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Asking "why" helps action control by goals but not plans

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Abstract The present research investigated whether asking "why" concerning the pursuit of one goal can affect the subsequent pursuit of a previously chosen goal. Asking "why" should activate cognitive procedures involving deliberation over the pros and cons of a goal (why-mindset). This mode of thinking should spill over to subsequently pursued goals, with different consequences for goal striving guided by goal intentions and for goal striving guided by implementation intentions (if-then plans). As goal intentions guide behavior by effortful top-down action control processes motivated by the expected value of the desired outcomes, being in a why-mindset should induce defensive postdecisional deliberation and thereby promote goal pursuit. In contrast, implementation intentions guide behavior by automatic bottom-up action control processes triggered by the specified situational cues; in this case, being in a why-mindset should eliminate the effects implementation intentions have on goal pursuit. Performance on a handgrip self-control task (Study 1) as well as on a dual-task (simultaneous go/no-go task and tracking tasks; Study 2) supported these predictions: why-mindsets reinforced goal intention effects and impaired implementation intention effects on handgrip and dual-task performance. Implications for effective goal striving are discussed.

Keywords Goal intentions · Implementation intentions · Mindset · Construal level · Automaticity

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Introduction

> True courage is a result of reasoning.
> (Collier 1722)

> Thinking is the most unhealthy thing in the world.
> (Oscar Wilde 1909)

How might asking "why" affect subsequent action control? On the one hand, activating a cognitive procedure that weighs the pros and cons of a goal (i.e., being in a why-mindset) might focus attention on the pros of an already chosen goal (i.e., its expected value), thereby facilitating persistence in goal-directed actions. On the other hand, being in a why-mindset could disrupt people's readiness to act, which might keep them from following through with planned goal-directed actions. The present research addresses these opposing possible outcomes, suggesting that the effect of why-mindsets on the attainment of an already chosen goal depends on the kind of intention that is in operation—goal intention or implementation intention.

Goal intentions and implementation intentions control actions by distinct processes. Goal intentions (such as "I want to attain outcome X!") relate to desired outcomes or behaviors (Bargh et al. 2010): They direct and energize efforts to achieve desired end states. The effectiveness of action control by goal intentions is determined by the strength of the intention to achieve the goal, the specificity with which the goal outcome is defined, and the cognitive resources available. The stronger

the intention to achieve a goal, the greater the effort exerted in goal striving will be (e.g., Fishbein and Ajzen 2010; Oettingen et al. 2001). The more specifically a goal (an outcome standard) is defined, the easier it becomes to notice and address discrepancies (e.g., Carver and Scheier 1990; Locke and Latham 1990, 2002). Moreover, the effects of goal intentions on action control are at least partially mediated by effortful processes (Brandstätter et al. 2001). Therefore, goal intention effects should be most pronounced when sufficient cognitive resources are available.

Implementation intentions, however, control actions by a different process. People use implementation intentions to plan when, where, and how they will strive for a goal in an "If I encounter situation Y, then I will perform goal-directed response Z!" format (Gollwitzer 1993, 1999). By pre-deciding how to act in response to a specific situation, implementation intentions delegate control over the initiation of goal-directed responses to the specified situational cues. Implementation intentions have been observed to mitigate the effects of typical goal-striving problems, such as failing to initiate action, losing focus, not calling a halt to futile striving, and over-extending oneself (Gollwitzer and Sheeran 2006). For instance, people who formed implementation intentions were more successful at completing a difficult personal project over their Christmas vacation than those who stated their goal to complete the project without including the implementation intention (Gollwitzer and Brandstätter 1997).

Both the if- and then-components of implementation intentions contribute to their beneficial effects on goal attainment. Forming implementation intentions (i.e., making if-then plans) heightens the activation of the mental representation of the specified cue (spelled out in the if-part), which ensures the cognitive accessibility of the cue (e.g., Aarts et al. 1999; Achtziger et al. 2012). In addition, implementation intentions forge a strong link between the anticipated situational cue specified in the if-part and the intended response specified in the then-part (Webb and Sheeran 2007, 2008), leading to automatic response initiation. This automation is indicated by the stimulus-driven attention to the specified cue (Wieber and Sassenberg 2006), the immediate and efficient initiation of the goal-directed response (e.g., Aarts and Dijksterhuis 2000; Brandstätter et al. 2001, Studies 3 and 4; Gollwitzer and Brandstätter 1997, Study 3), and the redundancy of conscious intent at the moment of response initiation (e.g., Bayer et al. 2009). Because of this automation of action control, the effects of implementation intentions should be found even when cognitive resources are limited. Based on the different processes by which implementation intentions and goal intentions control actions, we argue that asking "why" will affect action control by implementation intentions differently than action control by goal intentions.

Mindset effects on action control by goal intentions

The present research examines the effects of asking "why" on subsequent action control in terms of mindset effects. As mindset effects are theorized to be independent from the subject to which the cognitive procedure is applied, and as people generally fail to recognize these carryover effects most of the time, mindset effects influence action control outside of conscious awareness (Bargh and Chartrand 2000). Asking "why" concerning an already chosen goal should activate cognitive procedures involved with weighing pros and cons, with an intensive focus on the pros of goal pursuit (i.e., defensive postdecisional deliberation). This why-mindset should, in turn, spill over to a subsequently pursued goal, thereby supporting the effortful top-down action control that characterizes goal intentions. In line with this reasoning, such defensive postdecisional deliberation effects have been observed when postdecisional participants were asked to deliberate about the pros and cons of their goal (Nenkov and Gollwitzer 2012). As a consequence of this postdecisional deliberation, these participants showed stronger goal commitment, more goal planning, and improved initiation of and enhanced persistence in goal-directed behavior than predecisional participants who had received the same deliberation instructions. Moreover, the researchers observed that participants who were asked to spontaneously deliberate about their goal generated overly optimistic estimates of the likelihood that the pros would occur and more thoughts about potential positive outcomes than negative outcomes. Thus, postdecisional deliberation seems to be a functional strategy to support one's goal striving. We therefore propose that being in a why-mindset when striving for an already chosen goal will improve goal attainment. Being in a why-mindset should strengthen effortful top-down action control by goal intentions, as it involves cognitive procedures that render the expected value of the goal easily accessible and promotes an intensive focus on the pros of goal pursuit (defensive postdecisional deliberation). Finally, being in a how-mindset rather than a why-mindset should encourage a focus on goal-related situations and actions rather than on the pros of the chosen goal. Consequently, it is argued that how-mindsets fail to provide the motivational boosts that are elicited by why-mindsets.

Mindset effects on action control by implementation intentions

Implementation intentions control actions by delegating the initiation of goal-directed responses to selected situational cues, thereby establishing bottom-up action control (e.g., Gilbert et al. 2009). As being in a why-mindset is characterized by top-down action control (i.e., by what people

ultimately want to achieve), it should thus interfere with automatic action control, suspending the bottom-up action control established by implementation intentions. A why-mindset is expected to broaden the implementation intention-induced focus on specific situational cues to include other goal-relevant situations and means, and thereby eliminate any improvements in the detection of the critical cues specified in the if-part of the implementation intention. Moreover, a why-mindset should limit the automatic response initiation that characterizes automatic action control by implementation intentions, since it should ease the activation of alternative responses. In accordance with cognitive theorizing on motivation (e.g., Goal Systems Theory; Kruglanski et al. 2002), we assume that this activation of alternative responses pulls resources away from the focal response (Fishbach et al. 2006; Shah and Kruglanski 2002).

Evidence that reflective thought can impair automatic action control has been provided by research on the so-called "choking under pressure" phenomenon in skilled performance, whereby decreases in performance relative to one's skill level occur under circumstances that increase the perceived importance of good performance (e.g., Baumeister 1984; Baumeister and Showers 1986; Beilock et al. 2008). For instance, participants who had proceduralized their golf putting skills under conditions of low performance pressure underperformed under high performance pressure, as operationalized by video-taping (Beilock and Carr 2001; Studies 3 and 4). Further evidence that reflective thought impairs the effectiveness of automatic processes has been provided by research on the detrimental effects of analytic thought on the use of helpful heuristics, such as subjective feelings of familiarity and cognitive fluency in decision making and behavior (Dijksterhuis et al. 2006; McMackin and Slovic 2000; Wilson et al. 1984). For example, Halberstadt and Catty (2008) report that participants who were asked to reason "why" one bass solo was more popular than another used the degree of familiarity as a helpful method of judging the solo's popularity less often than participants who were not given the instruction to reason. Thus, being in a why-mindset when striving for an already chosen goal should impair the automatic action control established by implementation intentions.

The present research

Two studies tested whether asking "why" concerning a chosen goal enhances goal pursuit when combined with goal intentions but curbs goal pursuit when combined with implementation intentions. Goal intentions are formed when one decides to commit oneself to a potential goal that is perceived to be desirable and feasible. Goal intentions support goal pursuit by effortful processes, such as stepping up one's efforts in the face of obstacles. If a person is already committed to a goal, being in a why-mindset should make the expected value of the desired goal easily accessible and create an intensive focus on the pros of the respective goal; this has been found to increase people's goal-directed efforts (Nenkov and Gollwitzer 2012). However, why-reasoning should impair rather than improve goal pursuit when people have not only committed themselves to a goal but have also planned when, where, and how to strive for the goal using an implementation intention, as this mindset is expected to eliminate the automation of action control established by implementation intentions (i.e., improved detection of critical cues and the stimulus-response link).

Study 1 tested whether asking "why" as opposed to "how" would result in differential effects on action control by goal intentions versus implementation intentions. We used a common self-control paradigm (i.e., the handgrip persistence task) that allowed defensive postdecisional deliberation throughout the task. Participants formed either a goal intention to perform well on this task or a goal intention plus an implementation intention. Subsequently, either a why-mindset or a how-mindset was induced by asking participants to answer why- or how-questions. As a dependent variable, we measured holding time in the handgrip task.

Study 2 sought to improve our understanding of the processes underlying the effects of why-mindsets on action control by goal intentions and implementation intentions by additionally varying task demands. We used a dual-task paradigm (a go/no-go task embedded in a tracking task) to assess the automaticity of action control. We varied the task demands such that participants could engage in defensive postdecisional deliberation while working on the task to a greater or lesser extent. Again, participants first formed either goal or implementation intentions and were then manipulated into a why-mindset or a how-mindset using the same procedure as in Study 1. As a dependent variable, we measured response times in the go/no-go task under low versus high task difficulty (easy vs. difficult tracking). Whereas the low task difficulty condition allows defensive postdecisional deliberation to some extent, the high task difficulty condition in Study 2 limits the possibility to engage in defensive postdecisional deliberation during the task.

Finding the beneficial why-mindset effects on action control by goal intentions when task difficulty is low but not when it is high would thus indicate that the effects of why-mindsets on action control by goal intentions still rely on effortful rather than automatic processes. Finding the disruptive why-mindset effects on action control by

implementation intentions when task difficulty is low but not when it is high would suggest that defensive postdecisional deliberation during the task is required for why-mindsets to interfere with automatic action control by implementation intentions. Finding the disruptive why-mindset effects on action control by implementation intentions when task difficulty is low as well as when it is high, however, would suggest that simply being in a why-mindset before working on the implementation intention task is sufficient to eliminate automatic action control by implementation intentions.

Study 1: Handgrip persistence task

All participants first performed a handgrip task as a baseline measurement (see Muraven et al. 1998). Next, they formed the goal intention to hold the handgrip closed as long as possible in a second handgrip task to be performed later. Participants learned that ignoring the pain of holding a handgrip closed is a useful strategy to improve their performance. Participants in the implementation intention condition were asked to formulate the pain-ignoring strategy in an implementation intention, whereas those in the goal intention condition were not. Prior to the second handgrip task, either a why-mindset or a how-mindset was induced with respect to an unrelated task goal. All participants then performed the handgrip task again. Goal attainment was assessed in terms of participants' persistence in this second handgrip task, both between conditions and in comparison to the baseline measurement. For the goal condition, we predicted that a why-mindset should improve handgrip performance relative to a how-mindset. With regard to implementation intentions, however, we expected the why-mindset to hamper handgrip performance relative to the how-mindset. Thus, we predicted a mindset by intention interaction effect.

Method

Design and participants

Study 1 used a 2 between (Mindset: why vs. how) × 2 between (Intention: implementation intention vs. goal intention) × 2 within (Handgrip performance: first assessment vs. second assessment) factorial design. Participants were randomly assigned to the experimental conditions. Change in performance in a handgrip task served as the dependent variable. Forty-two undergraduate students (25 female) at the University of Konstanz with a mean age of 24 years (range 19–43, $SD = 4.97$) took part in the study (compensation was € 5).

Procedure

Upon arriving at the laboratory, participants were told that they would work on two different studies that were combined for convenience.

Baseline measurement: First handgrip task Participants were asked to hold the handles of a handgrip closed for as long as possible; two electrodes had been attached to each participant's forearm, presumably to measure muscle tone. In actuality, we were assessing the length of time (in seconds) that participants managed to hold the handgrip closed. All participants were then asked about their level of commitment to the goal of performing well on the upcoming second handgrip task on a three-item scale ("How determined do you feel about performing well on the upcoming handgrip task?", "How much did your muscles hurt before you stopped holding the handgrip closed?", and "How much did you force yourself to hold the handgrip closed as long as possible?") ranging from 1 (*not at all*) to 7 (*very much*). The observed internal consistency of this commitment measurement was high (Cronbach's $\alpha = .74$). The handgrip task was introduced as a potential new method of assessing personality attributes.

Goal intention versus implementation intention condition After the baseline measurement, participants were asked to prepare themselves for a second handgrip task. In all conditions, participants were first informed that the pain in their muscles from holding the handgrip closed was harmless, and that a good strategy to overcome this discomfort was to simply ignore it. All participants then formed the goal intention, "I will hold the handgrip closed for as long as possible!" Participants in the implementation intention condition additionally formed the following if-then plan: "And if my muscles start hurting, then I will ignore the pain!" Participants in both conditions were asked to memorize their goals and plans and to write them down.

Why-mindset versus how-mindset condition Subsequently, participants worked on an ostensibly unrelated paper-and-pencil study on "personal relationships," which served to introduce the mindset manipulation. The stated reason for this interspersed study was that their muscles needed to relax before the second handgrip task; in fact, this study was the mindset manipulation. To induce a why-mindset, participants were asked to write down *why* they would form and maintain personal relationships; to induce a how-mindset, they were asked to write down *how* they would form and maintain personal relationships. By asking "why" versus "how" questions four times in sequence (i.e., asking "why"/"how" regarding the answer to the

previous "why"/"how" question), the manipulation encouraged participants to repeatedly use why-related or how-related reasoning in their responses. Inducing a why- or a how-mindset in an unrelated task (concerning relationships) rather than during the focal task allows us to interpret changes in the handgrip performance in terms of a spillover of the cognitive procedures activated during the mindset induction task; this mindset manipulation represents a strict test of the mindset hypotheses, precluding a taskset effect explanation (i.e., that the content of the task instructions rather than the cognitive procedures affected performance).

Dependent variable: Second handgrip task After the mindset manipulation, participants were again asked to hold the handgrip closed as long as possible, and we again assessed their performance in seconds. All participants were then thoroughly debriefed, compensated, and thanked.

Results and discussion

Equivalence of groups

Two-factorial ANOVAs were used to test whether intention and mindset conditions differed in goal commitment or general ability to hold the handgrip closed. No differences were found for goal commitment (grand $M = 5.44$, $SD = 1.05$) or for handgrip baseline performance (grand $M = 115.12$ s, $SD = 58.11$), both Fs(1, 38) < 1.89, both ps $> .17$, partial $\eta^2 < .05$.

Handgrip performance

As an index of handgrip performance, we used difference scores (second performance minus baseline performance); higher values thus indicate better performance (see Fig. 1). This dependent variable was entered into a 2 between (Mindset: why-mindset vs. how-mindset) $\times$ 2 between (Intention: goal intention vs. implementation intention) ANOVA. No main effect of mindset, $F(1, 38) < 1$, $p > .65$, partial $\eta^2 < .01$, but a main effect of intention was observed, $F(1, 38) = 4.36$, $p < .05$, partial $\eta^2 = .18$, indicating that implementation intention participants performed better ($M = 6.31$ s, $SD = 9.30$) than goal intention participants ($M = -21.18$ s, $SD = 9.30$). This intention main effect was qualified by the expected interaction with mindset, $F(1, 38) = 8.05$, $p < .01$, partial $\eta^2 = .17$. When we analyzed the performance in the second handgrip task using an ANCOVA adjusted for baseline performance, the interaction effect was again observed to be significant, $F(1, 37) > 6.52$, $p < .02$, partial $\eta^2 = .15$.

Next, we performed planned comparisons of the effect of mindsets at different levels of intention. Within the goal intention condition, participants with a why-mindset ($M = -5.46$ s, $SD = 12.84$) outperformed those with a how-mindset ($M = -36.90$ s, $SD = 13.47$), $t(38) = 1.70$, $p = .05$ (one-tailed), $d = .55$. Within the implementation intention condition, however, why-mindset participants ($M = -15.30$ s, $SD = 13.47$) performed significantly worse than how-mindset participants ($M = 27.91$ s, $SD = 12.84$), $t(38) = 2.32$, $p < .05$, $d = .75$.

In summary, Study 1 tested whether asking "why" as opposed to "how" would result in differential effects on action control by goal intentions versus implementation intentions. As predicted, in comparison to the how-mindset, the why-mindset helped goal intention participants to perform better on a handgrip persistence task. This finding is in line with our assumption that being in a why-mindset strengthens effortful top-down action control, since it involves cognitive procedures that render the expected value of the goal easily accessible and create an intensive focus on the pros of goal pursuit (defensive postdecisional deliberation). For the implementation intention participants, the expected opposite effects on performance were observed. Relative to the why-mindset, the how-mindset helped implementation intention participants to perform better on a handgrip persistence task. This finding is in line with our assumption that being in a why-mindset impairs automatic bottom-up action control, such that the improved recognition of the situation specified in the if-part and the activation of the linked action specified in the then-part of the implementation intention does not automatically occur. However, one limitation of the handgrip task was that it allowed defensive postdecisional deliberation both before and during the actual handgrip task. Therefore, no conclusions can be drawn from Study 1 as to whether why-

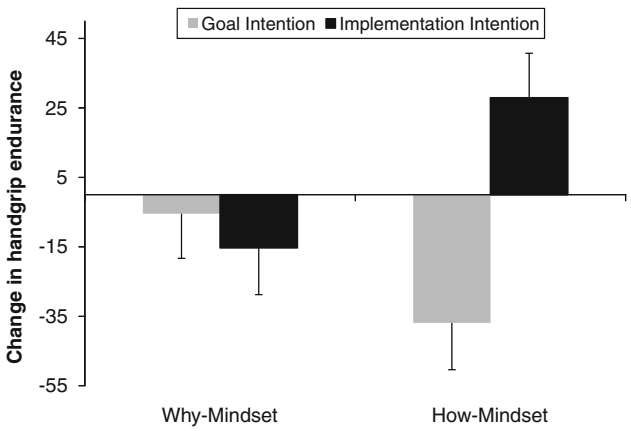

Fig. 1 Mean differences (and standard errors) between pre- and post-manipulation holding times in the handgrip task in seconds by Intention and Mindset (Study 1, $N = 42$)

mindsets would still affect action control by goal intentions and implementation intentions when the opportunities to engage in defensive postdecisional deliberation are limited during the actual task. Study 2 addressed this question.

Study 2: Dual-task performance

In Study 2, we aimed to replicate and extend the findings of Study 1 in a different context and to gain first insights into the processes underlying mindset effects on action control by goal intentions and implementation intentions. To this end, we used a dual-task paradigm that permitted variation in the task demands, such that participants had more opportunities (low task difficulty) or fewer opportunities (high task difficulty) to engage in defensive postdecisional deliberation while working on the task.

To test the effects of why-reasoning, we first manipulated participants' intentions to perform well on an upcoming dual-task (goal intention vs. implementation intention); we then manipulated their mindset (why-mindset vs. how-mindset) in a seemingly unrelated reasoning task. Next, participants worked on an established dual-task paradigm (a go/no-go task embedded in a tracking task; Brandstätter et al. 2001, Studies 3 and 4) assessing the automaticity of action control as indicated by immediacy and simultaneous efficiency.

When task difficulty is low, there should be sufficient cognitive resources to prompt defensive postdecisional deliberation. Consequently, a why-mindset should improve dual-task performance relative to a how-mindset for goal intention participants but impair dual-task performance for implementation intention participants. For low task difficulty, this prediction would be supported by a mindset by intention interaction effect on dual-task performance.

When task difficulty is high, however, a why-mindset should not improve dual-task performance relative to a how-mindset for goal intention participants: In both mindsets, action control by goal intentions would still rely on effortful processes that are compromised when cognitive resources are limited (i.e., high task difficulty). With regard to implementation intention effects when task difficulty is high, two different why-mindset effects seem plausible. First, being in a why-mindset might trigger postdecisional deliberation during the task; this would interfere with the bottom-up action control established by implementation intentions because it undermines the automatic detection of cues and action initiation. If this is the case, limiting such deliberation by the use of a difficult task should undo the why-mindset's impairment of the implementation intention effects. This would be demonstrated by an intention main effect, whereby implementation intentions would improve goal attainment in both how- and why-mindsets when task difficulty is high. Second, the cognitive procedures activated by a why-mindset and the opportunity to engage in postdecisional deliberation before the task at hand might be sufficient to impair the automatic action control of implementation intentions without the need for postdecisional deliberation during the actual task. If this is the case, even limiting such deliberation during the task by the use of a difficult task would not reverse the impairment of the implementation intention effects. This would be validated by a mindset by intention interaction effect such that when task difficulty is high, implementation intentions combined with a how-mindset would improve goal attainment; however, neither implementation intentions combined with a why-mindset nor either of the goal intention-mindset combinations would show improvement. Being in a how-mindset should leave the automatic action control intact.

Method

Design and participants

The study used a 2 between (Mindset: why vs. how) × 2 between (Intention: goal intention vs. implementation intention) × 2 within (Dual-task difficulty: low vs. high) factorial design. Participants were randomly assigned to the experimental conditions. As the dependent variable, we measured response times to the critical number 3 while adjusting for the response times to control numbers. In order not to increase the complexity of the experimental design, we used a fixed randomized order in operationalizing the dual-task difficulty factor. All participants first worked on the high difficulty trials before they moved on to the low difficulty trials. Ninety-two students (65 female) at a German university with a mean age of 23 (range 18–53; $SD = 4.64$) participated in the study (compensation was € 4).

Dual-task paradigm

In the tracking task (see Fig. 2), participants were told to cover a circle (1.7 cm diameter) that moved on a fixed random curving course across the computer screen with either a large mouse-controlled second circle (cursor, 4.2 cm diameter; low dual-task difficulty condition) or a small mouse-controlled second circle (cursor, 2.3 cm diameter; high dual-task difficulty condition). Overlap was recorded every 10 ms. Participants had to simultaneously perform a secondary task: a go/no-go task in which they were asked to press the left mouse button as quickly as possible in response to numbers (go), but not when letters appeared (no-go). Numbers (1, 3, 5, 7, and 9) and letters (A, E, N, V, and X) were presented within the moving circle until participants responded or until one second had elapsed.

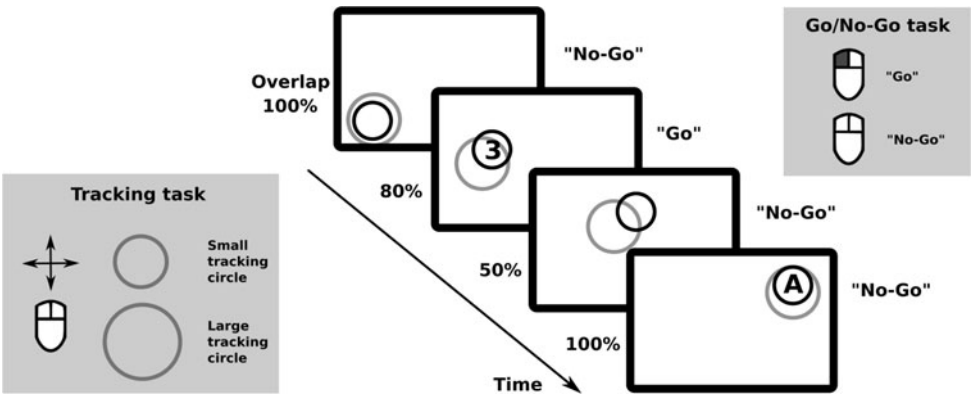

Fig. 2 Dual-task paradigm consisting of a tracking task that requires participants to cover the small moving target *circle* with a small (high dual-task difficulty) or large (low dual-task difficulty) mouse-controlled tracking *circle*; and a simultaneous go/no-go task that requires participants to press the *left* mouse button in response to numbers but not letters

We used 80 trials for each of the two dual-task difficulty conditions: 40 letter presentations and 40 number presentations. Each number and each letter were presented with the same frequency (i.e., 8 times). Inter-stimulus intervals (ISI) ranged from 2 to 6 s plus the residual presentation time (i.e., 1,000 ms, the response time provided). To ensure comparability between participants, the stimulus sequence and the sequence of varying ISIs were presented in a fixed pre-randomized order. In addition to response times, errors were recorded. Stimuli and instructions were presented on a 17″ computer screen (100 Hz) with a screen resolution of 1,024 × 768 pixels. The experiment was performed using Presentation® software (Version 0.70, www.neurobs.com).

Procedure

Computerized instructions informed participants that they would work on two different studies that had been combined for efficiency and convenience (i.e., the dual-task study and the personal relationship study). Participants first worked on the dual-task paradigm. The first trial block consisted of three different practice phases to familiarize participants with the tasks used in the dual-task paradigm: a short (1-min) version of the tracking task using the large circle, the go/no-go task, and the combination of the two.

Goal intention versus implementation intention condition All participants were informed that the go/no-go task required particular attention to the number 3. They then completed a 5-min training session, in which they were asked to form the goal intention, "I want to respond to numbers as quickly as possible!" Next, they either added an implementation intention ("And if the number 3 appears, then I will press the left mouse button particularly fast!") or a specific goal intention targeting the number 3 ("I will pay particular attention to the number 3!"). Participants were instructed to memorize their goals and plans and to write them down. Because the if-then format is central to the automation of action control (e.g., Brandstätter et al. 2001; Chapman et al. 2009; Oettingen et al. 2000, Study 3; Wieber and Sassenberg 2006, Study 2), this intention manipulation permitted a strict test of the automation hypothesis, excluding the possibility that an informational advantage might enhance the effects of implementation intentions.

Why-mindset versus how-mindset condition Participants were told that before performing the go/no-go task, they would be asked to work on an unrelated study on personal relationships, as the beneficial effects of the dual-task training session would take some time to develop. To induce a why- or how-mindset, we used the same procedure as in Study 1.

Dual-task Participants then read a reminder of their intentions and subsequently completed 80 trials of the dual-task under conditions of high dual-task difficulty (i.e., using the small circular tracking cursor). After a 20-s pause, 80 trials of the dual-task were performed under conditions of low dual-task difficulty (i.e., using the large circular tracking cursor). High dual-task performance is indicated by faster responses to the critical number 3 in the go/no-go task, when this rapid response did not negatively affect tracking task performance. This particular dual-task seemed especially appropriate, as it allowed us to vary difficulty in the task that was not addressed by the implementation intention, despite the fact that both tasks relied on the same resources (i.e., using visual perception as the input channel and motor response as the output channel) and had to be worked on simultaneously. After completing the trials, participants were debriefed, compensated, and thanked for their participation.

Results and discussion

Manipulation checks

Intention manipulation At the end of the intention manipulation, of the 46 participants in the goal intention

condition, 45 correctly wrote down the goal and the specific goal intention that they had been asked to learn. Of the 46 participants in the implementation intention condition, 43 correctly wrote down the goal intention, and 44 the implementation intention. Thus, the reproduction quality of goals and plans did not differ between the intention conditions, both χ^2 (3, $N = 92$) < 3.80, both $ps > .28$, suggesting that all participants learned their assigned intentions equally well.

Mindset manipulation Independent raters blind to condition evaluated whether participants' last entries in the why- versus how-mindset manipulation were concrete, abstract, or non-determinable, and whether these final entries were comparatively more abstract or concrete than their first entries (or if this was non-determinable). Inter-rater reliability analyses using the Kappa statistic were performed to determine consistency among raters (Landis and Koch 1977). Inter-rater reliability was found to be almost perfect, both Kappas > .95 ($ps < .001$). With regard to the ratings of the last entries of participants in the why-mindset condition, 41 entries were rated as abstract and only five entries were rated as concrete. In contrast, in the how-mindset condition, 41 entries were rated as concrete and only four were rated as abstract. The entry of one participant was rated as non-determinable. With respect to the changes from first to last entries, in the why-mindset condition, 34 of the final entries were rated as comparatively more abstract and only six were rated as more concrete. In the how-mindset condition, in contrast, 40 of the final entries were rated as comparatively more concrete and only four as more abstract. The answers of eight participants were rated as non-determinable. These results suggest that the mindset manipulation successfully induced participants to think either in terms of why or how.

Dual-task difficulty manipulation As a manipulation check of the objective dual-task difficulty manipulation, we compared the overlap rates between the moving circular target to be tracked and the circular tracking cursor during both the low and the high dual-task difficulty task blocks. The mean percentage of overlap was computed on the basis of 200 measurements (every 10 ms) within the first 2 s after the appearance of each of the 80 go/no-go targets. The overlap rates were greater under low dual-task difficulty ($M = 96.03$ %, $SD = .37$ %) than under high dual-task difficulty ($M = 77.68$ %, $SD = .67$ %; $F(1, 87) = 619.91$, $p < .001$, partial $\eta^2 = .88$), with no differences between mindset and intention conditions, all $Fs < 1$, $ps > .33$, partial $\eta^2 < .01$. Thus, dual-task difficulty was successfully manipulated. Because no differences between experimental conditions were found in the tracking task, better performance in the go/no-go task will indicate more efficient action control rather than a shift in the allocation of participants' attentional resources from the tracking task to the go/no-go task. As a limitation, it should be noted that the fixed order of the task difficulty trials (high task difficulty trials followed by low task difficulty trials) does not allow us to rule out order effects. However, a prior study on this dual-task paradigm (Brandstätter et al. 2001; Study 4) that used the reverse order (i.e., easy-difficult task sequence) observed the same pattern for implementation intention effects. This suggests that the implementation intention effects are not limited to a specific task sequence; rather, they are independent of the task difficulty order.

Dual-task performance

All errors as well as response latencies < 150 ms or greater than three standard deviations (958.26 ms) were excluded from the analysis. Error rates (total numbers of misses and false positives) were low overall (4.11 %). The mean number of errors in trials with critical numbers was entered into a 2 between (Mindset: why-mindset vs. how-mindset) × 2 between (Intention: goal intention vs. implementation intention) × 2 within (Tracking task difficulty: low vs. high) repeated-measures ANOVA. No significant effects were found, all $Fs < 2.76$, $ps > .10$, partial $\eta^2 < .04$.

Go/no-go task performance was measured using the response times to the critical number 3 (see Fig. 3). This dependent variable was entered into a 2 between (Mindset: why-mindset vs. how-mindset) × 2 between (Intention: goal intention vs. implementation intention) × 2 within (Dual-task difficulty: low vs. high) repeated measures ANCOVA with the response times to the control numbers during the low and high task difficulty trials as covariates to adjust for interindividual response time differences. Both covariates showed significant interaction effects with dual-task difficulty, both $Fs(1, 86) > 17.71$, $p < .001$, partial $\eta^2 > .17$. Moreover, a trend towards a Dual-Task Difficulty × Intention interaction effect was found, $F(1, 86) = 3.80$, $p = .06$, partial $\eta^2 = .04$. Most importantly, these effects were qualified by the predicted Mindset × Intention × Dual-Task Difficulty interaction effect, $F(1, 86) = 6.04$, $p < .02$, partial $\eta^2 = .07$. This interaction effect on the response times to the critical number 3 in the go/no-task remained significant when we additionally adjusted for tracking task performance by including the overlap rates coinciding with responses to the critical number 3 in the easy and difficult tracking tasks as covariates, all $Fs > 9.09$, $ps < .01$, partial $\eta^2 > .09$. The same descriptive pattern was observed when a repeated measure ANOVA was computed without including any covariates, $F(1, 88) = 2.39$, $p = .12$, partial $\eta^2 = .03$. No other effects were significant, all $Fs < 1.74$, $p > .19$, partial $\eta^2 < .03$. To further investigate the

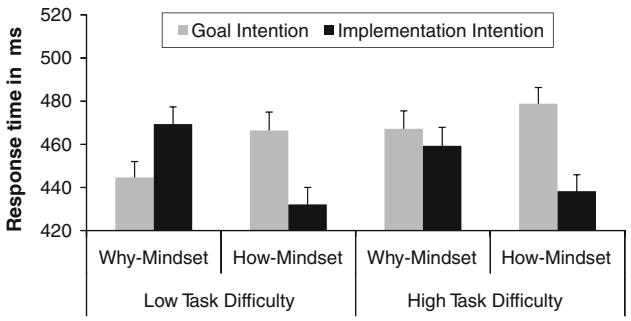

Fig. 3 Mean response times and standard errors of go-responses to the critical number 3 in the go/no-go task in milliseconds by Intention, Mindset, and Dual-Task Difficulty (Study 2, $N = 92$)

observed Mindset × Intention × Dual-Task Difficulty interaction effect, we separately analyzed performance on each level of task difficulty (i.e., low and high dual-task difficulty).

Low task difficulty Computing a 2 between (Mindset: why vs. how) × 2 between (Intention: goal intention vs. implementation intention) ANCOVA on the response times to the critical number 3 in the low task difficulty trials while adjusting for response times to the control numbers revealed a significant effect of the covariate $F(1, 87) = 244.93$, $p < .001$, partial $\eta^2 = .74$ and the expected Mindset × Intention interaction effect, $F(1, 87) = 8.58$, $p < .01$, partial $\eta^2 = .09$. To test our specific hypotheses in greater detail, we computed planned comparisons between the responses to the critical number 3 for each level of intention. As expected, in the goal intention condition, why-mindset participants ($M = 444.62$ ms, $SD = 55.01$) responded faster to the critical number than how-mindset participants ($M = 466.41$ ms, $SD = 73.67$), $F(1, 87) = 5.75$, $p < .02$, partial $\eta^2 = .06$. Moreover, in the implementation intention condition, why-mindset participants ($M = 469.39.80$ ms, $SD = 69.37$) tended to respond more slowly than how-mindset participants ($M = 432.15$ ms, $SD = 56.49$), $F(1, 87) = 3.05$, $p = .08$, partial $\eta^2 = .03$.

High task difficulty Computing a 2 between (Mindset: why vs. how) × 2 between (Intention: goal intention vs. implementation intention) ANCOVA on the response times to the critical number 3 in the high task difficulty trials while adjusting for response times to the control numbers revealed a significant main effect of the covariate, $F(1, 87) = 253.00$, $p < .001$, partial $\eta^2 = .74$, but no main effects of mindset or intention, both Fs$(1, 87) < 2.60$, $p > .11$ partial $\eta^2 < .03$, and no Mindset × Intention interaction effect, $F(1, 87) < 1$, $p > .46$, partial $\eta^2 < .01$. Exploratory analyses revealed that this lack of the predicted Mindset × Intention interaction effect could be traced back to implementation intention participants in the how-mindset condition, who responded especially fast to the critical number 3 but also to the control numbers. Adjusting for response times to the control numbers by including them as a covariate therefore abolishes the Mindset × Intention interaction effect that is observed for response times to the critical number 3 without this covariate, $F(1, 88) = 3.19$, $p = .07$, partial $\eta^2 = .04$.

In summary, Study 2 tested whether asking "why" as opposed to "how" would result in differential effects on action control by goal intentions versus implementation intentions. As predicted, goal intention participants in a why-mindset performed better on an easy dual-task than those in a how-mindset, and the reverse was true for implementation intention participants (i.e., implementation intention participants in a how-mindset performed better on an easy dual-task than those in a why-mindset). When task difficulty was high, the results were less straightforward. As expected, neither a why-mindset nor a how-mindset improved dual-task performance for goal intention participants, supporting the assumption that action control by goal intentions is effortful even when one is in a why-mindset. Moreover, why-mindsets canceled out the implementation intention effects that were observed for how-mindset participants. However, these findings should be interpreted carefully, as how-mindset implementation intention participants also responded faster to control cues when task difficulty was high. The lack of implementation intention effects for why-mindset participants when task difficulty is high would seem to support the assumption that simply being in a why-mindset may be sufficient to impair action control by implementation intentions; additional defensive postdecisional deliberation during the task itself may not be needed.

General discussion

The present research investigated whether and how asking "why" concerning a chosen goal differentially affects action control by goal intentions versus implementation intentions. The results of a handgrip persistence task (Study 1) and a dual-task (i.e., simultaneous go/no-go and tracking tasks; Study 2) support our hypothesis that why-mindsets promote action control by goal intentions but impair action control by implementation intentions. Goal intention participants in a why-mindset held a handgrip closed longer and responded faster to a critical cue in the go/no-go task of the dual-task (when task difficulty was low) than those in a how-mindset. The reverse effects were observed for implementation intention participants, who held a handgrip closed for less time and responded more slowly to a critical cue in the go/no-go task of the low task difficulty dual-task

trials when in a why-mindset relative to those in a how-mindset.

A limitation of the beneficial effects of why-mindsets on action control by goal intentions was indicated by the lack of performance enhancement when cognitive resources were limited (i.e., high task difficulty; Study 2). This finding supports our process assumption that action control by goal intentions is still effortful when one is in a why-mindset. With respect to the disruptive effects of why-mindsets on action control by implementation intentions, limited cognitive resources (i.e., high task difficulty; Study 2) did not prevent the performance impairment. This finding suggests that the disruptive effects of why-mindsets on implementation intention participants' performance are not mediated by any defensive postdecisional deliberation that takes place during the actual task. Rather, being in a why-mindset before the task seems to be sufficient to impair the beneficial implementation intention effects on performance that were observed in how-mindset participants even when cognitive resources were limited (i.e., high task difficulty; Study 2). However, regarding the improved performance of how-mindset implementation intention participants in high task difficulty trials, it should be noted that how-mindset implementation intention participants not only responded faster to the critical numbers, but also to the control numbers. Although such additional acceleration of control responses has been observed before (Brandstätter et al. 2001; Study 4) and one could argue that it represents and additional performance enhancement rather than a trade-off between critical and control trials, this general acceleration is not in accordance with the assumed specificity of implementation intention effects (e.g., Webb and Sheeran 2004). Therefore, both the acceleration of the critical responses and the three-way interaction effect should be interpreted carefully. One explanation that might reconcile this seemingly contradictory finding is the assumption that the automaticity associated with action control by implementation intentions frees cognitive and self-regulatory resources that can be invested to speed up other responses (see also Brandstätter et al. 2001). Indirect support for this explanation is provided by research on ego-depletion, in which action control by implementation intentions has been found to conserve self-regulatory resources more than control by goal intentions (Webb and Sheeran 2003, Study 1). In the study conducted by Webb and Sheeran, the conserved self-regulatory resources benefitted an unrelated subsequent task; however, the same benefitting effect could be found when the task involves numerous control trials that also require effortful action control, as is the case in the present study.

With regard to the spillover of mindset effects from an independent mindset induction task to a subsequent dual-task, the present results show that why- versus how-reasoning can affect subsequent action control, independent of the content of the why-reasoning, most likely by increasing the probability of defensive postdecisional deliberation concerning the primary task before and/or during this task. However, more research seems warranted to obtain a comprehensive understanding of the processes underlying the effects of why-mindsets on action control by implementation intentions.

Why-reasoning and action control by goal intentions

Our findings that why-reasoning benefits action control by goal intentions provide support for the idea that postdecisional deliberation leads to information processing in defense of the chosen goal, as has been demonstrated by Nenkov and Gollwitzer (2012). The faster responses in the go/no-go task paradigm under conditions of low dual-task difficulty indicate the potential performance benefits of engaging in defensive postdecisional deliberation by focusing on the pros of the respective goal. With respect to the processes underlying the effects of why-mindsets on action control, the lack of faster response times in the go/no-go task paradigm under conditions of high tracking task difficulty suggest that such biased postdecisional deliberation is, in fact, quite effortful. Thus, performance cannot be improved when the task in question draws heavily on cognitive resources. In sum, the effects of why-mindsets on action control by goal intentions should be most pronounced when people have sufficient cognitive capacity to engage in the reflective processing of pros and cons.

The observed pattern of findings offers a resolution to the seemingly contradictory predictions that both abstract why-mindsets (Freitas et al. 2004; see also high-level construals, Liberman and Trope 2008; Trope and Liberman 2010) and concrete how-mindsets (implementation intentions; Gollwitzer and Sheeran 2006; see also low-level construals, Liberman and Trope 2008; Trope and Liberman 2010) benefit action control. The interaction between abstract why-mindsets and the type of action control (by goal intentions or implementation intentions) must be taken into account. On the one hand, abstract why-mindsets (high-level construals) can be expected to improve goal pursuit when one's actions are controlled by goal intentions. For example, when one has committed to the goal to search for a job that fulfills one's needs for competence, autonomy, and relatedness (Deci and Ryan 2009), reflecting on reasons why one should apply for such a job should help applicants to avoid the temptation to apply for jobs that offer an attractive salary but only limited opportunities for personal growth. On the other hand, when it comes to stressful situations in which very limited cognitive resources are available, only implementation intentions should benefit action control. For instance, relative to mere goal intentions, implementation intentions improved

cooperative behavior even when time pressure was high and attractive temptations threatened cooperation in a group task (Wieber et al. 2013). Moreover, the beneficial effects of why-mindsets on effortful action control by goal intentions might be threatened by visceral states that bias information processing in the direction of impulsive behavior. For example, in a recent study by Nordgren and Chou (2012), hungry dieters were more likely to adhere to their dieting plans when their cognitive resources were limited rather than unlimited; the impulse to give into a temptation (e.g., eating chocolate cake) seemed to hijack people's reasoning, biasing their decisions in favor of the temptation rather than the higher-order goal of dieting. These findings point to the importance of tailoring one's motivational and volitional strategies to the kind of challenge (automatic impulses vs. biased thought) that will be faced during goal striving. If one knows that that automatic interferences (e.g., impulses or cravings) are likely to challenge one's goal striving, automatic action control by means of implementation intentions might be preferred, since this method has been found to effectively shield goal striving from automatic influences (e.g., Achtziger et al. 2008; Adriaanse et al. 2011; Bayer et al. 2010; Gollwitzer et al. 2011).

Why-reasoning and action control by implementation intentions

In contrast to the beneficial effects of why-reasoning on action control by goal intentions, we found that why-reasoning impairs action control by implementation intentions. Data obtained from the go/no-go task in the dual-task paradigm directly tested whether the automaticity of action control by implementation intentions would be impaired. In fact, for both difficulty levels of the dual-task, implementation intention participants that engaged in why-reasoning responded more slowly to the critical number than those who engaged in how-reasoning. These findings support the argument that simply being in a why-mindset, even without engaging in effortful postdecisional deliberation while working on a task, is sufficient to impair automatic action control by implementation intentions.

Previous implementation intention research has identified moderators including goal commitment, plan commitment, and plan format (Achtziger et al. 2012; Brandstätter et al. 2001; Gollwitzer et al. 2009), as well as personality-related moderators such as socially prescribed perfectionism (Powers et al. 2005), conscientiousness (Webb et al. 2007), and social anxiety (Webb et al. 2010). As a direction for future research, it might be promising to investigate whether implementation intention effects are also moderated by other kinds of mindsets (for an overview see Wyer and Xu 2010): holistic versus piecemeal mindsets (Higgins and Chaires 1980), situationally induced mindsets, such as relational thinking mindsets (e.g., Kim et al. 2008; Kühnen et al. 2001), or chronic mindsets, such as the level of action identification (Vallacher and Wegner 1987). Vallacher and Wegner, for instance, propose that the level on which people generally identify their own actions and those of others tends to be stable over time and across situations. Moreover, it has been suggested that psychological disorders such as depression, generalized anxiety disorder, post-traumatic stress disorder, and social anxiety are accompanied by biased or dysregulated levels of goal/action identification (Watkins 2011). Drawing on the present findings, a prevalence of low-level how-mindsets or high-level why-mindsets would call for tailored interventions to improve action control.

Related research

Support for the disruptive effects of why-mindsets on action control by implementation intentions has also been provided by recent studies on consumer behavior (Bayuk et al. 2010). Implementation intentions reduced the use of non-specified means when people were in a how-mindset; however, a why-mindset was found to alleviate this unwanted effect. For example, after forming an implementation intention or a simple goal intention to save money, participants thought about either how or why they wanted to save money (Studies 1 and 2). In line with the present findings, implementation intention effects were stronger in the how-mindset in comparison to the why-mindset condition. Moreover, why-mindsets effectively weakened the implementation intention's control over behavior (as assessed in terms of a heightened willingness to engage in out-of-plan behavior). This latter finding is in accordance with our hypothesized process, suggesting that why-mindsets indeed undermine the automaticity on which implementation intention effects are based. There is, however, a notable difference between the consumer behavior studies conducted by Bayuk et al. (2010) and the present research. Whereas the former focus on preventing the potential negative effects of implementation intentions (i.e., the reduced capacity to identify unspecified opportunities to act towards a goal), the present research concentrates on promoting the positive effects of implementation intentions (i.e., efficient goal implementation). Moreover, the studies conducted by Bayuk et al. primarily relied on self-reported behavioral intentions (i.e., self-reported tendency to engage in out-of-plan behavior) as dependent measures rather than actual behavior and used less powerful plans in an unspecified format rather than the if-then format (see Chapman et al. 2009; Oettingen et al. 2000, Study 3).

Moreover, research by Gagne and Lydon (2001, Study 2) on why-mindset effects on relationship perceptions is in line with the assumption that postdecisional why-reasoning benefits action control by goal intentions. Asking participants who were highly committed to their relationship goal to deliberate about whether or not they wanted to increase their commitment to their relationship after graduation led to more idealistic partner perceptions in comparison to those of highly committed no-mindset control participants. This defensive reaction to a threat to a relationship goal was only observed for high-commitment participants (i.e., postdecisional), not for low-commitment participants (i.e., predecisional); predecisional participants showed no increase in idealistic partner perceptions.

In addition, the beneficial effects of abstract why-mindsets on action control by goal intentions are also in agreement with Construal Level Theory (CLT; Liberman and Trope 2008; Trope and Liberman 2010). CLT proposes that mental construals of events change as a function of psychological distance, i.e., events that are remote in time, space, likelihood, or social distance are associated with abstract high-level construals. In a high-level construal, people should assign more weight to the global, superordinate, and primary (essential) task features in judgments, decisions, and actions than to their local, subordinate, and secondary (incidental) features. High-level construals are thought to help people to see the proverbial forest for the trees. This mindset should prevail when people construe events in a high-level why-mindset rather than a low-level how-mindset (e.g., Trope and Liberman 2000). In accordance with the proposed beneficial effects of why-reasoning on action control by goal intentions, high-level construals have been found to induce a focus on the pros of a desired goal rather than the cons (e.g., Eyal et al. 2004; Herzog et al. 2007).

Thus, goal intention effects on behavior (change) can be successfully supported by why-reasoning (as long as sufficient cognitive resources are available and visceral states do not interfere), as well as by implementation intentions, but not by why-reasoning when one has already formed an implementation intention; being in a why-mindset might be sufficient to cancel out the automatic action control established by implementation intentions. In fact, recent intervention research using tasksets has found a simple method whereby why-reasoning and how-reasoning can effectively cooperate in the promotion of goal pursuits: The order of reasoning must be controlled, such that already formed goal intentions are first strengthened with why-reasoning before implementation intentions are formed, thus creating strong goal commitment in the first step and effective goal implementation in the second (e.g., Adriaanse et al. 2010; Brunstein et al. 2008; Milne et al. 2002; Stadler et al. 2009, 2010).

Conclusion

Being in a why-mindset has been found to improve action control by goal intentions but hamper action control by implementation intentions. This pattern of results was found in a handgrip persistence self-control task, as well as in a dual-task paradigm when task difficulty was low (i.e., an easy tracking task and a simultaneous go/no-go task). When dual-task difficulty was high (i.e., the task limited the opportunity for effortful action control), why-mindsets improved neither action control by goal intentions (suggesting that this process was still effortful) nor action control by implementation intention (suggesting that simply being in a why-mindset is sufficient to impair automatic action control by implementation intentions). Together, the present findings on the distinct effects of why- and how-mindsets on action control by goals and plans highlight the importance of taking into account the mindsets of goal strivers.

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