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François Cury, Stuart K. Biddle, Philippe Sarrazin, Jean-Pierre Famose

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Francois Cury*

Laboratoire de recherche en STAPS, University of Paris XI-Orsay, France

Stuart Biddle*

School of Education, University of Exeter

Philippe Sarrazin

Laboratoire d'etudes et recherches sur l'offre sportive (YEROS), University of Grenoble I, France

Jean Pierre Famose

Laboratoire de recherche en STAPS, University of Paris XI-Orsay, France

Background. Contemporary views on motivation suggest that expectancy-value and social-cognitive perspectives can shed light on the important issue of student motivation.

Aims. To test the predictive value of achievement goals on the investment in learning a sport task. Two studies investigated whether investment in learning is affected by achievement goals and perceived ability.

Samples. Study 1: 57 school pupils selected from an initial sample of 212. Study 2: 99 pupils selected from 400. Selection was based on motivation and perceived ability scores from questionnaires. Pupils were aged 13–15 years and attended schools in northern France.

Methods. In Study 1 pupils prepared themselves for a sport task with a five-minute period of training. Study 2 pupils prepared themselves with a five-minute period of training after prior failure.

Results. Study 1 showed that those who were ego-involved with a low perceived ability had a weaker investment in the training situation than those ego-involved with a high perceived ability, or those task-involved regardless of their perceived ability. Ego-involved pupils used an attributional bias to minimise the effect of effort on performance. Study 2 confirmed these results by underlining the motivational deficits of ego involvement for those with a low perceived ability.

Conclusions. School pupils with high ego involvement in a sport task and low perceived ability show motivational deficits which manifest themselves in less time spent on practising a task. A social-cognitive and expectancy-value perspective appears to be valid for the study of motivational processes in school physical education.

*Correspondence and requests for reprints should be addressed to Dr Stuart Biddle, Reader in Exercise & Sport Psychology, School of Education, University of Exeter, EX1 2LU, UK, or from Dr F. Cury, 10 bis rue des Meuniers, 60600 Clermont, France.

Contemporary perspectives of achievement motivation have defined as one of their principal objectives the explanation and prediction of human behaviour in educational contexts (e.g., Ames, 1984*b*; Dweck, 1986; Elliott & Dweck, 1988; Maehr, 1984; Nicholls, 1984*a*, 1984*b*, 1989). This research is based on a social cognitive perspective which gives achievement goals a central place in the initiation and regulation of behaviours and is referred to as 'goals theory' (Weiner, 1990) or the 'achievement goal approach' (Roberts, 1992). Here the individual is considered as an intentional organism, directed by a goal, and who behaves in a rational manner. For this theory, in an achievement context such as an academic situation, of central interest is the demonstration of competence. This can be done in two main ways which are associated with two distinct motivational goals. On the one hand, the individual can demonstrate ability by establishing superiority over others. In this case, the feeling of personal competence is established by a normative comparison process, and by using socially referenced evaluation criteria. For the individual it is about revealing a higher ability than his or her peers or avoiding the display of low competence. Success or failure is not subjectively perceived but, instead, is viewed by comparing their result and invested effort with those of others. Behaviour motivated in this way is described as exhibiting *ego involvement* (Nicholls, 1984*a*, 1989), or the pursuit of a *performance* or *ego goal* (Ames, 1984*a*, Dweck, 1986; Nicholls, 1989).

Alternatively, one can establish competence by displaying personal progress. The feeling of competence is then based on a process of temporal comparison and self referenced criteria. The goal of the individual is to improve ability and to progress towards task mastery. This refers to *task involvement* (Nicholls, 1984*a*, 1989), a *learning goal* (Dweck, 1986), or a *mastery* or *task goal* (Ames, 1984*a*; Duda, 1992).

Although the first studies of achievement goals were in classroom contexts, the existence and the independence of these two achievement goals have also been demonstrated in the sport domain (see Duda, 1992; Durand, Cury, Sarrazin & Famose, 1996; Roberts, 1992; Roberts & Balague, 1991), and in school physical education (Biddle, Cury, Goudas, Sarrazin, Famose & Durand, 1995).

As supported by Duda (1992), in an achievement situation the preferred goal of the individual (i.e., ego involvement vs. task involvement) depends on situational factors, and on a personal predisposition with regard to one of the two goals (Ames, 1992*b*; Maehr, 1984; Nicholls, 1989), and these two factors can intervene jointly in behaviours and attitudes (Cury, Biddle, Famose, Goudes, Durand & Sarrazin, 1996). The predispositional aspect of individual achievement is the result of a socialisation process which tends to lead the child towards particular motivational orientations (i.e., task orientation vs. ego orientation), possibly in relation to cultural values passed on by the family and school. In this case we talk about individual motivational orientation, it being relatively stable and long lasting, and which can be evaluated through self-report. On the other hand, perception by the learner of information from the immediate situational concept (Ames & Archer, 1988; Biddle *et al.*, 1995; Cury *et al.*, 1996) tends to focus the learner on one goal over another. In particular, competitive situations, situations which are presented as tests, or which value public self-consciousness by imposing performance salience in front of an audience or video camera, contribute to the development of ego involvement. On the other hand, in a context centred on learning, progress, and which proposes tasks with a difficulty level adapted to each individual, task involvement is more likely (Ames, 1992*a*, 1992*b*; Butler, 1992; Nicholls, 1984*b*, 1989).

This theoretical framework supports the idea of a rational link between achievement goals and the learning behaviours of individuals, whether in the academic or sporting field (Ames, 1992*a*; Duda, 1992; Dweck, 1986; Famose, Sarrazin & Cury, 1995; Heyman & Dweck, 1992; Nicholls, 1989; Roberts, 1992). According to achievement goal theory, the choice of a task or difficulty level (Nicholls, 1984*b*; Sarrazin, Famose & Cury, 1995), the chosen effort level (Duda, Smart & Tappe, 1989), perseverance (Elliott & Dweck, 1988; Rudisill, 1990) and the search for information during task engagement (Butler, 1992, 1993) are behaviours which are influenced by the interaction between the goal pursued by the individual (task involvement vs ego involvement) and the perception of personal competence. This general hypothesis has its foundation in two general theories of motivation.

An expectancy-value theory of motivation

The expectancy-value approach describes a psychological process which drives the individual either to invest or not to invest in a situation depending on the attractiveness and the accessibility of the task. An individual engages in a given situation in relation to the nature of investment and cognitive operations which allow him or her to evaluate the feasibility of the project. On the one hand, they evaluate what the task will bring by assigning to it a particular value, and by ensuring that its accomplishment will allow motivational goals to be satisfied. On the other hand, the individual recognises their competences in the task (i.e., success expectation), taking into consideration its difficulty and their own perceived ability.

The combination of the attractiveness and accessibility which they attribute to the task subsequently induces a level of identifiable investment in learning behaviours such as effort or perseverance. Consequently, when task involved, an individual invests in the situation if they think that this will allow them to progress and to master the task. If they judge that high effort is necessary to improve competence or to resolve the given problem, they allocate a substantial amount of energy to accomplish the task. Conversely, energy will be low if they consider that minimum effort is sufficient to succeed or that a high investment would be in vain. Faced with a task which is perceived as too easy or too difficult (in the normative sense), the individual will not exert energy in the learning situation. However, if the problem seems to be of an optimal level of difficulty, they consent to try hard.

When ego involved, the individual invests in a task if he or she thinks that the latter can give the opportunity to confirm their superiority or to avoid revealing themselves as incapable in the eyes of their peers, and will try to avoid any effort which will reveal low competence. In these conditions, the level of normative difficulty is significant for deciding the degree of investment (Nicholls, 1984*b*). To fail on a normatively average task reveals a low ability, which is not the case if the task is perceived as normatively very difficult. Consequently, those who perceive themselves as incompetent will avoid trying on tasks with normatively average difficulty, and devote energy to easy tasks, since these represent a limited failure risk, or very difficult tasks, because, in this case, the failure is not necessarily due to a lack of ability. An individual who has great confidence in their own ability invests in average tasks since they allow for the confirmation of competence. Time and effort will be limited on easy tasks because they are attainable without much energy and represent limited interest, and on very difficult tasks, as failure appears to be possible in spite of maximum effort.

The attribution approach

The attributional model is supportive of the predictive value of goal theory on learning

behaviours by focusing on the way that the pupil interprets information from the task and infers particular reasons for the results of his or her actions. One of the most important theoretical contributions of this approach to the understanding of learning behaviours is in the capacity of the theory to demonstrate the links between attributions for performance and expectations for future performance. This is founded on a causal chain initiated by the preferred goal pursued by the individual.

Numerous authors defend the idea of relationships between the nature of accomplishment (i.e., task involvement vs. ego involvement) and attributions (Ames, 1992*a*; Ames & Archer, 1988; Butler, 1987, 1992; Elliott & Dweck, 1988; Jagacinski & Nicholls, 1984, 1987; Nicholls, 1989, 1992). Generally, the studies indicate that when an individual is ego involved, they are more likely to attribute performance to ability, and more so if the actual result confirms expectations. One who has a low perceived ability expects to fail and to appear incompetent in normatively difficult tasks. A failure, therefore, confirms one's fears and the individual attributes this result to a lack of ability.

On the other hand, an unexpected success should be attributed to chance. If the individual has confidence, they will attribute their success to their high level of competence, and find an external cause (e.g., bad luck) to explain a failure. In attribution theory, ability is considered to be an internal cause and one that is stable and uncontrollable (Graham, 1991; Weiner, 1986). Consequently, when the individual attributes a result to a stable cause like ability, they consider that in an identical situation the same causes should produce the same effects. Therefore, attributing a failure to a stable cause (low ability) should contribute to reduced future expectations of success. Convinced of their incapacity to change, the person is likely to try less hard, be less persevering, or give up.

Effort is the principal cause put forward to explain a result when task involved. When they attribute to unstable causes such as effort, the future expectation of success depends on factors which they think are capable of modifying the result (e.g., a more important effort; a change in the strategy used to solve the problem), or which the environment can give to the person (e.g., the help and advice of a teacher or friend). Confronted with failure the individual should persist in the task by increasing effort or by searching for supplementary information to change the strategy. Encountering success should reinforce convictions concerning the virtue of effort and the individual should be more persistent.

The attributional approach allows us to explain ego involved protective strategies which influence subsequent behaviours. An ego involved individual who anticipates the demonstration of low competence can decide to reduce effort during the task so that the subsequent result can be attributed to insufficient effort investment rather than lack of competence (Covington, 1985; Covington & Omelich, 1979; Pyszczynski & Greenberg, 1983). They can also falsify the objective reasons for performance (attributional bias) by allocating low effort to performance. In this way, an individual who has failed can suggest a lack of effort to avoid the association of failure with low ability, and one who has succeeded can increase their own value by minimising their investment in effort (Harris & Snyder, 1986; Thill, 1993; Tice, 1991).

The purpose of this research, therefore, is to test the predictive value of achievement goals theory on the investment in the learning of a sport task. To our knowledge, few studies have tried to show the influence of achievement goals and perceived ability on the investment in learning in a sport context. However, investment in a learning activity is considered a behavioural indicator of perseverance (Miller, 1986; Miller & Hom, 1990;

Rudisill, 1990), and volitional effort (Jagacinski & Nicholls, 1984, 1990), and constitutes a particularly important estimate of learning motivation (Ames, 1992*a*, 1992*b*; Dweck, 1986; Elliott & Dweck, 1988; Heyman & Dweck, 1992; Nicholls, 1989). Consequently, with reference to the theoretical frameworks discussed, we investigated whether task involved school pupils demonstrate stronger investment in learning compared to those who are ego involved and with low perceived ability.

Study 1

The main objective of this study was to test the predictive value of achievement goals, in combination with perceived ability, on the time in which the individual prepares for a test, referred to as 'investment in learning'.

Method

The study was structured according to a 2 x 2 design of achievement goal (task involvement, ego involvement) x perceived ability (high, low). Dependent variables consisted of the time devoted to prepare for the test (investment in learning), the perception of situationally-induced motivational goals, attributed effort during test preparation, and the importance given to task accomplishment.

Sample

Fifty-seven French males, aged 13–15 years (mean=14.1, SD=0.81) were selected from 212 college pupils according to two questionnaires appraising their dispositional motivational profile (i.e., task orientation and ego orientation), and their perceived competence level in basketball (i.e., high, low). This procedure allowed for the formation of four experimental groups:

1. a high ego orientation, low task orientation and low perceived ability group (N=13)
2. a high ego orientation, low task orientation and high perceived ability group (N=15)
3. a low ego orientation, high task orientation and low perceived ability group (N=15)
4. a low ego orientation, high task orientation and high perceived ability group (N=14).

To form these groups, we used percentile scores for each subscale of the motivational orientation questionnaire. Pupils were classified as high in one orientation when they were situated in the highest third part of the distribution, and low when they were situated in the lowest third. For perceived ability, pupils were classified as high when their mean score was greater than 6, the scale midpoint, while low ability was indicated by a score of less than or equal to 6.

Experimental task

The pupils were requested to perform a ball dribble exercise in basketball. The course was made up of a series of obstacles that the performer had to negotiate while dribbling a basketball. The test consisted of a timed attempt and was preceded by a five-minute period for training. Participation was voluntary, but no pupil declined. Informed consent was obtained from the pupils and, since testing took place in normal school time, their teachers as well.

Measures

Motivational orientation. Dispositional task and ego achievement goals were assessed by the Perception of Success in Sport Questionnaire (PSSQ) developed by Durand, Cury, Sarrazin & Famose (1996). This is a French version of the Perception of Success Questionnaire of Roberts & Ballague (1991). The questionnaire invites the participant to recall moments during which they experienced a strong feeling of success in sport. Six items represent task orientation (e.g., 'I progress after having made a big effort'), and six items represent an ego orientation (e.g., 'I am the best'). Answers are given on five-point scales anchored by 'don't agree at all' (1) and 'agree completely' (5). In the present study, the alpha internal consistency coefficient (Cronbach, 1951) of both the task orientation subscale (alpha=.78) and the ego orientation subscale (alpha=.85) were high. Moreover, the two subscales were independent (r=-.05, p>.05), as predicted from prior research (Duda, 1992).

Perceived basketball ability. The Specific Perceived Ability Questionnaire (SPAQ), developed by Famose, Sarrazin & Cury (1994), was used to assess perceived ability level in a particular sporting activity (in this case basketball). The instrument comprises four items which were developed from the subscale used by Nicholls, Patashnick & Nolen (1985) (e.g., 'When you play basketball and you compare yourself to most friends of your age, you feel ...'. The answers are indicated on an 11-point scale anchored by 'very bad' (1) and 'very good' (11). In previous research conducted on teenagers, the SPAQ has shown good construct validity, internal consistency and test-retest reliability. Evidence relative to concurrent validity and predictive validity of the questionnaire have also been established (Famose *et al.*, 1995; Sarrazin *et al.*, 1995). In this study, the internal consistency was high (alpha=.86).

Investment in learning. To assess this construct, the time taken by pupils to prepare for the test was recorded without the pupils' knowledge. Finding an excuse, the experimenter left the pupil on his own for five minutes with the instruction that there was a possibility to train on the course in order to prepare for the test, if the pupil so desired. During that period, the pupil was observed secretly from a room adjoining the test room, and the time spent on the circuit was recorded. At the end of the five-minute period, the experimeter reappeared and continued with the experimental procedure as announced at the outset of the experiment.

Situationally-induced motivational goal, attributed effort, and importance given to task success. After testing, pupils rated two statements symbolising a task involved context (i.e., 'In your opinion, we can say that the purpose of this experience is to test a learning method to progress in dribbling', and an ego involved context (i.e., 'In your opinion, the purpose of this experience is to rate each of the participants against each other in relation to their dribble technical level'). Ratings were made on a scale from 'don't agree at all' to 'agree completely'.

In addition, pupils rated two statements concerning effort attributed to his performance (i.e., 'In your view, to prepare for this test, how much effort did you make?'), rated on a scale from 'very little' to 'very much', and the value which the pupil assigns to the accomplishment of the course (i.e., 'For you, to succeed in this course is something that is ...'. This was rated on a scale from 'little importance' to 'very important'. The pupils answered these questions by placing a vertical line between the two extremities of a 30 cm horizontal bar. Each end corresponds to an expression (e.g., don't agree at all) which allows

the individual to position himself in relation to the question asked. Before each passage, the pupil was allowed practice on a series of examples in the presence of the experimenter.

Procedure

The pupils were tested individually and the experiment took place as follows:

Circuit presentation and induction to the motivational context. In the first phase, the experimenter presented orally, and through an active demonstration, the basketball dribbling circuit. The pupil was also placed in a condition conforming to his motivational profile to guarantee the viability of the goal (i.e., a pupil from the high ego orientation/low task orientation group was placed in a context inducing ego involvement and is named 'ego involvement-low perceived ability' or 'ego involvement-high perceived ability'. A pupil from the low ego orientation/high task orientation group was placed in a context inducing task involvement and is named 'task involvement-low perceived ability' or 'task involvement-high perceived ability'. In the context inducing ego involvement, the pupil is told that this situation is a test to classify individuals in relation to one another according to their technical level of dribbling from the time taken on the circuit. The stated objective was to locate the 30 best dribblers within a group of 60 selected pupils among the school sample. The teenager was filmed on video, and told at the end of the test series that all the participants could view the names of those selected and discarded.

In a context inducing task involvement, we indicated to the pupil that the purpose of the experience was to test the teaching quality of a circuit for use in the learning of basketball at school. The aim of the individual was to check whether he could quickly improve his dribbling.

First test and goal to reach. The pupil made his first timed attempt to ensure his understanding of the task. Time taken was noted by the experimenter but no feedback was given. Then, the experimenter suggested that the pupil should reach a goal. In the context inducing ego involvement, the experimenter announced, with reference to an established schedule relating to teenagers' performance from others schools, that the pupil must not take more than 2 minutes 30 seconds if he wanted to have a good chance of forming part of the selected group of pupils of his own age. In the context inducing a task involvement, the experimenter told the pupil that significant progress is obtained if he achieves a time of 2:30, which represented an improvement of 20 per cent compared to his established time during pre-test.

Measurement of perception of the situational goal, value attributed to the task, and investment in learning. The pupil was called upon to evaluate his perception of the goal induced by the context and the value which he attached to the task. Next, he was allowed five minutes to prepare for the test during which he was observed secretly, as outlined earlier.

Feedback and measurement of attributed effort. After practice, the pupil was given information on his performance. The feedback formulation was identical for both conditions, but dependant on his perceived ability level. The pupils with low perceived ability received negative feedback: 'Your time is greater than 2:30'; the pupils with high perceived ability received positive feedback: 'Your time is less than 2:30'.

Ethical considerations and debriefing. Given that unobtrusive observation took place, careful consideration was given to ethical issues in the conduct of this study. Unobtrusive observation was deemed safe and acceptable given that the activities observed were normal activities used on a daily basis in physical education lessons. Secondly, and in accordance with the British Psychological Society's Code of Conduct, observation was deemed acceptable

given that the pupils could expect, during the normal school day, to be observed by visitors as well as other members of the school community.

However, given the sensitive nature of unobtrusive observation, debriefing took place at a post-study meeting with the pupils, teachers and parents. Full information about the nature of the study was given and questions were taken freely.

Results

Data analysis revealed unequal variance between the experimental groups concerning the importance given to the task (Hartley Fmax=8.74, p<.004), the perception of ego involvement induced by the context (Hartley Fmax=6.71p<.01), and the perception of task involvement induced by the context (Hartley Fmax=11.14, p<.0005). This was not the case for the time devoted to the test preparation, neither for the effort attributed. Kruskal-Wallis ANOVA by ranks showed a significant effect of induced goal on the ego involvement perception induced by the context (H(1, N=57)=38.89), p<.0001), and on the task involvement perception induced by the context (H(1, N=57)=29.62), p<.0001). The pupils confronted with a context inducing an ego involvement perceived this motivational dimension more strongly (N=28, S of ranks=1201.5) than the pupils placed in a context inducing a task involvement (N=29, S of ranks=451.5). The pupils confronted with a context inducing a task involvement perceived this motivational dimension more strongly (N=29, S of ranks=1180.5) than the pupils placed in a context inducing an ego involvement (N=28, S of ranks=472.5). These results confirm the validity of the motivation induction.

Effects on the importance attached to the task

Kruskal-Wallis ANOVA by ranks did not show any significant effect (H(1, N=57)=1.77), p<.182) for the goal on the importance attached to task accomplishment. However, a strong effect was shown for perceived ability (H(1, N=57)=23.758), p<.00001). Consequently, pupils who perceived themselves to be incompetent attached less value to the task (N=28, S of ranks=508.5) than those who had high perceived ability (N=29, S of ranks=1144.5). Mann-Witney U test showed: (a) that the ego involved-low perceived ability group attached significantly less importance to the task than all other experimental groups (all p<.0001); (b) that the task involved-low perceived ability group had lower task value than the task involved-high perceived ability group (p<.034) and the ego involved-high perceived ability group (p<.002); (c) that the task involved-high perceived ability and the ego involved-high perceived ability groups valued the tasks equally.

Effects on investment in learning and attributed effort

A MANOVA conducted on time taken for practice (investment in learning) and attributed effort revealed a significant multivariate effect of goal (F(2,52)=20.06, lambda=.514, p<.00001), and perceived ability (F(2,52)=11.19, lambda=.699, p<.00009), and an interaction between the two independent variables (IVs) (F(2,52)=3.94, lambda=.868, p<.025). An ANOVA on investment in learning confirmed the previous results by highlighting: (a) a main effect for goal (F(1,53)=26.30, p<.00001) and for perceived ability (F(1,53)=20.24, p<.00003), and (b) an interaction effect between the two IVs (F(1,53)=4.49, p<.039). Newman-Keuls tests show that the ego involvement-low ability group spent less time preparing for the test than the other three groups (see Table 1).

Table 1. Means (*M*) and standard deviations (SD) for investment in learning and effort attributions in Study 1

	Ego involvement				Task involvement			
	Low perceived ability (*N*=13)		High perceived ability (*N*=15)		Low perceived ability (*N*=15)		High perceived ability (*N*=14)	
Measures	*M*	SD	*M*	SD	*M*	SD	*M*	SD
Investment in learning (secs)	155.07	49.92	230.73	46.22	237.93	44.11	265.14	36.16
Effort attributions	13.12	5.02	17.03	3.76	20.43	4.96	19.96	4.69

ANOVA on attributed effort showed a main effect for goal ($F(1,53)=17.48$, $p<.0001$), but not for perceived ability ($F(1,53)=1.979$ $p<.165$), and there was no significant interaction ($F(1,53)=3.20$, $p>.05$).

The motivational goal, therefore, influenced investment in learning and the effort assigned to prepare for the test. Task involved pupils reported more effort and attributed their performance more to effort than ego involved pupils. Moreover, pupils identified as low in perceived ability invested less in test preparation than high perceived ability pupils. The origin of the variation in investment in learning is more related to the specific position of the ego involvement-low perceived ability group in relation with the three other groups (see Table 1). As far as attributed effort is concerned, the source of the variation is more generally due to the goal ($M=15.21$ ($N=28$), for the ego involvement condition, and $M=20.21$ ($N=29$), for the task involvement condition).

Relationship between investment in learning and attributions

We attempted to highlight the mechanism of attributional bias from a simple linear regression computation between investment in learning and attributed effort over the different groups. The results in Table 2 show:

(a) for ego involvement-low perceived ability and ego involvement-high perceived ability groups the correlation between investment in learning and attributed effort is negative. For these pupils, the higher the investment in the test preparation the less effort is attributed subsequently to the result.

(b) in the task involvement-low perceived ability group, the more the pupils spent time in preparing for their test the more they related their performance to the importance of effort.

Table 2. Linear regressions between investment in learning and effort attributions in Study 1

Goal/perceived ability	*N*	*r*	r^2	*F*,*p*<
ego/low	13	−.657	.432	8.38, .02
ego/high	15	−.535	.286	5.21, .04
task/low	15	.557	.310	5.85, .03
task/high	14	.110	.012	2.45, .14

Discussion

Overall, the results agree with the theoretical framework developed earlier and show the predictive value of achievement goals in investment in learning and on attributional bias. The study points out that the status given to the test determines the investment the pupil puts into its preparation. Facing a normatively average task, an ego involved pupil with a low perceived ability anticipates demonstrating incompetence. Effectively, failure on a task at such a level of difficulty confirms low ability, the more so if the effort expended to obtain the result is high (Jagacinski & Nicholls, 1984, 1987). Therefore, the pupil is likely to attempt to disengage himself emotionally from a painful situation by discrediting the task, and putting in less effort than pupils in other groups.

Pupils from the ego involvement-high ability group anticipated their demonstration of normative competence to be above average and they highly valued a situation which allowed them to attain their motivational goals. Consequently, they put in effort to achieve their aims. The pupils who were task involved, however, tried hard whatever their level of perceived ability. The goal prescribed by the experimenter was perceived positively, consequently the pupil could look forward to progress and mastery of the task independently of his initial perceived competence. Also, the task was better valued by pupils high in perceived ability compared to those who had less confidence in their abilities.

The results show that attributed effort depends principally on the nature of the achievement. Whatever their level of perceived ability, the task involved pupils spent greater effort in preparing for the test than ego involved pupils. This result is in agreement with one of the fundamental constructs of achievement goals theory which argues for a strong relationship between the nature of the achievement goal and attributional thinking (Ames, 1992*b*; Butler, 1992; Duda, 1992; Heyman & Dweck, 1992; Nicholls, 1989, 1992; Roberts, 1992). Providing feedback in accordance with their perceived ability level reinforced the two groups of ego involved pupils in their forecast and helped attribute the result to ability rather than effort.

The regression analysis between investment in learning and attributed effort suggests that the pupils use effort attributions for different ends. The pupils who were ego involved tended to minimise the consequences of their investment. This mechanism is extensively described by self-worth theory but not yet verified in the motor learning domain (Harris & Snyder, 1986; Thill, 1993; Tice, 1991). These pupils may distort their answers by attributing their poor performance to low effort. In this way, failure is assigned to a lack of effort and hence may act as a form of self-esteem protection. Alternatively, the more energy devoted to preparing for the test, the more the pupils who are task involved attribute their result to their own effort. In this psychological state, failure does not threaten the self-esteem of individuals as it is considered a part of the learning process. The attributional bias observed mainly concerned pupils who were ego involved and who use this to avoid being deprecated in the eyes of others.

Study 2

The purpose of this study was to confirm the predictive value of achievement goals specifically for the perseverence of pupils after failure. This should allow us to study the mediating role played by the pupil's success expectation when confronted with failure. With reference to the attributional model, it is suggested that the attributions made by the pupils for their failure are linked to their motivational goal and that it contributes to the expectation of future success and subsequent investment in the task.

Method

In parallel with Study 1, this study involves a goal (task involvement, ego involvement) x perceived (high, low) design. The dependent variables consist of the perception of the motivational goal induced by the context, success expectation formulated after a prior failure, and the time devoted to prepare for a test (investment in learning) following test failure.

Sample

Male French school pupils (N=99), aged 13–15 years (mean=13.8, SD=0.78), were selected from 400 pupils according to their motivational profile and their perceived ability level in basketball. By using a similar procedure as that outlined in Study 1, we created four groups: a high ego orientation/low task orientation and low perceived ability group (N=23); a high ego orientation/low task and high perceived ability group (N=26); a low ego orientation/high task orientation and low perceived ability group (N=25); and a low ego orientation/high task orientation and high perceived ability group (N=25).

Task

The basketball dribbling task was identical to that used in Study 1. Participation was voluntary, but no pupil declined. Informed consent was obtained from the pupils and, since testing took place in normal school time, their teachers as well.

Measures

Motivational orientation, perceived ability in basketball and perception of the motivational goal induced by the context. These variables were measured by tools and procedures as outlined for Study 1. For the PSSQ, the internal consistency of the task orientation subscale (=.75) and ego orientation subscale (=.89) were satisfactory. Moreover, as in Study 1, the two subscales were independent (r=.08, p>.05). The SPAQ also had good internal consistency (alpha=.79).

Success expectation. Pupils determined their success expectation (i.e., 'in the dribble circuit, I think I have a good chance of success': don't agree at all vs. agree completely) and followed procedures identical to those in Study 1.

Procedure

The selected pupils were tested individually as follows:

Circuit presentation and motivational climate induction. The circuit presentation and the allocation of the pupils followed an identical procedure to that in Study 1. Moreover, in the context which induced an ego involvement, we told the pupils that the purpose of the experience was to locate the 50 best dribblers within a group of 100 pupils selected from the school population. In the context inducing task involvement, the experimenter stressed the importance of good concentration and doing one's best.

Negative feedback and goal to reach. The pupils completed a first timed attempt to ensure that the task was understood. Following the first test, the experimenter commented negatively on the pupil's performance then proposed a temporary goal for him to reach. In a context inducing ego involvement, the pupil was told: 'You have not produced a very good time compared to the other pupils who have performed.' Then the pupil is told that with reference to an established scale relating to the performance of teenagers in other schools, he must be quicker than 2 minutes 30 seconds if he wants to stand a good chance of rating above average for his own age.

In the situation inducing task involvement, the pupil was told: 'You have not produced a good time, you have not concentrated enough on the course.' Then he is told that significant progress can be obtained if he produces a time of 2:30, which represents a 20 per cent improvement compared to his performance established during the pretest.

Measurement of the perception of the goal induced by the context, success expectation, and investment in learning. The pupil was requested to rate his perception of the task context and success expectation. Then he was allowed five minutes to prepare for Test 2 during which he was observed secretly, as described in Study 1.

Ethical considerations and debriefing. The same ethical and debriefing procedures were used as documented in Study 1.

Results

The initial analyses showed similar variances between the four comparison groups for all dependent variables. A 2 x 2 (goal x perceived ability) MANOVA conducted on all dependent variables revealed multivariate main effects for goal (F(5,91)=86.13, lambda=.207, p<.00001), and perceived ability (F(5,91)=10.155, lambda=.694, p<.00001), as well as an interaction between the two IVs (F(5,91)=6.519, lambda=.779, p<.0002). Pupils placed in a context inducing ego involvement (M=24.52, SD=4.38) perceived the situation as more ego involving (F(1,95)=221.26, p<.00001) than pupils induced into task involvement (M=11.12, SD=5.14). Similarly, the pupils placed in a context inducing task involvement (M=22.2, SD=5.38) perceived greater task involvement (F(1,95)=54.28, p<.00001) than those induced into ego involvement (M=13.79, SD=5.94). These results confirm the validity of the motivational induction, which was also observed in Study 1.

Effects on success expectation

The results showed an interaction (F(1,95)=9.26, p<.003) between goals and perceived ability. Post-hoc Newman-Keuls test showed that ego involved pupils with low perceived ability expressed lower success expectations than the other groups (see Table 3). In addition, the pupils high in perceived ability expressed higher success expectations (M=23.28, SD=4.77; F(1,95)=21.76, p<.00001) than pupils low in perceived ability (M=18.43, SD=6.22)

Table 3. Means (M) and standard deviations (SD) for investment in learning and success expectations after failure (Study 2)

	Ego involvement				Task involvement			
	Low perceived ability (N=25)		High perceived ability (N=25)		Low perceived ability (N=23)		High perceived ability (N=26)	
Measures	M	SD	M	SD	M	SD	M	SD
Investment in learning (secs)	147.78	65.64	236.65	56.86	237.32	50.99	254.08	48.69
Success expectation	15.85	5.06	24.02	4.53	20.80	6.34	22.52	4.98

Effects on investment in learning

A significant interaction ($F(1,95)=10.34$, $p<.002$) between goal and perceived ability was shown on the amount of time invested in learning. Post-hoc Newman-Keuls test revealed that the ego involvement-low perceived ability group spent less time in the task after receiving a negative comment than the other groups (see Table 3). Pupils placed in a context inducing task involvement persisted longer ($M=245.7$, SD=50.06; $F(1,95)=22.76$, $p<.00001$) than pupils placed in a context inducing ego involvement ($M=194.94$, SD=75.28). Similarly, pupils high in perceived ability ($M=245.19$, SD=53.21) spent more time on the task ($F(1,95)=22.19$, $p<.00001$) than low perceived ability pupils ($M=194.42$, SD=83.72).

A structural equation modelling analysis

To test the links between the dependent variables, and to specify likely causal pathways, a structural equation modelling analysis was conducted. This tests a hypothesised model against the data observed. Three paths and one mediation were specified. A negative path from ego involvement to expectation, a positive path from task involvement to expectation, and a positive path from expectation to investment in learning were hypothesised from prior research (see correlation matrix in Table 4).

Table 4. Intercorrelations between perceived ego involvement, perceived task involvement, success expectations, and investment in learning (Study 2).

	1	2	3
1. perceived ego involvement			
2. perceived task involvement	−.585***		
3. success expectations	−.439***	.329**	
4. investment in learning	−.523***	.283*	.649***

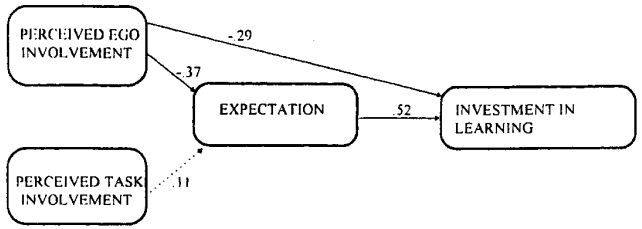
*$p<.01$ **$p<.001$ ***$p<.0001$

The structural equation modelling analysis was performed using LISREL VIII (Joreskog & Sorbom, 1993) and showed that the specified model (model 1) did not fit the observed data particularly well. The chi² was highly significant, thus rejecting the null hypothesis, and shows a difference between real observations and the proposed model. Additional indices confirm this observation: chi²/d.f. ratio is much greater than 2 and the Adjusted Goodness of Fit Index (AGFI) is relatively low (see Table 5, model 1). However, modification indices provided by LISREL suggested adding a direct path from ego involvement perception to investment in learning. The new model (model 2) includes this new prediction and the indices of fit are substantially improved (see Table 5). Model 2 appears to be a good fit to the observed data (see Figure 1).

Table 5. Indices of fit for the structural equation models tested in Study 2.

Indices of fit	Model 1	Model 2
Chi squared	13.76	1.09
d.f.	2	1
p	.001	.30
Chi²/d.f. ratio	6.88	1.09
GFI	.94	.99
AGFI	.69	.95
RMSR	.078	.019

Figure 1. Structural equation model for Model 2 (Study 2). The dotted path is not significant; all others are significant ($p<.01$)



Examination of the model reveals the predictive strength of ego involvement. It negatively predicts success expectation and investment in learning. Consequently, after failure, the more a pupil perceives the situation to be ego involving the less he thinks he has a chance of success and the less he perseveres at the test. However, task involvement does not induce any significant effect, rejecting our hypothesis that it would have a positive influence. In addition, expectation predicts investment in learning. That is, a pupil who thinks that task success is likely, or possible, perseveres longer in preparing for his test. Also, the perception of ego involvement influences investment in learning through success expectation. That is, after failure, the more a pupil perceives an ego involving context, and the less chance he gives himself to perform well, the less perseverance is observed in test preparation.

Discussion

The results generally conform to our assumptions. The pupils high in ego involvement and low in perceived ability had lower success expectations than the other groups, and persevered less on the task. This confirms Study 1 and underlines the psychological weakness of pupils placed in such a motivational state. The present study also highlights the reactions of pupils to failure. The nature of accomplishment determines the status given to the failure (Ames & Archer, 1988) and the type of attributions given (Ames, 1992*b*; Elliott & Dweck, 1988; Graham, 1991; Nicholls, 1989). The pupils from the ego involvement/low perceived ability group attributed their failure to ability and gave themselves little chance to solve a task of normatively average difficulty. This seemed to urge them to quit a training situation early. Conversely, an initial failure did not affect the pupils with high ego involvement-high perceived ability who attribute this preliminary result to external causes (Nicholls, 1989). In consequence, they remained engaged in the task and prepared actively for the test.

The pupils who were task involved had a very different interpretation of their encountered failure. The nature of the feedback seemed to reinforce attributing their failure to a lack of effort and concentration. These pupils were confronted with a task commensurate with their competence, consequently, whatever their initial perceived ability level, the pupils from these two groups formed high success expectations, hence they remained engaged in mastering the task.

The interpretation of the structural equation model confirms these results. In particular, the results clearly show the predictive value of the perception of an ego involvement induced by the context. This variable negatively predicts the expectation of success and investment in practising the task. In agreement with the theoretical frameworks discussed, failure induces a deteriorating action on learning investment when ego involvement is perceived as strong. This can be explained in two ways. First, this goal tends to reduce success expectations and consequently the investment in learning for the less confident pupils. This is likely to be due to attributing their failure to a stable cause, such as low ability (Graham, 1991; Weiner, 1986). Second, ego involvement perception reduces the investment in learning of the pupils by a direct causal path. This observation confirms earlier data which suggests that the perception of ego involvement induced by the context is positively related to attitudes and behaviours maladaptive for learning (Ames & Archer, 1988; Biddle *et al.*, 1995; Cury *et al.*, 1996). For some pupils, in particular for those ego involved with low perceived ability, an initial failure associated with a new normative evaluation of ability may create negative emotion for the individual, thus reducing his investment in the task.

Finally, the results point out the predictive value of success expectation for subsequent perseverance. The more an individual thinks of succeeding, the more he perseveres at the task. This is conceptually consistent with achievement motivation theories (Elliott & Dweck, 1988; Nicholls, 1989) and expectancy-value theories.

General discussion and conclusions

The results from the two studies are consistent with the theoretical frameworks used and confirm the hypotheses concerning investment in learning. The data confirm that pupils who are ego involved and have low confidence in their capacities engage a negative attitude and resist practice. The preferential goal pursued by the individual, and the success expectations he has for himself, induces investment in the task and influences progress.

A cognitive approach to motivation allows us to examine psychological mechanisms which provide this theory with high explanatory and predictive value. As Elliott & Dweck (1988) emphasise, '... each of the achievement goals runs off a different "program" with different commands, decision rules, and inference rules, and hence, with different cognitive, affective and behavioural consequences. Each goal, in a sense, creates and organises its own world — each evoking different thoughts and emotions and calling forth different behaviours' (p. 11).

When an individual is ego involved, the attractiveness and accessibility of a task are dependent on perceived ability and on the normative difficulty of the task. The causes of performance are then attributed more often to ability (Graham, 1991). The perception of success requires the demonstration of superior ability, either by obtaining a better result than others or by establishing an identical result with lower effort (Covington, 1985; Jagacinski & Nicholls, 1984). Conversely, failure intervenes when performance confirms an inferior ability compared to others or by an identical result to others in spite of greater effort. Consequently, in such a motivational state, the level of perceived ability induces important consequences for the individual's self-worth (Covington & Omelich, 1979) and investment over time on the task.

Conversely, when the individual is task involved, the attractiveness and accessibility of the task depends only on the subjective probability of success, and a good performance is

generally explained by effort. The individual perceives his performance as a success or a failure if he observes or does not observe progress and mastery of the task due to the effort exerted. This motivational state is not dependent on perceived ability and induces long-term investment in the task. As Ames (1992*b*) says: 'Central to a mastery goal is a belief that effort and outcome covary, and this is the attributional belief pattern that maintains achievement-directed behavior over time' (p. 262).

The data reported by the two studies support the validity of achievement goals theory for investment in the learning of a sport task, and bring ecological validity to this achievement motivation perspective.

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