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Predicting the use of praise among pre-service teachers: The influence of implicit theories of intelligence, social comparison and stereotype acceptance

Anna-Carin Jonsson* & Dennis Beach**

Abstract
This investigation concerns feedback praise (person and process praise) and how it relates to implicit theories of intelligence (entity and incremental theories) among pre-service teachers. In the first study 176 pre-service teachers participated, while in the second study 151 of such teachers participated. Two new measures, one of feedback praise and the other of social comparison, were found to be reliable and valid. In the first study, process praise was predicted by the variable incremental theories of intelligence and person praise was predicted by the acceptance of stereotypes. However, these results suffered in the reliability analyses and, even if the models are significant, they should be rejected. The results of the second study are more reliable, with regression analyses showing that person praise can be predicted from the two predictor variables of entity theories of intelligence, and social comparison. Some positive effects of teacher education were found in the second part; for example, the preference for person praise was significantly lower in the last semester than in the first.

Keywords: feedback praise, implicit theories of intelligence, student teacher, teacher education

Introduction
The use of feedback praise by teachers has generally been seen as a positive reinforcer of pupil learning and a means of motivation (Rathel et. al., 2008). Yet, on closer consideration, this statement is more contentious than it might seem. For instance, Henderlong and Lepper (2002) found that, depending on the type of feedback used, feedback can either promote motivation and learning or have negative consequences. As a result, in the present article we focus on what might influence student teachers’ preferences for using different forms of feedback praise. Two forms are focussed on: person praise and process praise. We chose these for theoretical and empirical reasons. In addition, we also try to develop a new measurement to investigate feedback preferences.

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Theoretical background

Dweck (1999) has conducted extensive research on learning and motivation. She suggests that motivation is promoted when the teacher praises the process instead of the person when giving feedback. She explains this in terms of the use of process praise increasing beliefs that intelligence is changeable and dependent on effort by encouraging what she terms an incremental theory of intelligence. In contrast, according to Dweck feedback praise that addresses the person encourages a theory of intelligence as a fixed entity, with negative consequences for pupil self-construct, motivation and achievement (Kamin & Dweck, 1999). She therefore recommends that teachers should use process praise as this is more likely to foster pupil motivation.

It is also noted in research on feedback praise that simply telling teachers to use process praise will not work (Pajares, 1992). We suspect that teachers’ subjective beliefs about intelligence and learning might be important here. This is in accordance with Jonsson’s (2004) conclusions that subjective beliefs play a critical role within cognitive systems and that naïve theories are an integral part of this. More specifically, in line with Butler (2000), we believe that subjective beliefs may play a causal role in affecting the regulation of cognitive processes and behaviour (also see Koriat, 2002, p. 262) and that there could be a relationship between the choice of feedback and the implicit theories of intelligence a teacher or a pre-service teacher holds. That is, if a teacher holds a theory of intelligence as a fixed entity, praising the person will be the most likely feedback behaviour whilst, if an incremental theory of intelligence as changeable and dependent is held, praising the process should be expected (Leroy, Bressoux, Sarrazin and Trouilloud, 2007). This would make the relationship between implicit theories and feedback preference more important for teacher education than has previously been suggested and the aim of the present article is therefore to investigate which factors contribute to the type of feedback praise a teacher chooses to use. Implicit theories of intelligence seem to be one factor, but the use of stereotypes (Levy et. al., 1998) and beliefs in classroom competition as a means to increase achievement levels (Trouilloud et. al., 2006) will also be investigated.

Feedback praise

We define feedback praise as regular positive evaluations made by a person of another’s products, performances or attributes given close to the behaviour in question (Henderlong & Lepper, 2002), although we have also considered Brophy’s (1981) suggestion that in typical classrooms teacher praise frequently lacks contingency, specificity and credibility and does not always correlate with pupil achievement. Instead, praise depends on the type of pupil the pupil is recognised as being, such as for example male-female, high-low achieving, well-not well behaved, attentive-or not and so on. It is also noted that they sometimes give praise which correlates significantly with boys’ perceptions of teachers’ expectancies and self-concept but not that of girls’ (Walkerdine, 1990).
Henderlong and Lepper’s (2002) review of praise and motivation describes five themes to attend to if a positive effect of praise is sought [1]. The themes are perceived sincerity, performance attributions, autonomy, competence and self-efficacy, and standards and expectations. But as for instance Kohn (1993) points out, what is most notable about a positive judgment is not always that it is positive but more that it is simply a judgement. As Malmberg and Little (2007) highlight, the teacher’s use of individual feedback is a provider of cues for the pupils to estimate their own ability. This is problematic if the praise lacks reliability and validity and depends on expectations related to issues like class and gender.

**Implicit theories of intelligence**

A distinction is necessary between implicit theories of intelligence (also called naïve or lay theories) and scientific theories of intelligence. Implicit theories are in general implied and not explicitly held. Scientific theories are explicitly argued and reargued (Tamir et. al., 2007). In this research we focus solely on the implicit theories of pre-service teachers and are not concerned with debating what intelligence de facto is or is not, or what is or is not a correct scientific theory about intelligence. Implicit theories of intelligence are important in that they exert an influence on motivation, learning and achievement (Carr & Dweck, 2011). However, we do follow Dweck’s (1999) conclusions that: (a) people seem to have a preference for either an entity theory or an incremental theory; and (b) that an incremental theory seems to be more beneficial for the learner with its focus on effort since beliefs in intelligence as fixed produce effects such as helplessness and passivity in the context of learning (Blackwell et. al., 2007; Carr & Dweck, 2011) [3].

**Aims**

The starting point of the present study is an acknowledgement of three research-based facts that can be identified above. First, teacher competencies and classroom performance effect pupil achievement more than any other factor (Billingsley & McLeskey, 2004). Second, feedback praise has been shown to influence pupil performance (Rathel et al., 2008). Finally, some forms of feedback seem to encourage motivation and good learning performances better than others (Carr & Dweck, 2011). Therefore, we will attempt to:

1. develop a valid and reliable measurement of feedback praise preferences; and
2. investigate the underlying factors of the preferences for praise in order to be able to influence and stimulate the increased use of types of praise that positively encourage pupil learning.

In order to effectively carry out these investigations we have developed a new measurement from feedback studies by Henerlong & Lepper (2007), which we call the **Person**
Process Feedback scale (hereinafter PPF). This scale is designed to measure teacher and pre-service teachers’ preferences for giving feedback praise to either the person or the process. This instrument is tested for reliability and validity in both studies. For the implicit theories of intelligence we use a Swedish translated version of the well-validated measurement Theories of Intelligence Scale (TIS) by Dweck (1999, see Appendix 1). For the specific measurements in each study, please see the Method section.

In the first study we investigate the choice of feedback praise for 177 pre-service teachers in relation to implicit theories of intelligence and acceptance of stereotype praise. For the second two, our focus is on the relations between choice of praise and beliefs in intelligence, but we also explore relations between praise and the beliefs that social comparison promotes learning. Here 151 pre-service teachers were involved. We also compare pre-service teachers’ preferences for feedback praise and beliefs in social comparison in the first semester and last semester among individuals in order to test Pajares’ (1992) statements.

Study 1

This study investigates how teachers’ beliefs and implicit theories of intelligence are integrated in their choice of feedback praise. Van Driel et. al. (2007) suggest that beliefs can cluster together and we contend that there could be a relationship between the choice of feedback praise, implicit theories of intelligence and acceptance of stereotypes (Carter et. al., 2006). This is in line with Levy et al. (1998) who pointed out that when people see intelligence traits as fixed and predictable their acceptance of stereotype use becomes more pronounced. Besides developing a short measurement for person and process praise (PPF), the following questions are addressed:

Research questions

• Do people who prefer to use person-focused praise tend to hold entity theories of intelligence and have a greater tolerance for accepting the use of stereotypes?
• Do those who prefer process-focused praise hold incremental theories and have little tolerance for accepting the use of stereotypes?

Method

Participants

176 pre-service teachers in the first study unit participated in study 1. Their ages were between 19 and 45 years old (mean 24). There were 151 women and 25 men. They were enrolled in preschool (116 pre-service teachers), elementary (45 pre-service teachers) and secondary (14 pre-service teachers) programmes. The gender distribution is heavily influenced by an emphasis on early-years teacher education programmes and is nationally representative.
Predicting the use of praise among pre-service teachers

Feedback praise
The PPF scale used in the investigation consists of four items that respectively measured: (a) person praise (sample item “You’re really good at this”); and (b) process praise (sample item “You must be concentrating hard”) (see Appendix 1). A ten-point clear numerical scale was used, ranging from 1 = I would absolutely not use this praise to 10 = I would absolutely use this praise. The participants included a numerical expression directly under each statement. The reliability analysis for the four person-praise items had a Cronbach alpha of .755 while the four process-praise items had a Cronbach alpha of .693. A factor analysis was performed analysing the validity of the measurement (see the Results section).

Implicit theories of intelligence
A Swedish translation of Dweck’s (1999) Theories of Intelligence Scale (TIS) was used to assess the pre-service teachers’ entity and incremental theories of intelligence. This was done within two disciplines: social science and mathematics. Four items were measured on a ten-point scale for respectively an entity theory of intelligence (sample item “In mathematics/In social science your intelligence is something about you that you can’t change very much”) and an incremental theory of intelligence (sample item “In mathematics/In social science you can always substantially change how intelligent you are”). Every participant received eight items (four entity and four incremental) related to social science and eight items (four entity and four incremental) related to mathematics. The reliabilities (Cronbach’s alpha) in social science were .700 for an entity theory and .874 for an incremental theory. In mathematics, they were .784 for an entity theory and .847 for an incremental theory (see Appendix 2).

Acceptance of Stereotypes Questionnaire
A 12-item questionnaire from Carter et al. (2006) was used to measure the acceptance of stereotypes. Three groups of items were used. The first group is concerned with the utility of knowing about others’ group membership and can be seen as an implicit measure. The second group of items deals with the need to generalise about groups as well as a moral defence of the use of generalisations as such. The third group of items includes the term stereotype and represents blanket condemnation (see Appendix 3). Cronbach’s alpha for the first factor reached .468. For the other two factors the reliabilities were .394 and .397.

Procedure
Trained researchers collected the data. The pre-service teachers did not receive any information about the aim of the study before giving their responses and were asked not to speak to each other. When they had finished each part of the investigation they were asked not to go back to it. Order effects of the measurements were controlled for. After all the participants had attended to all of the items they were given a lecture on the subject area and thanked for their participation.
Results
First, a principal factor analysis with orthogonal rotation was performed on the PPF scale in order to investigate the validity of the newly developed measurement. After this, Pearson’s correlations were obtained in order to control for multicollinearity and further investigate the relationships between the variables. Finally, two stepwise multiple regression analyses were performed in order to discover whether different preferences for feedback praise can be explained by beliefs in different implicit theories of intelligence. We also included the predictor variable of acceptance of stereotyping in the regressions. Table 1 presents the factor analysis, including the eight-item PPF scale.

Table 1. Orthogonal factor loadings matrix for the PPF scale including 4 items for person praise and 4 items for process praise (see Appendix 2 for the original scale).

| Variables                  | Factor 1 | Factor 2 |
|----------------------------|----------|----------|
| Feedback Person Item 3     | 0.86     | 0.05     |
| Feedback Person Item 7     | 0.79     | 0.07     |
| Feedback Person Item 4     | 0.70     | 0.22     |
| Feedback Person Item 1     | 0.64     | 0.16     |
| Feedback Process Item 6    | 0.06     | 0.84     |
| Feedback Process Item 5    | 0.14     | 0.73     |
| Feedback Process Item 2    | 0.20     | 0.65     |
| Feedback Process Item 8    | 0.08     | 0.60     |

Principal components analysis was conducted on the correlations of the eight variables. Two factors were initially extracted with eigenvalues equal to or greater than 1.00. Orthogonal rotation of the factors yielded the factor structure given in Table 1 above. The first factor accounted for 29% of the variance. The four person-praise items loaded onto this factor. The second factor accounted for 26% of the variance. The four process-praise items loaded onto this factor. The first factor seems to represent person praise and the second factor process praise.

Pearson’s correlations between predictor and criterion variables are presented in Table 2.

According to Howitt and Cramer (2008), there is a danger of multicollinearity when the inter-correlations between the predictor variables are 0.8 or above. The correlation coefficient between entity theories of intelligence and incremental theories of intelligence in mathematics was $r = -0.621, p < 0.001$, between entity theories of intelligence and incremental theories of intelligence in social science the correlation was $r = -0.471, p < 0.001$, between entity theories of intelligence in social science and entity theories of intelligence in mathematics the correlation was $r = 0.544, p < 0.001$ and between incremental theories of intelligence in mathematics and incremental theories...
of intelligence in social science the correlation was \( r = .535, p < 0.001 \). Further, a weak relationship was found between entity theories of intelligence in mathematics and incremental theories in social science \( r = -.319, p < 0.001 \) and between incremental theories in mathematics and entity theories in social science \( r = -.288, p < 0.001 \).

Table 2. Pearson’s correlations between the variables; 1) entity theory in mathematics; 2) incremental theory in mathematics; 3) entity theory in social science; 4) incremental theory in social science; 5) stereotype acceptance; 6) person praise; and 7) process praise (\( N = 175 \)).

| Variables                          | 1   | 2   | 3   | 4   | 5   | 6   | 7   |
|------------------------------------|-----|-----|-----|-----|-----|-----|-----|
| 1. Entity theory in mathematics    |     |     |     |     |     |     |     |
| 2. Incremental theory in mathematics | -.621*** |     |     |     |     |     |     |
| 3. Entity theory in social science | .544*** | -.288*** |     |     |     |     |     |
| 4. Incremental theory in social science | -.319*** | .535*** | -.471*** |     |     |     |     |
| 5. Stereotype acceptance           | .170* | -.119 | .242** | -.058 |     |     |     |
| 6. Person praise                   | .079 | -.077 | .008 | .146 | .182* |     |     |
| 7. Process praise                  | -.023 | .044 | -.125 | .136 | -.004 | .315** |     |

* = \( p < 0.05 \), ** = \( p < 0.01 \), *** = \( p < 0.001 \)

The variable stereotype acceptance correlated with an entity theory in mathematics \( r = 170, p < 0.05 \), an entity theory in social science \( r = .242, p < 0.01 \) and the criterion variable person praise \( r = .182, p < 0.05 \). Finally, the two praise variables correlated significantly with each other \( r = .315, p < 0.001 \). This last relation may be an effect of measurement use.

The results of the two stepwise multiple regression analyses are shown in Table 3. The dependent variable preference for person praise is examined in the first regression and the preference for process praise in the second with the predictor variables entity theories of intelligence in mathematics and social science, incremental theories of intelligence in mathematics and social sciences and acceptance of stereotyping.

Table 3. Summary of two stepwise multiple regressions for the variables predicting: 1) person praise; and 2) process praise (\( N = 164 \)).

| Dependent variable | Independent variable                      | B   | SE B | Beta  |
|--------------------|------------------------------------------|-----|------|-------|
| Model 1            | Acceptance of stereotype use              | 0.248 | 0.098 | 0.198* |
| \( R^2 = 0.39 \), Adjusted \( R^2 = 0.033 \) | | | | |
| Person praise      | Incremental theories in social science    | 0.158 | 0.068 | 0.179* |
| \( R^2 = 0.032 \), Adjusted \( R^2 = 0.026 \) | | | | |

Note. * = \( p < 0.05 \). The independent variables were an entity theory in mathematics, an entity theory in social science, an incremental theory in mathematics, an incremental theory in social science and Acceptance of stereotype use. Only one model was suggested for the regressions and all other independent variables were excluded, except for those presented above.
For the dependent variable *preference for person praise* only one model was suggested and all other predictor variables were excluded, except *acceptance of stereotyping*. More specifically, in the stepwise multiple regression the predictor variable *acceptance of stereotyping* was the only one entered. It explained 3.3% of the variance when $R^2$ was adjusted for the sample, $F(1, 162) = 6.43, p < 0.05$. All other predictor variables were excluded and no alternative model was suggested. However, the stereotype scale did not reach acceptable levels of reliability and the results are to be interpreted with this in mind. For the dependent variable *preference for process praise* only one model was suggested and all other predictor variables were excluded, except for *incremental theory in social science*. In the stepwise regression the predictor variable *incremental theory of intelligence in social science* was entered and explained 2.6% of the variance when $R^2$ was adjusted for the sample, $F(1, 162) = 5.24, p < 0.05$.

**Discussion of study 1**

Our intention was to develop a quantitative instrument for measuring preferences for feedback praise. We partly succeeded in that the PPF scale seems to be reliable and valid. We can therefore recommend the use of that scale. Our first research question can also be answered. Pre-service teachers who prefer to use person praise have a greater acceptance of stereotype use. However, the relationship was weak. Our hypothesis was that person praise had relations to both entity theories and stereotypes, in accordance with research by Van Driel et al. (2007). That these variables had relations was also suggested by Levy et al. (1998), in that people who hold entity theories of intelligence have a greater acceptance of the use of stereotypes [4]. We partly confirmed this. However, there could be an indirect relationship between implicit theories, feedback praise and acceptance of stereotypes. This could be explored by structural equation modelling. Our samples are too small for this but this could be a subject for future research.

Our second research question concerned whether pre-service teachers with a preference for process praise hold strong incremental theories of intelligence. This was confirmed in the regression analysis for social science despite no negative relation being found for the acceptance of stereotype use.

The explained variance in our investigation is not very large but is in line with previous research by Blackwell et al. (2007) and Dweck (2007). However, an alternative explanation of the weak results could be that our instruments did not manage to measure our core concepts. What speaks against this is that both the Cronbach alpha and the factor analyses reached acceptable levels for the PPF scale and TIS. Only the instrument *Acceptance of Stereotype* failed in the reliability analyses. The measures seem reliable and valid. If this is the case, there might be a significant relation that fits theory, but it might be so weak that it has no practical implications. We will return to this in the General Discussion at the end of this article.
Study 2

This study investigates the choice of feedback praise among pre-service teachers in relation to their beliefs about social comparison in classrooms and implicit theories of intelligence. Social comparison has received attention because, if pupils compare themselves with each other in order to see if they are succeeding (instead of focusing on mastery acquisition), they may face motivational problems when confronted with difficulties. Pupils who achieve objective task mastery but do so less quickly or perfectly may demonstrate a negative effect, frustration and some degree of helplessness if comparisons with other pupils who succeed in an early stage dominate the classroom climate (Henderlong & Lepper, 2002).

Trouilloud et al. (2006) showed that teachers who conform to an entity explanation of intelligence also encourage social comparisons among pupils. A teacher’s decision to use person praise and not process praise could be related to beliefs that social comparison improves learning and strong beliefs in an entity theory of intelligence (Leroy et al. 2007). This is important in that the choice of person praise may influence learning negatively (Henderlong & Lepper, 2007). However, it is also noted that a change in beliefs seems hard to accomplish among pre-service teachers attending teacher educational programmes (Pajares, 1992). We will also validate the PPF scale again and try to develop a measurement for attitudes to social comparison.

Research questions

• Do people who prefer to use person-focused praise tend to hold entity theories of intelligence and have stronger beliefs in social comparison as promoting learning?
• Do those who prefer process-focused praise hold incremental theories and have weaker beliefs in social comparison as promoting learning?
• Do changes in either choice of feedback or beliefs in social comparison occur between the first and last semesters of teacher education?

Method

The sample included 151 pre-service teachers aged between 18 and 57 years, with 69 being in their first semester and 82 in their last. The mean age among the pre-service teachers in the first semester was M = 26.8 and in the last semester M = 30.8, which could interfere with other analyses between these groups. There were 140 women and 10 men (1 missing value for sex). They were enrolled in preschool (38), elementary (82) and secondary (29) programmes (2 missing values for school). As in study 1, the gender distribution is heavily influenced by sample emphases on early-years teacher education programmes and is nationally representative.
Feedback praise

The same Person Process Feedback scale (PPF) was used as in the first study with the same ten-point numerical scale. The four items of person praise reached a Cronbach alpha of .818 and the four items of process praise reached a Cronbach alpha of .732. The reliability of PPF can therefore be seen as convincing. A factor analysis was performed (see the Results section).

Implicit theories of intelligence

The same version of Dweck’s (1999) Theories of Intelligence Scale (TIS) as in study 1 was used. The reliabilities (Cronbach’s alpha) for an entity theory in social science were .671 and for an incremental theory .829. In mathematics the values were .777 for an entity theory and for an incremental theory .871. Further, the two measures of entity theories within social science and mathematics correlated significantly with each other \( r = 0.609, p < 0.01 \). They were therefore combined to form a general measure of an entity theory of intelligence. In addition, the two measures of incremental theories within social science and mathematics correlated significantly with each other \( r = 0.641, p < 0.01 \). They were combined as a general measure of an incremental theory of intelligence. These general measures were then used as predictor variables in the multiple regression analysis.

Social Comparison

A seven-item scale was created. Cronbach’s alpha for all seven items was .804. A ten-point clear numerical scale was used, ranging from 1 = strongly disagree to 10 = strongly agree with the statement. The participants included a numerical expression directly under each statement to reflect the extent to which they agreed with it. A higher value signalled a stronger agreement with social comparison as a means to promote learning in class and a lower value signalled a lower agreement. A factor analysis was performed analysing the validity of the measurement (see the Results section).

Results

First, two principal factor analyses with orthogonal rotation were performed on the PPF scale and the Social Comparison scale in order to investigate the validity of the newly developed measurement. After this, Pearson’s correlations were obtained in order to control for multicollinearity and further investigate the relationships between the variables. Finally, two stepwise multiple regression analyses were performed in order to discover the relations between the type of feedback preference and implicit theories of intelligence and beliefs in social comparison as promoting learning. After this, variance analyses were performed between the first and last semesters on the dependent variables feedback praise (person and process) and social comparison.

Table 4 presents the factor analysis including the eight-item PPF scale. Four items measured the preference to give person praise and four items the preference for process praise.
Table 4. Orthogonal factor loadings matrix for the PPF scale including 4 items for person praise and 4 items for process praise (see Appendix 2 for the original scale).

| Variables                        | Factor 1 | Factor 2 |
|----------------------------------|----------|----------|
| Feedback Person Item 3           | 0.91     | 0.03     |
| Feedback Person Item 4           | 0.80     | 0.22     |
| Feedback Person Item 7           | 0.74     | 0.22     |
| Feedback Person Item 1           | 0.70     | 0.17     |
| Feedback Process Item 6          | 0.16     | 0.83     |
| Feedback Process Item 5          | 0.20     | 0.80     |
| Feedback Process Item 2          | 0.19     | 0.65     |
| Feedback Process Item 8          | 0.05     | 0.62     |

A principal components analysis was conducted. Two factors were initially extracted with eigenvalues equal to or greater than 1.00. Orthogonal rotation of the factors yielded the factor structure given in Table 3 above. The first factor accounted for 33% of the variance. The four person praise items loaded onto this factor. The second factor accounted for 28% of the variance. The four process praise items loaded onto this factor. The first factor seems to represent person praise and the second process praise. These are the same dimensions as in study 1 for the PPF scale.

Table 5 presents the factor analysis including the seven-item social comparison scale.

Table 5. Orthogonal factor loadings matrix for the social comparison scale including 7 items (see Appendix 4 for the original scale)

| Variables              | Factor 1 | Factor 2 |
|------------------------|----------|----------|
| Social comparison Item 3 | 0.87     | 0.05     |
| Social comparison Item 4 | 0.82     | 0.19     |
| Social comparison Item 2 | 0.82     | 0.12     |
| Social comparison Item 1 | 0.81     | -0.05    |
| Social comparison Item 5 | 0.80     | -0.01    |
| Social comparison Item 6 | 0.78     | 0.28     |
| Social comparison Item 7 | 0.07     | 0.98     |

A principal components analysis was conducted on the correlations of the seven variables. Two factors were initially extracted with eigenvalues equal to or greater than 1.00. Orthogonal rotation yielded the factor structure given in Table 5. The first factor accounted for 57% of the variance. The six social comparison items loaded onto this factor. The second factor accounted for 16% of the variance. Only the last social comparison item loaded onto this factor. The first factor seems to grasp social
comparison in that it explains a considerable amount of the variance and all six items loaded onto it. Pearson’s correlations between the predictor and criterion variables are presented in Table 6.

**Table 6.** Pearson’s correlations between the variables; entity theories of intelligence, incremental theories of intelligence, social comparison, person praise and process praise (N = 149).

| Variables               | Entity theories | Incremental theories | Social comparison | Person praise | Process praise |
|-------------------------|-----------------|----------------------|-------------------|--------------|---------------|
| Entity theories         |                 |                      |                   |              |               |
| Incremental theories    | .650***         |                      |                   |              |               |
| Social comparison       | .210*           | -.164*               |                   |              |               |
| Person praise           | .296**          | -.165*               | .246**            |              |               |
| Process praise          | .024            | .036                 | .052              | .395**       |               |

* = p. 0.05, ** = p. 0.01, *** = p. 0.001

Correlation coefficients of 0.8 or above between predictor variables give a high risk of multicollinearity (Howitt & Cramer, 2008). Entity theories of intelligence correlated significantly with incremental theories of intelligence $r = -.650$, $p < 0.01$. The correlation between social comparison and entity theories of intelligence was $r = .210$, $p < 0.05$ and with incremental theories $r = -.164$, $p < 0.05$. Person praise showed a positive, significant relation with entity theories $r = .296$, $p < 0.01$, and a negative relation with incremental theories $r = -.165$, $p < 0.05$ and again a positive one with social comparison $r = .246$, $p < 0.01$. Person praise and process praise correlated significantly with each other $r = .395$, $p < 0.01$, which is the same result as in Study 1.

Stepwise multiple regression analyses were performed with the dependent variable **person praise** (see Table 7) and the dependent variable process praise. In both regressions the predictor variables were **entity theories** of intelligence, **incremental theories** of intelligence and **social comparison** as promoting learning in class.

**Table 7.** One stepwise multiple regression for the variables Entity theory of intelligence, Incremental theories of intelligence and Social comparison predicting person praise (N = 146).

| B          | SE B | Beta    |
|------------|------|---------|
| Model 1    |      |         |
| Entity theory of intelligence | 0.460 | 0.129   | 0.283*** |
| Model 2    |      |         |
| Entity theory of intelligence | 0.392 | 0.130   | 0.242** |
| Social comparison | 0.260 | 0.106   | 0.196*  |

Note * = p. 0.05, ** = p. 0.01, *** = p. 0.001. Model 1: $R^2 = 0.080$, Adjusted $R^2 = 0.074$, Model 2: $R^2 = 0.117$, Adjusted $R^2 = 0.105$. Incremental theory was excluded as a predictor of person praise.
For the dependent variable *preference for person praise* the stepwise multiple regression firstly suggested Model 1 where the predictor variable *entity theory of intelligence* was entered and explained 7.4% of the variance when $R^2$ was adjusted for the sample, $F(1, 145) = 12.60, p < 0.001$. In the second model, Model 2, the predictor variables *entity theory of intelligence* and *social comparison* were entered and explained 10.5% of the variance when $R^2$ was adjusted for the sample $F(1, 145) = 9.52, p < 0.001$. A stronger preference for using *person praise* was associated with greater beliefs in *entity theories of intelligence* and with *social comparison* as a positive factor in motivation and learning.

The second stepwise multiple regression analysis was performed with the dependent variable *preference for process praise* with predictor variables *entity theories of intelligence*, *incremental theories of intelligence* and *social comparison*. No significant effects were found. Finally, a mixed repeated $2 \times 2$ ANOVA between groups for *semester* (first semester, last semester) and within individual *feedback preference* (person and process praise) was computed. A one-way ANOVA was used to analyse beliefs in *social comparison* between the first and last semesters (between groups) in teacher education to study whether beliefs in social comparison had changed as well (Table 8).

Table 8. Means (and SDs within parentheses) for the measures feedback praise; person and process praise and beliefs in social comparison as promoting learning (First term N = 69 and Last term N = 82)

| Teacher Educational Programme | Feedback praise | First semester (N = 69) | Last semester (N = 82) | Total (N = 151) |
|------------------------------|-----------------|--------------------------|-----------------------|-----------------|
| Person                       | 6.10 (2.04)$^a$| 4.44 (2.05)              | 5.20 (2.20)$^c$       |
| Process                      | 7.71 (1.51)     | 7.32 (2.03)              | 7.50 (1.81)           |
| Social Comparison            | 4.04 (1.51)$^b$| 3.12 (1.64)              | 3.54 (1.64)           |

*a* = $p < 0.001$ interaction effect with person versus process and first versus last semester  
*b* = $p < 0.001$ compared with last period  
*c* = $p < 0.001$ main effect; compared with process  
Adjustment for multiple comparisons: Bonferroni

A main effect was found for the dependent factor feedback praise within the individual $F(2, 149) = 165.36, p < 0.001$ between the preference for using *person praise* ($M = 5.20$) and *process praise* ($M = 7.50$). This shows that in general the pre-service teachers would like to give less person praise compared to process praise. An interaction effect was found between Feedback praise and Semester $F(2, 149) = 12.02, p < 0.001$. Here the preference for *person praise* drops significantly from the first semester ($M = 6.10$) to the last ($M = 4.44$), although for *process praise* no significant change is found from the first semester ($M = 7.71$) to the last ($M = 7.32$). An adjustment for multiple comparisons was performed with Bonferroni. It seems that pre-service teachers near
the end of their teacher education prefer to use person praise to a lesser extent while the preference for process praise did not change. We suggest that this is a positive effect of the teacher education.

The one-way ANOVA with the between factor first and last semester revealed a significant difference for the dependent variable social comparison; \( F(1, 146) = 12.33, p < 0.001 \) between the first semester (\( M = 4.04 \)) and the last semester (\( M = 3.12 \)). The pre-service teachers’ beliefs in social comparison as promoting learning in class were thus significantly lower in the last semester compared to the first semester.

**Discussion of study 2**

In this study the PPF scale is confirmed as reliable and valid with a new sample. This also applied to the Social Comparison scale, which was reliable as well as valid with the small adjustment that the last item did not fit. Accordingly, it was removed from the original scale. We present this scale in Appendix 4 with six items instead of seven.

Our analyses show that those who preferred using person praise also have stronger beliefs in intelligence as fixed and innate and further believe that social comparison promotes learning. This complements previous research where person praise seems to be associated with entity theories of intelligence and beliefs in the value of a competitive classroom climate (Leroy et al., 2007). However, concerning the second question, the study failed to find predictor variables for the dependent variable *process-oriented feedback praise*. One explanation could be that the sample in the two studies encompasses less than 200 participants, which in a multiple regression is considered to be small. Another problem is the sample itself in that the probability to trace relations is greater where variance is higher and for that we use a cohort design (Cook & Campbell, 1979). We suspect that the participants’ beliefs are more similar (they are all pre-service teachers from teacher education) than if we had included, for example, students from many different professions. The consequence is reduced variance with difficulties in finding relations. Further research is needed.

The third question that tacit beliefs are hard to change in teacher educational programmes revealed that the pre-service teachers’ preference for person praise was lower in the last semester than in the first. The same applied for social comparison, but the pre-service teachers did not differ in terms of their preference for process praise. However, the pre-service teachers also differed in mean age between the first and last semesters. We cannot exclude that the results may be explained by age in that younger pre-service teachers may have stronger beliefs in person praise and social comparison compared with older pre-service teachers. Yet the teacher education could also have some impact in our study and Pajares’ statements may be interpreted with some caution. One explanation could be that a deeper elaboration of epistemological perspectives complicates the picture of ability as fixed within a person and because of this less feedback is focused on the person.
Predicting the use of praise among pre-service teachers

General discussion

When people make judgments, implicit theories and subjective beliefs become an integral part of the behavioural output (Jonsson, 2004) and are even suggested to play a causal role in affecting cognitive processes (Koriat, 2002). We applied this theorising to how intelligence is constructed by people at a naïve level. More specifically, we investigated their implicit theories of intelligence (Carr & Dweck, 2011) and how they might influence their choices of person or process feedback praise. We also made assumptions about the relatedness between the acceptance of stereotype use and social comparison.

The results are not fully consistent. In the first study the finding was that the pre-service teachers’ preferences to use process praise were positively related to beliefs in an incremental theory of intelligence. But the variance explained was as small as 3–4% and the practical implications for teachers might not be relevant. In the second regression, person praise was associated with the acceptance of stereotypes, but the stereotype measurement was not reliable. However, in the second study person praise was significantly predicted by entity theories of intelligence and beliefs in social comparison as a positive factor in achievement. Our findings could be interpreted as indicating that the only relation that seems to have some impact is the one that predicts person praise from entity theories of intelligence and beliefs in social comparison as promoting learning. This is in line with but extends the findings of Henderlong and Lepper (2007).

Alternative explanations can be proposed about why the relationship between person praise and entity theories did not show up in the first study but was revealed in the second, and why the regression model showed a significant relationship between the favouring of process praise and incremental theories of intelligence in the first study but not the second. One possible reason is that in the first study implicit theories of intelligence within specific knowledge domains were measured in contrast to general implicit theories of intelligence within the second study. However, the results are in the theorised direction in both studies and to some degree this can be explained by naïve implicit theories of intelligence. Moreover, as the choice of what feedback praise to use seems to be related to some extent to the implicit theory of intelligence held by a pre-service teacher, it may be possible to influence feedback choices via implicit theories of intelligence in that by focussing on reinforcing beliefs in incremental theories of intelligence in teacher education it may be possible to increase the use of process praise in schools in the future, with this then having subsequent positive effects on pupil learning and motivation. Since simply telling pre-service teachers to use process praise may not work, these findings are potentially very important (Pajares, 1992) [6].

In the second study, the preference for person praise and beliefs in social comparison were shown to be lower in the last semester than in the first. This could be an effect of the teacher educational programme but one problem is that the mean age
differed such that it could be that younger pre-service teachers have stronger beliefs in person praise and social comparison than older pre-service teachers and that the teacher education does not have any effect. Georgiou (2008) showed that young and inexperienced teachers preferred to explain achievement from the situation and not from a person’s attributes in comparison to older and more experienced teachers. However, Jonsson et al. (in print) could only explain age in interaction with experience where older and less experienced teachers had weaker beliefs in entity theories. These alternative explanations should be investigated further in future research.

Finally, if a pre-service teacher or a practicing teacher believes intelligence is fixed and innate, it becomes logical to praise these abilities when succeeding and to blame them when failing. On the other hand, if intelligence is seen as malleable and changeable, then praising or blaming effort should be expected. Effort is something that is under the pupil’s control. There is something you can do about it in contrast to an innate and fixed ability. The preference for praise (person or process) among pre-service teachers as well as practicing teachers is therefore something that should be taken seriously.

**Conclusions**

Our studies suggest that if a person believes intelligence is fixed and innate, s/he will be more likely to attribute success and failure to innate capabilities and use person praise, whereas if beliefs in incremental theories are stronger then process praise is more likely. Process praise seems to have positive effects on learning, whilst person praise may have negative effects. One interesting project for the future would therefore be to investigate to what extent pre-service teachers as well as practicing teachers change their choices of feedback if their implicit theories can be challenged and changed in a specific direction. Finally, we present two new reliable and valid measurements to be used in further research, the PPF scale (see Appendix 2) for measuring the preference to give person or process feedback, and the Social Comparison scale (Appendix 4) for measuring beliefs that social comparison is beneficial for learning.

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Predicting the use of praise among pre-service teachers

Notes
1 Hendelong and Lepper let 93 fourth- and fifth-grade pupils engage in a puzzle task. After a failure experience, the results showed that process praise enhanced motivation and person praise dampened motivation for girls. No effect was found for boys.
2 In previous research on implicit theories of intelligence, the focus has often been on learning, motivation, achievement and goal orientation (Brøtten & Stromso, 2006; Dupeyrat & Mariné, 2005) or the impact of implicit theories on either stereotype processing (Levy et al., 1998; Plaks, Grant, & Dweck, 2005) or development in early childhood and adolescence (Gonida et al., 2006; Leondari & Gialamas, 2002). Our research makes use of this research but is also slightly different.
3 Here we recognise that learning and achievement have been shown to be promoted more effectively when an incremental theory of intelligence is held by teachers and adopted by pupils (Dweck, 1999) and that person-oriented feedback fosters an entity theory of intelligence within pupils (Kamin & Dweck, 1999) and should only be used very sparsely, whilst process-oriented feedback praise seems to foster an incremental theory of intelligence and have positive consequences for motivation and achievement (Dweck, 1999). These two points are in line with Blackwell, Trzesniewski and Dweck’s (2007), experimental studies with 7th graders in mathematics.
4 The main problem here is to have full control. However, how could one ever have such control over the content taught to pre-service teachers during a time period of 4 years? In line with Cook and Campbell’s (1979) suggestions about quasi-experimental research, we feel there are serious benefits of this type of research despite the weak control.
5 Mueller and Dweck gave elementary school children process- or person-focused praise and found that those given process praise were more likely to adopt incremental theories and attribute failure to effort instead of ability. In general, children given process praise persisted to a greater extent, showed more positive affect and performed better in the face of failure (Kamin & Dweck, 1999).
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Appendix 1

Theories of Intelligence Scale – Other Form For Adults (Dweck, 1999)

The scale (without the words mathematics or social science) is designed by Carol Dweck in order to investigate ideas about intelligence. In this study we have brought the disciplines of mathematics and social science into the items. The participants first rated the eight items below from the perspective of the mathematics (social science) discipline and after this rated the eight items from the perspective of social science (mathematics) discipline.

1a) In mathematics/In social science people have a certain amount of intelligence, and they can’t really do much to change it.
2a) In mathematics/In social science someone’s intelligence is something about them that they can’t change very much.
3b) In mathematics/In social science no matter who someone is, they can significantly change their intelligence.
4a) To be honest, in mathematics/in social science, people can’t really change how intelligent they are.
5b) In mathematics/In social science people can always substantially change how intelligent they are.
6a) In mathematics/In social science people can learn new things, but they can’t really change their basic intelligence.
7b) No matter how much intelligence a person has in mathematics/in social science, they can always change it quite a bit.
8b) In mathematics/In social science people can change their basic intelligence level considerably.

a = Entity theories of intelligence; b = Incremental theories of intelligence
Appendix 2

The following feedback is the one I would have given my pupils when, for example, they had solved a complicated puzzle or finished some complicated work in school.

Indicate the extent to which you would have used the feedback below by writing any number between 1 and 10. The number 1 means that you would not have used the feedback at all and number 10 indicates that you absolutely would have used it. In other words, the higher the number the more you would have used the feedback.

1) You’re really good at this!
2) You must be working hard!
3) You are so talented!
4) You have a great puzzle-solving ability.
5) You must be concentrating hard!
6) You have really made an effort!
7) You are so gifted!
8) It is great that you did not give up even if it was hard.

PPF Scale: Person Process Feedback Scale
Person praise: Item 1, 3, 4 and 7
Process praise: Item 2, 5, 6 and 8
Appendix 3
Carter, J.D., Carney, D.R., & Rosip, J.C. (2006).

a = concerned with the utility of knowing about others’ group memberships, with none of these items using the term “stereotype”.

b = included the necessity and/or utility of generalising about groups as well as moral defence using the term “stereotype”

c = used the term stereotype and all represented blanket condemnation (all reversed items)

1a) Sometimes when I meet new people, I can predict their behaviour or attitudes just from knowing what social/cultural groups they belong to.

2a) In daily life, there’s so much to pay attention to, it helps if you can make a few assumptions about a person.

3a) When interacting with others, it’s very important to have a sense of what social/cultural groups they belong to.

4b) Stereotypes can be harmful but they are essential for interacting with members of real groups.

5a) People differ so much from one another, it is impossible to generalise about them (R).

6b) You cannot get through life without generalising about people, even though such generalisations may be overstated.

7a) It’s impossible to know how a person will behave from knowing what social/cultural groups the person belongs to (R).

8c) If you hold a stereotype about people you’ll never be able to see them for who they really are (R).

9c) Stereotypes have too much influence on our behaviour towards others (R).

10b) To hold a stereotype does not necessarily mean that you are looking down on someone.

11c) If we did not stereotype each other, there would be a lot less conflict in the world (R).

12b) Stereotypes are useful in daily life even though they are not always correct.
Appendix 4

The following statements will be about whether you feel competition promotes learning in school.

Indicate the extent to which you agree with the statement by writing any number between 1 and 10. The number 1 means that you do not agree with the statement and number 10 indicates that you absolutely agree with the statement. In other words, the higher the number the more you agree with the statement.

1) Competition between pupils increase motivation and promotes learning.
2) It is good that pupils compare themselves with others because this will stimulate them.
3) Competition increases ambition in class.
4) It is fun for the pupils to compete with each other in that they will learn better.
5) Competition between pupils is positive for the development of society.
6) It is important with individual comparable performance.
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