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The Goal-Dependent Automaticity of Drinking Habits

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Abstract

In recent treatments of habitual social behaviour, habits are conceptualised as a form of goal-directed automatic behaviour that are mentally represented as goal-action links. Three experiments tested this conceptualisation in the context of students' drinking (alcohol consumption) habits. Participants were randomly assigned to conditions where either a goal related to drinking behaviour (socialising) was activated, or an unrelated goal was activated. In addition, participants' drinking habits were measured. The dependent variable in Experiments 1 and 2 was readiness to drink, operationalised by speed of responding to the action concept "drinking" in a verb verification task. Experiment 3 used uptake of a voucher to measure drinking behaviour. Findings supported the view that when habits are established, simply activating a goal related to the focal behaviour automatically elicits that behaviour. These findings are consistent with a goal-dependent conception of habit. Possibilities for interventions designed to attenuate undesirable habitual behaviours are considered.

"*Habit and routine free the mind for more constructive work*"

—Theodore Roosevelt (attrib.; see Connolly & Martlew, 1999, p. 97)

Roosevelt's observation makes intuitive sense: It is more constructive to plan one's day while brushing one's teeth than it is to deliberate about each brush stroke. It is more constructive to think about the content of the e-mail one is going to send than it is to contemplate whether or not to switch on one's computer. More generally, it is functional that behaviours that one has performed at the same time and in the same place countless times before can be performed in a relatively mindless fashion; it means that one can devote thought to the things that require thought.

For most people, behaviours like brushing one's teeth when one gets up in the morning and switching on the computer when one gets into the office are habits: They are learned sequences of acts that have become automatic responses to situations, and are functional in obtaining certain goals or desired states (see e.g., Dewey, 1897; James, 1890, for a discussion on goal-directedness of habits). It has almost become a routine finding in studies of attitude-behaviour relations that a measure of habit (usually frequency of past behaviour) provides better prediction of future behaviour compared to measures of reasoned-based constructs like attitude or intention (see Ouellette & Wood, 1998, for a review). Foxall (1997) argued that this finding should lead us away from social cognition, and back to behaviourism. However, to deal with the automaticity in goal-directed behaviour, Aarts and colleagues recently proposed a cognitive-motivational conceptualisation of habit that differs from behaviourism (e.g., Aarts & Dijksterhuis, 2000a; 2000b; Aarts, Verplanken, & van Knippenberg, 1998; see also Bargh & Gollwitzer, 1994). According to this view, habits are a form of goal-dependent automatic behaviour: Mere activation of a goal is capable of automatically eliciting an action serving that goal. The aim of the present research is to test this conception in the context of a health-risk behaviour, namely, students' alcohol consumption habits.

Habits as Goal-Dependent Automatic Behaviour

The key difference between Aarts and colleagues' conception of habit and the traditional behaviourist conception concerns goal-dependency. Because the concept of habit is strongly rooted in behaviourist approaches to learning theory, most accounts of the development of habits take a mechanistic perspective on habitual behaviour. According to this view, the probability that a situation (or stimulus) will elicit a behaviour (or response) depends upon the frequency of reinforcing the behaviour in the situation. The more often performance of the behaviour in response to the situation has been positively reinforced, the stronger the situation-behaviour link (i.e., the stronger the habit). This account makes no reference to internal psychological states or mental processes in explaining the development or operation of habits (e.g., Skinner, 1938; Watson, 1914).

The cognitive-motivational view, on the other hand, gives centre stage to the goal or anticipated desired state guiding the performance of behaviour. According to this conceptualisation, situational features become associated with a particular goal, and activation of that goal leads to performance of the behaviour. Positive reinforcement strengthens the link between the goal and the behaviour as one learns that the behaviour leads to the goal or expected result. Furthermore, recurrent instigation of the goal in the same situation increases the link between situation and goal (Bolles, 1972; Tolman, 1932; see also Hommel, 1998). Because the situation, goal, and action are assumed to be mentally represented, it follows that perception of the situation is capable of automatically activating the representation of the goal and resultant action (all the way down to the motor program). This way, habitual action may be initiated and subsequently executed without much awareness of the goal driving the action. Thus, upon getting up in the morning we may walk into the bathroom and pick up brush and toothpaste in order to clean our teeth, all without the need to devote conscious thought to the goal and action. In sum, the cognitive-motivational view of habit proposes that goal activation mediates the relationship between situation and behaviour whereas the behaviourist view posits a direct relationship between situation and behaviour (see also Bargh & Ferguson, 2000).

So is there evidence that situational features can activate goals or that goal activation automatically leads to behaviour, as the cognitive-motivational conceptualisation suggests? The idea that environmental features can activate goals automatically (i.e., outside participants' awareness) is central to Bargh's auto-motive model (e.g., Bargh, 1990; Bargh & Gollwitzer, 1994). In one of their first studies to test these ideas, Bargh, Raymond, Pryor, and Strack (1995) employed priming techniques to see if the situational feature of power would activate the goal of having sex among men with sexual harassment tendencies (as measured by the Attractiveness of Sexual Aggression [ASA] scale, Malamuth, 1989). Power was primed by a language test procedure. In a subsequent (supposedly unrelated) experiment, men with high or low ASA scores worked on a visual illusion task alongside a female confederate posing as another participant; there was no interaction with the confederate. Participants were then told that the visual illusion task was actually a cover for a study of the impressions that people form of others with whom they have had little interaction. As predicted, high ASA participants who had been primed rated the confederate as more attractive and wished to get to know her better compared to controls. These findings can be interpreted as showing that situations where a man possesses power over a woman (e.g., a teacher-pupil relationship) are able to activate (mental representations of) the goal of having sex among some men at least. Moreover, these effects were automatic: Participants reported no awareness of the effects of the situational cue nor of the operation of the goal during debriefing (for a similar effect in the realm of automatic goal adoption, see Aarts, Gollwitzer, & Hassin, in press).

In a more recent demonstration, Bargh and colleagues (Bargh, Gollwitzer et al., 2001) obtained evidence that environmental features lead to goal activation and subsequent overt behaviour automatically. In one experiment, participants worked on a word-search task. For one-half of the participants, achievement-related words (e.g., "achieve", "succeed") were embedded in the task whereas, for the remaining participants, the embedded words were neutral with respect to achievement. This procedure was designed to activate achievement goals for some participants. Participants then undertook an (ostensibly unrelated) second task involving word

puzzles. Consistent with predictions, participants who had been primed with achievement performed significantly better on the puzzle task compared to control participants. As was the case for the effects of situational features on goal activation, participants reported no awareness of the impact of the goal on their behavioural performance during debriefing.

Thus, there is some evidence that situational cues automatically activate goals and that goal activation automatically elicits behaviour. Importantly, however, there is also evidence concerning these processes as they directly relate to habits—from a series of experiments by Aarts and Dijksterhuis (2000a, b). Participants undertook an initial task where one-half were unobtrusively primed with the goal to travel (e.g., by exposing participants to sentences that described travel goals like going to attend lectures) whereas the other half were not. Participants subsequently took part in two further "studies" ostensibly designed by different research teams. In fact, the second study was designed to measure participants' readiness to cycle—operationalised by response latencies to the verb or action word "cycling" (the faster responses to the action word, the higher the readiness to perform, or accessibility of, the action). Participants then reported their bicycle use habits in the putative "third study" and were divided into habitual versus non-habitual cyclists on the basis of a median split. Consistent with the idea that habits are goal-dependent, habitual participants showed significantly faster responses than non-habitual participants—but only when they had previously been primed with the goal to travel. When travel goals had not been activated, there was no difference between the response latencies for habitual versus non-habitual participants. A second experiment confirmed these findings by showing that the mere presence of travel location words (e.g., university) did not increase the accessibility of cycling. That is, the action representation of cycling was only facilitated for habitual cyclists after being activated with the goal to travel, irrespective of whether travel locations words were primed before responding to cycling. These results support the idea that habits are goal-dependent by showing that the speed of responding with the habitual action is only enhanced when a relevant goal is activated.

The Role of Socialising Goals in Drinking Habits

The aim of the present research is to extend the concept of goal-dependent automaticity of habits to another important behavioural domain, namely, drinking habits. Numerous studies have shown that drinking alcohol is better predicted by participants' previous drinking behaviour than by their intentions to drink (e.g., Bentler & Speckart, 1979; Conner, Warren, Close, & Sparks, 1999; Murgraff, White, & Phillips, 1999). In fact, the first demonstration that past behaviour increases the variance explained in future behaviour after variables from the theory of reasoned action (Fishbein, 1980; Fishbein & Ajzen, 1975) have been taken into account concerned students' alcohol consumption (Bentler & Speckart, 1979). More recently, Rivis and Sheeran (2003) showed that even though variables specified by Ajzen's (1991) theory of planned behaviour explained 40% of the variance in behaviour, the addition of past behaviour increased the explained variance to 52%, and reduced intention to non-significance. These findings are consistent with the idea that drinking can be controlled by habit (cf. Ouelette & Wood, 1998; Triandis, 1980; Verplanken et al., 1998).

So what goals are associated with drinking? The present research concerns university students and it is well established that university life is associated with excess alcohol consumption (e.g., Norman, Bennett, & Lewis, 1998; Weschler, Dowdall, Davenport, & Castillo, 1995). There is also evidence that socialising goals are strongly associated with drinking among university students. For example, Senchak, Leonard, and Green (1998) found that students who seek larger social contexts manifested heavier drinking than students who preferred smaller contexts while Treise, Wohburg, and Otnes (1999) found that the goal of being with friends increased alcohol consumption even among students who intended not to drink. Thus, students' drinking would seem to fit Aarts and colleagues' model of habit. That is, students conceive of socialising as the motivational element or goal guiding their drinking behaviour (for similar ideas on action identification and goal-directed behaviour, see Vallacher & Wegner, 1987), and thus the goal to socialise can be strongly associated with drinking. It also seems likely that the association between the goal of socialising and drinking are strengthened by satisfying recurrent

experiences, that is, when drinking habits are established. In sum, the goal of socialising seems to be a prime candidate to test whether habitual drinkers' readiness to drink automatically increases after being primed with this goal.

The Present Research

The present research tests whether drinking habits are goal-dependent as the cognitive-motivational model of habit proposes. For this purpose, readiness to drink was assessed in a response latency paradigm after habitual and non-habitual drinkers were either primed with the goal of socialising or not. More specifically, participants were requested to indicate as fast as possible whether drinking (among other words) was an action word or not. Thus, response latencies on the drinking trials represent the accessibility of drinking which serves as a measure of readiness to drink (Aarts & Dijksterhuis, 2000a,b). We predict an interaction between activation of the goal to socialise and the strength of drinking habits in the accessibility of performing the act of drinking: Habit should only increase the accessibility of drinking when the socialising goal is activated; when an unrelated goal is activated, habit should have no effect on accessibility. In other words, goal activation enhances habitual drinkers' speed of responding to the action concept of drinking whereas without either the goal or the habit, the facilitated access to the concept of drinking will be less pronounced or even absent.

Experiment 1

Method

Participants and Design

Forty undergraduates at an UK university (*M*-age = 19.78, *SD* = 3.13) participated in return for experimental credits. Participants were randomly assigned to goal activation conditions and habit strength was measured. The experiment had a 2 (habit strength: habitual vs. non-habitual) X 2 (goal activation: related vs. unrelated) between participants design.

Procedure, Task, and Habit Measure

Participants were tested individually in a laboratory. They were informed that they were going to take part in a verb verification task, as part of a study of language. The experiment ran

on a computer and all necessary instructions were presented on screen. While the computer program was loading, each participant was asked to respond to a short questionnaire. Participants were told that the questionnaire was a pilot for unrelated upcoming research. In actual fact, two questionnaires were administered; one was designed to activate the goal to socialise whereas the other activated an unrelated goal—studying.

In the *related goal* condition, participants were exposed to questions dealing with the goal of "socialising". More specifically, they were asked to think about the importance of going out to socialise, which night(s) they will go out to socialise during a regular week, and what are the usual things they will do with their friends (cf. Aarts & Dijksterhuis, 2000a, for a similar procedure to prime representations of goals). In the *unrelated goal* condition (controls), participants were provided with a similar questionnaire containing identical questions related to the goal of studying. The unrelated goal condition was used to keep working load and the procedure equivalent across conditions.

After activation of the goals, participants undertook the verb verification task. They were informed that two words would be presented one after the other on the screen. The first word was not related to socialising or drinking but served as an alerting item for the presentation of the second target word. Participants had to indicate, as quickly and accurately as possible, whether or not the second word was a verb by pressing a key marked YES or NO. A verb was defined as a word that referred to an action. Once participants understood the task, they were told to press any key to start the computer program, and the experimenter left the room. No further explanation was given for the types of words that were presented as targets.

The following sequence comprised an experimental trial: (a) presentation of a row of asterisks for 500 ms as a fixation point, (b) presentation of the warning word for 200 ms, (c) presentation of a row of asterisks for 100 ms, and (d) presentation of the target word. Everything appeared at the same location on the screen, and the target word remained on screen until the participant pressed the YES or NO key. To ensure maximum speed during the task, participants were instructed to keep their fingers above the keys throughout the task. Reaction times were

measured in milliseconds from the onset of the target word to the time participants responded. There was a 2-second interval between word trials.

Participants responded to 72 target words; 36 target words were verbs and 36 were not verbs. The verb *drinking* was presented three times within the 36 verbs. The other trials served as fillers, and these items were not related to drinking (e.g., knitting, cleaning, colour, steam). The dependent variable was the response latency averaged across the three drinking trials.

After participants completed the verb verification task, they were asked to complete another questionnaire that was designed to measure their drinking habits. To grasp a comprehensive picture of participants' drinking behaviour, the following five items were administered: "How many times have you been out drinking in the last two weeks?", "How many times have you been drunk in the last two weeks?", "How long is it since you last went drinking?" (in days), "How many units did you consume the last time you went drinking (1 unit = 1/2 pint or one shot)?", and "Which nights do you go drinking every week?" (coded as the number of nights). Scores were reliable (alpha = .83) so the items were standardised and averaged. In line with previous work (Aarts & Dijksterhuis, 2000a), a median split was used to designate participants' habit strength (habitual vs. non-habitual).

Once participants had completed the questionnaire, they were thanked for taking part and debriefed fully. Debriefing indicated that none of the participants realised the true nature of the experiment; participants indicated no awareness of either the experimental hypotheses or the relationship between the three tasks.

Results

The analyses only included latencies for yes responses to the drinking trials (98.3% of all responses). Latencies faster than 300 ms and slower than 2000 ms were also excluded to reduce the impact of outliers. However, one participant exhibited exceptionally slow responses to the critical trials (latencies were more than three standard deviations above the mean) so data from this participant were excluded from further analyses.

Because age has an important impact on students' drinking behaviour (Rivis & Sheeran, 2003), this variable was controlled in statistical analyses. The average response latency was subjected to a 2 (habit strength: habitual vs. non-habitual) X 2 (goal activation: related vs. unrelated) between-participants ANCOVA with age as the covariate. First, the regression of the covariate on the dependent variable showed that age had some effect on the speed of recognizing drinking as an action concept, although the effect was not significant, $F(1,34) = 2.45$, $p < .13$. The analysis further revealed a main effect of habit, $F(1,34) = 3.72$, $p < .07$, whereas the main effect of goal activation was far from significant, $F(1,34) = 0.03$, *ns*. Furthermore, the expected interaction between goal activation and habit was present, but just failed to reach the conventional level of significance, $F(1,34) = 2.76$, $p < .06$ (one-tailed). The adjusted means are presented in Table 1.

Given the pattern of means and our more specific hypotheses, we deemed it appropriate to test additional insightful effects. First of all, the conditional role of goal activation in habitual actions can be tested throughout a specific contrast analysis which globally compared the habit and related goal combination condition to the remaining three conditions in the ANCOVA (weights 3 -1 -1 -1). This contrast turned out to be significant, $F(1,34) = 4.83$, $p < .04$. This result indicates that, as expected, in the habit and related goal combination condition participants responded faster to the action concept of drinking than in the other three conditions. Finally, simple comparison tests were conducted to further scrutinise the goal-dependency effect in habits. These analyses showed that habitual participants' response latencies were significantly faster than the response latencies from non-habitual participants when the socialising goal had been activated, $F(1,17) = 6.17$, $p < .03$. When the unrelated goal had been activated, there was no difference between the latencies for habitual versus non-habitual participants, $F(1,16) = 0.01$, *ns*. In addition, differences in response latencies between the related versus unrelated goal activation conditions were not significant among non-habitual participants, $F(1,16) = 0.51$, *ns*, but showed an almost significant effect among habitual participants, $F(1,17) = 3.89$, $p < .07$. Specifically, the activation of the goal enhanced participants' speed of responding to drinking only when they

established relatively strong drinking habits. This pattern of findings supports our hypothesis: Habit only enhances the accessibility of actions when a related goal has been activated; when an unrelated goal is activated, habit has no effect on accessibility.

Discussion

Findings were consistent with the idea that drinking habits are a form of goal-dependent automatic behaviour. Participants' readiness to drink was greatest when *both* goal related to drinking was active *and* participants possessed relatively strong drinking habits. Although these findings support our hypothesis, two issues need to be addressed.

First, it is conceivable that the goal activation priming procedure in Experiment 1 could have led habitual drinkers to think explicitly about drinking, and therefore increased the accessibility of drinking behaviour. However, such an effect does not really speak to the automatic process of habits we propose, namely, being unaware of the goal driving the habitual action. Second, the priming procedure might have caused participants to think about situational contexts associated with drinking (e.g., a pub). As the proposed cognitive-motivational model of habit states that it is the activation of the goal to socialise that facilitates the mental accessibility of drinking behaviour, it might have been the case that the situation activated representations of habitual drinking behaviour directly. Thus, the results are not conclusive as to whether priming of the goal or the situational context caused the obtained effects.

In order to address the potential problems with the goal priming method in Experiment 1, we conducted a second experiment in which we used an experimental priming procedure—the "Scrambled Sentence Test" (Srull & Wyer, 1979)—that enabled us to unobtrusively (and more strictly) prime the goal to socialise. Previous research has clearly established that this technique is effective in merely priming specific mental representations (e.g., of goals) in a certain context and exerts an unintended and unconscious influence on subsequent perceptions or actions (Bargh & Chartrand, 2000). Our hypothesis was the same as in Experiment 1: Drinking habit will affect mental accessibility of drinking only when the socialising goal has been activated. In the absence of that goal, habit will have no effect on responses.

Experiment 2

Method

Participants and Design

Forty-two undergraduates at an UK university (*M*-age = 20.40, *SD* = 1.47) participated in return for experimental credits. They were randomly assigned to goal activation conditions and their drinking habits were measured. The experiment had a 2 (habit strength: habitual vs. non-habitual) X 2 (goal activation: yes vs. no) between-participants design.

Procedure, Task, and Habit Measure

Participants were tested individually in a laboratory. Participants were informed that they were going to take part in two unrelated tasks concerning language. The first task was the Scrambled Sentence Test (Srull & Wyer, 1979). Participants had to construct 25 grammatically correct four-word sentences from 25 five-word strings as quickly as possible (e.g., "Nick prepares the dinner" from "dinner oversees the Nick prepares"). In actual fact, there were two versions of the test, one of which was designed to prime the goal to socialise (see Bargh, Gollwitzer, et al., 2001, for similar use of this procedure to prime goals). The experimental (prime) condition contained 12 words relating to socialising (*accompany*, *associate*, *greet*, *mixed*, *join*, *mingle*, *acquaint*, *socialise*, *conglomerate*, *greets*, *crowd*, *shared*) whereas in the control (no-prime) condition, words that were not related to socialising were used (e.g., remembers, float, writes). Care was taken not to include any words that were related to drinking or locations associated with drinking in the word strings.

The second task was the verb verification task. Instructions to participants were the same as Experiment 1. There were 74 target words; one-half were verbs whereas the other half were words that were unrelated to drinking or socialising. The verb *drinking* was presented five times. We also simplified the presentation of stimuli. Each trial comprised presentation of a row of asterisks for 500ms as a fixation point followed by presentation of the target word. Everything appeared at the same location on the screen, and the target word remained on screen until the participant pressed the YES or NO key. There was a 2-second interval between word trials and

reaction times were measured in milliseconds from the onset of the target word to the time participants responded.

After participants completed the verb verification task, they were asked to complete another questionnaire that was designed to measure their drinking habits. The following three items were administered: “How many times have you been drunk in the last two weeks?”, “How long is it since you last went drinking?” (in days), “How many units did you consume the last time you went drinking (1 unit = 1/2 pint or one shot)?”. Scores were fairly reliable (alpha = .52) so the items were standardised and averaged. A median split was used to designate habitual versus non-habitual drinkers.

After completing the questionnaire, participants were thanked and debriefed fully. Debriefing once again indicated that participants did not realise the true nature of the experiment; none of the participants were aware that the tasks were related or of the hypothesis under investigation. Importantly, none of the participants believed that their responses to the verb verification task could have been influenced by the scrambled sentence test.

Results

All participants correctly identified “drinking” as a verb so no latencies were excluded for this reason. However, latencies faster than 300 ms and slower than 2000 ms were excluded as in the previous experiment. To control for possible age effects, the average response latency was subjected to a 2 (habit strength: habitual vs. non-habitual) X 2 (goal activation: no vs. yes) between-participants ANCOVA with age as the covariate. First, the regression of the covariate on the dependent variable showed that age had some effect on the speed of recognizing drinking as an action concept, although the effect was not significant, $F(1,37) = 1.64$, $p < .20$. The analysis further revealed a main effect of goal, $F(1,37) = 4.06$, $p < .06$, whereas the main effect of habit was not significant, $F(1,37) = 0.11$, *ns*. Importantly, these effects were qualified by a significant interaction effect between goal activation and habit, $F(1,37) = 5.64$, $p < .03$. The adjusted means are presented in Table 2.

The specific contrast analysis which globally compared the habit and goal combination condition to the remaining three conditions (weights 3 -1 -1 -1) was highly significant, $F(1, 37) = 7.95$, $p < .01$. As predicted, participants responded faster to the action concept of drinking in the habit and related goal combination condition compared to the other three conditions.

Simple comparison tests were also conducted. These analyses showed that habitual participants' response latencies were faster than the response latencies from non-habitual participants when the socialising goal had been activated, $F(1,19) = 3.11$, $p < .05$ (one-tailed). When a goal had been not activated, however, there was no difference between the latencies for habitual and non-habitual participants, $F(1,19) = 1.48$, *ns*. Moreover, there was a significant effect of goal activation among habitual participants, $F(1,19) = 8.28$, $p < .01$, but no effect of goal activation among non-habitual participants, $F(1,19) = 0.01$, *ns*. These last effects parallel the findings obtained in Experiment 1: Habitual participants responded faster than non-habitual participants to the action concept of drinking only when the socialising goal had been activated. This pattern of findings supports the hypothesised goal-dependency of habits.[1]

Discussion

Experiment 2 provided further support for the postulated goal-dependent automaticity in habits, this time using a standard and subtle goal priming procedure—the scrambled sentence test. Findings indicated that goal priming had an important effect on whether habits affected participants' mental readiness to drink. That is, habit only affected the accessibility of drinking behaviour when the goal to socialise had been activated; without the activation of a goal related to drinking, habit had no impact on drinking responses. Thus, activation of a relevant goal seems to be a prerequisite for habitual responding.

Experiments 1 and 2 examined the effects of habit and goal activation on the accessibility of drinking behaviour and not on drinking behaviour itself. Although mental products do not always produce actions, there is evidence that mental representations of behaviour (of which accessibility is a key index) are related to actual behaviour. For example, in a series of experiments on the automatic activation of situational norms Aarts and Dijksterhuis (2003)

primed their participants with the goal to visit a particular environment (e.g., a library which is associated with the behavioural norm of being silent). The dependent variable was response latencies to words related to the norm (e.g., quiet, whisper) and actual behaviour (e.g., voice intensity in a pronunciation task). Findings indicated that priming had equivalent effects on behaviour representation and actual behaviour, and that the accessibility of behaviour representations mediated the effects on overt behaviour. This lends support to the idea that accessibility can be a valid indicator of behaviour (see also Dijksterhuis, Aarts, & Smith, in press), and thus constitutes a valuable outcome measure that is helpful in understanding the process underlying habitual social behaviour.

Although we think that accessibility constitutes a useful non-reactive index of mental readiness to drink, the generality of the present analysis of habitual responding would be enhanced by a demonstration using a measure of drinking behaviour. We, therefore, conducted a third experiment that used an objective index of alcohol consumption, namely, uptake of a coupon for either beer/wine or tea/coffee for a specified Café Bar. The prediction tested is that drinking habit will only affect uptake of the alcohol coupon when the goal to socialise is activated.

Experiment 3

Method

Participants and Design

One hundred and thirty-one undergraduates at an UK university (*M*-age = 20.45, *SD* = 1.86) who drank tea/coffee/beer/wine and knew of the specified Café Bar participated in return for £1 (about €1.5). Participants were randomly assigned to goal activation conditions and drinking habit was measured. The experiment had a 2 (habit strength: habitual vs. non-habitual) X 2 (goal activation: related vs. unrelated) between-participants design.

Procedure and Measures of Habit and Behaviour

Participants were tested individually. They were asked to take part in a brief survey about cities and were given an envelope containing a questionnaire. In actual fact, there were two

versions of the questionnaire; one was designed to activate the goal to socialise whereas the other did not activate this goal. Questionnaires were distributed in envelopes to ensure that the experimenter was blind to participants' experimental condition.

In the *related goal* condition, participants were exposed to questions about "Good cities for social life" and were asked to nominate two cities in the UK, one city in Europe, and another city anywhere in the world where it would be good to visit to have a good social life. In the *unrelated goal* condition, participants were exposed to equivalent questions about "Good cities for historical sites."

After activation of the goal to socialise (or not), participants turned to the next page on the questionnaire and were informed that the experimenter will offer them a voucher worth £1 off either beer/wine or tea/coffee at a named Café Bar in the Students' Union, to thank them for their co-operation. The two vouchers were printed side-by-side on the page; dates printed on the vouchers indicated that they were valid for use starting in one week 's time. Participants were asked to select one of the two vouchers. Whether or not participants initialled the alcohol voucher constituted the behavioural measure of drinking.

Participants were then asked to take part in a brief survey that, they were told, was being conducted by an entirely different researcher in the Sociology Department. This survey asked two questions that were designed to measure participants drinking habits: "How many times have you been out drinking alcohol in the last two weeks?" and "How many times have you been drunk in the last two weeks?" These items proved reliable (alpha = .72) and were standardised and averaged; a median split was used to designate participants' habit strength (habitual vs. non-habitual).

Finally, while the experimenter was apparently sorting out the paperwork to do with the voucher, participants were given a debriefing questionnaire that asked them whether they thought the questionnaires were related in any way, why they had chosen the tea/coffee or beer/wine voucher, and whether their answers to the questionnaire about cities could have influenced their choice of voucher. Twenty-three participants (17%) reported believing that the questionnaires

were related, though 10 of these participants did not indicate what they thought that relation actually was. Just to be sure, data from all participants who reported seeing a relation were removed from further analyses (including these participants did not change the pattern of results).

Upon completing the questionnaire, participants were fully debriefed about the nature and purpose of the study, and the hypotheses under investigation. They were informed that, in actual fact, there were no vouchers for the Café Bar, but that the experimenter would give them £1 in cash instead.

Results

Uptake of the alcohol voucher (coded no = 0, yes = 1) was subjected to a 2 (habit strength: habitual vs. non-habitual) X 2 (goal activation: related vs. unrelated) between-participants ANCOVA with age as the covariate. The regression of the covariate was not significant, $F(1,103) = 1.10$, $p < .30$, and there was no main effect of goal, $F(1,103) = 1.50$, *ns*. The main effect of habit was significant, $F(1,103) = 9.86$, $p < .002$, but was qualified by an interaction with goal activation that was marginally significant, $F(1,103) = 3.48$, $p < .07$ (see Table 3).

The specific contrast analysis which globally compared the habit and goal combination condition to the remaining three conditions (weights 3 -1 -1 -1) proved significant, $F(1,104) = 4.44$, $p < .04$. As predicted, participants in the habit and related goal combination condition showed greater uptake of the alcohol voucher compared to the other three conditions.

Tests of simple main effects further supported our predictions. These analyses showed that habitual participants' were more likely to take the alcohol voucher than were non-habitual participants when the socialising goal had been activated, $F(1,43) = 4.55$, $p < .04$. When this goal had been not activated, there was no difference in uptake for habitual and non-habitual participants, $F(1,59) = 0.01$, *ns*. There was also a significant effect of goal activation among habitual participants, $F(1,44) = 4.52$, $p < .04$, but no effect of goal activation among non-habitual participants, $F(1,58) = 0.18$, *ns*. These findings parallel those obtained with the response latency index of readiness to drink in Experiments 1 and 2. Habitual participants are more likely than

non-habitual participants to engage in drinking-related behaviours—but only when the socialising goal had been activated. In sum, habitual responses are moderated by goal activation.[2]

General Discussion

The present research attempted to simulate the mental processes underlying the automaticity in habits. Findings supported the idea that drinking habits are a form of goal-dependent automatic behaviour. In three experiments, we manipulated whether or not a goal that has an established relationship with drinking (i.e., socialising) was activated. The goal was activated in different ways in these experiments; quite blatantly in Experiments 1 and 3, and more subtly by means of the Scrambled Sentence Test (Srull & Wyer, 1979) in Experiment 2. The measure of drinking behaviour also varied across studies. In two experiments, the dependent variable was participants' mental readiness to drink, or the accessibility of drinking, operationalised by response latencies to the verb "drinking". In Experiment 3, we used uptake of an alcohol consumption voucher to index drinking behaviour. Regardless of which priming procedure or dependent variable was used, results showed that goal activation moderated the relationship between habit and behavioural responses. Activation of a relevant goal automatically heightened behavioural readiness or increased action when strong habits were established—that is, without conscious intention to do so and without awareness of the impact of the goal on the responses, as was revealed by participants' reports during debriefing. These findings confirm our predictions and provide support for recent cognitive-motivational accounts as to the role of habits in social behaviour.

It is important to note that the present findings not only form the first conceptual replication of the results obtained in the Aarts & Dijksterhuis (2000a, b) studies on travel behaviour, but also extend our knowledge about habits to a different, and important behavioural domain, namely, alcohol consumption. The present experiment shows that goal-dependent automaticity also characterises a behaviour that differs from travel behaviour in terms of taking place in social contexts and involving clear physiological reward mechanisms (see, e.g., Carroll, Stitzer, Strain, & Meisch, 1990). It is also the case that heavy drinking has deleterious health and

social consequences (Ichiyama & Kruse, 1998). Our findings suggest that activation of the goal to socialise automatically elicits the act of drinking among habitual drinkers, meaning that, at least in the present studies, drinking habits are likely to be identified and guided in terms of socialising goals (cf. Vallacher &Wegner, 1987). Moreover, these findings point to the cognitive mechanism that may mediate the empirically established direct link between past drinking and future drinking (Bentler & Speckart, 1979; Conner et al., 1999; Murgraff et al., 1999). That is, actual drinking is less guided by conscious intentions to perform that behaviour when the habit of drinking increases in strength.

Ironically, it is well established that increased consumption of alcohol diminishes the capacity for making reasoned-based and well-considered decisions, and hence forces people to rather rely on routines and automatised processes in order to deal with (social) situations (see, e.g., research on the “alcohol myopia” hypothesis; e.g., MacDonald. Fong, Zanna, & Martineau, 2000; Steele & Josephs, 1990). Consequently, automatic (habitual) drinking may even more readily emerge and proceed in social settings when people have already consumed a certain amount of alcohol (unless, of course, a boundary is reached and the body starts to resist any intake of more drinks). After all, under such circumstances people are more prone to automatic reactions to situations – including habits to drink alcohol given the goal to socialise. Yet, whether alcohol intake indeed plays a moderating role in the goal-dependent automaticity of drinking awaits empirical testing, and therefore constitutes an interesting and important avenue for further exploration. From a prevention point of view, if alcohol consumption renders the automatic effect of goal activation on drinking behaviour more likely, students would be better off not drinking (much) alcohol at home before going out to socialise.

Although the present research was not targeted at changing habits, it is worthwhile to consider the implications of the goal-dependent account of habit for interventions designed to prevent or reduce undesirable habitual behaviours like drinking. According to the present account, an intervention would need to block the link between the goal and the behaviour (i.e., between socialising and drinking, in the present case) in order to “break” the habit. This analysis

suggests that changing drinking habits via the attitude-intentions-behaviour route may not be entirely effective—even if one succeeds in changing intentions. After all, when drinking habits are established, the behaviour is no longer guided by these intentions; rather, behaviour is guided by action representations automatically activated by the goal of socialising. Traditional persuasive communications aimed at changing attitudes might be effective only for weak habit target groups, for instance to prevent them from developing drinking habits (see also Aarts et al., 1997). The data presented in this study, therefore, suggest that additional strategies need to be considered in order to increase the probability of acting upon intentions not to drink (or to drink less alcoholic, or more non-alcoholic, items), and thereby change drinking habits.

One recent advance in action control might be used to obstruct the automatic link between the goal of socialising and drinking in order to change drinking habits is Gollwitzer's (1993, 1996, 1999) concept of implementation intentions. Implementation intentions refer to plans of the form: "I intend to perform goal-directed behaviour *Y* when I encounter situation *Z*!" and are distinct from goal/behavioural intentions (which have the form: "I intend to do *X*"). Implementation intentions are effective in promoting goal achievement (Gollwitzer, 1999; Sheeran, 2002) because their formation heightens the accessibility of situational cues strategically linked to the behaviour. When participants form implementation intentions, they effectively relinquish control of the goal and associated behaviour to specified environmental cues that serve to automatically elicit action (Aarts, Dijksterhuis, & Midden, 1999; Gollwitzer, 1993). Thus, there are strong parallels between forming an implementation intention to perform a behaviour and possessing a habit in relation to that behaviour (e.g., Aarts & Dijksterhuis, 2000a; Brandstätter, Lengfelder, &Gollwitzer, 2001; Orbell, Hodgkins, & Sheeran, 1997). In both cases there are associations in memory between particular situational features and particular goals and between particular goals and particular behaviours. There is promising evidence that implementation intentions can attenuate associations between past and future behaviour (Orbell et al., 1997; Sheeran & Orbell, 2000) and are capable of turning old habits into new ones (Holland, Aarts, & Langdam, 2004). Further research is needed to determine whether an implementation

intention that specifies, e.g., what one will say in order to refuse someone's offer of another drink, could be effective in attenuating the socialising-drinking link and thereby undermine drinking habits (see Murgraff, White, & Phillips, 1996; see also Gollwitzer & Schaal, 1998).

Conclusion

The present study tested the cognitive-motivational model of habit (Aarts & Dijksterhuis, 2000a; Bargh & Gollwitzer, 1994) in relation to a health behaviour—drinking alcohol. Findings showed that when habits were established, simply activating a goal related to drinking automatically evoked the habitual response. Among non-habitual drinkers, activation of the goal had no effect on responses. These findings are consistent with the goal-dependent account of habit. Discussion of possible interventions to reduce drinking habits indicated that the formation of implementation intentions has potential value because these intentions operate in a very similar manner to habits. In the former case, the associations between situations, goals, and behaviours are formed through a mental act of will (Gollwitzer & Schaal, 1998), whereas in the latter case, these associations are formed through experience—thus, implementation intentions can be construed as cognitively formed "habits" (Gollwitzer, 1999). Implementation intentions might, therefore, be effective in breaking the cycle of alcohol consumption because, as Thomas à Kempis (1441/1994) famously observed: "*Habit is overcome by Habit*".

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Footnotes

[1] To check for possible effects of goal activation, habit strength, and the interaction between both on response latencies to the filler verb items, we subjected these latencies to a 2 x 2 ANCOVA with age as the covariate. Analyses from both experiments yielded no significant main and interaction effects (Fs < 1.55), indicating that habit strength and goal activation only affected responses to the action concept of drinking.

[2] Although the aims of the present research were primarily theoretical, we also examined effects for gender. There were no gender differences in drinking habits in Experiments 1 and 2 (both *F*s < 1) though there were relatively small proportions of male participants in both of these studies (23% and 24%, respectively). There was significant gender effect in Experiment 3, $F(1,107) = 11.95$, $p < .001$, such that men had stronger drinking habits than women (mean *Z*-scores were 0.16 and –0.38, respectively). Most important for present purposes, the findings concerning the interaction between habit and goal activation were not substantively affected when gender was covaried in the analyses.

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Table 1

Mean Response Latencies (in ms) as a Function of Habit Strength and Goal Activation: Experiment 1

	Goal Activation	
Habit strength	Unrelated	Related
Non-habitual	748	877
Habitual	726	568

Table 2

Mean Response Latencies (in ms) as a Function of Habit Strength and Goal Activation: Experiment 2

	Goal Activation	
Habit strength	No	Yes
Non-habitual	636	655
Habitual	721	544

Table 3

Uptake of Alcohol Coupon as a Function of Habit Strength and Goal Activation: Experiment 3

	Goal Activation	
Habit strength	Unrelated	Related
Non-habitual	.46	.40
Habitual	.58	.88