

25 Performance Feedback and Emotions

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I was really hurt. I was devastated. Although I knew that I haven't done well the feedback was quite negative only the first sentence said it was a nice attempt, but then a long row of negative things.

(Katya, interview, in Shields, 2015, p. 620)

Students' emotions greatly influence the way in which they are able to receive and process feedback.

(Värlander, 2008, p. 146)

Summary

This chapter discusses the relations between performance feedback and emotions in educational settings. First, we define the complex constructs of “feedback” and “emotions.” Second, we outline existing theoretical approaches and empirical findings of the relations between feedback and emotions and consider potential moderators and mediators of those relations. Third, we summarize the theoretical approaches and existing findings on the relations between performance feedback and emotions in a comprehensive model. Finally, we offer suggestions for future directions.

Introduction

Feedback and emotions are omnipresent in education. Both constructs are of very high relevance with respect to future learning, behavior, and career choice (e.g., Krannich, Goetz, Lipnevich, & Roos, 2017). Above and beyond the effects of both constructs on various performance outcomes, emotions represent a cluster of crucial outcome variables in their own right. For example, Fredrickson (2001) states that “positive emotions are worth cultivating, not just as end states in themselves but also as means to achieving psychological growth and improved well-being over time” (p. 218; for positive emotions in the context of “positive psychology,” see also Seligman & Csikszentmihalyi, 2000).

Intuitively, one might assume that feedback and emotions are reciprocally linked, either directly and/or via potential moderating and mediating mechanisms. Feedback (e.g., positive feedback on achievement) can directly (e.g., enjoying the good grade) or indirectly (e.g., by fostering high control

cognitions) elicit strong emotions (e.g., enjoyment, pride), which, in turn, might have an impact on subsequent learning behavior (e.g., high amount of self-regulated learning) and consequently learning outcomes. Positive learning outcomes can, in turn, influence subsequent reactions to feedback. However, only a few theoretical assumptions and empirical results currently exist that describe the direct and indirect interplay between feedback and emotions. Reviews on feedback (e.g., Hattie & Timperley, 2007) typically do not mention emotions, and the emotion literature rarely explicitly mentions feedback as an antecedent or consequence of emotions. An exception to this is Pekrun's (2006) control-value theory that describes antecedents and effects of academic emotions. In this model feedback is explicitly mentioned as an antecedent of emotions, with emotions subsequently affecting achievement outcomes and consequently further receptivity of feedback. A further exception is research on test anxiety, which dates back to the 1950s (Sarason & Mandler, 1952; Zeidner, 2007). In this literature, the relations between anxiety and achievement outcomes as one facet of feedback are outlined (see meta-analyses of Hembree, 1988; Seipp, 1991; Ma, 1999).

In this chapter we focus on the relations between instructional feedback and student performance and emotions. It is an aim of this chapter to synthesize existing theoretical approaches and empirical data and to develop a heuristic model summarizing the interplay between performance feedback and emotions by taking potential moderators and mediators of those relations into account. Further, and based on this model, we outline avenues for future research in this field.

Definition of Feedback and Emotions

Our lives are an ongoing, bidirectional interaction between ourselves and the environment. We continuously impact our environment and, in turn, are impacted by it. Thus, similar to the title of Karl Popper's (1999) essay, "All Life Is Problem Solving," life is an ongoing feedback process that is filled to the brim with "natural" feedback processes as well as consciously initiated actions on the environment that humans undertake to achieve their goals (Kluger & DeNisi, 1996). Numerous definitions of feedback have been outlined in this volume (see Chapters 1–4). Due to our focus on performance feedback, in this chapter, we employ a definition by Hattie and Timperly (2007): "Feedback is information provided by an agent (e.g., teacher, peer, book, parent, self, experience) regarding aspects of one's performance or understanding" (p. 102). Thus, feedback is engendered by performance and/or understanding. It is important to note that this definition includes self-evaluations related to achievement, such as judging the quality of one's oral answer to a question posed by the teacher. However, beyond the importance of performance feedback given by others, the self is always relevant in the feedback process as feedback gets consistently interpreted and classified with respect to specific frames of references, like

internal or social comparisons or self-defined criteria (e.g., individual goals, criteria, and thresholds for “good” or “bad” performance; cf. Marsh, 1986, 1990; Goetz, Frenzel, Hall, & Pekrun, 2008).

Similarly, numerous definitions of emotions have been proposed in the literature (see Kleinginna & Kleinginna, 1981; Lewis & Haviland-Jones, 2000). Prominent definitions entail a componential perspective (e.g., Scherer, 1984; Damasio, 2004), in which emotions are viewed as multicomponent, coordinated processes of psychological subsystems that include affective, cognitive, motivational, expressive, and peripheral physiological processes. Anxiety, for example, is an emotion comprising uneasy, nervous feelings; worries about possible negative events and outcomes; motivation to avoid the situation; physiological activation; and a specific facial expression. Enjoyment, on the other hand, comprises happy feelings, positive perceptions and thoughts, motivation to stay in the situation, physiological activation, and happy expression.

In the context of performance feedback, achievement emotions play a pivotal role. They can be defined as emotions pertaining to achievement activities or achievement outcomes (Pekrun, 2006). In addition to this object focus (activity vs. outcome), they can be grouped with respect to their valence (positive vs. negative or, simply put, pleasant vs. unpleasant). Taking both object focus and valence into account renders a 2×2 classification (Pekrun et al., 2006) grouping these emotions as follows: (1) activity/positive (e.g., enjoyment), (2) activity/negative (e.g., boredom, anger), (3) outcome/positive (e.g., hope, pride), and (4) outcome/negative (e.g., anxiety, hopelessness, shame). As feedback can refer to both activities and outcomes, all four groups of emotions might be relevant in the context of the relations between feedback and emotions. Teachers provide feedback on both the process and product of activity such that the emotions elicited would inevitably vary across Pekrun's (2006) dimensions of valence and object focus.

Related to the assumingly high relevance of outcome emotions in the field of feedback-emotion relations, Johnson and Connelly (2014) argue that it is important to differentiate emotions that are induced by the feedback message itself (e.g., good achievement results, i.e., outcome emotions like pride and shame) and emotions that are involved in the feedback exchange (e.g., enjoyment of the feedback provider). It can be assumed that emotions of the feedback provider and emotions of the feedback receiver depend on the feedback message itself (i.e., positive or negative in nature) and its interpretation (e.g., based on individual goals and criteria). Further, it can be assumed that emotions of the feedback provider and the emotions of the receiver of the feedback dynamically interact (i.e., emotional transmission processes; e.g., Frenzel, Goetz, Lüdtke, Pekrun, & Sutton, 2009). Beyond the direct emotional contagion (Hatfield, Cacioppo, & Rapson, 1994) that is the transmission of emotions among interaction partners by mimicking emotional expression and immediately adopting each other's emotions, rather complex processes of emotional transmission may be taking place in the context of education (and beyond). For example, results of a study by Taxer and Frenzel (2012; see also van Doorn, van Kleef, &

van der Pligt, 2014) indicate that the emotions of the feedback receiver following a negative achievement outcome can strongly differ based on the emotions demonstrated by the feedback provider: anger expressed by the teacher might result in students' feelings of hope, as students may interpret anger as an indicator of teacher's high belief of students' ability to achieve better results (i.e., anger of the feedback provider increasing the self-concept of the feedback receiver resulting in hope). This scenario may work in a highly supportive environment and will depend on strong positive student–teacher relationship. In contrast, teacher's pity might result in hopelessness of the feedback receiver, as it may be construed by a student as the teacher's belief in the student's lack of ability (e.g., due to low intelligence) to achieve better results. However, beyond such initial empirical results we lack knowledge on the complex interplay between the emotions of the feedback providers (be they teachers or peers) and the receiver of the feedback. Thus, we focus in this chapter on emotions as induced by the feedback message itself.

Direct Relations between Performance Feedback and Emotions

The Role of Feedback and Emotion Valence (Positive vs. Negative)

Based on the existing literature on performance feedback and emotions, Goetz and Hall (2013) suggest that the valence (positive vs. negative; pleasant vs. unpleasant) of both feedback and emotions plays a crucial role with respect to the relations between the constructs. Generally, positive feedback is related to positive emotions and negative feedback is related to negative emotions. The majority of studies investigating the relations between performance feedback and emotions do not allow for conclusions on causal relations, but there is initial evidence demonstrating such links; we present these findings below. These studies were done in different (academic) disciplines and across age groups (e.g., Nicaise et al., 2007, for school students in the context of physical education; Lipnevich & Smith, 2009a, 2009b, in tertiary education; for an overview, see Goetz and Hall, 2013). The existing empirical findings show that positive feedback is typically related to positive emotions, negative feedback is related to negative emotions – and vice versa.

However, things are not always straightforward, as it is not always clear whether feedback is “positive” or “negative” in nature. Inherently, a numerical score or a letter grade do not carry any valence, positive or negative. However, depending on the context, task, and student, grade becomes one of the most emotionally charged pieces of feedback that a student may receive in an instructional context. For one student 80/100 is a very desirable outcome that will elicit a slew of positive emotions, whereas for another student 80/100 is a detrimental outcome resulting in intense negative emotions. Student characteristics, prior performance, and teacher expectations may affect

differential receptivity of identical grades (see later sections for discussion of mediators and moderators).

Lipnevich and Smith (2009a) report the results of a large experimental study that examined differential effects of individualized comments, grades, praise, and source of information on student performance and emotions. The researchers revealed that a mere presence of grade had a significant effect on students' reported negative affect. Students who received a grade had higher negative affect (and lower reported levels of self-efficacy) than their counterparts for whom their grade was unknown. Lipnevich and Smith (2009a) manipulated the source of feedback and examined the effects of various types of feedback across students of different ability levels. The findings demonstrated that the grade from the instructor had a negative effect on performance and significantly enhanced negative affect. This was not the case for students who received virtually identical feedback with an understanding that it came from the computer. It is reasonable to presume that the computer-based grade was viewed as being less judgmental or personally directed than the instructor-based grade. Subsequent focus group discussions (Lipnevich & Smith, 2009b) supported this speculation, with many focus group participants mentioning that seeing their grade made them think that they could not possibly improve their work to earn a passing score. The grade caused them "to panic," "to feel ashamed," or "to get angry" at themselves and the professor. Any of these emotions could hinder students' improvement on the task at hand, and obviously, they did. Interestingly, there were no differences in emotions as a result of praise. Inherently positive in valence, a statement of encouragement or praise presented in the study did not influence positive emotions. Praise did affect motivation, but in an unusual fashion, where students presented with a laudatory statement reported lower levels of motivation than those who were not (Lipnevich and Smith, 2009a, 2009b). Overall, the most common types of feedback offered in an instructional setting result in changes in student emotions, which, in turn, may affect student performance on a task.

To gain a deeper understanding of the complex links among feedback and emotions, we further examined the data collected in the Lipnevich (2007) dissertation (as reported in Lipnevich & Smith, 2009a, 2009b) for the purposes of this chapter. We investigated relations between feedback and discrete emotions that students experienced immediately following the presentation of feedback. Interestingly, but not surprisingly, we found that receiving a grade, as opposed to written comments, increased student ratings on distressed, upset, scared, hostile, ashamed, nervous, and afraid – all negative emotions. Additionally, we also saw a decrease in pride when grades were given compared with written comments. Further, in order to explore the relation between feedback condition, emotions elicited, and differences in student essay scores, we tested a mediation path model. We hypothesized that emotion played a mediational role in the relation between feedback type and differences in essay score. Both direct and indirect paths were included in the model in order to test negative affect as a mediator in the relation between grade condition and revised essay score.

Additionally, exploratory path analyses were conducted with various discrete emotions that were highly correlated with feedback condition and differences in student scores. We found that the discrete negative emotions of upset and ashamed were significant mediators in the relation between feedback condition and differences in essay scores. Additionally – and interestingly – we also found the emotion of pride negatively predicted change in essay scores. Decreases in pride, as a result of grade opposed to comment, led to smaller improvements in essay scores. Predicted relations changed when we considered the positive emotion of pride. The direct effect of feedback condition on difference in essay scores from draft to the final performance on an essay remained the same, demonstrating that grades predicted less change in essay scores. However, the condition of grade elicited a decrease in the experience of pride. This negatively predicted differences in essay score, suggesting that students improved their scores less when they experienced a decrease in a positive emotion. This study provides evidence of the close links between feedback and emotions, and warrants further exploration. Further, unlike Kluger, Lewinsohn, and Aiello's (1994) quasi-experimental study that showed positive effects of achievement outcomes (grades) on pleasantness, the results of Lipnevich and Smith (2009a, 2009b) showed no differences in positive affect for students of all ability levels or depending on scores presented to them (i.e., 50/100 or 100/100 did not result in changes in positive affect).

Above and beyond the fact that it is often not quite clear whether feedback is “positive” or “negative” in nature, it is important to emphasize that numerous studies have revealed that positive and negative affect are not merely the opposite ends of a single continuum and should be regarded as separable phenomena (e.g., Diener & Emmons, 1985; Watson, Clark, & Tellegen, 1988; Cacioppo & Berntson, 1994). Hence, we should not always expect an emotional response well aligned and proportional in valence and intensity to the valence and intensity of a feedback message.

Concerning the strength of relations, the average correlation between achievement outcomes and emotions across single positive and negative emotions (e.g., enjoyment, pride, anxiety, anger, boredom) is $|.25|$ (Goetz & Hall, 2013; for meta-analyses especially in the field of test anxiety, see Hembree, 1988; Seipp, 1991; Ma, 1999). Although this correlation is not very high (medium in terms of effect size; Cohen, 1988), it is important to note that even weak effects may have a strong cumulative impact due to the omnipresence of feedback situations and emotions in academic settings.

Causality in the Feedback/Emotion Relations

When it comes to causal relations between feedback and emotions, the admittedly minimal existing empirical evidence indicates that performance feedback and emotions are linked by reciprocal causality. A recent longitudinal study by Pekrun et al. (2017) ($n = 3,425$ school students from grades five to nine) revealed positive reciprocal relations between achievement outcomes (end-of-year grades

and test scores) and positive emotions (enjoyment, pride) as well as negative reciprocal relations between achievement outcomes and negative emotions (anger, anxiety, shame, hopelessness, boredom). By employing two longitudinal studies, Pekrun et al. (2010, 2014) demonstrated that negative achievement enhanced boredom, which in turn had negative effects on subsequent achievement. This study showed further support for the assumption of reciprocal causality between feedback and emotions.

The Role of the Achievement Level of the Reference Group

With respect to the effects of performance feedback on emotions, empirical evidence suggests that is important to take into account the achievement level of the reference group (e.g., average grade level of the school class) in addition to the individual performance (e.g., math grade). By referring to the big-fish-little-pond effect (BFLPE; Marsh, 1987), Goetz et al. (2004) used a longitudinal study design ($n = 1,762$ school students, mathematics domain) and found that high individual achievement (investigated via a math achievement test) led to an increase in enjoyment and a decrease in anxiety, whereas high average class achievement (mean class score on the math achievement test) resulted in the opposite effects. In other words, the achievement level of the reference group (classmates) had negative effects on individual emotional experiences. Although not directly referring to performance feedback, findings by Zeidner and Schleyer (1999; $n = 1,020$ gifted elementary school students, across-domain approach) also indicate that the achievement level of the reference group has an impact on individual emotions. They found that gifted students in mixed ability regular classes (i.e., big fish) reported lower test anxiety than their counterparts (i.e., little fish) in special classes for the gifted. By analyzing a subsample of the study by Zeidner and Schleyer (1999), namely, the gifted students attending special gifted classes ($n = 769$), Goetz, Preckel, Zeidner, and Schleyer (2008) found that individual grades were negatively related to test anxiety, while the average achievement of the class was positively related to test anxiety. In sum, these studies indicate that both individual performance feedback and the perceived performance level of the reference group have an impact on emotions.

The Role of Performance Feedback across Domains

Interestingly, studies suggest that feedback presented in one domain may influence emotions in a different domain. For example, referring to the internal/external frame of reference model (Marsh, 1986, 1990), Goetz, Frenzel, Hall, and Pekrun (2008) found that in a study of 1,380 high school students, mathematics performance (grades), assessed in the previous academic year, positively predicted enjoyment in mathematics classes and negatively predicted enjoyment in language classes. Language class performance (grades) positively predicted enjoyment in language classes and negatively predicted enjoyment in

mathematics classes. Thus, emotional experiences in a specific academic domain seem to be impacted not only by the performance feedback within the domain but also by performance feedback in other domains.

Moderators and Mediators of the Relations between Feedback and Emotions

Latham and Locke (1991) argue that the effects of feedback are difficult to predict without taking other variables into account: “Actually, feedback is only information, that is, data, and as such has no necessary consequences at all” (p. 224). In fact, performance feedback is often just a number (e.g., grades; Sticca et al., 2017) and the role of additional variables must be considered when judging the effects of feedback on emotions. Vice versa, the effects of emotions on achievement outcomes and corresponding performance feedback seem also rarely to be predictable without taking further variables into account.

Thus, knowledge of moderators and mediators of the relations between performance feedback and emotions seems to be important with respect to understand the “net relations” (i.e., [.25]; see above) between both constructs. Further, such knowledge is crucial with respect to practical implications. For example, modifying the levels of a specific moderator in students (e.g., enhancing meta-cognitions on feedback) might decrease negative effects of negative performance feedback on emotions. As for mediators (e.g., appraisals of control), they might be considered when giving performance feedback (e.g., fostering control cognitions even the feedback is negative in nature), for example, with respect to decreasing negative effects of negative performance feedback on emotions. Moderators and mediators can be assumed to play a pivotal role with respect to their effects of performance feedback on emotions and vice versa.

In the next sections we outline the variables that are mentioned in the literature as moderators and mediators of the relations between performance feedback and emotions by taking the causal relations into account (reciprocal relations: feedback ↔ emotions; unidirectional relations: feedback → emotion, emotion → feedback). Figure 25.1 depicts moderating and mediating variables discussed in the current chapter.

Feedback ↔ Emotions: Moderators

Level of Generalization. The research literature suggests that the level of generalization may moderate the strength of relations between feedback and emotions (Goetz & Hall, 2013). More specifically, relations are stronger when both performance feedback and emotions refer to a specific academic domain (e.g., feedback on mathematics and math emotions) as compared with both constructs referring to a more generalized area (e.g., GPA and school-related emotions; for possible explanations, see Brunswik, 1952; Goetz et al., 2006).

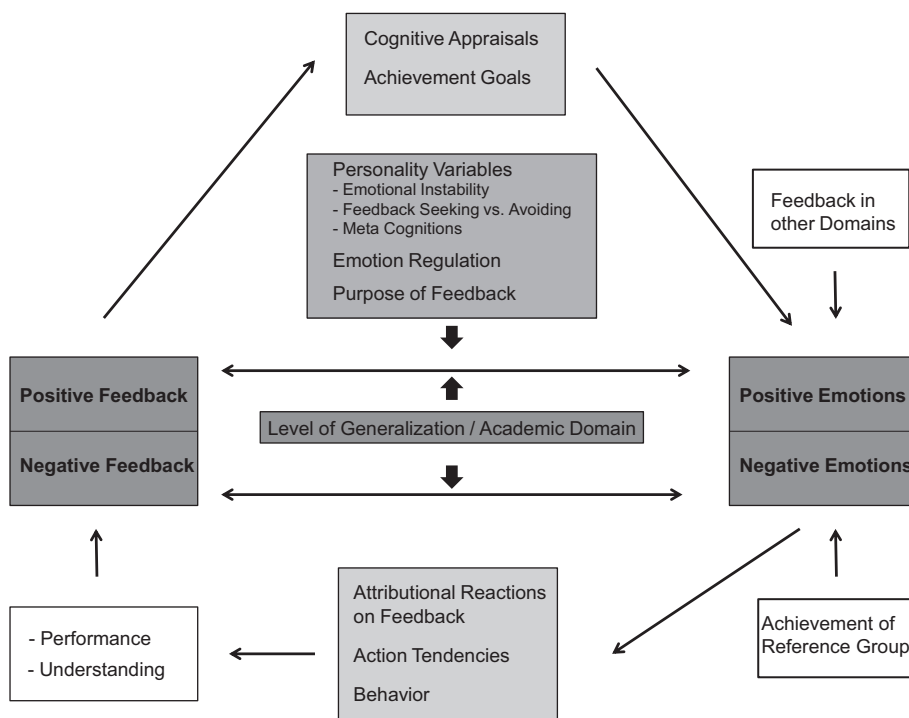


Figure 25.1 *Relations between feedback and emotions: reciprocal causality, moderators, and mediators.*

In other words, a “fit” of the levels of generalization can be assumed to result in stronger relations (cf. Gogol, Brunner, Preckel, Goetz, & Martin, 2016).

Academic Domain. The strength of relations between performance feedback and emotions may also depend on the nature of the academic domain (e.g., language arts, mathematics). For example, in their meta-analysis of research in formative assessment, Kingston and Nash (2011) found that formative assessment practices, including feedback, were more effective in language arts than in mathematics or science. In contrast, Goetz et al. (2007) found relations to be stronger in mathematics and the science domains as compared with the verbal domains. Possible explanations for those findings are outlined in Goetz et al. (2010). For example, when compared with the language domains, mathematics and science have been found to be less subjective and have clearer criteria for assessment, resulting in greater alignment between performance feedback and emotions in these domains. This is reflected in higher reliabilities and validities of grades and emotion scales in math and science domains as compared with the language domains (cf. Sticca et al., 2017). The inconsistent findings show that the role of the academic domain in feedback–emotions relations is certainly a fruitful area of research for future investigations, and we hope new studies will shed light on feedback–emotions contingencies across domains.

Feedback → Emotion: Moderators

Personality Variables. In the literature, three personality variables are mentioned with respect to moderating the effects of feedback on emotions. Niemann et al. (2014) refer to emotional instability and suggest that emotionally unstable persons (i.e., with high levels of neuroticism; McCrae & Costa, 2008) would react to negative feedback with more anger than emotionally stable persons. This assumption was confirmed in their experimental study ($N = 84$ adults), in which participants received negative feedback (low score on a scale ranging from 1 (very bad) to 10 (outstanding)) on a working task for a marketing company. Neuroticism moderated the effect of negative feedback on anger with highly neurotic persons experiencing higher levels of anger. Further, Fong et al. (2016) refer to feedback-seeking versus feedback-avoiding and found ($N = 270$ undergraduate students) that feedback-seekers (i.e., with high values on the item “I look forward to receiving feedback”; see Cassidy, Ziv, Metha, & Feeney, 2003) as compared with feedback-avoiders experienced higher pleasant emotions and lower unpleasant emotions with respect to constructive and negative feedback. In other words, feedback-seeking versus feedback-avoiding moderated the effect of feedback on emotions. Finally, in the context of medical education, Sargeant et al. (2008) ($N = 28$ physicians) employed a qualitative interview study approach and found that meta-cognitions (i.e., a facet of self-regulation) could reduce negative emotions following negative feedback (see also Chapter 13 in this volume). More specifically, they argue that reflection on emotional reactions following negative feedback can reduce negative emotional experiences. In other words, meta-cognition can be assumed to moderate the effects of negative feedback on negative emotions. In sum, (1) emotional instability, (2) feedback-seeking versus feedback-avoiding characteristics, and (3) meta-cognitions have been found to be significant moderators of the relation between feedback and emotions.

Emotion Regulation. Raftery and Bizer (2009) proposed that emotion regulation (Gross, 1998; Gross & John, 2003) would have an impact on how people responded to negative feedback. In their quasi-experimental investigation ($N = 144$ undergraduates) they showed that reappraisers (i.e., people thinking about a situation to change its emotional impact) who received negative feedback (poor performance) completed a further test more quickly and performed better as compared with people who received moderate feedback (performance slightly above average). The authors found no such effects for suppressors (i.e., people inhibiting emotion-expressive behavior). Thus, individual differences in reappraisal and suppression seem to be meaningful with respect to the impact of negative feedback on subsequent cognitive performance. Thus, the specific way of regulating emotions that individuals employ after negative feedback has been received seems to moderate the effects of feedback on performance. As emotions are at the focus of emotion regulation, it can be assumed that emotion regulation moderates the impact of feedback on emotions.

Purpose of Feedback. Rowe, Fitness, and Wood (2014) conducted an interview study and investigated university students' emotions related to anticipating and receiving feedback (21 students and 15 teachers). The researchers concluded that the purpose of feedback moderated its effects on students' emotions. For both positive and negative feedback, the effects on emotions differed according to the purpose of the feedback (i.e., whether it focused on evaluation or was used to support student learning). In other words, whether feedback was used for formative or summative purposes moderated the link between feedback and emotions (see Chapter 4 in this volume for a detailed discussion of summative versus formative purposes of feedback). The authors argue that evaluative feedback may be associated with "achievement emotions" (according to Pekrun et al., 2002; e.g., pride, enjoyment, anxiety), and the more formative type of feedback may be linked to both achievement and "social" emotions (e.g., gratitude, love). Sargeant et al. (2008) ($N = 28$ physicians) found that the effects of negative feedback on emotions strongly differed according to whether the focus of the feedback was the task or the self. Negative emotional reactions were found to be weaker when the task was in focus. This finding is consistent with the literature on formative feedback. As Hattie and Timperley (2007) suggest, task, process, and self-regulation feedback may be more effective in promoting improvement compared with the person-level feedback, which is self-focused and, thus, more emotionally charged. Depletion of cognitive resources that results from students' focus on the self and not the task may impede the constructive use of feedback, and their performance is likely to decrease or stay the same (Baumeister et al., 1990).

Feedback → Emotion: Mediators

Cognitive Appraisals. According to Pekrun's (2006) control-value theory of achievement emotions, feedback on success and failure (outlined in the theory as an aspect of the social environment) should have an impact on the feedback receiver's emotions via his or her appraisals of control (e.g., expectations, attributions) and values (e.g., intrinsic and extrinsic). In other words, performance feedback should have effects on feedback receivers' control and value cognitions that in turn should have an impact on emotions. The effects of feedback on control and value depend on the type of feedback. It is possible to give feedback in a way that it has specific effects on appraisals of control and value (e.g., giving negative performance feedback by outlining that this might have deep consequences for a future career might reduce levels of control and increase the judgment of the value of the achievement outcome). High levels of control are assumed to align with positive emotions, whereas low levels of control typically coincide with negative emotions. Value is assumed to increase both positive and negative emotions, with the exception of boredom, which should decrease with increasing value. However, it is important to note that there are different types of value (e.g., intrinsic value, utility, costs, attainment; Gaspard et al., 2015), which might be differentiated with respect to their mediating role.

The few existing studies on the relations between feedback, appraisals, and emotions are in line with the aforementioned assumptions. In a study of 577 high school students, Goetz (2004) found that positive performance feedback (grades) increased both students' control cognitions (self-concept) and value cognitions (achievement value). Control, in turn, reduced anxiety and increased enjoyment. In contrast, value increased both anxiety and enjoyment. Further, encouraging feedback on negative performance (e.g., "When I receive a bad grade my math teacher is cheering me up") increased achievement value, which increased both anxiety and enjoyment. These results indicate that even "positive" ways of giving feedback can result in negative emotions via increasing extrinsic value cognitions. Pekrun, Goetz, Daniels, Stupnisky, and Perry (2010; $N = 287$ university students) focused on boredom and found that grades increased both students' control and value cognitions, with both types of appraisals reducing student experiences of boredom.

Beyond studies referring to Pekrun's (2006) control-value theory there are very few findings indicating that cognitive appraisals mediate the relations between performance feedback and emotions. However, most of those studies do not explicitly mention and test this mediation assumption (e.g., Turner and Schallert, 2001).

Achievement Goals. Pekrun, Cusack, Murayama, Elliot, and Thomas (2014) developed a theoretical model on the effects of anticipated feedback on academic emotions, in which they assumed that achievement goals would mediate the effects of feedback on emotions. Anticipated feedback in this study was defined as the expectation of students about the kinds of performance feedback they expected to receive. Self-referential feedback (referring to individual competence developments related to past performance) and normative feedback (referring to competence relative to other students' performance) were differentiated. This approach groups academic emotions with respect to their valence dimension (positive vs. negative; i.e., pleasant vs. unpleasant) and with respect to activity versus outcome focus (see above, definition of emotions). Goals in this study were conceptualized according to the trichotomous goal model (i.e., mastery goals, performance-approach goals, performance-avoidance goals; Elliot & McGregor, 2001). Thus, achievement goals were assumed to mediate the effects of feedback on emotions. To summarize, according to this model, self-referential feedback should promote the adoption of mastery goals, while anticipating feedback should promote the adoption of both performance-approach and performance-avoidance goals. Further, mastery goal orientation should have an effect on activity emotions (e.g., enhancing enjoyment, reducing anger); performance approach goals should have effects on positive-outcome emotions related to success (e.g., enhancing hope and pride); and performance avoidance goals should affect negative-outcome emotions related to failure (e.g., enhancing anxiety, hopelessness, shame, and relief). In Pekrun et al.'s (2014) experimental study ($N = 153$ high school students), participants were informed that they would receive self-referential feedback, normative feedback, or no feedback at all in a test-taking situation. The hypotheses were mainly

confirmed and the study found that achievement goals mediate the effect between feedback and emotions. The main implication of this study is that self-referential feedback is clearly preferable to normative feedback with respect to its impact on achievement goals and students' academic emotions.

Emotion → Feedback: Mediators

Attitudinal Reactions on Feedback. Niemann et al. (2014) assumed that emotions involved in a feedback process have an impact on attitudinal reactions to the feedback. Such attitudes can be expected to have an impact on performance and, consequently, on further performance feedback. The researchers found ($N = 47$ undergraduates) that negative feedback increased anger in students, which in turn had effects on the attributional reactions: anger reduced the liking of the feedback provider (e.g., response to the item "I think that my subordinate is a pleasant person"); it lowered the perceived ability of the feedback provider (e.g., "I think that my subordinate is able to give useful comments"); and it also reduced feedback acceptance (e.g., "My subordinate rightfully criticized me"). In line with those findings, Sargeant et al. (2008) found that negative feelings following feedback reduced the acceptance of the feedback. Beyond the state of current research findings, it could further be assumed that the attributional reactions to feedback have an impact on subsequent performance and consequently on the acceptance of the performance feedback. Thus, attributional reactions can be presumed to mediate the effect of emotions on performance feedback.

Action Tendencies. Belschak, Jacobs, and Den Hartog (2008) suggested that emotions involved in a feedback process influenced individuals' specific actions. In their scenario study ($N = 101$ working adults) they found that positive emotions (enjoyment, relief, pride, contentment, enthusiasm) involved in the feedback process resulted in increased positive extra-role behaviors (organizational citizenship behavior), whereas negative emotions (anger, anxiety, frustration, disappointment, guilt, shame) increased negative extra-role behaviors (counterproductive behavior, turnover intention). Therefore, action tendencies appear to impact subsequent performance and, consequently, performance feedback; they can be assumed to mediate the effect of emotions on performance feedback.

Behavior. By referring to dual process models (e.g., Chaiken & Trope, 1999), Baumeister, Vohls, DeWall, and Zhang (2007) argue that emotions represent a feedback system that influences behavior. Emotions can be assumed to stimulate cognitive processing following a specific outcome. From this perspective, feedback on achievement activates an "emotional feedback system," which in turn has an impact on subsequent behavior. Thus, emotions involved in a feedback process mediate the effects of (external) feedback on performance. In line with this mediation assumption, Fishbach, Eyal, and Finkelstein (2010) argue that "the affective response is not a side effect or an epiphenomenon of the feedback, but rather the underlying mechanism by which feedback

influences behavior” (p. 523). Also in line with this mediation assumption, Pekrun (2006) argued that emotions have an impact on performance via activation of cognitive resources, motivation to learn, and individuals’ use of specific learning strategies and self-regulated learning processes (see also Goetz & Hall, 2013). However, to date, there has been little empirical evidence on the causal mechanisms leading to the effects of emotions on academic outcomes (for cross-sectional findings, see Goetz, 2004; Pekrun et al., 2004, 2011).

Summarizing the Current State of Our Knowledge on the Relations between Feedback and Emotions

Figure 25.1 summarizes the current state of our knowledge on the relations between feedback and emotions in a heuristic model. As outlined earlier, the existing cumulative empirical evidence on the outlined relations, moderators, and mediators strongly differs across constructs and is for some aspects quite clear (e.g., valence (positive vs. negative) as a moderator of the reciprocal relations), while for other aspects it is rather scarce (e.g., feedback-seeking vs. feedback-avoiding as a moderator of the impact of feedback on emotions). The majority of the existing empirical evidence on the relations between feedback and emotions is based on studies in which feedback was assessed via achievement outcomes (test scores, course grades, GPA).

Avenues for Future Research on the Relations between Feedback and Emotions

Taking Different Types of Feedback into Account. As outlined above, most studies on the relations between performance feedback and emotions refer to achievement outcomes as provided by test scores, course grades, and GPA. Thus, we lack knowledge on the relations between other types of performance feedback (e.g., oral feedback, computer-based feedback, immediate process feedback) and emotions. Future studies might take other taxonomies and purposes of feedback into account (e.g., formative vs. summative feedback, correction, reinforcement, forensic diagnosis, benchmarking, longitudinal development; Price, Handley, Miller, & O’Donovan, 2010; progress feedback vs. gap feedback; Voerman, Korthagen, Meijer, Simons, 2014; Chapter 3 in this volume). Of note is that we (the authors of this chapter and our collaborators) are currently embarking on a study that will investigate student emotional responses to feedback provided on a written task. We will examine these effects longitudinally.

Taking the Emotions of the Feedback Provider into Account. As outlined above, Johnson and Connelly (2014) argued that emotions that were induced by the feedback message itself (e.g., good achievement results, i.e. outcome emotions) as well as emotions that were communicated in the feedback

exchange (e.g., enjoyment of the feedback provider) should be taken into account. Research is lacking on the latter aspect, and to our knowledge, there are no studies that focused on both aspects simultaneously. As for the emotions involved in the feedback exchange, emotional transmission processes should be investigated (Frenzel et al., 2009). Studies may examine how emotions of the feedback provider and the feedback receiver interact in an oral or written feedback process.

Taking Intraindividual Relations into Account. Although most of the theoretical approaches on the relations between performance feedback and emotions (e.g., control-value theory; Pekrun, 2006) refer to intraindividual mechanisms (cf. Molenaar, 2004; Voelkle, Brose, Schmiedek, & Lindenberger, 2014), nearly all existing studies focus on interindividual relations from which it is hardly ever possible to extrapolate to intraindividual relations (Schmitz & Skinner, 1993; Goetz et al., 2016). Future studies might investigate intraindividual relations by assessing feedback, emotions, and moderating as well as mediating variables repeatedly within persons over time. Longitudinal questionnaire studies or experience-sampling methods can be effectively used for these purposes (Csikszentmihalyi & Larson, 1987; Hektner, Schmidt, & Csikszentmihalyi, 2007). Intraindividual analyses of longitudinal data and intraindividual time-series analyses (cf. Schmitz & Skinner, 1993) might be helpful to shed light into the intraindividual relations between performance feedback and emotions. As argued by Voelkle et al. (2014), findings on the intraindividual level are a prerequisite to support theoretical assumptions on intraindividual functioning and to develop intervention programs for individuals.

Theory Development. Above and beyond the model presented in this chapter, it is important to develop empirically sound theories describing the interplay between performance feedback and emotions. Such theories might be based on the results of studies on intraindividual relations between both variables. They would be helpful for further research in this field and for bringing different theoretical approaches together (e.g., those from feedback and emotion research and from educational and work psychology).

Developing Intervention Studies. There is a clear lack of intervention studies with respect to providing feedback with the purposes of eliciting differential emotions and also with respect to emotions being beneficial concerning achievement outcomes and subsequent performance feedback. Such studies might take existing findings on the moderators and mediators of the relations between feedback and emotions into account and should be based on results of studies on intraindividual relations between performance feedback and emotions. In conclusion, we offer the following quotes that came from a focus group discussion, in which students described their reactions to feedback messages (Lipnevich, 2007): “I saw my grade and froze. I can’t really improve that much from 55 [referring to the score]. I am going to fail it. I felt quite mad” or “I was upset because I thought I did a lot better. I stared at it for, like, fifteen minutes before I could start making some changes. I kept thinking that I failed the exam.” Similarly, “I felt super happy and proud that I scored so highly.

I submitted my essay and left. I didn't need to improve my score beyond 92. I was satisfied." Interestingly, these quotes from students include the discussion of mediators and moderators of the link between feedback, emotions, and performance, thus presenting additional evidence that these relations do in fact exist, are meaningful, and should be further explored.

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