we receive from the environment into our existing self-concept in a way that will satisfy our needs - for acceptance, for high self-esteem, for control etc. Thus, some people will be more affected by bad experiences or negative feedback and will be very inclined to believe it, while others, although equally or even less successful, will "silence" the criticism and remember only praises and positive experiences. In other words, we are armed with various mechanisms that defend us against unpleasant cognitions and/or protect our existing self-image. For example, individuals confronted with identity threat (i.e. negative feedback) can spontaneously resort to autobiographical recall of mastery experiences as a way to maintain or enhance their self-esteem (Tavitiyan-Elmadjian et al., 2020). Which mechanism will prevail in a situation might depend on our self-esteem as a reflection of satisfaction with the image we have of ourselves.

Indeed, research that has been done so far has shown that we process self-related information differently than information that refers to other people. Specifically, the experiments focusing on self-other comparison (Chiao et al., 2010; Han & Northoff, 2009; Kelley et al., 2002) confirmed

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the superior memory for self-relevant traits in comparison to other-relevant traits (Kuiper & Rogers, 1979), a phenomenon named the self-reference effect (Rogers et al., 1977). Even recent studies that investigated the impact of self-esteem on the neural correlates associated with the process of self-evaluation and self-reflection confirmed this effect (Nowicka et al., 2018; Yang et al., 2012; Zhang et al., 2013).

Biased processing of self-related information is a well-documented phenomenon, but the impact of self-esteem on this self-bias is still an understudied topic. Researchers usually focus on two major psychological motives of people's self-evaluation process (Zheng, 2019) that represent different strategies in preserving one's self-views, i.e. self-esteem. One is the motivation for self-positivity or the self-enhancement motive (Caprara et al., 2013; Sedikides & Gregg, 2008). There is clear evidence that self-referent information is often processed selectively - we focus on information that has positive implications for us, while avoiding information that negatively affects us. Thus we maintain a positive notion of ourselves, that is, a sense of self-worth and competence. While some researchers consider it universal (Allport, 1937; Baumeister, 1998; Greenwald, 1980), others challenge this view and consider it more present in Western cultures focused on individualistic values and independent self (Heine et al., 1999; Markus & Kitayama, 1991). It is also hypothesized that different cultures value different things and that self-enhancement might be universal because all people express a strong desire for self-positivity, but self-enhance on different attributes (Brown & Kobayashi, 2003; Gaertner et al., 2008; O'Mara et al., 2012; Tam et al., 2012). The other self-motive is the self-verification motive (Swann, 1987, 1990; Swann & Higgins, 1990) that refers to the motivation to evaluate oneself in a way that confirms the existing self-concept. Even James (1890) considered the most important characteristic of individual's mental structure the effort to maintain a consistent view of oneself and the world around us and to fit new information in accordance with existing beliefs. When the self-verification motive is at work, we pay more attention to information that confirms an already existing image of ourselves because it gives us a sense of cognitive coherence and hence predictability and control. There is ample evidence for the existence of this motive, both in the clinical population, on depressed participants (Swann, 1990), and among students as adjusted, motivated individuals (Swann et al., 1989; Swann & Brooks, 2012).

These motives can act harmoniously in situations where the consequence of their action is the same (Katz et al., 1996). For example, a person with a positive self-concept pays more attention to the positive feedback because it confirms the self-concept, but also to feel good about oneself. However, a person with negative self-concept will either focus on positive feedback to feel better about self, or on negative feedback that is consistent with one's self-concept. Only a few studies have moved in that direction by exploring which motive is dominant in a situation when they are mutually exclusive (Alicke & Sedikides, 2009; Gregg et al., 2011; Kwang & Swann, 2010; Sedikides, 1993). Namely, research to date has yielded contradictory results and there are arguments in favor of prioritizing both of these motives (Katz et al., 2010; Swann et al., 1989).

One explanation of the contradictory findings lies in the characteristics of the feedback. Specifically, people tend to selectively forget feedback that threatens central self-conceptions. Such inferior recall for negative (i.e. self-threatening) feedback compared to positive feedback was named the mnemonic neglect effect (Sedikides et al., 2004) and it is considered a self-protective strategy (Pinter et al., 2011) related to avoiding motivation that affects recall rather than recognition (Green et al., 2008; D'Argembeau et al., 2005). It occurs for information that is more central to the self-concept rather than peripheral (Green et al., 2008; Pinter et al., 2011). In this study, we will strive to meet all known criteria for shaping threatening and non-threatening feedback, based on previous research (Green et al., 2009; Sedikides & Green, 2000). The feedback should be formulated in a specific behavioral form (but designed to clearly indicate the underlying trait). It should include both

positive and negative traits (making it more valid and giving one the opportunity to choose what information to process more deeply and which to ignore), should relate to the characteristics central to the participants' self-image, and should be diagnostic for the selected characteristics. According to Sedikides (1993), stronger focus on feedback pertaining to more central aspects of self-concept (regardless whether positive or negative) signifies self-verification, while stronger focus on the more positive aspects of self-concept signifies self-enhancement motive.

The predominant motive can also be determined by the characteristics of the individual, namely their self-esteem. The majority of self-esteem research has focused on the level of self-esteem. This approach is based on the conception of self-esteem as a trait, and day-to-day fluctuations are dismissed as a measurement error. However, recent studies differentiate between the level of self-esteem and self-esteem stability (Jelić, 2012; Kernis, 2005) showing that instability of self-esteem might explain why some high self-esteem individuals are prone to prejudice, aggression, and various biases in processing. Self-esteem stability reflects the level of short-term fluctuations in self-esteem (e.g., Kernis, 2005) and is usually correlated with the self-esteem level (see Okada, 2010). However, self-esteem stability also showed an incremental validity over and above the self-esteem level in predicting variables relevant for psychological functioning - neuroticism (Butler et al., 1994), depression (Kim & Cicchetti, 2009), vulnerable narcissism (Campbell et al., 2002), emotional responsiveness (Rhodewalt et al., 1998), attachment (Foster et al., 2007), and dysfunctional coping strategies (e.g., alcohol abuse; Bentall et al., 2011). Self-esteem stability is therefore also related to life satisfaction (Oosterwegel et al., 2001). Hence, self-esteem stability might prove to be relevant in the processing of the self-referent feedback because research done so far suggests that individuals with unstable self-esteem are more biased in their processing and motivated to enhance their self-esteem by protecting themselves from negative feedback. The "gold standard" in the measurement of self-esteem stability (Chabrol et al., 2006) is an indirect assessment in which the self-esteem level is assessed longitudinally with multiple administrations of the Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965), and the standard deviation of the means is calculated (Kernis, 2005; Kernis et al., 1989).

Thus, another possible explanation for the contradictory findings lies in the stability of self-esteem that has often been neglected in previous studies. All the feedback memory models offer hypotheses that relate exclusively to the level of self-esteem, regardless of its stability. However, both the level and stability of self-esteem should be considered to shed light on the conflicting findings so far. Participants with stable self-esteem would be expected to be driven by the self-verification motive to preserve consistent, stable self-views, whereas those with unstable self-esteem should be more motivated to enhance self-views (self-enhancement motive).

## 2. Our study

The aim of our research follows from the above guidelines. First, we want to determine if people recall evaluative feedback differently depending on whether it is self-relevant or not. In other words, we want to explore if our data confirms the self-reference effect. Next, we want to examine the relationship between the level and stability of self-esteem with the self-relevant feedback recall, i.e. to determine whether an individual's self-esteem is associated with remembering positive and negative central-trait-related feedback. We focused on feedback relating to two fundamental dimensions underlying self-esteem - self-liking and self-competence. We hypothesized that: (H1) self-referenced information would be better recalled than other-referenced information (i.e., self-reference effect); (H2) people with high self-esteem would better recall positive self-referenced information relative to negative self-referenced information regardless of the stability of their self-esteem; (H3) people with low self-esteem would better recall positive self-

referenced information relative to negative self-referenced information when their self-esteem is unstable (i.e., self-enhancement motive), whereas they would better recall negative self-referenced information relative to positive self-referenced information when their self-esteem is stable (i.e., self-verification motive).

**3. Method**

We used an experimental design with a control and an experimental group that differed in the type of feedback they received. Participants in the experimental group received a series of statements related to them personally, while the participants in the control group received an identical series of statements related to an unknown person. As we were interested in the relationship between the level and stability of self-esteem on the one hand, and the processing of feedback about ourselves on the other, we additionally divided participants with respect to their level and stability of self-esteem. We did not manipulate the self-esteem level of our participants because we were interested in the authentic, true self-esteem of individuals and how it determines the processing of relevant feedback from the environment.

**3.1. Participants**

The total sample consisted of 450 participants; 210 participants were female. Participants were high school graduates and freshmen from Zagreb University. Participants (M age = 18.21, SD age = 13.18) were randomly assigned to a self-referent task (n = 230) or other-referent task (n = 220). This sample size is larger than in most studies conducted in this area (e.g. sample size in Green, Pinter and Sedikides study was 96 students) ensuring adequate statistical power of our analyses.

An additional 94 students participated in stimuli norming tasks (content of feedback) as described below.

**4. Stimuli norming and preparation of the materials**

We defined the final statements in our feedback through 4 steps. First, we wanted to identify traits important to liking and competence by using two methods simultaneously - free associations with assessments of importance, and assessments of the importance of already offered traits. 45 psychology students first listed the traits they considered important in assessing how much they would like a person and the traits they considered important for assessing someone's competence. They were also asked to assess the importance of that trait for liking or competence on a 5-point scale. In addition, participants rated importance of 33 pairs of traits taken from previous research in this area for the assessment of a person's competence and liking on a 5-point scale. We analyzed the obtained data with regard to the frequency of individual statements stated in open-ended questions, obtained average ratings of the importance of individual traits separately for liking and competence, and possible differences in estimates for liking and competence. Six selected traits met several criteria: they were assessed as extremely important for the assessment of one's liking and competence, and evaluations for each selected trait significantly differ depending on the criterion (liking or competence). As the representative traits for self-liking the following dimensions were chosen: warm-cold, honest - unfair and good - bad, and as the main representatives of competence the following characteristics were chosen: intelligent - stupid, diligent - lazy and serious - frivolous.

Next, we wanted to determine the diagnosticity of individual behavioral descriptions for selected claims. 45 participants rated the diagnosticity (i.e. representativeness) of 166 specific behaviors related to the chosen six traits (at least 19 claims for one trait) using a 11-point scale (1 - not at all diagnostic, 6 - neutral, 11 - very diagnostic). Based on the results, 12 claims were selected as highly diagnostic for each trait, i.e. a total of 96 claims. Diagnostic estimates of selected behaviors (or claims) vary from 6.34–10.59, and the average diagnostic rate of

selected claims is 8.74.

Third, we aimed to determine the valence of individual behavioral descriptions for selected claims to ensure that the feedback included the equal number and strength of positive and negative statements.

A different group of 49 participants rated the valence of these 96 statements on a scale from -3 (extremely negative behavior) to +3 (extremely positive behavior). Based on the obtained results, we eliminated 18 claims that were perceived as neutral (average value between 3.0 and 5.0).

Finally, from the remaining 72 claims, we selected two positive and two negative claims for each trait, that are also highly diagnostic for the trait to which they refer, describe specific behavior and are central (i.e. important) to participants. A total of 24 claims were selected using these criteria. Average diagnosticity of the selected positive and negative claims with respect to the traits that will be covered in the feedback are presented in Table 1. There is no difference in average diagnosticity (t = 1.405; p = .163), average positivity (t = 3.608; p = .060), nor in average negativity (t = -2.186; df = 10, p = .064) between claims related to liking and those related to competence.

**5. Main study**

**5.1. Procedure**

The questionnaires contained basic demographic data on the participant (age, gender, school/study, grade), the Rosenberg Self-Esteem Scale (RSES) and the revised Self-Liking and Self-Competence Scale (SLCS-R). Participants then completed the RSES once a week (altogether six times) with the goal of determining the stability of self-esteem. In the third measurement, they also assessed how important each of the six traits offered to them was personally, as an additional feedback check because it was important that it included features that participants consider important.

During the experimental part of the study, the participants were divided into control and experimental groups and approached the research at computer classrooms in their schools or faculties. Participants were unaware of the division into groups and believed that everyone had exactly the same tasks. Experimental manipulation

**Table 1**

Means and differences between self-referent and other-referent group for self-esteem level, self-esteem stability, perceived importance of traits, and number of recalled statements.

Scale	Feedback type	N	M	SD	t
RSES	Self-referent	225	4.03	0.62	-0.53
	Other-referent	212	4.00	0.62	
Self-liking	Self-referent	225	3.71	0.80	-0.03
	Other-referent	212	3.70	0.79	
Self-competence	Self-referent	225	3.39	0.66	-0.55
	Other-referent	212	3.36	0.66	
Importance of "serious"	Self-referent	207	5.35	1.30	0.29
	Other-referent	197	5.39	1.32	
Importance of "good"	Self-referent	207	6.14	1.15	1.92
	Other-referent	197	6.34	0.93	
Importance of "diligent"	Self-referent	207	5.58	1.24	-0.96
	Other-referent	197	5.46	1.42	
Importance of "honest"	Self-referent	207	6.42	1.11	-0.32
	Other-referent	197	6.39	1.08	
Importance of "intelligent"	Self-referent	207	5.60	1.24	0.51
	Other-referent	197	5.66	1.36	
Importance of "warm"	Self-referent	207	5.67	1.58	0.22
	Other-referent	197	5.71	1.60	
Self-esteem stability	Self-referent	230	0.31	0.20	0.44
	Other-referent	220	0.32	0.19	
Feedback recall	Self-referent	230	6.90	3.34	-4.66**
	Other-referent	220	5.45	3.23	

Note. N indicates number of participants, M and SD are used to represent mean and standard deviation respectively, and t indicates t-test.

\*\* Indicates p < .001.

involved computer completion of a personality and cognitive ability questionnaire that resulted in false feedback presented via the computer immediately after completing the test. In the case of the experimental group, after completing the test, the participants were presented with a computer instruction announcing their feedback based on the results they achieved in the test. The feedback consisted of statements that described a specific behavior that one is likely to do. The control group received the same information, but relating to an unknown person and not to them personally, with the explanation that the computer program is still in the developing phase.

All participants were then given the last set of tasks in paper form. First, they solved the distractor task (count in a short text how many times a certain letter appears). After that, they were asked to recall the sentences from the feedback with the instruction that this is the most important task of our research to examine unintentional memory as a very important ability that provides important information about a person. Finally, participants were asked to state what they thought was the goal of the research as a manipulation check. No respondent expected to remember sentences from feedback, nor did they assume that we were interested in the relationship between self-esteem and feedback. After that all participants were debriefed.

## 5.2. Instruments

The level of self-esteem was operationalized in two ways: as the level of general personal self-esteem measured by the Rosenberg self-esteem scale, and as the level of two domains of self-esteem - self-esteem and self-competence - measured by the revised version of Tafarodi and Swann's self-esteem and self-competence scale.

*The Rosenberg self-Esteem scale (RSES; Rosenberg, 1965).* This 10-item explicit self-esteem scale was administered 6 times (once a week). Participants indicated their agreement with each item using a 5-point Likert scale format ranging from "strongly agree" to "strongly disagree". Higher total RSES scores reflect a higher self-esteem. The reliability of the RSE scale was  $\alpha = 0.80$  in the first time point and ranged from 0.80–0.89.

Participants also completed the 16-item Self-Liking/Self-Competence Scale-Revised (SLCS-R; Tafarodi & Swann, 2001) using a 5-point Likert scale format ranging from "strongly agree" to "strongly disagree". The reliability of the RSE scale was  $\alpha = 0.88$ . Higher total scores on self-liking (SL) or self-competence (SC) indicate higher domain-specific self-esteem.

The stability of self-esteem is operationalized as the stability of repeated measurements of explicit general personal self-esteem. Specifically, standard deviations of the results obtained by multiple administration of the RSES represented the measure of self-esteem stability for each participant.

Questionnaire of personality and cognitive abilities. To make the feedback more convincing and important to participants, they were first presented with a "questionnaire of personality and cognitive abilities that is recognized in the world as one of the most accurate, and is now used for the first time in our country." The tasks in the questionnaire were constructed for the purposes of this research and consisted of 10 items that measure conscientiousness and 10 items that measure agreeableness as personality traits (IPIP, Goldberg, 1999), and five tasks that require logical reasoning, which were taken from various studies of cognitive functioning. The reliability of the conscientiousness scale, as well as the agreeableness scale, is  $\alpha = 0.81$ .

Participants were offered feedback through a computer program, which consisted of 24 sentences that related to the content of positive and negative forms of behavior, as described earlier. Sentences were designed to refer to specific behaviors "to which participants are prone" (i.e., in the case of the control group, behaviors to which person X is prone). Examples of sentences given to participants in the feedback are: "You would be the only student who would not understand the material the professor is teaching." (competence - intelligent - negative), "You

would refuse to borrow your notes from a lecture to a sick friend who missed the lecture." (like - good - negative).

*The dependent variable* is operationalized as the recall of feedback with respect to their valence and the aspect of self-perception to which they relate. Participants were instructed to write as many behaviors as they could remember from the feedback (after a distractor task). Two judges independently coded the answers. For each correct recall, the participant received one point in the respective category: positive liking, negative liking, positive competence or negative competence. They also determined the number of intrusions defined as remembering the same behavior multiple times, remembering behaviors not presented in the feedback, and changing valence in behavior. The agreement among the judges is very high ( $r = 0.95$ ) indicating good reliability.

## 6. Results and discussion

### 6.1. Self-reference effect

The first problem of our research focuses on the self-reference effect in the feedback recall. We hypothesized that participants will remember self-referent feedback relative to other-referent information better, regardless of their valence.

To make sure our findings were valid, we first checked for differences between the group that received the self-relevant feedback and the other-relevant feedback group in all independent variables. The results confirmed that the two groups did not differ in the level and stability of self-esteem, nor in assessing the importance of the traits we used in the dependent variable, i.e. feedback. Both groups really considered these traits to be very important - with a possible range of importance of 1–7, the average ratings of the importance of the examined traits range from 5.35–6.42. Thus, any difference in the recall task between the two groups can be attributed to the personal relevance of the feedback.

Recall data for each of the two referent groups are shown in Table 1. As expected, independent-samples *t*-test results replicated the robust self-reference effect with greater correct recall within the self than within the other condition. The self-referent group recalled on average two sentences more than the other-referent group, confirming our hypothesis (H1).

Also, as an additional indicator of focusing attention and processing feedback, we analyzed the number of intrusions when recalling statements from feedback. Intrusions are operationalized as recalling the same behavior multiple times, recalling behaviors not presented in feedback, and changing valence in behavior. The number of intrusions was higher in the other-referent group corroborating that this group processed the feedback more superficially which resulted in "false" memories ( $t = 2998$ ,  $df = 448$ ,  $p = .003$ ).

### 6.2. Positive and negative feedback recall depending on the level and stability of self-esteem

To determine how self-esteem is related to the recall of the self-referent feedback, i.e. which motive predominates in information processing depending on an individual's self-esteem, further analyses were conducted solely on the self-referent group.

We conducted a MANOVA with two independent variables: self-esteem stability and self-esteem level (median-split). The correlation between the dependent variables is moderately high ( $r = 0.45$ ,  $p = .001$ ). The results are shown in Table 2. As some participants did not recall a single feedback, suggesting complete lack of motivation that could affect the results and obscure the true relationships between the variables, we excluded the results of such participants. Table 3 shows the results of MANOVA with the self-esteem level and self-esteem stability as independent variables.

The results obtained on the sample of motivated participants indicate a significant interaction effect of the level and stability of self-esteem on the memory of positive and negative feedback about oneself and thus

**Table 2**

The average number of recalled positive and negative self-referent information, standard deviations, and the number of participants per group.

Self-esteem level	Self-esteem stability	Positive information recall			Negative information recall	
		N	M	SD	M	SD
Low	Stable	36	3.63	1.46	2.91	1.68
	Unstable	60	4.43	1.80	3.58	1.77
	Total	96	4.13	1.71	3.33	1.76
High	Stable	63	4.25	1.67	3.49	1.69
	Unstable	26	3.92	1.20	2.65	1.72
	Total	89	4.15	1.54	3.24	1.73

**Table 3**

Multivariate effects for recall of positive and negative feedback for two independent variables (self-esteem level and self-esteem stability).

	Pillai's Trace F	Information valence	df	F	p
Self-esteem level	0,273	Positive information	1/184	0.04	0.84
		Negative information	1/184	0.43	0.51
Self-esteem stability	0,55	Positive information	1/184	0.83	0.36
		Negative information	1/184	0.10	0.75
Self-esteem level × Self-esteem stability	5,27	Positive information	1/184	4.91	0.03
		Negative information	1/184	7.76	0.01

only partially confirm our hypotheses (H2 and H3). The obtained interactions are shown in Fig. 1.

The findings support our prediction that people with high self-esteem would better recall positive self-referenced information relative to negative self-referenced information. However, contrary to our expectations, stability of their self-esteem also played a role. Specifically, people with stable self-esteem tend to recall both positive and negative feedback better relative to those with unstable self-esteem. Thus, H2 was only partially confirmed.

The same is true for H3. Namely, we confirmed that people with low self-esteem would better recall positive self-referenced information relative to negative self-referenced information when their self-esteem is unstable (i.e., confirming self-enhancement motive). However, our assumption that those with stable self-esteem would better recall negative self-referenced information relative to positive self-referenced information (i.e., self-verification motive) was not confirmed.

Altogether, our findings suggest that participants with unstable low and stable high self-esteem process deeper and remember both positive

and negative self-referent feedback better compared to participants with stable low and unstable high self-esteem. The interaction is stronger for negative than for positive feedback, and partially confirms the initial assumption. We expected such an interaction for positive feedback, but not for negative. If we look at the obtained interactions, participants generally remember positive feedback better than negative, independent of their own self-esteem ( $t = 5078, df = 229, p = .001$ ). Although MANOVA has shown significant interactions between the level and stability of self-esteem for recalling positive and negative information, this effect is small. The partial squared Eta is only 0.06, which means that the obtained interaction explains only 6% of the total variance.

Guided by the idea that the impact of self-esteem is dependent on the level of specificity, i.e. that it should be on the same specificity level as the feedback offered to participants, we repeated the analyses on two specific dimensions of self-esteem (self-liking and self-competence) instead of global self-esteem. However, when we repeated the analyses with the level of self-liking and self-competence, no significant effects of level or stability of self-esteem on feedback recall were obtained (Tables 4 and 5).

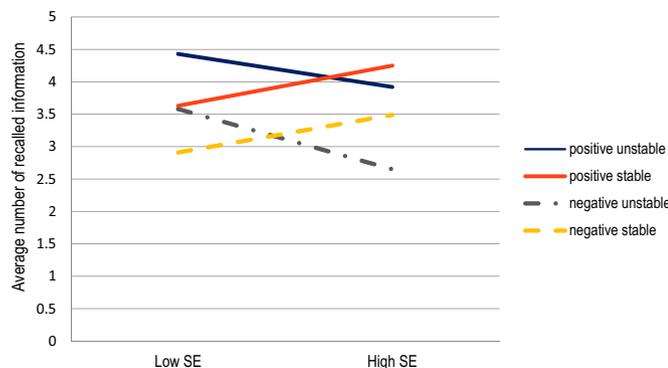
**7. Discussion**

Our aim was to investigate how people process evaluative feedback and examine the relationship between the level and stability of self-esteem and self-motives in this context.

Self-motives by which individuals are guided were operationalized by self-relevant feedback recall. Thus, half of the participants received self-referent feedback, and the other half received other-referent feedback.

We expected to confirm the self-reference effect. Furthermore we hypothesized that people with high self-esteem would better recall positive self-referenced information relative to negative self-referenced information regardless of the stability of their self-esteem. We also expected that people with low self-esteem would better recall positive self-referenced information relative to negative self-referenced information when their self-esteem is unstable (i.e., self-enhancement motive), whereas they would better recall negative self-referenced information relative to positive self-referenced information when their self-esteem is stable (i.e., self-verification motive).

Our study confirmed the robustness of the self-reference effect, in line with expectations. The finding that self-referenced information was better recalled corroborates studies conducted in healthy populations (Conway & Dewhurst, 1995), but also those conducted in psychiatric (Derry & Kuiper, 1981; Kuiper & Derry, 1982) and neurological (Kalenzaga et al., 2013; Kalenzaga & Clarys, 2013) populations. However, our results suggest a somewhat smaller effect than reported in literature (reported Cohen d varies from 0.84 to 1.40), probably due to the greater diversity of our sample as most other studies were conducted on psychology students. Psychology students might be more motivated



**Fig. 1.** Interaction of stability and levels of self-esteem for positive and negative self-referent feedback.

**Table 4**

Multivariate effects for recall of positive and negative self-liking feedback for two independent variables (self-esteem level and self-esteem stability).

	Pillai's Trace F	Recall	df	F	p
Self-liking	0.47	Positive liking	1/190	0.01	0.98
		Negative liking	1/190	0.94	0.33
Self-esteem stability	0.35	Positive liking	1/190	0.12	0.73
		Negative liking	1/190	0.63	0.43
Self-liking x Self-esteem stability	0.31	Positive liking	1/190	0.39	0.53
		Negative liking	1/190	0.30	0.58

**Table 5**

Multivariate effects for recall of positive and negative self-competence feedback for two independent variables (self-esteem level and self-esteem stability).

	Pillai's Trace F	Recall	df	F	p
Self-competence	2.18	Positive competence	1/186	0.34	0.56
		Negative competence	1/186	4.28	0.04
Self-esteem stability	1.18	Positive competence	1/186	0.64	0.43
		Negative competence	1/186	1.46	0.23
Self-competence x Self-esteem stability	1.19	Positive competence	1/186	2.19	0.14
		Negative competence	1/186	0.39	0.53

or even more interested in self-referent feedback in such studies than the average person. Hence, we call for more representative samples in future studies.

Next, we wanted to determine which out of all the self-relating information people process deeper and remember better. The answer to that question offers an insight into human nature and underlying motives. Are we more inclined to remember positive information about ourselves and ignore negative ones to feel better about ourselves? Or do we strive to remember all the feedback as accurately as possible to determine where we stand and adjust our behavior? Or do we focus on the information that confirms our existing self-views and ignore information that is inconsistent with our self-views and would cause dissonance that we are motivated to reduce? Different theories offer different answers to this question, i.e. highlight different self-motives that guide such self-relevant information processing. The findings of previous research are ambiguous, and all theories offer arguments and results that support them. A careful analysis of previous research has led us to the conclusion that the contradictory findings can be explained at least in part by the deficient methodology. We tried to overcome the shortcomings of previous research and focused on examining how self-esteem influences the retrieval of feedback referring to central traits in a surprise recall task. We advanced research by using between subjects experimental design on a large sample to answer the question how self-esteem impacts the processing of self-related and other-related information. Furthermore, we investigated multiple domains of self-esteem - by examining self-esteem as both a one-dimensional and a two-dimensional construct, and by using both agentic and communal traits, i.e. traits referring to liking and competence as two main domains that self-esteem is built on, because research showed that individuals high in self-esteem possess a high degree of both agency and communion (Campbell et al., 2002; Campbell et al., 2006). We also included a self-esteem stability variable that has been shown to be relevant in recent research. Using a self-reference versus other-reference task manipulation we examined whether the self-esteem level and self-esteem stability differentially influenced the feedback recall of four types of trait words (i.e., positive competence/agency, positive liking/communion, negative competence/agency, and negative liking/communion).

We expected an interaction of the level and stability of self-esteem as indicated in our predictions. This was only partially confirmed. People with unstable low and stable high self-esteem recall both positive and negative self-referent feedback better compared to people with stable low and unstable high self-esteem. This effect is stronger for negative than for positive feedback. Altogether, participants remember positive feedback better than negative and the effect of self-esteem is very weak. The results of the conducted research do not seem encouraging in terms of the role of self-esteem in the processing of feedback. Altogether, the finding that the positive feedback was better recalled than the negative speaks in favor of the greater relative importance of the self-enhancement motive in relation to the self-verification motive

(regardless of the self-esteem level and specificity). In that sense, our results corroborate findings from Sedikides (1993) showing that self-enhancement is stronger motivational force in the situations when our self-image is threatened. In such situations, the priority is to restore self-esteem to an initial (or higher) level. Our results also potentially corroborate the mnemonic neglect model because we confirmed that participants process deeper and recall better positive feedback (relative to negative), regardless of the level and stability of self-esteem. It seems that when our virtues are disputed and threatened, we are motivated to self-protect and one way is by focusing on positive or actively neglecting negative feedback. This finding implies that negative self-referent feedback presents a threat to people and they engage in self-protective behavior to reduce this threat, including selectively neglecting negative information (compared to positive). To further test this hypothesis based on mnemonic neglect model, we compared the recall for self-threatening feedback to recall for other-referent negative feedback. However, results showed that, contrary to expectations, recall was better for negative self-referent feedback relative to other-referent negative feedback ( $F = 22.63, p < .001$ ). This finding would suggest the loss of mnemonic neglect probably because negative feedback is especially relevant to people, as suggested by Sedikides et al. (2016). Hence, people tend to process all self-referent feedback better, regardless of its valence, when self-improvement motive is at work. People use feedback to adjust their behavior rather than perceive it as immediate threat. As our feedback was designed to represent important information to them, our participants were probably led by self-improvement motivation and paid attention to negative feedback so they could work on it later. Altogether, it seems plausible from our results that our immediate reaction to self-threat is to self-enhance by remembering positive feedback better than the negative, but we keep in mind some negative parts of the feedback to deal with them later. It seems that self-esteem has a multiple function - it protects us from being initially overwhelmed by negative feedback (and also shows the strength of the motivation for self-enhancement), but also warns (motivates) us to do something to stay accepted or not to experience being rejected by others. In this respect our results are quite in line with the self-esteem function as suggested by sociometer theory (Leary, 2005; Kirkpatrick & Ellis, 2001).

The impact of self-esteem on information processing and memory is generally small in our study. It is worth noting that some previous studies investigating the impact of self-esteem on feedback processing reported stronger effects and concluded that self-esteem is an important determinant of feedback processing (Tafarodi et al., 2001; Sedikides & Green, 2000). This discrepancy between the findings of those studies and the current one may be attributed to aforementioned procedural differences. First of all, we could look for an explanation in the specifics of our sample as the abovementioned studies were conducted exclusively on psychology students, which makes their sample more specific or biased than ours. Moreover, the mentioned research was mainly focused on finding differences in remembering information related to the participant and information related to another person or looking for differences in remembering central and peripheral traits for self-image (with varying positivity of claims in feedback). Furthermore, Tafarodi et al. (2001) used feedback recognition rather than feedback recall as an indicator of memory or information processing. Finally, the Sedikides and Green (2004) study, which resembles our study, was conducted on an initial sample of 490 participants, of whom 50 people with a positive and 50 with a negative self-image were selected for the main study. This study found that individuals who received personally relevant feedback remembered fewer negative claims than participants who received personally irrelevant feedback, whereas there was no difference in the memory of positive claims. Furthermore, it turned out that the positivity of the image that participants had of themselves did not play a key role in memorizing feedback - participants remembered more positive information even when they had a negative image of themselves. However, this study only used adjectives relating to self-liking but neglected self-competence dimension.

To sum up, we believe that the effect of self-esteem on feedback processing exists, but is relatively small and unstable, depending on the quality of the sample, as well as the methodology used, and illustrating the strategic nature of self-protection.

## 8. Implications

Researchers should focus on exploring other potential moderators that may be more important than self-esteem (e.g. anxiety, dysphoria etc.). Furthermore, whether or not some negative evaluative information will be considered a threat might also depend on the perceived modifiability of the trait in question. We pretested the feedback to refer to central traits but did not confirm that these traits are perceived as (un) modifiable. This is closely connected to the self-improvement motive so future studies should focus on the self-improvement motive as it could change one's orientation drastically. Additionally, research suggested that self-protection is flexible and strategic, i.e. that people recall self-threatening feedback when it has ramifications for long-term relationships well (Green et al., 2009) so future research should also consider the source of the feedback. We believe that these findings have important implications for feedback-seeking literature in management and organisational psychology.

## Declaration of competing interest

The author declares that there is no conflict of interest.

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