Non-conscious goal conflicts

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ABSTRACT

The question raised in this paper is whether goal conflicts can occur outside of conscious awareness. Given the numerous and potentially conflicting goals people pursue, and the severe scarcity of mental resources, we offer a positive answer. Six experiments that employed a dissociation paradigm tested this hypothesis. Using three implicit behavioral markers of goal conflict (increased decision times, increased decision variance and heightened sensitivity to environmental information), and one physiological marker (increased arousal as measured by skin conductance level), these experiments document goal conflicts that do not reach conscious awareness.

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From the conflict between craving for a change and the wish to enjoy the status quo, through the confrontation between doing good deeds with one's money and accumulating a fortune, to the battle between the desire to maintain a good marriage and the temptation to approach an attractive other: Goal conflicts are pervasive in our lives. The question we raise in this paper is whether goal conflicts can occur outside of conscious awareness, and the answer that we propose is positive.

The argument we make here – that goal conflicts can occur non-consciously – rests on two compelling and uncontroversial premises. The first is that goal pursuits are pervasive in our lives, and that we oftentimes attempt to pursue goals that are potentially contradicting (e.g., to enjoy a cake and to remain slim; to be a devoted parent and to do as much research as possible). The second premise is that our conscious resources are gravely limited (e.g., Baddeley & Hitch, 1974; Kahneman, 1973).

From here on, our argument rests on simple algebra. If every goal conflict we confront and manage in our daily lives would have required awareness and conscious resources then, given the scarcity of mental resources, we would have had little cognitive resources for anything else. In other words, we would have been cognitively paralyzed. Since this does not seem to be the case, we propose here that goal conflicts can occur non-consciously.

There are two definitional notes we wish to make before we continue. First, we distinguish between the *operation* of the cognitive and motivational processes involved in goal conflicts, and their *subjective experience*. We use the notion 'conflict' to denote the

former, and examine whether goal conflicts are necessarily accompanied by the latter.

Second, we distinguish between two types of goal conflicts. Goals are *indirectly conflicting* if they compete for a limited resource (or a limitedly-available cognitive process) *and* additional resources may resolve the conflict. Thus, for example, if one only has two hours to spend, the goal of swimming for two hours and that of studying for two hours are in conflict. But if one increases one's resources by freeing two more hours the conflict will disappear. When no additional resources (or processes) are recruited, the concurrent pursuit of these goals is likely to lead to what we refer to as *goal interference*. Goals are *directly conflicting* if they have opposing behavioral implications and additional resources (or processes) *cannot* remedy the conflict. For example, the goal of keeping all of one's money to oneself, and that of doing good deeds with one's money, are in conflict: No matter how much money (resources) one earns, if one wants to keep ALL of one's money to oneself, the goals will remain in conflict. In this paper we focus on the latter case, that is — on *direct* goal conflicts.

Non-conscious goal pursuit

The theory

Goals are desired end states one believes (consciously or not) one knows how to attain (or to begin attaining). Traditionally, theories of goal pursuit emphasized the role of conscious thought and intention (e.g., Ajzen, 1991; Bandura, 1986; Deci & Ryan, 1985; Locke & Latham, 1990). The underlying intuition seems clear: As anyone who has ever wooed, adapted to a new environment, or attempted to make money realizes — achieving one's goals often seems to be a very effortful, conscious process.

This view of goal pursuit began changing in the early 1990s, when John Bargh and Arie Kruglanski presented models of non-conscious goal pursuit (Bargh, 1990; Kruglanski, 1996). For the purposes of our

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discussion here the similarities between these models outweigh their differences, and so we discuss them together. Both models begin by assuming that goals are mentally represented in memory within complex cognitive networks in which higher order goals are connected to lower order goals, means for their attainment, and alternative goals. These networks are shaped by one's history and experience with the goals and their pursuit, and they allow activation to spread between the different nodes. Any component included in the network (e.g., context, means) may activate the rest of the network via activation spread. Thus, for example, when one is exposed to the context in which the goal is habitually pursued, the goal itself might be activated, leading to the activation of means for its attainment, which together affect behavior and lead to goal pursuit (for an extension of these views see Hassin, Aarts, Eitam, Custers, & Kleiman, 2009).

The evidence

Empirical investigations of these models quickly followed. The general paradigm used in most of this research is very simple. In a first phase of an experiment the goal is subtly primed by exposing participants to goal-related stimuli (e.g., concepts and names). In the second, allegedly unrelated phase, the experimenter implicitly examines participants' goal pursuit, looking for priming-related changes.

Experiments of this sort have repeatedly demonstrated that the subtle activation of various components in goal networks can lead to the non-conscious pursuit of various goals. To take just a few examples, primed goals include impression formation and memorization (Chartrand & Bargh, 1996), achievement (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Troetschel, 2001; Eitam, Hassin, & Schul, 2008; Hassin, Bargh, & Zimerman, 2009), competition and cooperation (Bargh et al., 2001), dieting (Fishbach, Friedman, & Kruglanski, 2003), specific task goals (Shah & Kruglanski, 2002, 2003), sex and money (Aarts, Gollwitzer, & Hassin, 2004), solving puzzles (Aarts, Custers, & Veltkamp, 2008; Custers & Aarts, 2005), interpersonal goals (Fitzsimons & Bargh, 2003), attachment goals (Gillath et al., 2006) and egalitarian goals (Moskowitz, Gollwitzer, Wasel, & Schaal, 1999; for recent reviews see Latham, Stajkovic, & Locke, 2010; Fishbach & Ferguson, 2007).

Taken together, the data gathered in various laboratories strongly supports the idea that the subtle activation of components in goal networks can lead to goal pursuit in the absence of conscious intention and thought (see Dijksterhuis, Chartrand, & Aarts, 2007).

Pursuing more than one goal

Thus far most of the empirical investigation of non-conscious goal pursuit was conducted under the (mostly implicit) working assumption that primed goals are "adopted" by participants as if other goals they pursue are irrelevant to the process. It should not be surprising, then, that until very recently there was no scientific evidence that pertained to the issue of the current investigation, that is — to non-conscious goal conflicts (for conscious goal conflicts see, Emmons & King, 1988; Emmons, King, & Sheldon, 1993; Kehr, 2003; Lee, Locke, & Latham, 1989). This state of affairs is beginning to change, however, and evidence that is generally supportive of the idea of non-conscious goal conflicts is emerging.

It has been shown, for example, that priming of goals that are in direct conflict with a salient social norm results in increased negative affect (Oettingen, Grant, Smith, Skinner, & Gollwitzer, 2006); that priming of goals that are in indirect conflict with one's focal goal results in decreased performance on the focal task (Shah & Kruglanski, 2002); that priming a focal goal inhibits the accessibility of alternative goals (i.e., goal shielding; Shah, Friedman, & Kruglanski, 2002), and that priming of temptations that are in direct conflict with higher level goals results in the activation of these very same goals, thus improving self control (Fishbach et al., 2003).

Given the priming techniques used in the abovementioned research we believe that its findings may partially reflect goal conflicts of which participants are unaware, findings that are highly encouraging for the current project. This is especially true for the experiments of Fishbach et al. (2003), who examined self control dilemmas which often involve active goal conflicts. We acknowledge that since this previous research was not designed to examine non-conscious conflicts the data is not as conclusive as one would have like it to be. Specifically, all previous research on goal conflicts did not assess whether participants were aware of the conflicts, and hence we cannot reject the possibility that at least some of the conflicts were conscious. Yet, the idea that these investigations documented conflicts that were at least somewhat non-conscious seems reasonable.

The idea that goal conflicts might occur outside awareness also gains indirect support from research on attitude ambivalence. Specifically, recently it has been argued that discrepancies between implicit and explicit evaluations of an object (evaluations which social psychologists often refer to as *attitudes*) may lead to ambivalence that does not reach conscious awareness or, put differently, to implicit ambivalence (Petty, Tormala, Briñol, & Jarvis, 2006). To take an example, suppose Bob always believed that James is a lovely person, but has recently learned James is violent on occasion. Bob's explicit attitude is likely to change as a result of this information: Bob would not consciously think that James is as lovely as he had previously thought. Yet, on an implicit level, the older attitude may still linger, thereby creating ambivalence between the implicit (more positive) and explicit (more negative) attitudes. Implicit ambivalence, then, is created when one's mental representation of an object (James, in our case) is associated with two *discrepant* evaluations — one implicit and one explicit.

In a recent series of experiments Petty and colleagues examined similar situations (Petty et al., 2006; Briñol, Petty, & Wheeler, 2006), and showed that there are cases in which discrepancies of this sort affect attitude-related processes without reaching awareness. The main novelty in the implicit ambivalence literature (at least from the current perspective) lies in the idea that the two evaluations *may operate concurrently, on the same processes*. In a different line of work pertaining to the discrepancies between implicit and explicit attitudes, Rydell, McConnell, and Mackie (2008) have demonstrated that these kinds of discrepancies result in discomfort (characterizing a state of cognitive dissonance) that participants can explicitly report. Note, however, that participants were still unaware of the cause of these feelings, suggesting they were unaware of the discrepancy itself (see Rydell & McConnell, 2010, for a review). The evidence gathered in this new literature constitutes a qualitative step forward in terms of our understanding of the dynamics of attitudes and non-conscious processes more generally.

Taken together, then, the literatures surveyed in the last two sections suggest that mental processes that involve contradicting schemas (attitudes, goals) can occur outside of conscious awareness.

Markers of goal conflict

In order to provide evidence for non-conscious goal conflicts one has to establish a dissociation between data from explicit phenomenology and data from indirect measures, or markers of goal conflict. We suggest four markers, all of which result from a conceptual analysis of the meaning of 'goal conflict', and two of which have supporting data from previous research.

Arousal

Decisions made in conflictual situations are characterized by difficulty and unease, inconsistent behavioral intentions and inconsistent affective tendencies. Decades of research using various measures of arousal have

shown that these types of situations are usually accompanied by higher levels of arousal (see, e.g., Allen & Crowell, 1989; Blascovich et al., 1993; Kahneman, 1973; Kelsey, 1991; Obrist, 1981). Hence, we propose here that arousal may also characterize goal conflicts that occur non-consciously.

Decision duration

The basic assumption underlying much of the cognitive conflict literature – from Stroop (1935) to condom use (Abraham & Sheeran, 2003) – is that decisions under conflict take longer. This is the case because during conflicts one has to negotiate between (at least) two conflicting goals, plans, or behaviors, and negotiation takes time. When two goals are in conflict, there are conflicts at all of the abovementioned levels, and they are inherently confounded. Thus, while pinpointing the precise locus of increased duration times in goal conflicts might pose a very difficult challenge, one can definitely predict increased decision duration times.

Behavioral variance

Goal conflicts are created when there are multiple goals that a person finds attractive, and with them come multiple appealing behaviors. Take donating for charity as an example. If one only cares about accumulating wealth then one will never donate. If one also has the conflicting goal of doing good deeds with one's money, however, then one's behavior is *likely* to show more variance: Sometimes one will be tempted to donate a lot and in other times less. Hence, behavioral variance in conflict situations should be larger than in situations that are not conflictual.

Subtle cues

When two (or more) goals are in active conflict they often create close-call decisions, i.e. – decisions in which the alternatives seem to have very similar utilities. Metaphorically, then, the "decision scales" are more or less balanced. It is exactly in these cases where minor (and possibly irrelevant) cues in the environment have the potential of tipping the scales. Consider donating again. The behavior of the caller who asks for the donation is unlikely to affect one's decision when one is determined and knows exactly what one wants to do. When one is in conflict, however, this behavior may indeed make a difference. If the person is nice and warm, the likelihood of a big donation may increase; if this person is very rude, it may decrease. This analysis illustrates, then, that environmental information, even when it is irrelevant to a decision, is more likely to affect behavior in conflictual situations.

It is important to note here that this list is not meant to be exhaustive, and that each characteristic in itself is neither necessary nor sufficient. Yet, taken as a group the four characteristics suffice to identify a situation as one involving goal conflict.

The current research

The paradigm

We report six experiments that use the "separate experiments" paradigm (e.g., Bargh et al., 2001; Chartrand & Bargh, 1996). In all experiments the "first experiment" induced a goal (or a control state), whereas the "second experiment" was a social dilemma task. In this latter task, participants played the role of a fisherman, and were asked to decide, on each trial, how many of the fish that they had "caught" they wanted to "return back to the lake" (see Bargh et al., 2001). Participants were warned that if the fish population drops below a certain threshold — it would get extinct.

Previous research has shown that the dominant goal in tasks of this sort is to compete and accumulate wealth, that is — to keep as many fish as possible (e.g., Brewer & Kramer, 1986). As Fehr and Fischbacher (2003) put it: "In public goods experiments that are played only once, subjects typically contribute between 40 and 60% of their endowment […] cooperation is, however, rarely stable and deteriorates to rather low levels if the game is played repeatedly (and anonymously)" (p. 786).

There are many advantages to using this paradigm for our purposes. First, it creates a *direct* conflict between two goals — cooperation and accumulating wealth: No matter how many resources one has, every step *towards* cooperation (that is, returning fish to the lake) is a step *away from* accumulating wealth (keeping fish to oneself), and vice versa. Secondly, the fact that there is a dominant goal allows us to increase conflict by priming the non-dominant goal. This is important, because in situations where there is no dominant goal (or where we do not know which goal is dominant), priming of one of the goals may lead to *a reduction* in conflict.

Note that while the commons resource dilemma is likely to activate both goals (to different degrees), it is only the cooperation goal that is being primed. Thus, any evidence for increased conflict as a result of priming should be attributed to a conflict between a dominant goal and priming-enhanced non-dominant goal.

Examining awareness

Phenomenology of conflict is usually examined by asking participants how conflicted they are (e.g. Emmons, 1989). However, in contexts where conflict is possible, maybe even socially desirable, this question is likely to create a demand to refrain from reporting lack of conflict (try: "how conflicted were you about eating this rich chocolate cake?"). Generally, then, one cannot expect participants in these types of situations to report that they are not conflicted at all.

In order to circumvent this problem we use a dissociation paradigm: We compare the control and non-conscious goal conflict conditions, looking for a dissociation between explicit measures – subjective ratings of phenomenology, and implicit ones – the abovementioned markers. The explicit measures of conflict should reveal no differences between the groups, thereby implying no differences in phenomenology. The implicit measures, however, should reveal differences between conditions, suggesting that the conflict is more pronounced for participants in the conflict condition than for those in the control condition [a similar methodology is widely used in the non-conscious goal pursuit literature (for a recent review see Ferguson, Hassin, & Bargh, 2008) and in the implicit ambivalence literature (see Petty et al., 2006)].

The explicit measures used in the current experiments include direct questions (e.g., "to what extent did you feel conflicted between the wish to return fish to the lake and the wish to keep fish to yourself?") and less direct ones (e.g., "how much did you deliberate before making your decisions?"). In Experiments 1 to 5 we ask these questions during a thorough awareness assessment at the end of the experiment.

To overcome issues of power, we also present a meta-analysis of the awareness measures in the current paper, analyses that include 233 participants. To presage our conclusion, there are no signs of awareness of the conflict even in these more sensitive analyses. Importantly, in Experiment 6 we ask participants to report difficulty level *on each and every trial*, thus ruling out the possibility that by the time participants in Experiments 1 through 5 completed the awareness assessment, they had already forgotten how conflicted they were.[1]

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[1] We chose to ask an indirect question for two reasons. First, difficulty is inherently associated with conflict, and we hence believe that it is a very good measure of conflict. Second, we didn't want to prime the notion of *conflict* in the control group, and hence we had to avoid using the word and its synonyms. See more regarding this issue in Experiment 6.

Overview

Six experiments examine whether goal conflicts can occur non-consciously. All of the experiments use the "separate experiments" paradigm, in which a goal is primed during an allegedly "first experiment", whereas goal pursuit and goal conflict are assessed in a "second, unrelated experiment" (cf. Bargh et al., 2001; Chartrand & Bargh, 1996). Experiment 1 examines non-conscious goal conflict via the second and third markers (decision duration and behavioral variance), and Experiment 2 rules out an alternative explanation of the results in terms of mere priming. Experiment 3 uses the first marker — arousal (assessed via GSR), and in Experiment 4 we examine the fourth marker — the use of subtle, irrelevant cues in a non-conscious goal conflict situation. Experiment 5 further addresses the question of whether the induced conflict is motivational in nature by examining a central characteristic of goal pursuit — resumption after interruption (Bargh et al., 2001; Förster, Liberman, & Friedman, 2007; Zeigarnik, 1938). In this experiment goal pursuit is interrupted by an engaging and distracting task, following which participants go back to the social dilemma (conflictual) task. Finally, to further address the issue of awareness, in Experiment 6 participants are probed for conscious awareness *on each and every trial*, thereby providing a more stringent test of awareness (see more below).

Experiment 1

Participants were either primed with a cooperation goal or not, and they then engaged in the social dilemma task described above. We hypothesized that priming the goal of cooperation, which in this context means returning fish to the lake, would result in increased conflict. Hence, participants in this condition should take longer to make their decisions (second marker), and their decisions should show more variance (third marker).

Method

Participants

Thirty one undergraduate students (55% females) participated in the experiment.

Materials and tools

Goal priming. Priming was carried out via a scrambled sentences task (Bargh et al., 2001; Srull & Wyer, 1979). Participants were given a list of 26 scrambled sentences, each containing five words, and were asked to form grammatical four-word sentences. In the *non-conscious goal conflict condition* (henceforth, the *conflict condition*) the theme of 11 sentences was related to cooperation (e.g., he shoe helpful very is). In the *control condition* all 26 sentences were goal-neutral.

Social dilemma. Each participant was led to believe that s/he is one of two fishermen currently fishing in a small lake. In each "fishing season" (i.e., trial) participants "caught" a certain number of fish (randomly chosen from 13–17), and they were then asked to decide how many fish they would return back to the lake. Participants were not given information regarding the number of fish in the lake, nor were they informed of the "other fisherman's" decisions, but they were warned in advance that if the fish population drops below a certain threshold it would die. To increase the believability of the task and the threshold, a message that appeared after five specific trials warned participants that the fish population approached threshold (sequential numbers of these trials were chosen randomly but were fixed for all participants). We expected participants' level of cooperation to increase following these messages (i.e., participants should return a larger percentage of the fish caught to the lake in the next trial). This was indeed the case as can be seen in Fig. 2. The task consisted of 60 trials.

Assessing awareness. In a post-experimental questionnaire participants rated their commitment to the goals of cooperation and accumulating wealth. Specifically, participants were asked: "how important was it for you to accumulate wealth/cooperate in the fishing game?" responses were given on a scale ranging from 1 — "not at all important" to 9 — "very important". In addition, participants were asked two questions about the experience of conflict. The first question read "to what extent did you feel conflicted between the goal of accumulating wealth and the goal to cooperate during the game"? The second question read "to what extent did you deliberate before making your decisions?" Responses were again given on a 9 point scale. Participants were also probed for suspicion regarding the cover story and the relations between the various stages of the experiment. Two participants indicated awareness of the relation between the two tasks and their data were discarded (not changing the pattern of results).

Results

Manipulation check

As hypothesized, participants who were primed with a cooperation goal (i.e., those in the conflict condition) returned a larger percentage of their fish to the lake compared to control participants ($M = 48.95\%$, $SD = 16.67$ and $M = 34.14\%$, $SD = 17.73$, respectively), $t(27) = 2.31$, $p = 0.03$, $d = 0.86$. This result basically replicates previous findings of Bargh et al. (2001) in a different culture and extended number of trials (60 vs. 5).

Markers of conflict

Behavioral variance. To examine decision variance we computed, for each participant, the standard deviation of responses across the 60 trials. This within-participant standard deviation served as our dependent variable, and it was subjected to a *t*-test. As hypothesized, the behavioral variance of the conflict group ($M = 20.91$, $SD = 10.50$) tended to be larger than that of the control group ($M = 15.18$, $SD = 6.54$), $t(27) = 1.77$, $p = 0.08$, $d = 0.65$.

Decision duration. Decision times in the conflict condition ($M = 2.38$ s, $SD = 1.40$) were indeed significantly longer than those in the control condition ($M = 1.52$ s, $SD = 0.38$), $t(27) = 2.28$, $p = 0.04$, $d = 0.83$.

Awareness

To assess conscious goal commitment we asked participants to report their commitment to both goals (see specific questions in the Assessing awareness section of the method). The priming did not yield differences in conscious goal commitment, $ts(27) < 1.33$, thus suggesting that priming did not lead to differences in conscious goal pursuit.

More importantly, participants were asked several questions in an attempt to assess their conscious conflict. The most direct and explicit question was "to what extent did you feel conflicted between your wish to return fish to the lake and your wish to keep fish to yourself?" The answers to this question yielded an unexpected significant difference, such that participants in the conflict condition experienced *less* conflict than participants in the control condition, $t(27) = 2.12$, $p = 0.04$, $d = 0.78$ (see more on this unexpected effect in the Discussion section). A less direct question assessed participants' deliberation, in the assumption that conscious conflict yields conscious deliberation (the exact question was "to what extent did you deliberate before making your decisions?"). No significant differences between the conditions emerged, $t(27) = 1.17$.[2]

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[2] Another possible way to dissociate the implicit measures of conflict from the explicit ones is to covary out the variance that is associated with explicitly reported conflict. To do this we ran separate ANCOVAs (one with the mean standard deviation and another with the mean RT as dependent variables) in which participants' explicitly reported conflict served as a covariate. The results were practically identical to those we reported above ($p = 0.05$ for RT and $p = 0.06$ for the behavioral variance). The same analysis was performed for Experiments 2 through 6 and yielded similar results.

The results of the awareness assessment and the analyses of variance lead us to conclude, then, that priming did not yield differences in conscious goal pursuit or in conscious goal conflict. Hence, we attribute the results of prolonged decision time and larger behavioral variance to the manipulation of non-conscious goal conflict.

Discussion

The results of the first experiment support our hypotheses: While participants in the goal conflict condition took longer to make their decisions, and their behavior revealed more variance, their conflict awareness assessment showed that these effects were not accompanied by a parallel amplification of conscious conflict. On the contrary, if anything participants in the conflict condition seemed to have experienced less conflict. In other words, the results establish a dissociation between the implicit markers of conflict and its phenomenology.

The latter finding raises the possibility that the dissociation we predicted between conscious experience of conflict, and the implicit measures of conflict, is more complex than we suspected. Given that we did not predict it, however, the other possibility – that this is simply a fluke – looms larger. To presage later sections in this paper, this suggestion gains support from the results of the other experiments we report.

Experiment 2

The manipulation of conflict and that of goal priming were confounded in Experiment 1: Participants in the conflict condition were primed whereas those in the control condition were not. One may argue, then, that the findings of this experiment could be attributed to goal priming per se, and not to the non-conscious conflict it (ex hypothesis) produced.

Experiment 2 tests this alternative explanation. To do so, we used the same social dilemma, yet primed a non-conflicting goal, that of accumulating wealth. If the results of the first experiment are due to goal priming per se, then they should replicate here. We think, however, that these results reflect non-conscious conflict. Hence, we predict that priming the goal of accumulating wealth should not result in increased decision times and behavioral variance. Furthermore, given that the primed goal is also the dominant goal, its priming may even *reduce* the conflict that is inherent to the task. It is possible, therefore, that our implicit measures will show a reduction in conflict.

Method

Participants

Fifty undergraduate students (54% females) participated in the experiment.

Goal priming

We used a word search puzzle to prime the goal of accumulating wealth (see Bargh et al., 2001). The puzzle was a 10 * 10 matrix of letters below which appeared a list of 13 words that were embedded in the matrix. In the priming condition we used seven words that were pilot-tested to be related to the accumulation of wealth (e.g., wealth, profit, and earnings) and six were goal-neutral. In the control condition all words were goal-neutral.

Experimental task and assessing awareness

These were identical to Experiment 1. One participant thought that the priming task may have affected his later performance, and his data (that did not change the pattern of results) were excluded.

Results

Manipulation check

Participants in the priming condition returned a significantly smaller percentage of their fish to the lake compared to control participants ($M = 26.76\%$, $SD = 15.90$ and $M = 36.52\%$, $SD = 17.50$, respectively), $t(47) = 2.04$, $p = 0.05$, $d = 0.58$.

Markers of conflict

Behavioral variance. No difference was found between participants in the priming condition and those in the control condition, $t < 1$.

Decision duration. Participants in the priming condition were *faster* than those in the control condition ($M = 1.41$ s, $SD = 0.54$ and $M = 1.93$ s, $SD = 1.09$, respectively), $t(47) = 2.13$, $p = 0.04$, $d = 0.60$.

Awareness

There were no significant differences between the conditions in terms of commitment to the (primed) goal of accumulating wealth, or that of cooperation, $ts(47) < 1.38$. There were also no significant differences between the conditions in reported experienced conflict, $t(47) < 0.93$ or perceived deliberation, $t(47) < 1.63$. These results suggest that priming did not affect conscious goal commitment or conscious conflict.

Discussion

The results of Experiment 2 show that goal priming per se does not lead to increased decision times and behavioral variance, thus allowing us to reject the alternative explanation proposed earlier. Furthermore, they suggest that conflict may also be decreased non-consciously: When a primed goal concurs with the dominant one the conflict is toned down, leading to a reduction in decision times.

Experiment 3

Experiment 3 examines non-conscious conflicts using the first marker: arousal. As was argued above, decisions in conflictual situations are typically difficult and uneasy, and they involve inconsistent intentions and emotions — characteristics that have been repeatedly found to affect level of arousal. If, indeed, cooperation priming increases conflict then it should lead to higher arousal. Arousal is measured in this experiment via Skin Conductance Level, or SCL (e.g., Ben-Shakhar & Elaad, 2002; Gronau, Cohen, & Ben-Shakhar, 2003). We hypothesize, then, that the SCL values of the participants in the conflict group should be higher than those of control participants.

Method

Participants

Forty undergraduate students (71% females) participated in the experiment. For prosaic technical reasons only right handed participants took part in the experiment (for precise measurement of skin conductance level one hand needs to be fixated and a left side armrest chair was used for this purpose).

Apparatus

Skin Conductance Level (SCL) was measured by a constant voltage system (0.5-V ASR Atlas Researchers). Two Ag/AgCl electrodes (0.8 cm diameter) were attached to participants' left index and ring fingers.

Goal priming task

A cooperation goal was primed through a word search puzzle. In the *conflict condition* we used six words that were pilot-tested to be

related to cooperation (*share*, *team*, *group*, *commune*, *collaborate*, and *together*). The rest of the words were goal-neutral. In the *control condition* all words were goal-neural.

Social dilemma task

The same task that was used in Experiments 1 and 2 was used in the current experiment.

Procedure

Participants were told that they would take part in a series of unrelated experiments. They were seated in a chair in front of a computer and their left index and ring fingers were attached to two electrodes. Participants were told that their skin conductance will be measured during the various experiments, and they were assured that the procedure was harmless and painless. They were then told that a baseline measure of their skin conductance is needed and they were asked to sit as steadily as they can. The experimenter then left the room and the baseline measure – 20 measurements over two minutes – began. At the end of the baseline measurement participants were given the word search puzzles. Upon completion, another SCL measurement was taken — 10 measurements over one minute. At the end of this measurement the experimenter entered the room and started the social dilemma task. She encouraged participants to minimize their movements and then left the room. During the social dilemma task SCL measurements were taken on every trial. Two measurements were taken 150 ms and 200 ms after the decision screen appeared. Beginning exactly 1000 ms after the presentation of the decision screen, 20 measurements were taken at intervals of 50 ms. In the Results section below we report data for the averaged 20 measurements, but data from the 150 ms and 200 ms are virtually identical. After participants completed the social dilemma task a final measurement was taken (10 measurements during one minute).

Assessing awareness

Questions aimed at assessing awareness to the goal primed and the conflict were identical to those of Experiments 1 and 2.

Two participants in the non-conscious goal conflict condition indicated awareness of the cooperation goal prime. Their data were discarded from the analyses, but the pattern of results remains the same if they are included in them.

Results

Manipulation check

A *t*-test between the two conditions revealed that participants in the conflict condition indeed returned more fish to the lake compared to control participants ($M = 43.90\%$, $SD = 21.43$ and $M = 30.50\%$, $SD = 16.89$, respectively), $t(36) = 2.15$, $p = 0.04$, $d = 0.72$.

SCL measures

A comparison of the baseline SCL scores revealed that there were no initial differences between the control and conflict conditions ($M = 6.66$, $SD = 2.72$ and $M = 6.96$, $SD = 3.50$, respectively), $t(36) < 1$. This allows us to proceed to our central analyses.

To examine our main hypothesis we calculated a conductance score for each participant by subtracting her baseline conductance level from the mean conductance score of the 60 social dilemma trials (a total of 1200 measurements for each participant). As hypothesized, participants in the conflict condition had higher conductance scores compared to their control counterparts ($M = 3.18$, $SD = 1.84$, and $M = 2.11$, $SD = 1.36$), $t(36) = 2.05$, $p = 0.05$, $d = 0.68$. As can be seen in Fig. 1, conflict participants had higher conductance scores throughout the social dilemma task. We thus conclude that the subtle induction of goal conflict increases arousal.

Behavioral markers

Behavioral variance. Participants in the conflict condition revealed significantly larger behavioral variance compared to their control counterparts ($M = 21.18$, $SD = 9.06$ and $M = 15.98$, $SD = 5.74$, respectively), $t(36) = 2.14$, $p = 0.04$, $d = 0.71$.

Decision duration. Though analysis of decision times revealed means in the predicted direction ($M = 3.47$ s, $SD = 0.80$ and $M = 3.20$ s, $SD = 0.62$, for conflict and control participants, respectively), this tendency did not reach statistical significance, $t(36) = 1.17$, $p = 0.25$, $d = 0.39$, possibly due to the fact that the technical difficulty of using the mouse and keyboard with one hand resulted in considerably longer decision times (compared to decision times in the previous experiments).

Awareness

Participants in the control and conflict conditions did not differ in their commitment to either cooperation or accumulating wealth goals, $ts(36) < 1.43$.

Critically, there were no differences between the control and conflict conditions in terms of their experienced conflict and perceived deliberation, both $ts < 1$.

Discussion

Priming of a cooperation goal just before engaging in a social dilemma task increased arousal during the task, thereby suggesting that this priming indeed increased conflict. Yet, explicit measures of conflict did not yield any differences between the conditions in terms of the direct phenomenology of conflict, and a less direct measure — subjective deliberation time. These results support our suggestion that goal conflicts may occur non-consciously.

Experiment 4

Experiment 4 examines non-conscious goal conflicts via the fourth marker — susceptibility to subtle, irrelevant cues. We argued above (in the Markers of goal conflict section) that even minor (irrelevant) events in the environment should have a stronger effect on our behavior in conflictual (vs. non-conflictual) situations. This is the case, we argued, because in close-call decisions even very minor events have the potential of affecting behavior. The metaphor we used was of balanced scales. When the decision scales are balanced, every minute event has the potential of tilting them.

To test this prediction Experiment 4 makes use of the anchoring phenomenon (Tversky & Kahneman, 1974). If participants in the conflict condition are indeed more affected by subtle cues in their environment, as our analysis suggests, then participants in the non-conscious goal conflict condition should be more affected by the anchors than participants in the control group. Experiment 4 examines this hypothesis.

Like all previous experiments, this was a two-stage experiment. Unlike them, however, participants were told that in the second stage they will switch between two tasks. One is the social dilemma used in the previous experiments. The other required participants to indicate whether numbers that appeared on the screen were odd or even (more details below). The tasks alternated, such that a number appeared prior to every trial of the social dilemma. The numbers were designed to be either *high* or *low anchors*. Given the analysis above, we predicted that participants in the conflict condition would be more affected by these anchors than participants in the control condition. Specifically, participants in the conflict condition should return a smaller percentage of fish to the lake following low (vs. high) anchors and vice versa, whereas no such effect is hypothesized for the control
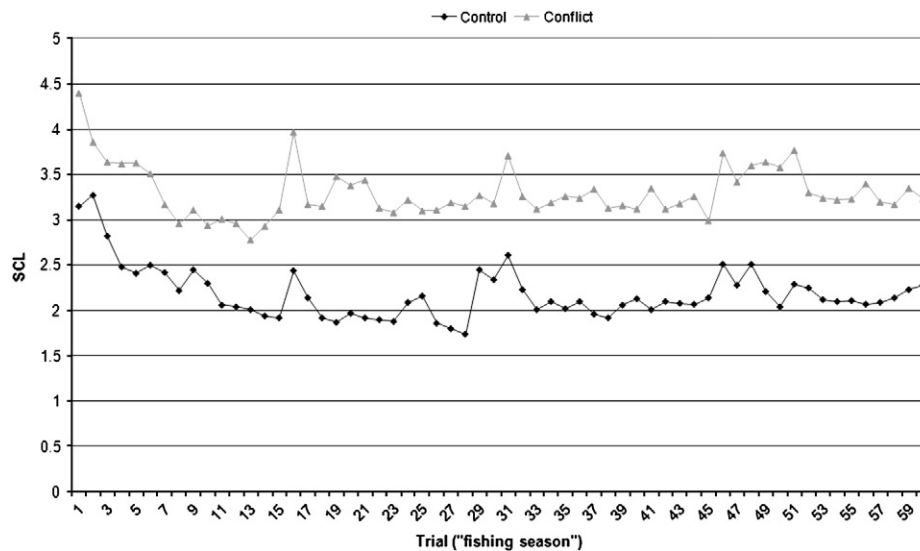
Fig. 1. Mean SCL levels (indicating level of arousal) of the control and conflict conditions for every trial in the social dilemma task in Experiment 3.

condition. This effect should manifest itself as an interaction between Priming (control vs. conflict) and Anchor type (low vs. high).

Method

Participants

Fifty undergraduate students (72% females) participated in this experiment.

Goal priming

Goal priming was carried out using the same word search puzzle task that was used in Experiment 3.

Experimental tasks

Social dilemma. This task was identical to that of Experiments 1 and 2, except for the number of trials (120 instead of 60). Before each trial appeared an anchor.

Anchoring. On each trial of this task participants saw either a number or a letter. When they saw a number (90 trials), their task was to indicate whether it is odd or even. Crucially, the anchoring manipulation was carried out by these numbers, which served either as *low anchors* (the numbers 1, 2, or 3 appeared in 45 trials) or as *high anchors* (the numbers 9, 10, or 11 appeared in 45 trials). On each trial the number to be used as anchor was randomly selected from the list of the relevant numbers. The letter trials (30) were meant as distractors, and participants were asked to decide whether the letter that appeared on the screen was a consonant or a vowel.

Assessing awareness

This was identical to those of the previous experiments, except for two additional questions that assessed participants' perceptions of the numbers task. Three participants suspected that the tasks were related, and their data were discarded from further analyses (but did not change the pattern of the results).

Results

Markers of conflict

Effects of subtle cues. The predicted effect should result in an interaction, which would show stronger effects of the anchors in the conflict condition. Thus, a mixed model ANOVA was conducted with Priming

(control vs. conflict) as the between participants factor and Anchor type (low vs. high) as a within-participant factor.

http://172.20.145.93:14001/wmsAs hypothesized, the two factors significantly interacted, $F(1, 45) = 4.94$, $p = 0.04$, $\eta^2 = 0.10$. Simple effect tests revealed a significant effect of anchors in the conflict condition, such that in the low anchor trials participants returned less of their fish to the lake ($M = 40.15\%$, $SD = 16.80$) than in the high anchor trials ($M = 41.84\%$, $SD = 17.12$), $t(21) = 3.15$, $p = 0.01$. There was no effect of Anchor type in the control condition ($M = 35.36\%$, and $M = 34.77\%$, respectively), $t < 1$. There were no main effects for either Priming, $F(1, 45) = 1.72$, $p = 0.19$, or Anchor type, $F(1, 45) = 1.15$, $p = 0.29$.

Behavioral variance and decision duration. The fact that participants had anchors that they could use – and that they indeed used them – is likely to have influenced the psychological processes that underlie conflict management. More specifically, the use of anchors may change the nature of the task by providing a tempting way out, which may, in turn, change the implicit construal of the situation. In addition, since the anchors affected participants' actual responses, they are also likely to have affected behavioral variance and decision duration in a more direct way. Currently, the nature of these complex interactions is only poorly understood, so we were not certain whether the other markers of conflict will emerge in this experiment. The results indicate that they did not: There were no significant differences between conditions in either decision duration or behavioral variance, both $ts < 1$.

Awareness

There were no differences between conditions in commitment to the relevant goals, experienced conflict, and experienced deliberation, all $ts < 1$.

Discussion

Our analysis in the Introduction suggested that subtle cues in the environment should more strongly affect decisions when one is in conflict (vs. not). And indeed, while the anchors failed to affect participants' behavior in the control condition, participants in the conflict condition returned less fish after low (vs. high) anchors. These results indicate, yet again, that our manipulation created non-conscious conflict. Note that in the current paradigm the anchors were normatively irrelevant to the focal decision, and hence the results also suggest that when we are in non-conscious goal conflict we are in a higher risk of being affected by irrelevant information.

Experiment 5

Experiment 5 further addresses the question of whether the conflict is motivational in nature. One of the characteristics differentiating motivational priming from semantic priming is its duration (e.g., Bargh et al., 2001). In the previous three experiments the effects of priming lasted 60 trials, suggesting that the effects were indeed long-lasting. However, in the task used here participants make repeated decisions, and it may be argued that the effects are long-lasting due to this specific characteristic of the task.

Hence, in Experiment 5 we examine another characteristic of goal pursuit. In accordance with the theoretical suggestions recently reviewed and advanced by Förster et al. (2007; see also Bargh et al., 2001; Zeigarnik, 1938), we examined whether the conflict resumes after interruption.

Method

Participants

One hundred and eighteen undergraduate students (63% females) participated in the experiment.

Goal priming task

Goal priming was carried out using the same word search puzzle task that was used in Experiments 3 and 4.

Social dilemma task

The same task that was used in Experiments 1 through 3, was used in the current experiment.

Distracting task

We used the Wason card selection task (Wason & Johnson-Laird, 1972) as a distracting task. In this task four cards each bearing a symbol (E, K, 7, and 2) are presented along with a rule: "if a card has a vowel on one side it has an even number on the other side". Participants' task is to select which cards to turn over in order to determine whether the rule is valid or not. This is a challenging and difficult task, which took approximately 5 min to complete.

Procedure

Participants were told that they would take part in a series of unrelated experiments. They first completed the word search puzzle. They then completed 30 trials of the social dilemma task ("the fishing game"). After the 30th trial an instruction slide appeared on the screen, telling participants that they will continue with the "fishing game" in a short while, and that now they will perform a different task. The Wason task was then presented. Upon completion of the Wason task participants went back to the "fishing game", and completed additional 30 trials of the social dilemma.

Assessing awareness

The questions asked to assess participants' awareness to the goal primed and the conflict were identical to those of Experiments 1 and 2.

Results

Manipulation check

A t-test comparing the two conditions in the trials preceding the distracting task, revealed that participants in the conflict condition indeed returned more fish to the lake compared to control participants ($M = 35.93\%$, $SD = 16.68$ and $M = 27.10\%$, $SD = 16.37$, respectively), $t(116) = 2.90$, $p = 0.004$, $d = 0.54$.

The same results emerged when comparing the two conditions in the trials following the distracting task. Again, participants in the conflict condition returned more fish to the lake compared to control

participants ($M = 38.22\%$, $SD = 19.03$ and $M = 29.69\%$, $SD = 18.98$, respectively), $t(116) = 2.44$, $p = 0.016$, $d = 0.45$.

Behavioral markers

Behavioral variance. Participants in the conflict condition revealed significantly larger behavioral variance compared to their control counterparts, both in trials preceding the distracting task ($M = 17.33$, $SD = 8.08$ and $M = 14.67$, $SD = 6.05$, respectively), $t(116) = 2.03$, $p = 0.045$, $d = 0.38$, and in trials following it ($M = 20.13$, $SD = 10.50$ and $M = 16.48$, $SD = 9.14$, respectively), $t(116) = 2.01$, $p = 0.047$, $d = 0.37$.

Decision duration. Participants in the conflict condition had longer decision times compared to control participants before the distracting task ($M = 2.27$ s, $SD = 1.14$ and $M = 1.77$ s, $SD = 0.93$, respectively), $t(116) = 2.62$, $p = 0.01$, $d = 0.49$. The decision times following the distraction task tended to be longer as well ($M = 2.24$ s, $SD = 0.60$ and $M = 2.07$ s, $SD = 0.49$, respectively), $t(116) = 1.65$, $p = 0.10$, $d = 0.31$.

Awareness

Participants in the control and conflict conditions did not differ in their commitment to either cooperation or accumulating wealth goals, $ts(116) < 1$.

Critically, there were no differences between the control and conflict conditions in terms of participants' experienced conflict and perceived deliberation, both $ts < 1$.

Discussion

Replicating the results of Experiment 1, Priming of a cooperation goal just before engaging in a social dilemma task increased cooperation level, as well as decision duration and behavioral variance.

Crucially, these effects resumed after an engaging, thought demanding and distracting task. Because resumption after interruption is one of the hallmarks of motivational processes (Bargh et al., 2001; Förster et al., 2007; Zeigarnik, 1938), these results strongly suggest that we indeed primed a goal and that the resulting conflict was motivational in nature.[3]

Experiment 6

In Experiments 1–5 awareness of the conflict was assessed at the end of the experiment. The main goal of Experiment 6 is to rule out the possibility that we see no evidence for increased *conscious conflict* in these experiments because by the time participants got to the awareness assessment at the end of the experiment they had already forgotten how conflicted they were.

In order to do so, we probed for task difficulty, a proxy for conflict, after each and every trial. We used an indirect probe because we feared that directly asking participants to rate "level of conflict" would prime "conflict", thereby turning the control condition into another experimental condition.[4]

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[3] One may expect goal activation to not only resume, but to also increase after interruption, because motivation tends to increase when one nears goal achievement (for a recent review see Förster, Liberman, & Friedman, 2007). In the current paradigm, however, participants did not know, at any point in time, how many "fishing seasons" are left, and thus they could not estimate how close they are to achieving their goal (whatever it may be). Thus, we did not expect to see increase in motivation after goal resumption.

[4] To demonstrate that conflict is indeed strongly associated with difficulty we ran a pilot study ($N = 12$), asking participants to rate to what extent certain concepts are associated with other concepts on a scale ranging from 1 (not at all associated) to 9 (strongly associated). The mean rating of the association between conflict and difficulty was 7.67 ($SD = 1.5$), demonstrating that these two concepts are strongly associated.

Method

Participants

Fifty students (69% females) participated in the experiment.

Goal priming

A lexical decision task was used to prime participants with the goal of cooperation. Trials began with a 500 ms fixation point, followed by a word or a non-word. In the non-conscious goal conflict condition six of the words were cooperation-related (the same words that appeared in the word search puzzle in Experiment 3). In the control condition all words were goal-neutral.

Social dilemma

The same task used in the previous experiments was employed in current experiment, with one change: After each trial participants were asked to rate "how difficult was it for you to make your decision?" Answers were given on a 9-point scale ranging from *not difficult at all* to *very difficult*. After having answered this question, participants moved on to the next "fishing season".

Procedure

Participants were told they would participate in a series of unrelated experiments. They first performed the lexical decision task. Then they were presented with the instructions for the social dilemma task, and went on to do 60 trials of it. Finally, participants were thoroughly debriefed.

Assessing awareness

Questions were identical to those used in Experiments 1, 2, 3 and 5. Two participants in the non-conscious goal conflict condition suspected that the priming may have affected their performance and their data were discarded from further analyses (without changing the pattern of the results).

Results

Manipulation check

Participants who were primed with a cooperation goal (i.e., those in the *conflict condition*) returned more of their fish to the lake ($M = 36.68\%$, $SD = 22.57$) than participants in the control condition ($M = 24.19\%$, $SD = 13.71$), $t(46) = 2.34$, $p = 0.02$, $d = 0.69$.

Markers of conflict

Behavioral variance. The decisions of participants in the conflict condition showed more variance than those of participants in the control condition ($M = 24.24$, $SD = 19.97$ and $M = 14.69$, $SD = 5.39$), respectively, $t(46) = 2.31$, $p = 0.03$, $d = 0.68$.

Decision duration. Though mean decision times revealed a pattern in the predicted direction ($M = 3.64$ s, $SD = 1.18$ and $M = 3.30$ s, $SD = 0.73$, for the conflict and control conditions, respectively), like in Experiment 4, this tendency did not reach statistical significance, $t(46) = 1.19$, $p = 0.24$, $d = 0.35$, possibly due to the fact that decision times were considerably longer in this experiment. We are not sure why did decisions take longer, overall, but given that the repeated difficulty assessment is the only difference from previous experiments, we suspect that it has affected decision duration in both conditions.

Awareness

Goal commitment. There were no differences between the control and conflict conditions in terms of their commitment to cooperation or to accumulating wealth, both $ts(46) < 1$.

Conflict. Analysis of the awareness assessment data showed that there were no differences between the control and conflict conditions in experienced conflict or perceived deliberation, both $ts(46) < 1.41$.

The crucial addition in this experiment is the trial-by-trial assessment of subjective difficulty as a proxy of conflict. As hypothesized, there were no differences between participants in the conflict and control conditions ($M = 2.68$, $SD = 1.30$ and $M = 2.83$, $SD = 2.05$, respectively), $t(46) = 0.29$. Thus, even when conflict is assessed on each and every trial, our priming procedures do not create a noticeable change in phenomenology.

The trial-by-trial probing for difficulty complements the previous data from the awareness assessments at the end of the experiment if, and only if, difficulty ratings really tap conflict. Our pilot study demonstrated that the two concepts are strongly associated. In addition, we examined this question using the experimental task itself. Before we examine this question we want to remind the readers that during the social dilemma task participants received, in five different trials, a message that warned them that "the fish population is at risk". This message should have increased conflict because it, too, implies that participants should cooperate more than they want to.

We took advantage of these trials to examine the sensitivity of our measure by averaging subjective difficulty in the trials that immediately followed these five warnings, and comparing them to the difficulty ratings in trials that just preceded them. This comparison yields a significant increase in felt difficulty ($M = 3.14$, $SD = 1.94$ and $M = 2.53$, $SD = 1.81$, respectively), $F(1, 46) = 19.83$, $p = 0.001$, $\eta^2 = 0.30$. We take this data to empirically support our contention that increased conflict is reflected in increased subjective difficulty.

Meta analyses of the experiments

To further examine our hypotheses we conducted a mini-meta analysis using a two-way ANOVA with Priming (conflict vs. control) and Experiment (Experiment 1, Experiment 3, Experiment 5, and Experiment 6) as the between participants factor ($N = 233$). The two conflict markers that were used in these experiments are decision duration and decision variance. Note, that data from Experiment 2 was not included because it used a different goal and priming was not intended to increase conflict; data from Experiment 4 was not included because the use of anchors in this experiment affected decisions, conflict levels, and decision times in ways that are different from the simple effect of priming.

Behavioral variance

A significant effect of non-conscious conflict emerged, $F(1, 225) = 17.19$, $p < 0.0001$, $\eta^2 = 0.07$, confirming that participants in the conflict condition had larger decision variability ($M = 19.77$, $SD = 11.99$) compared to participants in the control condition ($M = 14.96$, $SD = 5.88$). There was no effect of experiment, nor an interaction, both $ps > 0.12$.

Decision duration

The analysis yielded a significant effect for Priming, $F(1, 225) = 11.18$, $p = 0.001$, $\eta^2 = 0.05$, confirming that participants in the conflict condition were slower to make the decisions ($M = 2.75$, $SD = 1.28$) than participants in the control condition ($M = 2.30$, $SD = 1.09$). A significant effect for experiment emerged as well, $F(3, 225) = 37.69$, $p < 0.0001$, $\eta^2 = 0.33$. Participants in Experiments 3 and 6 were considerably slower than participants in Experiments 1 and 5 (this difference was not hypothesized). Importantly, however, there was no interaction between the factors, $F(3, 225) < 1$.

Awareness

The two-way ANOVA did not reveal any significant differences in terms of awareness. No significant differences were found in the explicit phenomenology of conflict as a function of condition ($M = 4.81$, $SD = 2.19$, and $M = 4.50$, $SD = 2.10$, for the control and non-conscious goal conflict conditions, respectively), $F(1, 225) = 1.72$, $p = 0.19$. In addition, no significant effects were found for Experiment, or the interaction between condition and experiment, both $Fs < 1$.

Furthermore, when explicit ratings are entered into the analyses as a covariate, the pattern of results described above remains for both decision duration and behavioral variance. Put differently, the hypothesized effect of non-conscious conflict on its markers holds still.

General discussion

The results of six experiments suggest that goal conflicts can occur non-consciously. Subtle goal priming has led to either increase (Experiments 1, 4, 5 and 6) or decrease (Experiment 2) in implicit *behavioral* measures of conflict, without concomitant increase/decrease in reported phenomenology. Similarly, Experiment 3 showed that our manipulation increased physiological arousal – another characteristic of conflict – again, with no accompanying increase in experienced conflict. In all experiments, the effects of priming persisted for a long while, suggesting that our priming and the resulting conflict are motivational in nature (Bargh et al., 2001). Furthermore, Experiment 5 examined another central feature of motivational processes – resumption after interruption, providing further evidence for the motivational nature of the effects (Bargh et al., 2001; Förster et al., 2007; Zeigarnik, 1938). Lastly, Experiment 6 confirmed that the conflict was non-conscious by examining a proxy of conflict on *each and every trial*. Here, too, the documented changes in behavior were not accompanied by changes in phenomenology. Together, the evidence from these six experiments strongly suggests that goal conflicts may occur and operate non-consciously.

As we have argued in the Introduction, the modal view holds that conflicts are predominantly conscious. The current findings suggest that this is not necessarily the case. Goal conflicts, we showed, may operate below consciousness' radar. This finding opens the way for a host of new questions that await empirical investigation. These include the characterization of non-conscious conflicts; mapping the similarities and differences between conscious and non-conscious conflicts; investigating the mechanisms that underlie non-conscious goal conflicts and their resolution and, lastly, examining the implications of non-conscious goal conflicts to related cognitive and motivational processes.

Revisiting the issue of awareness

Across all experiments, participants in both conditions do not report having *no phenomenological* conflict between their goals, but rather *a certain degree* of it. So in what sense is goal conflict non-conscious here?

As we have argued in the Introduction, given the pragmatics of such questions participants are unlikely to report zero conflict, so what counts as "no conflict" is not immediately clear. We therefore adopted a dissociation strategy that is already in use in other domains of high-level implicit processes (e.g., non-conscious goal pursuit, Bargh et al., 2001; implicit ambivalence, Petty et al., 2006). In all of our experiments there were significant differences between conditions in the markers of conflict (implicit measures). Yet these differences *were not* accompanied by changes in awareness of the conflict, thereby suggesting that the two groups did not differ in their relevant phenomenology. It is in this sense, then, that the conflict is non-conscious here.

Furthermore, a mini-meta-analysis showed that even when one takes into account the data of all 233 participants, thereby increasing the likelihood of revealing weak effects, there is no effect of priming on the phenomenology of conflict.

Two other measures taken in these experiments strongly support our contention that the evidenced conflicts are non-conscious. First, in Experiment 6 phenomenology was assessed on each and every trial — and not at the end of the experiment. Second, in all experiments we used ANCOVAs in which explicit ratings of conflict were the covariate. These analyses yielded the same results of the original ANOVAs, thus suggesting that the effects of non-conscious conflicts are independent of explicit ratings of conflict.

What have we been priming?

Did we really prime goals? There are two good reasons to think that the answer is positive. First, in all experiments our priming lasted for a long while, a traditional marker of goal pursuit (Bargh et al., 2001; Förster et al., 2007). Second, in Experiment 5 goal conflict resumed after interruption, again — a classical marker of motivational processes (Zeigarnik, 1938). While these data strongly support our contention, in the following paragraph we wish to discuss the major alternative explanations. If we did not prime goals, thereby inducing goal conflict, what exactly did we prime? The three prominent alternatives are semantic priming, procedural priming and behavioral/response priming. We discuss these options in turn.

Dealing with the first alternative is relatively easy: There is no doubt that we primed semantic content related to cooperation (or competition in Experiment 2). Given that priming altered behavior in a complex behavioral paradigm, however, semantic priming *in itself* cannot tell the whole story. Simply put, in semantic priming one concept activates another, but in our case (a) either this priming resulted in behavior/procedural priming, with which we deal in the following paragraphs, or (b) it resulted in goal/motivational priming.

Procedural priming may look very similar to goal priming. It, too, affects behavior in complex (social) situations and it, too, can last for a very long time. On the face of it, then, procedural priming seems like a good alternative explanation. But if we primed the procedure of *increasing cooperation* then why did this primed procedure increase reaction time, decision variance, arousal and most crucially reliance on (irrelevant) information in the environment?

We see no reason to suspect that procedural priming per se would alter these behaviors, and so in order to explain our results one needs to resort to the notion of *procedural conflict* (between the procedure of cooperating and the procedure of competing). This, however, would result in a violation of the principle of parsimony: We know less about procedural (vs. goal) conflicts, and we understand them less (as an illustration consider the following search in APA's PsycNet: There are no papers that mention *procedural conflict* whereas 99 results contain *goal conflict*). Occam's razor, then, prescribes that we prefer *goal conflict* over *procedural conflict* to describe our manipulation and its hypothesized results.

Lastly, did we prime behaviors, thereby creating *response conflicts*? After all, unlike procedural conflicts, response conflicts are well documented in the literature (over 1000 results in PsycNet), and they are known to increase reaction times and arousal. Yet, we argue that the notion of *goal conflict* is more adequate in our case. First, we primed participants only in the beginning of the experiment, and this priming affected behavior throughout 60 to 120 trials (see Fig. 2). To the best of our knowledge no one has ever argued, nor shown, that response conflicts can persist for so long; the (mostly implicit) assumption in the literature is that response conflicts last a trial. Additionally, we see no reason to assume or hypothesize that response conflict will result in increased effects of irrelevant information (Experiment 4) or persist after the task was interrupted and then resumed (Experiment 5).
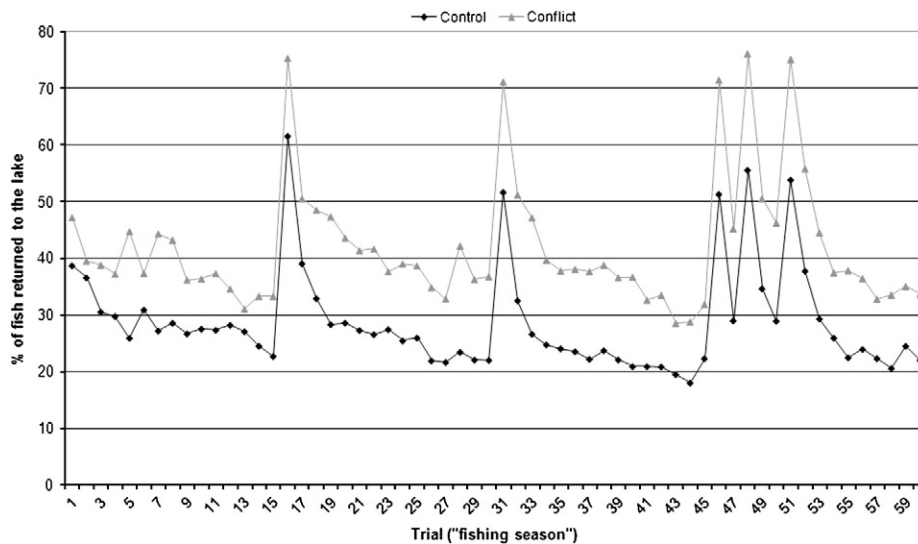
Fig. 2. Mean percent of fish returned to the lake for the control and conflict conditions across Experiments 1, 3, 5 and 6. Note. The 5 spikes in trial no. 16, 31, 46, 48, and 52 correspond to the 5 messages warning participants that the fish population approached threshold (see method of Experiment 1).

We conclude, then, that (a) in the reported research we documented two classic features of motivational processes and that (b) the alternative explanations are less successful at explaining our results. Hence, we believe that the reported results strongly suggest the existence of non-conscious goal conflicts.

Self control

Self control – the ability to overcome temptations in order to achieve desired states in the future – is a crucial determinant of successful goal pursuit: It is badly needed whenever there are allurements that thwart goal achievement (or, in other words, rather frequently). It should not come as a surprise, then, that the investigation of self control plays a central role in many social, health, and brain sciences (for recent collections see Baumeister & Vohs, 2005; Hassin, Ochsner, & Trope, 2010).

As we described in the Introduction, recent advances in the investigation of goal pursuit taught us that some self control processes may occur automatically. Fishbach et al. (2003) have shown that upon encountering a temptation that thwarts self control, good self controllers activate the higher order goal (thus, e.g., *cigarette* activates *health*), whereas this is not the case with less efficient self controllers. Put differently, Fishbach and colleagues have shown that conflicts may be averted, or minimized, by activating the higher order goal.

The paradigm we used here is considered by many to involve self control (e.g., Sanna, Chang, Parks, & Kennedy, 2009): Whereas one is tempted to keep as many fish as possible to oneself, one's worries for her future, and for the well being of the other "fishermen", imply that one should overcome the temptation and return many fish to the lake. The current findings, then, add to the existing literature on the automaticity of self control by describing the non-conscious dynamics of ongoing conflicts, and by showing how these dynamics affect decisions and behaviors. These dynamics, we hypothesize, should characterize everyone who is in a self control situation, but they should be more evident for those participants who are not extremely good at self control: The good self controllers can solve the conflict by activating the higher order goal.

Together, the current results and those of Fishbach and colleagues begin to paint a new picture of the relation between self control and conscious awareness. Keeping in mind the severe shortage of mental resources that characterizes human beings, self control stands much to gain by working below the radar and by requiring less mental resources. Non-conscious goal conflicts operate just like that.

Conflict resolution

The most important missing piece in this story is *conflict resolution*. To the best of our understanding, we did not examine, nor did we show, conflict resolution. Participants did indeed end up making decisions, but we have no evidence that they ended up becoming less conflicted about them. More specifically, had we documented conflict resolution, arousal levels and behavioral markers should have gone down at some point, but they did not (see Figs. 1 and 2). To illustrate this point consider the conflict between work and parenthood: We make a related decision at least twice a day (going to work and coming home), and usually much more. This does not mean, however, that we are not conflicted. We make decisions because we have to act in the world, but the conflict is still there.

In order to show conflict resolution we need to show that participants who begin with increased decision duration, behavioral variance, and arousal, gradually (or not, if this is a discrete process) become faster, more determined, and less aroused. We leave this fascinating line of research for the future.

Acknowledgments

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