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Imagining Success: Multiple Achievement Goals and the Effectiveness of Imagery

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ABSTRACT

Imagery (richly imagining carrying out a task successfully) is a popular performance-enhancement tool in many domains. This experiment sought to test whether pursuing two *achievement* goals (vs. one) benefits performance after an imagery exercise. We examined mastery goals (aiming to improve skill level) and performance goals (aiming to outperform others) among 65 tennis players who were assigned to a mastery goal condition, a performance goal condition, or a mastery goal *and* performance goal condition. After reading instructions for a service task, which included the goal manipulation, participants completed 20 tennis services. They then completed an imagery exercise and, finally, completed another 20 services. Postimagery service performance was better in the dual-goal condition than in the other conditions.

Imagery is a mental performance improvement technique that involves "programming" body and mind with the purpose of responding optimally in a performance situation. The technique is based on the notion that an imagined action activates an internal cognitive representation that is the same as the cognitive representation underlying the "actual" action (see Holmes & Collins, 2001). Imagery has become one of the most popular psychological techniques to improve performance in athletic (e.g., Hall, 2001), academic (e.g., Vasquez & Buehler, 2007), and work contexts (e.g., Neck & Manz, 1992). Imagery is especially well studied in sports, and research in that area supports the claim that imagery improves a wide range of relevant, beneficial outcomes such as objective performance, exercise frequency, attentional focus, game-related tension, and confidence, but also a quicker recovery from injury—outcomes that have been examined across a range of sports contexts (Callow, Hardy, & Hall, 2001; Calmels, Berthoumieux, & Arripe-Longueville, 2004; Cupal & Brewer, 2001; Hale & Whitehouse, 1998; Page, Sime, & Nordell, 1999; Smith, Wright, & Cantwell, 2008).

Although those studies clearly support the claim that imagery is a technique that can facilitate the beneficial effects of training and exercise, and certain factors have been identified that moderate the effectiveness of engaging in imagery, little is known on the psychological, especially motivational, factors that may facilitate the effectiveness of imagery itself. Providing insight into such potential facilitators holds practical utility because understanding relatively changeable conditions, such as motivation, that influence the effects of imagery may allow people to optimize their application of imagery techniques and to get the most out of training and practice. The current research explicitly examines PETTLEP imagery, as PETTLEP has been the most effective form of imagery compared to other forms of imagery, and set out to test under which *achievement goal* conditions PETTLEP imagery has the strongest effect on tennis service performance. Prior research showed that, compared with pursuing either a mastery goal (aim to improve skill) *or* a performance goal (aim to outperform others), pursuing *both* goals predicted greater motivation to carry out imagery (Cumming, Hall, Harwood, & Gammage, 2002). In line with this study, we propose that multiple (as opposed to one) achievement goals should also lead to superior *performance* after PETTLEP imagery.

PETTLEP imagery

PETTLEP is a specific imagery technique that is considered most effective and is currently most prominent. The acronym indicates that *physical, environment, task, timing, learning, emotional,* and *perspective* relevant aspects of the imagery all need to be aligned with the aspects of the actual activity. This means the physical

state (e.g., clothes and attributes), the environment (e.g., the playing field), the specific movements involved in the actual activity, and the speed of the actual activity all need to be the same as in the actual movement. Further, the athlete should adapt the imagery to his or her current skill level, to experience the emotions he or she would experience in a game situation, and finally to view the situation from his or her own perspective, as it would be seen if he or she was to carry out the activity him- or herself (although sometimes using a different perspective may also be useful; see Callow & Roberts, 2010).

Due to these criteria, the PETTLEP method has been argued to lead to a relatively *realistic* representation compared with other manners of imagery that did not include all these elements (Wakefield & Smith, 2012). Indeed, the PETTLEP imagery method has been shown to be relatively effective compared to other imagery methods (Smith, Wright, Allsopp, & Westhead, 2007; Wright & Smith, 2009), which may stem from the method's root notion of *functional equivalence* (Jeannerod, 1999). Because research indicates that engaging in imagery and actually carrying out an activity involve the same brain regions, imagery may help to strengthen the neural pathways that are involved in actual activities (Decety & Grèzes, 1999). Accordingly, the activity or movement to which imagery is applied should be as similar as possible to the actual activity or movement, and this functional equivalence criterion is precisely what PETTLEP is based on.

Recent research again supports the utility of the method by showing that the PETTLEP method makes it easier for people to create a more *vivid* image in their mind when using PETTLEP imagery, compared to using more traditional methods (Anuar, Cumming, & Williams, 2016). Although general ability to conduct mental imagery is an important predictor of imagery effectiveness, breaking down the aforementioned method into its elements makes clear that those elements are also vastly different in their nature. This may be taken to suggest that effectively engaging in different aspects of this type of imaging would be facilitated by different goals and mind-sets. As we elaborate next, different PETTLEP elements just discussed align strategically with different goals, mastery, and performance achievement goals. Accordingly, we predicted that simultaneously pursing a mastery *and* a performance goal enhances the effect of imagery, relative to pursuing only one goal.

Achievement goals

Achievement goal theory (Elliot, 2005; Nicholls, 1984) distinguishes mastery goals and performance goals.

Mastery goals imply a task-based standard of competence, meaning that individuals aim for a certain standard that reflects their skill level or proficiency on a task. Performance goals imply an interpersonal comparison standard, meaning that individuals aim for a certain standard of competence relative to others. Achievement goal theory also distinguishes, within mastery and within performance, the possibility that individuals gear their efforts either toward positive possibilities (competence) or to avoiding negative possibilities (incompetence). Avoidance goals almost exclusively predict detrimental outcomes (Van Yperen, Blaga, & Postmes, 2014), and therefore we decided not to include these in our study. Hence, when using *mastery* we refer to mastery-approach goals, and when using *performance* we refer to performance-approach goals. Accordingly, we conceptualize mastery goal as the aim to *learn*, to *develop* competence, to *improve* skill level. Performance goal is conceptualized as the aim to perform *better* than others.

Certain elements of PETTLEP imagery align well with a mastery goal, for example, imagining performing a movement in a technically skilled way and adapting the task to one's individual skill level. Such elements a mastery-motivated individual would be more motivated to engage in because it directly serves the person's focal goal. Other elements of PETTLEP imagery align well with a performance goal, for example, imagining scoring points and envisaging the competitive game context and the emotions one feels while winning a point.

When these respective goals are activated, not only are individuals more motivated to engage in activities that support these goals but the mental activation of these goals likely makes imagery of these *elements* in particular easier. That is, when the cognitive structures that are associated with these goals become active, closely related structures are more easily cognitively accessible. This means that the activation of the goal makes the experiences (such as those related to the elements of imagery) more easily accessible and therefore makes the imagery more effective.

Hence, alignment means that there is a correspondence or fit between the goal that individuals are pursuing and the behaviors they are exhibiting (in their imagery), that the behaviors *serve* their focal goal and that the distinct imagery elements are more accessible because they are cognitively associated with the respective goal construct. When individuals pursue *both* goals, the means (elements, imagines behaviors) used in the activity align with individuals' motivation serve both their goals.

Although the latter has not been tested with regard to achievement goals, these achievement goals are

highly relevant because they apply strongly whenever individuals find themselves in achievement situations. In addition, it should be noted that the notion that imagery serves several functions is not new; it can be traced back to important work such as Paivio (1985). In support of our reasoning, Cumming et al. (2002) found that athletes with a balance of mastery and performance orientations also reported "greater motivation to perform the functions of imagery that would help them to maximize their performance" (p. 127), but their research did not test whether such individuals would, indeed, show better performance than individuals with only one of these goal.

Similar to Cumming and colleagues' rationale, we suggest that PETTLEP imagery may be instrumental in the pursuit of mastery and performance goals and, as such, the overall utility of the imagery is greater when individuals pursue both these goals (Kruglanski et al., 2002). As a consequence, individuals are more motivated and committed to the imagery activity (it is more useful to them) and the imagery may be more effective (Shah & Kruglanski, 2000). Hence, we hypothesized that imagery leads to better performance among individuals with both a mastery and a performance goal, compared to individuals who pursue either one of these goals. We tested this hypothesis in the context of a tennis service exercise with players of moderate skill levels.

Method

Participants

Participants were 65 tennis players (24.6% women, $M_{age} = 27.09$, $SD_{age} = 11.32$) with classification of between Levels 3 and 5 according to the classification of the Royal Dutch Lawn Tennis Association (corresponding to between Levels 4 and 7 of the United States National Tennis Rating Program). Male and female participants were distributed equally across the conditions. Erring on the conservative side, we aimed to recruit 30 participants per cell, yet we did not attain this number, and we decided to stop collecting data at a point in time when it became impossible to recruit participants, because they had a vacation from their training program (see next).

Procedure

This experiment was approved by the ethics committee at the first author's institution. We approached teachers from the Tennis Association's training academy and asked them to suggest study participation to their students (tennis coaches in training). Interested players
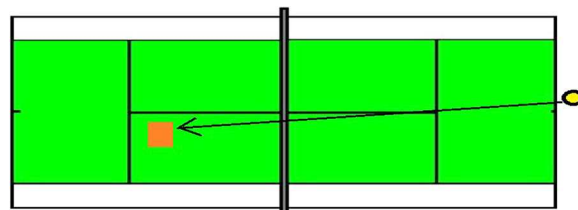

Figure 1. Graphical representation of the service task setting.

were sent an e-mail with information about the study and a request to complete a brief online questionnaire, among other things, to measure demographic variables. Participants were then approached for appointments to participate in an on-site session. During the experiment, each participant individually joined the researcher on the tennis court. First, participants were given another opportunity to read the study information. After signing informed consent, participants were given the opportunity to serve 12 balls as a warm-up (no further warm-up instructions were given to the participants). Subsequently, participants received written instructions for the task (see next), and the researcher placed the target in the service box (see Figure 1). These instructions integrally included one of the three manipulations (mastery, performance, or both; see next for details), to which participants were assigned randomly. After reading instructions, participants carried out the first service task. After making 20 services, participants read instructions for the PETTLEP imagery. When participants indicated they had completed the imagery, they again carried out 20 services. After, they completed two manipulation check items.

Materials

Achievement goal manipulation and service task instructions

The manipulation was identical to that used by Murayama and Elliot (2011), and instructions were adapted to the task. Participants in the *mastery* condition read, "This exercise will help you to improve your tennis skills. Focus on the exercise and do your best to improve your tennis skills." Participants in the *performance* condition read, "This exercise allows you to show that your tennis skills are better than those of others. Focus on the exercise and do your best to perform better than other tennis players." Participants in the *dual*-goal condition read, "This exercise will help you to improve your tennis skills, and to show that your tennis skills are better than those of other tennis players. Focus on the exercise and do your best to improve your tennis skills and to show that your tennis skills are better than those of other tennis players."

Next, all read the instructions for the service task:

> The task is to carry out 20 services and, in doing so, to try to hit the target in the service box. Hitting the target results in two points. Not hitting the target, but hitting the service box, results in one point. Not hitting the service box results in zero points. Take as much time for each service as you think you need.

The instruction/manipulation ended by repeating the second sentence of the manipulation.

PETTLEP instructions

The instructions were based on instructions used by Smith et al. (2008) among golf players. Adapted to the tennis service, the instructions read,

> Later on, stand at the baseline with your racket in your hand. Imagine serving 20 balls and hitting the target every time. In your mind, try to imitate as complete an experience of the serve as possible without actually moving. Feel the movements that the body makes during the service, small responses in your muscles are normal and don't need to be suppressed. You see how you toss the ball in the air and next how the ball makes its way from the face of the racket to the target. Feel the emotions you experience before you're about to serve and feel the emotions you experience when you see the target being hit. Imagine that, after every service, you take the time to prepare for the next ball. Visualize the 20 services in real time and envisage the situation as if you are seeing it through your own eyes. Start visualizing the 20 services when you are ready. When you're done, let the researcher know.

Performance measurement

The researcher kept track of the number of times participants missed (0 points: $M_1 = 7.86$, $SD_1 = 2.63$; $M_2 = 7.38$, $SD_2 = 2.67$), the number of times they hit the service box (1 point: $M_1 = 10.78$, $SD_1 = 2.71$; $M_2 = 10.88$, $SD_2 = 2.63$), and the number of times they hit the target (2 points: $M_1 = 1.34$, $SD_1 = 1.34$; $M_2 = 1.75$, $SD_2 = 1.52$). For the service task, Wilson US Open balls were used. The target was a doormat of 50×30 cm that was placed in the service box on the deuce side (see the supplement). Note that the correlations between the pre- and post-measurements were .36, .60, and .71, for the number of times on target, the number of times hitting the service box, and the number of misses, respectively.

Manipulation checks

At the end of the experiment, participants responded to two items (Elliot & Murayama, 2008), namely, "My goal during the service task was to improve my tennis skills" ($M = 3.55$, $SD = 1.21$) and "My goal during the service task was to do better than other tennis players" ($M = 3.12$, $SD = 1.40$). Participants responded to these items on a scale ranging from 1 (*completely disagree*) to 5 (*completely agree*).

Results

Preparatory analyses

We first examined the manipulation checks. Considering that we assumed that the dual-goal condition to activate both goals, and that we assumed the single-goal condition to activate the goal it was intended to activate more strongly compared to the condition in which the *other* single goal was being activated, the following should be observed: The mastery item should be rated lower in the performance-goal-only condition, compared to the other two conditions, and the performance goal item should be rated lower in the mastery-goal-only condition, compared to the other two conditions. This pattern was indeed observed as the *mastery* goal was rated lower in the performance condition ($M = 3.09$, $SD = 1.34$) compared to the mastery condition ($M = 3.82$, $SD = 1.01$), $ES_{um} = 0.73$, $d = 0.60$, and compared to the dual-goal condition ($M = 3.55$, $SD = 1.21$), $ES_{um} = 0.46$, $d = 0.38$. The performance goal item was rated lower in the mastery condition ($M = 2.64$, $SD = 1.40$), compared to the performance condition ($M = 3.55$, $SD = 1.44$), $ES_{um} = 0.91$, $d = 0.65$ and compared with the dual-goal condition ($M = 3.19$, $SD = 1.40$), $ES_{um} = 0.55$, $d = 0.39$.

The number of misses and the number of points in the service box were highly negatively correlated, $r = -.84$, suggesting that they may reflect a similar variable and together unitarily reflect performance on the task. However, the correlation between the number of services in the service box and the number of services on the target was *negative* as well, $r = -.26$, and the correlation between the number of misses and the number of points on the target was only $r = -.31$. Although it may be intuitive that the two "positive" indicators together reflect performance, the negative correlation indicates that these two indicators together would not be a valid representation of the same construct (e.g., performance). That is, when two variables represent the same underlying construct, they should be positively correlated. The negative correlation shows that the two do not represent the same construct in a valid way and indicate that it would not be desirable to add these together. Therefore, we decided to analyze the three performance indicators separately.

Main analyses

We expected that, after imagery, individuals would perform better in the dual-goal condition compared

Table 1. Means and standard deviations in the three conditions before and after imagery.

	Preimagery		Postimagery		Post minus pre	
Condition	M	SD	M	SD	M	SD
Misses (0 points)						
Mastery	8.05	2.70	7.55	2.69	–	2.35
Performance	8.18	2.75	8.23	2.69	0.05	1.81
Dual-Goal	7.33	2.48	6.33	2.39	–	1.84
Hit service box (1 point)						
Mastery	10.45	2.94	10.55	2.79	0.09	2.88
Performance	10.59	2.46	9.86	1.98	–	1.78
Dual-Goal	11.33	2.78	12.29	2.53	0.95	2.18
Hit target (2 points)						
Mastery	1.50	1.57	1.95	1.91	0.45	1.68
Performance	1.23	1.02	1.90	1.54	0.68	1.55
Dual-Goal	1.29	1.42	1.38	0.92	0.10	1.67

with the other conditions. Table 1 shows the mean values of the three separate indicators within each condition on the preimagery task and the postimagery task. It also shows the post-minus-pre difference that reflects the degree of *improvement* after (vs. before) imagery within each condition. In line with recommendations by others (Valentine, Aloe, & Lau, 2015), Table 2 shows the unstandardized mean differences and the Cohen's *D* effect size for the differences between the three conditions on all of the variables that are also shown in Table 1. Note that *D* reflects the difference between the conditions, divided by the overall (pooled) standard deviation, thus providing an indication of how many standard deviations difference is observed between the conditions.

First, the number of misses (0 points) was *smaller* in the dual-goal condition ($M = 6.33$, $SD = 2.39$) compared with the mastery condition ($M = 7.55$, $SD = 2.69$) and the performance condition ($M = 8.23$, $SD = 2.69$). Note that the "improvement" post imagery indicates that participants in the dual-goal condition, on average, missed once *fewer*, whereas this number was close to zero for the performance goal condition and was 0.50 for the mastery goal condition.

Table 2. Unstandardized mean differences between conditions and effect sizes *D*.

	Preimagery		Postimagery		Post minus pre	
Comparison	ESum	D	ESum	D	ESum	D
Misses (0 points)						
Mastery vs. Performance	–	0.05	–	0.26	–	0.27
Mastery vs. Dual goal	0.71	0.27	1.21	0.45	0.50	0.25
Performance vs. Dual goal	0.85	0.32	1.89	0.71	1.05	0.51
Hit service box (1 point)						
Mastery vs. Performance	–	0.05	0.68	0.26	0.82	0.34
Mastery vs. Dual goal	–	0.32	–	0.66	–	0.36
Performance vs. Dual goal	–	0.27	–	0.92	–	0.70
Hit target (2 points)						
Mastery vs. Performance	0.27	0.20	0.05	0.03	–	0.14
Mastery vs. Dual goal	0.21	0.16	0.57	0.38	0.36	0.22
Performance vs. Dual goal	–	0.04	0.53	0.35	0.59	0.36

Second, the number of points in the service box (1 point) was *greater* in the dual-goal condition ($M = 12.29$, $SD = 2.53$) compared with the mastery condition ($M = 10.55$, $SD = 2.79$) and the performance condition ($M = 9.86$, $SD = 1.98$). Again note that the "improvement" post imagery indicates participants in the dual-goal condition, on average, had nearly one (0.95) more hits in the service box after imagery, compared with before imagery. This number was close to zero (0.09) for the mastery only condition and was even negative (-0.73) for the performance goal condition.

Third, the differences between the conditions in terms of the number of hits on the target (2 points) was much smaller and even went slightly in the opposite direction. That is, although all conditions improved slightly, the improvement in the mastery condition (0.45) and the performance goal condition (0.68) was slightly larger than the improvement in the dual-goal condition (0.10).

As Tables 1 and 2 show, the number of hits on the target was very low and the effects observed on that indicator are much smaller than the effects that were consistently found on the other two indicators of performance improvement. Considering these two indicators, only participants in the dual-goal condition showed a clear pattern of performance improvement on both.

Discussion

Results indicated that participants in the dual-goal condition served inside the service box *more* often, and missed *less* often, than participants in the other two conditions. Furthermore, the rate of improvement with regard to these two indicators was consistently greater in the dual-goal condition. The finding that participants in the dual-goal condition exhibit fewer misses and more services in the service box suggests that their performance was indeed better compared to the other two conditions. It seems similarly unlikely that this finding is due to a practice effect, because there is no reason to indicate that individuals with both performance and mastery goals benefit more from practice in general. For example, Van Yperen and Duda (1999) found no link between performance orientation and performance improvement in sports, Linnenbrink (2005) did not find that a dual-goal condition (in an educational context) led to greater improvement than a performance goal condition, and Valle et al. (2003) similarly found no difference between a dual-goal condition and a mastery goal condition. Because (a) studies do not suggest that performance goals

typically have a strong impact on skill improvement and (b) neither goal seems to add to the effect of the other on improvement, it is plausible that the effects we observed stem from the imagery. As such, the data suggest that it may be beneficial to pursue both achievement goals when using imagery.

Related to the methodological choice that participants always completed 20 services, there are negative correlations between some of the three indicators. The methodological choice also necessitates that the indicators are not wholly independent of each other, which makes it debatable whether analyzing them as separate dependent variables is valid. Important to note is that the mean score of the on-target serves (2-point scores) was very low, suggesting that hitting the target was too difficult. The choice of this target was made because the doormat is used in tennis training sometimes to aid in practicing aiming of the serve, so we attempted to make the exercise as realistic as possible in order to reduce participants' awareness of being in a unique study situation. It should be noted that rewarding services within the service area was done for the same reason, experimental realism, but that such an incentive might lead participants to satisfice, to settle for a less ambitious outcome. This would mean that the 1-point score is not a valid indicator of performance and especially not of improvement. We would argue, however, that it is more plausible that hitting the target was too difficult. Moreover, combined with the improvement in terms of the reduction in misses, the increase in the number of services within the service box indicates quite clearly that performance improvement was greatest in the dual-goal condition.

In our analysis, in addition to examining mean values in the conditions, we also looked at the difference between post- and preimagery scores as indicators of improvement. A criticism of such a difference scores approach is that (especially in pre–post test designs) the two scores composing the difference score are correlated, which can decrease the reliability of the difference score itself. However, Trafimow (2015) recently argued and showed that this mostly becomes a problem in cases where pre–post correlations are extremely large, which was not the case in this study (see Materials section).

One limitation of the current research is that we manipulated the achievement goals in a relatively vague manner. We closely followed manipulations that have been used in experimental research previously (Murayama & Elliot, 2011), but the goals could also have been formulated in regard to more specific outcomes, for example, because tennis serving obviously has many different skill-relevant elements on which an athlete might focus individually but which the mastery goal

manipulation did not specify. Likewise, the context we used does not explicitly create a social context in which performance goals would become highly relevant. However, at the same time, it should be noted that a social context is also not present in most other achievement goal research (e.g., Murayama & Elliot, 2011). The goal of competing with others is a goal that every individual understands, and it can easily be activated even in the absence of an explicit social context, guiding motivation, and behavior.

Although the purpose of PETTLEP is to create the best possible functional match to a real performance situation, one might wonder whether the manipulation of achievement goals would likewise provide a functional match. Our study examined performance in a practice situation, but one may indeed wonder if the effects extend to a game situation. Achievement goal research seems to assume that goals will indeed have similar effects across situations, and research suggests that, although individuals' achievement goals differ significantly across achievement domains, the effects of these goals within a domain are the same as in other domains (e.g., Van Yperen, Hamstra, & van der Klauw, 2011). Nevertheless, important questions for future research and practice are whether athletes' achievement goals remain the same across game and practice contexts and whether imagery and achievement goals effects are moderated further by other variables.

Previous research applying similar PETTLEP techniques (e.g., Smith et al., 2007; Smith et al., 2008) has found convincing evidence for the utility of PETTLEP imagery techniques. In the current research, we found that the dual-goal condition showed improvement and that the mastery goal condition showed *some* improvement in terms of the number of misses. As such, one might wonder whether this research replicated the classis benefit of PETTLEP imagery. In this regard, it should be noted that Smith and colleagues used much longer imagery training, lasting several days or weeks, whereas we examined only a brief exercise. It seems likely that, even among performance goal individuals, long-term PETTLEP imagery would be helpful.

All in all, this is the first research investigating athlete-level motivational factors that influence the effectiveness of imagery, and the results suggest that pursuing both a mastery goal and a performance goal is more beneficial when using imagery, compared with pursuing only one of these goals, a finding that aligns well with the notion that imagery can serve multiple different functions (Paivio, 1985). More research into factors that facilitate the effectiveness of imagery is needed, because having knowledge about how to get the most out of implementing mental techniques is important for users of imagery

techniques across a range of performance situations such as the workplace, the classroom, and the sports field. For example, part of our argumentation was that activation of both achievement goals would make cognitive structures needed for successful imagery of all PETTLEP elements more easily accessible. This could be taken to imply that individuals, under such conditions, show more *complete* imagery of the situation, and it would be interesting to examine whether this would indeed contribute to the observed effects. Also, such research could be useful to those who encourage others' goals (e.g., as coaches do with athletes or teachers with students) and to those who try to motivate themselves to maximize the benefits of imagery specifically, and of training in general.

Acknowledgments

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