
On the Investigation of Primed and Chronic Autonomous and Heteronomous Motivational Orientations

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Four studies examined primed and chronic autonomous and heteronomous motivations. Study 1 showed that autonomy and heteronomy can be primed and influence perceptions and behavior in a way consistent with consciously regulated motives. In Study 2, a measure of chronic motivation was developed and its construct validity and reliability were assessed. In Study 3, the chronicity measure predicted behavior while consciously regulated motives predicted intention but not behavior. Results of Study 4 replicated results of the priming manipulation in Study 1. However, this effect was moderated by level of motivational chronicity. The priming effect was found to be stronger for non-chronics than for chronics. Overall, the findings suggest that autonomous and heteronomous motivations can be regulated automatically as well as consciously.

Keywords: *automaticity; priming; autonomous motivation; self-determination theory*

Recent studies in social cognition (e.g., Bargh, 1997; Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trötschel, 2001; Chaiken, Giner-Sorolla, & Chen, 1996; Devine, 1989; Fazio, Jackson, Dunton, & Williams, 1995) have demonstrated that individuals are not always aware of the processes underlying their perceptions, behaviors, and goal pursuit and that these processes nonetheless influence their ways of thinking and behaving. Many aspects of our everyday life, including attitudes (Bargh, Chaiken, Gollwitzer, & Pratto, 1992; Fazio, 1986; Fazio, Sanbonmatsu, Powell, Kardes, 1986), prejudice and stereotypes (Bargh, Chen, Burrows, 1996; Dovidio, Kawakami, Johnson, & Johnson, 1997), personality traits (Bargh, Lombardi, & Higgins, 1988; Higgins, King, & Mavin, 1982), higher order mental processes (Bargh &

Fergusson, 2000), as well as goals and motives (Bargh et al., 2001; Chartrand & Bargh, 1996) are at least partially regulated by automatic processes. Although most motivational theories emphasize conscious regulation of behavior (Bandura, 1996; Carver & Scheier, 1998; Deci & Ryan, 2000), Bargh's Auto-Motive Model suggests that motives and goals also can be activated automatically, outside of awareness and without the involvement of conscious guidance or choice.

According to the Auto-Motive Model (Bargh, 1990; Bargh & Chartrand, 1999), automatic processes are those that have been consistently and frequently engaged in the past in a similar manner in response to certain environmental contexts (see also Bargh & Barndollar, 1996; Shiffrin & Dumais, 1981). Because goals and motivations are represented in memory much like attitudes are, following repeated associations with an external event, these goals and regulatory styles would become automatically linked to the representation of those situations (see Bargh, 1997, for a review). Once associated with features of a situation, these constructs, motivational or perceptual, represented in memory

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could be triggered automatically and then influence perceptions and behaviors in subsequent situations (Bargh & Ferguson, 2000).

Bargh (1997) argues that whether goal structures, such as information-processing goals, are directly activated by external stimuli or through a conscious decision, they will be associated with the same outcomes because the same construct has been activated (Bargh & Ferguson, 2000). Chartrand and Bargh (1996, Experiment 1) tested this hypothesis for information-processing goals. Whether the goal of forming an impression about a target person was activated consciously or non-consciously, in both cases, participants showed significantly better recall of the target's behaviors than when a memorization goal was activated. More recently, Bargh and collaborators (2001) demonstrated in a series of experiments that the behavioral goals of performing well or cooperating can be activated automatically without requiring a consciously made choice or decision and influence subsequent behaviors in goal-consistent ways. Results of these studies also showed that the motivational quality of persistence on a task observed with consciously activated goals also could be observed with non-consciously triggered goals. Thus, automatically regulated goals, once activated, have been shown to produce effects that are similar to the effects of consciously regulated goals.

So far, the research supporting the Auto-Motive Model has mostly focused on the automaticity of specific concrete goals, such as to memorize, evaluate, perform well, or cooperate. The goal of the present article is to demonstrate that relatively abstract and complex motivational orientations, that is, autonomous and heteronomous motivations, can operate automatically just as it has been shown for other goals and motives. Thus, demonstrating that these motives can be activated automatically as well as intentionally would broaden our perspective on automatic processes and their potential application in daily life.

AUTONOMY AND HETERONOMY

According to Self-Determination Theory (SDT) (Deci & Ryan, 1985, 1987, 2000), intrinsic motivation, or more generally autonomous motivation, represents people's innate, organismic tendencies to be self-determined and autonomous, to explore novelty and to interact effectively with the environment. When individuals are autonomously motivated, they experience feelings of excitement, interest, and enjoyment (Deci & Ryan, 2000; Harackiewicz, Manderlink, & Sansone, 1984) and a sense of deep absorption or flow (Csikszentmihalyi, 1997). When in this motivational state, individuals experience many positive emotions

and a deep sense of well-being. Autonomous motivation can be fostered by external events, such as choice and competence feedback, that provide people with opportunities to feel autonomous and competent (Deci, Koestner, & Ryan, 1999). In contrast, external events that do not support individuals' basic needs for competence and autonomy have repeatedly been found to thwart efforts toward self-determination, thus leading to heteronomy in the self (Deci et al., 1999). Heteronomy or extrinsic motivation refers to behaviors that are performed for instrumental reasons, such as fear of punishment, external rules, or the expectation of a reward rather than for the satisfaction derived from the activity itself (Deci & Ryan, 1985). Extrinsic motivation also has been associated with a variety of negative affective states such as anxiety and tension (Deci & Ryan, 2000). Because SDT emphasizes conscious behavioral regulation, previous research has examined autonomous and heteronomous forms of motivation by explicitly manipulating the functional meaning of an event (autonomy supportive or pressuring). For example, individuals are given a reward, provided with positive feedback in a more or less autonomous way, or exposed to heteronomy- or autonomy-oriented teachers (see Deci & Ryan, 2000; Vallerand, 1997, for reviews). The psychological processes most likely to be operative in these situations are deliberate and consciously regulated.

Although we often experience a sense of volition in our actions, perceptions, feelings, and behaviors, these might not always be determined by conscious self-regulatory processes. Thus, some psychological processes relevant to autonomous and heteronomous motivation may occur outside of people's awareness. For example, if an individual experiences himself as pressured in school over and over again, it becomes adaptive for the system to subsume this situation and the interactions occurring in this situation under the category "heteronomous" and stop consciously regulating perceptions and behaviors in this situation. It makes people more efficient by not having to make the same decision consciously time and time again (Atkinson & Shiffrin, 1968; Bargh, 1997; Bargh & Barndollar, 1996; Shiffrin & Dumais, 1981). Although this notion is not inconsistent with the motivation literature, no research to date has specifically demonstrated the existence and functional significance of automatically regulated autonomous and heteronomous motivational orientations. The present research was designed to do so.

THE PRESENT INVESTIGATION

Four studies were conducted in an attempt to expand our understanding of autonomous/intrinsic and heter-

onomous/extrinsic motivational orientations by considering the existence and functional relevance of automatic processes underlying these behavioral regulations. We argue that people would possess mental representations of motivational states capable of being automatically activated by stimuli relevant to autonomy and heteronomy. Constructs related to autonomous and heteronomous motivation would be available in individuals' cognitive structures to be made more accessible through temporary activation or chronic use (see Higgins, 1996). Study 1 examined whether autonomous and heteronomous motivation can be temporarily primed by words related to the experience of being autonomously or heteronomously motivated and then influence perceptions and behavior in a way consistent with the effects of consciously regulated motivations. In priming studies, the level of accessibility of an available construct stored in memory is temporarily raised so that it can be readily applied to a different situation and influence behavior and perceptions in the new situation. In the present study, temporary priming of motivational constructs was achieved through the use of the Scrambled Sentence Test method (Srull & Wyer, 1979) in which the priming manipulation is presented as a language ability task. This task also was used as the priming technique in the previously described Chartrand and Bargh (1996) study to automatically activate the goal of impression formation or memorization. In their study, participants were asked to construct sentences from a set of five words presented in a scrambled order (e.g., idea has he impression an). Embedded in these sets of words were words related to the goal of forming an impression (e.g., evaluate) or memorizing information (e.g., memory).

Studies 2 and 3 examined chronic motivational orientations related to autonomy and heteronomy. In Study 2, a measure of chronically accessible autonomous motivation was developed and its reliability was assessed. In Study 3, we examined the predictive validity of this new chronicity measure. Chronically accessible constructs have been shown to automatically influence perceptions, impressions of a target, and behavior (Bargh et al., 1988, 1992; Bargh & Ferguson, 2000; Higgins & King, 1981). For example, Higgins et al. (1982) and Bargh, Bond, Lombardi, and Tota (1986) defined individuals' chronically accessible constructs for kindness and shyness as the traits listed first when asked to describe a person they liked and frequently encountered. Results demonstrated that a week later, chronics' perceptions of a target's behavior were more extreme on dimensions related to kindness and shyness than they were for nonchronics. In Study 3, we examined level of motivational chronicity as a predictor of actual behavior over and above the effect of consciously regulated motives.

Finally, Study 4 explored the interplay between chronically accessible and temporarily primed constructs related to autonomous and heteronomous motivation. We examined whether chronically accessible motivational constructs could make individuals less susceptible to the effects of primed stimuli. Consistent with this reasoning, recent findings by Gollwitzer (1999) show that implementation intentions associated with automatic action initiation can protect people from the effects of external primes. We also expected chronically accessible autonomous motivational orientations to mimic primed motivational states and thus be associated with enjoyment and persistence on a task. According to the Auto-Motive Model (Bargh 1990), regardless of how the necessary level of accessibility or activation potential is achieved, constructs that are automatically activated through priming or chronic use will operate similarly once activated and lead to similar outcomes (Bargh & Chartrand, 2000; Bargh et al., 1986, 1992; Fazio, 1986; Higgins, 1996). In the Bargh et al. (1986) study, participants judged a target as more extreme on the traits of kindness or shyness whether these traits had been automatically activated through temporary priming or chronic use. In sum, a motive or a goal, whether automatically activated through priming, chronic use, or conscious self-regulation, would lead to similar outcomes.

STUDY 1

Consistent with the procedure developed by Srull and Wyer (1979), participants were asked to do two unrelated tasks. During the initial task, the Scrambled Sentence Test (Srull & Wyer, 1979) was used to temporarily prime autonomous and heteronomous motivations. In the subsequent task, we assessed the effects of the primes on perceptions and motives for doing a crossword puzzle task. Our main hypothesis was that participants initially primed with words relevant to autonomous/intrinsic motivation would display greater intrinsic motivation, perceived choice, and interest-enjoyment toward the subsequent task than participants initially primed with constructs relating to heteronomous/extrinsic motivation. Furthermore, we expected that behavior on the experimental crossword task also would be influenced by the priming manipulation. Prior research showed that when people are pressured by a competitive environment or by external evaluations they become less creative. In contrast, autonomy-supportive environments seem to foster more creative artwork (Amabile, 1983). On tasks that require creativity (such as playing with clues) autonomous motivation should enhance performance on the crossword puzzle task.

Method

PARTICIPANTS

The initial sample consisted of 72 undergraduate students from the University of Ottawa, Canada. Twelve participants were removed from the sample, 6 because they did not follow the experimental instructions and 6 because they expressed suspicion about the experiment or the primes and they thought that the initial and subsequent tasks were related in some way. Participants were removed from the sample because of their suspiciousness about the nature of the experiment or the primes and the connection between the two tasks based on their answers on the test of awareness to be described later.

Therefore, the final sample comprised 60 students (52 women, 8 men), 20 in each condition. Age ranged from 19 to 45 years old ($M = 24.3$). Participants were recruited in undergraduate psychology courses and had been attending university for an average of 3.2 years. All participants had learned to speak English before age 5.

PROCEDURE

Students who volunteered to participate were contacted by phone. They were informed that they would take part in two unrelated experiments. They were told that the purpose of the first experiment was to examine some of the processes involved in sentence construction. The second experiment was presented as a study of the processes involved in the completion of complex tasks (see Bargh et al., 1996; Chartrand & Bargh, 1996).

Participants completed the experimental session individually. After arriving, they were informed that during the first experiment they would be working on the construction of English sentences. Then, they were randomly assigned to one of three priming conditions (i.e., autonomous motivation, heteronomous motivation, or neutral), with the only restriction that an equal number of participants be present in each condition. After written consent was provided, participants were given a folder with one of the three versions of the Scrambled Sentence Test, which served as the prime. This procedure ensured that the experimenter was kept unaware of participants' priming condition. Then the experimenter left the room. The average time for the completion of the Scrambled Sentence Test was about 10 min.

After completing the Scrambled Sentence Test, participants were thanked for taking part in the first experiment. The second experiment was then introduced by telling them that it was designed to examine the completion of complex tasks such as crossword puzzles. A written consent was obtained from participants, who were then left alone to work on the puzzle for a period of 15

min. This was the task in which the dependent variables were assessed.

All participants were given an indefinite time period to avoid pressuring them by imposing a time limit. However, after a period of exactly 15 min, the experimenter returned to the experimental room and asked participants to complete the questionnaire assessing intrinsic motivation and perceptions of the crossword puzzle task. After completing the questionnaire, participants' awareness of the nature of the primes was assessed. Following this, participants were fully debriefed and thanked.

PRIMING OF AUTONOMOUS AND HETERONOMOUS MOTIVATION

In the initial task, participants were exposed to 15 series of words requiring them to form a grammatically correct sentence using four out of five words that had been presented in a scrambled order. Based on previous research (Chartrand & Bargh, 1996; Srull & Wyer, 1979), prime words were incorporated in 12 of the items (80%). Primes in the autonomous/intrinsic motivation condition were spontaneous, challenge, interested, involved, satisfied, volunteering, mastering, delighted, autonomous, absorbed, competent, and enjoying. An example of an item for the autonomous motivation condition is as follows: "dizzy is feeling he competent." For the heteronomous/extrinsic motivation condition, the primes were competitive, obligation, expected, evaluated, constrained, demanded, avoiding, restricted, forced, pressured, controlled, and proving. An example of an item for the heteronomous motivation priming condition is as follows: "has obligation he an armchair." In the neutral condition, the primes were replaced by still, apartment, carried, numbed, cold, close, moving, sending, near, early, hungry, and going. All the other words in each condition were neutral with respect to the types of motivation. Two grammatically correct sentences could be constructed, one included the prime word whereas the other did not. Moreover, the sentences consisted of words that were identical in the autonomous and heteronomous motivation conditions except for the respective primes.

EXPERIMENTAL TASK

The task involved three conventional crossword puzzles. Each one of the puzzles was chosen for its neutral word content, with respect to the forms of motivation. Twenty pilot participants judged the crossword puzzles to be neutral. The mean interest scores for the crossword puzzles were 5.3, 6.0, and 6.3 on a scale ranging from 1 (*not at all interesting*) to 9 (*very interesting*). All participants had 15 min to work on the same crossword puzzle. If they finished the puzzle in that time, they could try to solve another one.

DEPENDENT MEASURES

Intrinsic motivation. The intrinsic motivation subscale (three items) of the State Motivation Scale (Guay & Vallerand, 1997) was used to measure individuals' level of intrinsic motivation toward the crossword puzzles. The full scale is composed of 18 items grouped in 6 subscales and assesses the reasons people have for doing an activity and is designed to measure the motivational constructs in SDT (Deci & Ryan, 1985). In the present study, the questions were worded to measure participants' intrinsic motivation at the time they were doing the crossword puzzles (e.g., because it was really fun). Participants answered each item on a 7-point scale ranging from 1 (*does not correspond at all*) to 7 (*corresponds exactly*) ($\alpha = .95$).

Interest-enjoyment. Five items (e.g., I found the task really interesting) assessed the individual's experience of interest-enjoyment with the experimental task (Pelletier & Vallerand, 1996). Participants answered these items on a 9-point scale ranging from 1 (*do not agree at all*) to 9 (*agree completely*) ($\alpha = .90$).

Perception of choice. Four items (e.g., I felt that what I did in this task was really what I wanted to do) measured participants' perception of choice while working on the experimental task (Pelletier & Vallerand, 1996). Participants responded on a 9-point scale ranging from 1 (*not at all*) to 9 (*extremely*) ($\alpha = .65$).

Behavioral measure of motivation. During the experimental session, participants had to work on at least one crossword puzzle for a period of 15 min. The amount of words participants were able to correctly identify in that period of time represented the performance measure.

Test of awareness. To verify that participants were unaware of the nature of the primes, they were subjected to a bogus debriefing following the second experiment. As outlined in Chartrand and Bargh (1996), participants completed a questionnaire in which they were asked (a) whether they had done the two experiments as two unrelated tasks and (b) whether anything they had done on the first experiment had affected what they had done on the second experiment (item recoded). These questions were answered on a 7-point scale ranging from 1 (*do not agree at all*) to 7 (*agree completely*). Participants also answered questions about the purpose of the two experiments and whether they thought that any of the words from the Scrambled Sentence Test seemed unusual or distinctive.¹ In addition, during the debriefing, they were specifically asked whether they suspected that a motivation had been activated in the experiment.

Results and Discussion

TEST OF AWARENESS

Participants believed that what they had done in the initial experiment did not affect what they did in the second ($M = 6.60$) and that they had performed the two experiments as unrelated tasks ($M = 6.67$). All the participants in the final sample indicated at least a 4 on both awareness check questions. Correlation coefficients were computed between the awareness check items and the dependent measures assessed. All correlations between the measures of suspiciousness and the dependent variables were nonsignificant (all $ps > .08$, most $ps > .30$, most $rs < .10$). When asked about the purpose of the experiments, participants mentioned objectives related to the cover story of the study. When asked about any prime words in the Scramble Sentence Test that seemed unusual or distinctive, participants could not remember any words that seemed to stand out. After being told about the nature of the priming manipulation, no participant reported suspicion of a motivation being primed.

EFFECTS OF PRIMED MOTIVATION

Table 1 presents the mean scores for each of the four dependent variables. The effects of priming on each dependent variable were examined in a priming linear contrast. Each contrast compared the mean scores of the autonomous priming condition (weight = +1) to that of the extrinsic priming condition (weight of -1); the neutral priming condition was assigned a weight of 0. The results are presented in the first column in Table 2. It can be seen that all four contrasts were significant. Clearly, people who were primed with an autonomy orientation displayed higher levels of intrinsic motivation, interest enjoyment, perceived choice, and performed better than people primed with a heteronomous orientation.

Taken together, the above findings provide encouraging support for the automatic activation of autonomous and heteronomous motivations. The results suggest that these motivational styles can be temporarily activated and subsequently influence individuals' self-reports and behavior without participants' awareness of such influences. In addition, these findings replicate the results obtained in previous studies through conscious regulation of autonomous motivation (Deci & Ryan, 2000).

STUDY 2

Given evidence of the availability of cognitive structures relevant to autonomous and heteronomous

TABLE 1: Mean Ratings for Intrinsic Motivation, Task's Performance, Interest-Enjoyment, and Perceived Choice as a Function of Priming Condition in Study 1

	Priming Condition		
	Autonomous Motivation		Heteronomous Motivation
	Neutral		
Intrinsic motivation	6.10	5.92	4.70
Interest-enjoyment	7.15	7.20	5.96
Perceived choice	6.90	6.09	5.78
Behavioral measure of motivation (performance)	47.25	39.55	31.95

NOTE: The means for performance represent the number of words correctly identified on the puzzles.

motives that can be made more accessible through temporary priming, we proceeded with the investigation of chronically accessible motivational constructs in part because temporary priming is meant to reproduce the effect of chronic constructs. The purpose was to develop a measure of chronically accessible autonomous motivations and assess its validity by relating it with existing, validated, self-report scales of autonomous and heteronomous motivation.

Method

PARTICIPANTS AND PROCEDURE

Participants were 190 first-year students (50 men, 140 women) recruited in introductory psychology courses at the University of Ottawa, Canada. They ranged in age from 17 to 52 ($M = 20.5$). An additional 30 participants completed the free-response measure of chronically accessible academic motivation twice to examine test-retest reliability.

Participants completed all measures in class. After completing the free-response measure of motivation, they answered 10 filler items about their academic goals (e.g., obtaining the best grades). Then, they followed the self-report measures of academic motivation (i.e., the AMS and the SMS, described below). The questionnaires took approximately 20 min to complete. Participants were told that the purpose of the study was to understand students' reasons for attending university.

MEASURES

Free-response measure of chronically accessible motivations. An adapted version of Higgins et al.'s (1982) free-response measure of accessible constructs was used to identify individuals' chronically accessible motivational orientations toward university studies. Based on principles of automaticity research, we needed to select a

TABLE 2: Results of Contrast Analysis for Studies 1 and 4

	Prime		Combined Prime	Prime Linear × Nonchronic vs. Chronic	
	Linear Contrast (Study 1) (t) (df = 57)	Prime Linear Contrast (Study 4) (t) (df = 105)	Contrast Linear (Studies 1 and 4) (z)	Chronicity Contrast (Study 4) (t) (df = 105)	Chronic Contrast (Study 4) (t) (df = 99)
Intrinsic motivation	2.37**	1.53†	2.69**	2.43**	1.80†
Interest-enjoyment	2.79**	1.75†	3.12**	3.34**	2.12*
Perceived choice	2.85**	1.01	2.64**	1.89†	1.62
Performance (Study 1)	2.61**				
Free-choice (Study 4)		1.78†		3.25**	1.90†

† $p < .10$. * $p < .05$. ** $p < .01$. All significance levels are two-tailed tests.

domain that would be relevant to the situation, the dependent variables studied, and the participants, so that peoples' chronically accessible constructs could be activated. The domain needed to be general enough so that it would be relevant to most individuals but not too general so that it would not be specific to any one situation (Bargh et al., 1988; Higgins, 1996; Higgins & Bargh, 1987; Higgins et al., 1982). Academia seemed to be a life domain that met these conditions for university students. Participants were asked to "take a few minutes to list up to 10 reasons they had for attending university in general." They were given a maximum of 3 min to come up with a list of reasons, which is ample time according to Higgins et al. (1982) because only the first few motives are used for coding. After completing this part of the questionnaire, participants were instructed to answer the other questions without returning to the initial measure. This was done to ensure that participants' spontaneous responses would not be influenced by the subsequent items.

The Academic Motivation Scale (AMS). The AMS (Vallerand et al., 1992) is a 28-item scale designed to assess autonomous and extrinsic regulatory styles. It contains seven subscales (4 items each) that measure three types of intrinsic motivation (to experience stimulation, to know, and to accomplish), three types of extrinsic motivation (identified regulation, introjected regulation, external regulation), and amotivation. Participants answered each item on a 7-point scale ranging from 1

(does not correspond at all) to 7 (corresponds exactly). For purposes of this study, a composite Self-Determination Index (SDI) was computed in the following way, after averaging the three intrinsic motivation subscales: $(2 \times \text{intrinsic motivation}) + (\text{identification}) - (\text{external regulation}) - (2 \times \text{amotivation})$; this procedure has been used and reported before (see Vallerand, 1997). The AMS possesses acceptable reliability and validity (Vallerand et al., 1992).

The State Academic Motivation Scale (SMS). This scale by Guay and Vallerand (1997) consists of 18 items that measure individuals' level of motivation toward a particular activity at a certain time. The SMS has six subscales (3 items each): intrinsic motivation, integrated regulation, identified regulation, introjected regulation, external regulation, and amotivation. Participants had to answer each item on a 7-point scale ranging from 1 (*does not correspond at all*) to 7 (*corresponds exactly*). An SDI also was computed for this scale using the same formula as with the AMS. The SMS also possesses acceptable reliability, validity, and internal consistency. Results of confirmatory factor analyses support the structure of the SMS. In addition, correlation between the subscales and various related constructs supports the continuum of self-determination proposed by Deci and Ryan (1985).

Coding of chronically accessible motivation. According to Higgins et al. (1982), the first few answers that spontaneously come to an individual's mind in response to a question are considered representative of his or her most accessible constructs. Consequently, and based on prior research using similar measures (Bargh et al., 1988; Higgins, 1996; Higgins & Bargh, 1987; Higgins et al., 1982; Higgins & King, 1981), only the first two motives spontaneously provided by participants were coded. As a result, we obtained a measure of individuals' automatically activated, chronically accessible motivations. Although the free-response measure appears similar to measures used in prior research to assess consciously regulated autonomous and heteronomous motivations, one important difference lies in which motives are actually examined. When a free-response measure is used to assess consciously regulated motives, all of the motives are considered as important strivings of the individual (Emmons, 1986). In contrast, and as described previously, when free-response measures are used to study chronically accessible constructs, only the first few characteristics or motives individuals provide are considered and treated as representative of individuals chronically accessible, automatically regulated constructs.

When one of the first two motives could not be coded precisely, due to lack of information in the description, the third motive was coded instead (Bargh et al., 1988; Higgins, 1996; Higgins & Bargh, 1987; Higgins et al.,

1982). Two independent raters coded all the responses. The coding procedure was designed to yield a continuous measure of chronic autonomous motivation so we could correlate it with validated measures of autonomous motivation. The codification of participants' motives was based on the self-determination continuum and the way the SDIs are computed for the AMS and SMS. The forms of motivation that are adjacent on the continuum are significantly related and can be combined, whereas motives at opposite ends of the continuum cannot (Deci & Ryan, 2000). Thus, the coding procedure used made the chronically accessible measure more conceptually equivalent to validated measures of motivation.

The first two motives given for attending university were identified either as intrinsic (e.g., because I enjoy learning new and interesting things), extrinsic self-determined (e.g., because I want to get a good education), or extrinsic non-self-determined (e.g., because I have to get a job that pays well). Intrinsic motives are by definition self-determined. In contrast, extrinsic motives can vary in their underlying level of self-determination. Some motives are self-determined (i.e., chosen), whereas some are non-self-determined (i.e., pressured). Extrinsic non-self-determined motives represent the prototype of extrinsic motivation (Deci & Ryan, 1985, 2000). Based on the Self-Determination Continuum, intrinsic and self-determined extrinsic motives can be combined; non-self-determined extrinsic motives and self-determined extrinsic motives also can be combined. However, intrinsic and non-self-determined extrinsic motives cannot be combined. Participants were considered extrinsic chronics (-3 to -1) when at least one of the first two motives was extrinsic non-self-determined and the other motive was not intrinsic. Participants were considered autonomous chronics ($+1$ to $+3$) when at least one of the first two motives was intrinsic and the other was not extrinsic non-self-determined. If the first two motives given were extrinsic self-determined, participants were considered neither chronic autonomous nor chronic heteronomous and given a score of 0. Finally, if one of the first two motives was intrinsic and the other extrinsic non-self-determined, the person was labeled as having an ambiguous motivational orientation. Theoretically, the person's most accessible motives are considered contradictory because they are located at opposite ends on the Self-Determination continuum and strongly negatively related. The motives could not be combined. In this case, participants were removed from the sample.

In sum, we created a continuous measure of motivational chronicity, from -3 (heteronomous chronics) to $+3$ (autonomous chronics), with more positive scores reflecting higher levels of chronic autonomous motivation. This procedure paralleled the way the Self-

Determination Indexes are computed for the AMS and SMS and allowed us to correlate these measures.

Results and Discussion

PRELIMINARY ANALYSES

Participants generated a total of 380 motives (2 motives for each of the 190 participants). Five percent of the motives ($n = 17$) could not be coded due to lack of information. In these cases, the third motive given was coded instead. Interjudge reliability was found to be very satisfactory ($r = .94$). The few discrepancies were resolved through discussion. Thirty-four participants were removed from the experimental sample because their motives were classified as ambiguous with regard to chronic motivational orientation, leaving 156 participants (111 women, 45 men) for the analyses.

DISTRIBUTION OF SCORES

Free-response measure. Out of the 156 participants, 120 were labeled as chronically heteronomously/extrinsically motivated toward academics. Fourteen participants were given a score of 0 and considered to be nonchronic with respect to autonomy or heteronomy. Twenty-two participants were labeled chronically autonomously/intrinsically motivated toward school.

Academic and state academic motivation scales. The scores on the AMS ranged from -3.13 to 5.50 , with a mean score of 2.16 . Similarly, the scores on the SMS ranged from -3.72 to 8.00 , with a mean value of 3.00 . Out of the 156 participants, 143 reported being self-determined toward academia on the AMS and 129 did so on the SMS.

TEST-RETEST RELIABILITY

Thirty participants completed the free-response measure of chronically accessible academic motivation twice over a period of at least 2 months. The test-retest reliability was found to be adequate ($r = .78$).

RELATIONS BETWEEN CHRONICALLY ACCESSIBLE AND SELF-REPORTED MOTIVATIONS

Participants' level of motivational chronicity toward university studies was significantly correlated with both the AMS ($r = .34, p < .01$) and the SMS ($r = .27, p < .05$). However, the chronicity measure and the other self-report measures seemed to assess somewhat different types of motivations because we found a large discrepancy in the distributions of scores on the chronicity and AMS and SMS measures. Specifically, the majority of the participants (77%) possessed a chronically accessible extrinsic motivation toward academia, and very few were found to be chronically intrinsically motivated. In contrast, almost all of the participants were found to be self-determined on the AMS and SMS (92%). Thus, people do not seem to access the same information when filling

out the chronicity and the scaled measures. The first few responses that come to mind do not represent the same information about an individual as the information obtained from Likert-type scaled measures. The chronicity measure taps into individuals' spontaneous motivational orientation without orienting them toward autonomous or heteronomous motives. It might better assess people's most important motives. In contrast, self-report measures (AMS, SMS) give people the opportunity to endorse many types of motives to various degrees. These measures could potentially sway people toward one or another motive because response options are presented to people.

STUDY 3

In Study 3, we examined the predictive validity of the chronically accessible motive developed in Study 2. We assessed chronic autonomous motivations toward school as well as level of autonomous motivation with the AMS and SMS. We investigated the relations of chronically accessible motives to immediately expressed behavioral intentions and to actual behavior observed approximately a month after the assessment of the intentions. In prior research, chronically accessible constructs have been found to be good predictors of spontaneous behavior (Bargh, 1990, 1997). Therefore, we expected chronically accessible motives to predict attendance at an experimental session a month later.

At the University of Ottawa, where this study was conducted, participation in experimental studies is clearly advertised as a way to obtain valuable research experience useful for students' academic careers. This is even more salient for these students because they do not receive compensation for their participation, either monetary or through extra course credit. Thus, we hypothesized that chronically accessible autonomous motivation would predict participation because it is entirely voluntary and presumably driven by an interest in academia. The conditions activating the chronically accessible autonomous motives (an interest in academia) would still be present and activated by the prospect of taking part in a laboratory study.

Method

PARTICIPANTS, MEASURES, AND PROCEDURE

Data were collected from 176 first-year students (47 men, 129 women) recruited in introductory psychology courses at the University of Ottawa. Participants ranged in age from 17 to 48 ($M = 20.5$).

The same measures and procedure used in Study 2 were again used in Study 3. In addition, participants were contacted by phone 1 month after the initial assessments and invited to participate in a laboratory study.

The outcome measure was whether participants showed up at the laboratory at the agreed scheduled date and time. Every participant was given a reminder call the night before about his or her scheduled laboratory session. In addition, the behavioral intention to participate in the future study also was assessed at the initial assessment. This measure consisted of three items (e.g., I have the intention of participating in the future laboratory study). Participants were asked to indicate on a 7-point scale ranging from 1 (*not at all likely*) to 7 (*extremely likely*) the extent to which they agreed with each of the three statements concerning their intention to participate in another study in the future.

Results and Discussion

DISTRIBUTION OF SCORES

Free-response measure. Out of the 176 participants, 124 were labeled as chronically extrinsically motivated toward academics, 27 (21%) of which showed up for the laboratory session. Nineteen participants were given a score of 0 and considered to be nonchronic with respect to autonomous or heteronomous motivation; 7 (38%) of these showed up for the follow-up session. Thirty-three participants were labeled chronically autonomously motivated toward school, 21 (64%) of which showed up for the follow-up laboratory session.

Academic and state academic motivation scales. The scores on the AMS ranged from -2.10 to 4.83, with a mean score of 2.11. Similarly, the scores on the SMS ranged from -3.58 to 5.75, with a mean value of 2.60. Out of the 176 participants, 164 reported being self-determined toward academia on the AMS and 156 did so on the SMS.

Again, the scores' distributions on the chronicity and scaled measures were discrepant. Most people were found to possess an automatically activated extrinsic motivation, whereas most people reported being self-determined on the AMS and SMS. The chronicity measure correlated moderately with the SMS ($r = .25$) and with the AMS ($r = .37$). Then, the simultaneous predictive validity of the scaled measures of autonomous motivation (AMS and SMS) and the free-response measure of chronically accessible motivation were examined in a model using structural equation modeling with LISREL 8 (Jöreskog & Sörbom, 1996). The fit of the overall model was adequate, as demonstrated by all the fit indices, $\chi^2(48, N = 176) = 78.60, p = .004$; Comparative Fit Index (CFI) = .97; Goodness of Fit Index (GFI) = .93; root mean square error of approximation (RMSEA) = .06.

As presented in Figure 1, the only variable significantly predicting intention was the SMS ($\beta = .20, p < .01$). The chronicity measure was not significantly associated with intention ($\beta = .10, p = ns$). In contrast, the only vari-

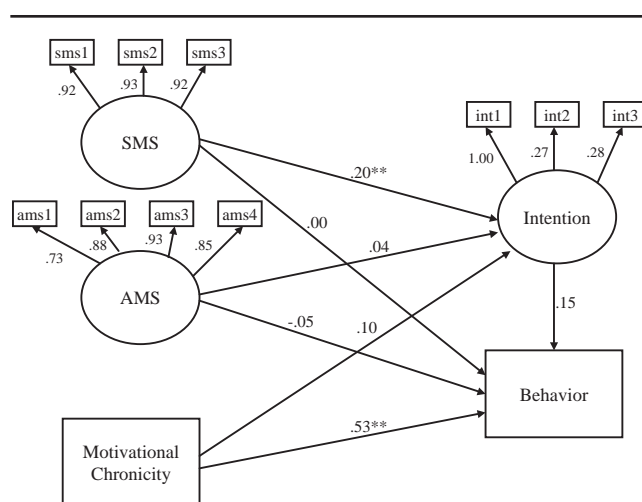


Figure 1 Structural equation model examining the predictive validity of the scaled measures (AMS and SMS) of autonomous motivation and chronically accessible motivation.

NOTE: Structural parameters indicated by two asterisks are significant at $p < .01$. The fit of the model was adequate, $\chi^2(48, N = 176) = 78.60, p = .004$, Comparative Fit Index (CFI) = .97; Goodness of Fit Index (GFI) = .93; root mean square error of approximation (RMSEA) = .06. SMS = State Academic Motivation Scale; AMS = Academic Motivation Scale.

able significantly predicting the actual behavior of returning to another study was level of motivational chronicity ($\beta = .53, p < .01$). The AMS and the SMS were unrelated to actual behavior ($\beta_s = -.05$ and $.00$, respectively; $p_s = ns$). Even the expressed intention to participate in another study was not a significant predictor of actual behavior over and above the level of motivational chronicity ($\beta = .15, p = ns$).

Taken together, the results from Studies 2 and 3 provide strong evidence for the validity and reliability of the measure of chronically accessible motivations. Indeed, the results showed that chronic autonomous motivation correlated with established measures of autonomous motivation and predicted long-term actual behavior over and above the effect of scaled measures of autonomous motivation as well as expressed intention to behave in a certain way. Of interest, chronicity seemed better at predicting actual behavior, whereas the scaled measures were better at predicting intention.

STUDY 4

In Study 4, we examined the interplay between chronically accessible and primed autonomous motives. When chronically accessible and temporary primed motivations are simultaneously activated, the most highly accessible construct should be more salient and more readily applicable to the immediate situation (Bargh et al., 1988; Higgins, 1996; Higgins et al., 1982). Thus, we expected to find a strong main effect for level of motiva-

tional chronicity. We predicted that autonomous chronics, when compared to heteronomous chronics, would spontaneously be more intrinsically motivated and interested toward a relevant task, perceive more choice while doing it, and spend more time on the task during a free-choice period.

Although we expected the effects of the priming manipulation to replicate the effect found in Study 1, we also expected the priming effect to be mostly apparent for individuals without a chronically accessible motivation. For nonchronics, autonomous and heteronomous motives are available but not chronically accessible (Higgins, 1996). These motives are not naturally salient, but their accessibility could be raised through priming. In contrast, the perceptions and behaviors of autonomous and heteronomous chronics were expected to be less systematically influenced by the primed motives. This is because their chronic motivation would have been most salient at the time they engaged in the subsequent task and most likely to affect their perceptions and behaviors. Of importance, we expected the main effect of motivational chronicity and the main effect of the prime to parallel each other. Such results would support the similarity between temporary and chronic sources of accessibility found in prior studies (Bargh et al., 1986) for motivational constructs and further suggest that a motivation was temporarily primed.

In Study 4, we also incorporated a behavioral measure of intrinsic motivation to assess one fundamental characteristic of motivational states: persistence on a task in a free-choice paradigm. We hypothesized that the activation of an autonomous motivational orientation would lead people to persist longer at a difficult, challenging task when other less challenging task options are available (Deci & Ryan, 2000).

Method

PARTICIPANTS

The selection of participants was based on their answers to the free-response measure of chronically accessible motivations, administered a few weeks prior to the actual experiment as part of another unrelated study. Participants were not informed of the relation between this initial assessment and the actual study. Again, we chose to measure chronicity toward school because it is a domain that is relevant to all university students. It also needed to be a domain relevant to the task to be performed in the actual experiment a few weeks later. For the situational context to automatically activate a chronically accessible construct, that situation needs to be relevant to the construct to be activated (Higgins, 1996). As mentioned previously, at the University of Ottawa where the study was conducted, participation in experimental studies is advertised as a way to obtain valuable research

experience. More important, participation is entirely voluntary and determined by students' level of interest because they do not receive any external compensation for participating.

A total of 686 students from social sciences courses at the University of Ottawa completed the free-response measure of chronically accessible motivation. Following the coding procedure outlined in Study 2, participants were classified as possessing either a chronically accessible autonomous/intrinsic motivation, a chronically accessible heteronomous/extrinsic motivation, or as being nonchronic with respect to autonomous and heteronomous motivation toward school. Of these possible participants, 102 (about 15%) individuals were removed from the sample because they were ambiguous with respect to their academic motivational orientation. This percentage of ambiguous participants was very similar to that found in Study 2. Of the remaining 584 potential participants, approximately 74% were classified as chronically extrinsically motivated, approximately 10% were classified as nonchronics, and approximately 16% were found to be chronically autonomously motivated, which paralleled the distribution found in Studies 2 and 3. Of these 584 potential participants, 121 individuals participated in the experiment. The other potential participants either could not be contacted, refused to participate in the experiment, or did not show up at their scheduled appointment. We invited people to participate until an equal number of participants were present in each condition. Most of the potential participants that refused to participate or that did not show up were chronically heteronomously motivated. We invited all of the potential extrinsic chronics, and only a little less than 10% of them chose to participate in the laboratory experiment. In contrast, the majority of the participants with an automatically activated autonomous motivation who were invited to take part in the study agreed to participate. This resulted in a fairly balanced distribution of participants who chose to take part in the laboratory experiment. The relatively small proportion of participants who were in the experimental sample compared to those who provided chronicity responses is comparable to that obtained in previous studies (see Bargh, 1997, for a review).

Of the 121 participants, 13 were removed from the experimental sample: 7 because they did not follow the experimental instructions and 6 because they expressed suspicion either about the true purpose of the experiment or the nature of the primes and the connection between the two tasks. A total of 108 participants, 36 autonomous chronics, 36 heteronomous chronics, and 36 nonchronics (70 women, 38 men) took part in the study. The age of the sample ranged from 18 to 50 ($M =$

21.95). Participants had learned to speak English before the age of 5 years.

EXPERIMENTAL PROCEDURE

The experimental task, the SOMA puzzle, involves spatial ability and has been used in previous studies examining intrinsic motivation (see Deci & Ryan, 2000). We used a different experimental task than in Study 1 to investigate the generalizability of the influence of automatically activated motivational processes. In the present study, the SOMA task was introduced to participants as one intended to examine the completion of academic tasks involving spatial ability. The task was purposefully presented as an academic task so that the chronically accessible motivations of participants would be activated by this contextual cue.

The task consists of seven three-dimensional pieces, from which dozens of figures can be formed. During the experimental session, participants were given the same four figures and allowed a period of 15 min to work on them. The number of figures participants were given to work on during the 15-min period was reasonable based on a previous study in which the SOMA puzzles also was used (Pelletier & Vallerand, 1996). If participants were able to solve all the figures in the time given, they could then try to solve additional figures that were placed in a folder.

The procedure for the actual experiment was generally the same as in Study 1. Priming was again done with the use of the Scrambled Sentence Task (initial task) using the same primes as in Study 1. Autonomous chronics, heteronomous chronics, and nonchronics were each exposed to one of the three types of primes in the initial task: autonomous, heteronomous, and neutral prime words. The design was thus a 3 (level of chronicity) \times 3 (priming conditions) between-subjects experiment. In Study 4, we added a 6-min free-choice period to obtain a behavioral measure of intrinsic motivation. After the 15-min period, the experimenter returned to the experimental room holding a pager and told participants that they could stop working on the puzzles. Then, they were led to believe that the experimenter had just been paged and needed to make a phone call. The experimenter left with the SOMA puzzles participants had worked on during the 15-min period. This was done to avoid any desire on their part to complete the unfinished puzzle during the free-choice period. Participants were left alone with extra puzzles that they could choose to work on while waiting. After 6 min, the experimenter returned to the room and asked participants to complete the questionnaires.

DEPENDENT MEASURES

All measures from Study 1 were again used in Study 4, with the addition of the behavioral measure of intrinsic

motivation operationalized as the amount of time participants spent working on the SOMA puzzles during the free-choice period (Pelletier & Vallerand, 1996).

Results and Discussion

TEST OF AWARENESS

Participants indicated that the first task did not affect what they did in the spatial ability task ($M = 6.29$) and that they performed the two tasks as if they were unrelated ($M = 6.24$). All of the correlation coefficients between the measures of suspiciousness and the dependent variables assessed were nonsignificant (all $ps > .13$, most $ps > .40$), except for the relationship between the first awareness question and intrinsic motivation ($r = -.21, p < .05$).² When asked about the purpose of each task, participants mentioned goals related to the cover story of the study. Furthermore, no one suspected they had been recruited for the experiment based on their chronically accessible motivations.

PRIMING EFFECTS

The design was a 3 \times 3 in which three levels of chronicity were crossed with 3 levels of priming condition. Table 3 presents the resulting nine mean scores for each of the dependent variables. To replicate the results of Study 1, we first examined the prime linear contrast for each variable. The results of the four analyses are presented in the second, left-hand column of Table 2. It can be seen that three contrasts approached significance ($ps < .10$) and one result was not significant. Because the results appear weaker than those obtained in Study 1, we tested the significance of the differences between the two sets of findings. Specifically, for each variable, we tested the significance of the difference between the p levels obtained in each study (Rosenthal & Rosnow, 1991); we also calculated the contrast r corresponding to each p level and tested the difference between the rs obtained in each study (Rosenthal & Rosnow, 1991). Note that both Study 1 and Study 4 employed three identical variables (intrinsic motivation, interest-enjoyment, perceived choice), resulting in six comparisons (three for contrast p levels and three for contrast rs). In addition, we also compared the fourth behavioral measure in Study 1 (performance) to a fourth behavioral measure in Study 4 (free-choice). All together, there were thus eight comparisons performed.

The four comparisons of the p levels were all nonsignificant, with Z s ranging from .56 to 1.23 (three of the Z s were less than 1). The four comparisons of the r contrasts also were not significant, with Z s ranging from .23 to 1.67 (three of the Z s were less than 1.17). The lack of significant differences between Study 1 and Study 4 allows us to combine their effects. The combined Z s (Rosenthal & Rosnow, 1991) appear in the middle col-

TABLE 3: Mean Ratings for Intrinsic Motivation, Interest-Enjoyment, Perceived Choice, and Free-Choice Behavior as a Function of Chronicity Level and Priming Condition

Priming	Chronicity Level								
	Autonomous Chronics			Nonchronics			Heteronomous Chronics		
	Intrinsic	Neutral	Extrinsic	Intrinsic	Neutral	Extrinsic	Intrinsic	Neutral	Extrinsic
Intrinsic motivation	5.69	6.47	6.00	6.25	5.39	4.42	4.89	5.67	4.31
Interest-enjoyment	7.03	7.52	7.02	7.18	6.83	5.33	5.85	6.13	5.62
Perceived choice	6.21	6.46	6.65	6.69	5.79	5.58	5.58	6.58	5.21
Free-choice (seconds)	289.89	291.57	262.22	284.64	219.91	133.92	102.80	168.00	127.60

NOTE: The means for free-choice represent the amount of time in seconds spent on the task during the free-choice period.

umn of Table 2 and are all significant. Clearly, these results indicate that priming people with autonomy orientation leads them to display higher levels of intrinsic motivation, interest-enjoyment, and perceived choice; greater levels of performance in Study 1; and free-choice behavior in Study 4.

CHRONICITY EFFECTS

The effects of chronicity on each dependent variable also were examined in chronicity linear contrast. Each contrast compared the mean scores of the autonomous chronics (weight = +1) to that of the extrinsic chronics (weight = -1); nonchronics were assigned a weight of 0. The results are presented in the second, right-hand column in Table 2. It can be seen that three contrasts were significant and one contrast approached significance. People who spontaneously reported autonomous motives displayed higher levels of intrinsic motivation, interest-enjoyment, greater perceived choice ($p < .10$), and free-choice behavior than those reporting heteronomous motives. These results replicate the combined results of the priming manipulation.

PRIMING × CHRONICITY INTERACTION

It was predicted that the effects of the priming manipulation would be more apparent for the nonchronics. To examine this prediction, we examined the interaction between the prime linear contrast and the chronicity contrast. The results are presented in the right-hand column of Table 2. It can be seen that one contrast was significant, two approached significance, and one (perceived choice) was not significant ($p = .12$). Thus, there is some support for the notion that the chronic and nonchronics were differentially affected by the priming manipulation.

In a second round of analysis, we examined the effect of priming separately for the chronic and nonchronic groups. For each group, we tested the prime linear contrast for each one of the dependent variables. For nonchronics, results showed that people primed with an autonomy orientation felt more intrinsically motivated

toward the task ($t = 2.35, p < .01$), were more interested in the task ($t = 2.75, p < .01$), and spent more time working on the task in the free-choice period ($t = 2.62, p < .01$). The contrast for perceived choice approached significance ($t = 1.90, p < .07$). In contrast, for chronics, none of the contrasts approached significance ($t < 1.00$). Clearly, the results support our hypothesis. It appears that nonchronics were influenced by the priming manipulation, whereas chronics were not.

In sum, and as predicted, we found a main effect for the levels of motivational chronicity. Chronically accessible autonomous and heteronomous motives influenced subsequent levels of motivation, perceptions, and free-choice behavior over and above the effect of the primes. The main effects of priming appeared somewhat weaker but did not differ significantly from those obtained in Study 1. We also found some support for the interaction between chronicity and priming and strong support for the finding that priming influences level of intrinsic motivation for nonchronic but not for chronic participants.

Of importance, the main effects of the prime and the chronicity measure paralleled each other. This suggests that autonomous and heteronomous motives can be automatically activated through priming or chronic use. Although operationalized at different levels of generality, the priming and chronicity measure similarly influenced different outcomes. This is consistent with Vallerand's (1997) hierarchical model in which motivations at different levels of generality are shown to have similar effects.

GENERAL DISCUSSION

The research presented in this article demonstrated that autonomous and heteronomous motivational orientations can be activated and operate automatically. The results of Study 1 clearly showed that autonomous and heteronomous motivation can be automatically activated just like other goals and motives (Bargh et al., 2001). These primed motivational states subsequently

affected individuals' self-reports of intrinsic motivation, interest, and perceived choice, as well as task performance and free-choice behavior, similar to consciously operating motivational states (see Deci & Ryan, 2000). The effect of the prime was replicated in Study 4 and generalized to a different experimental task. Of importance, in the present set of studies, priming was achieved with words related to the experience of being autonomously or heteronomously motivated rather than with words semantically related to the constructs to be primed. Studies on the power-sex association (Bargh, Raymond, Pryor, & Strack, 1995; Chen, Lee-Chai, & Bargh, 2001) represent the only other research we know of that used primes not semantically related to the concept being activated.

The findings of Studies 2 and 3 demonstrated that autonomous and heteronomous motivations can be chronically accessible and demonstrated the reliability and validity of the measure of motivational chronicity. In Study 2, the motivational chronicity measure was found to be associated with validated measures of motivations, and its predictive validity was supported in Study 3 by showing that chronic autonomous motives predicted attendance at a lab study conducted 1 month later. Of interest, only the chronic accessibility measure of motivation predicted actual behavior, whereas the scaled measures of motivation (SMS and AMS) predicted intention to participate but not behavior. In a review paper, McClelland, Koestner, and Weinberger (1989) reported similar findings across many studies examining implicit and explicit motives. Overall, results showed that implicit automatically activated motives were better predictors of behavior over time, whereas explicit motives were better predictors of immediate perceptions in response to a specific situation. Similar results were obtained by Fazio and his collaborators (1995) in a study on the effect of racial attitudes. The implicit measure of racial attitudes was associated with participants' behavior toward a Black experimenter, whereas the explicit self-report measure, the Modern Racism Scale, was not. Our findings also are consistent with the results of recent studies demonstrating that people seem unable to predict their own behavior in various situations (Epley & Dunning, 2000; Kruger & Dunning, 1999, 2002). People consistently overestimated their social and intellectual skills, especially when incompetent at the task performed. Furthermore, the poor performers were unaware of it. Taken together, the previous findings are very much in line with our own results and seem to suggest that automatically activated motives, not consciously regulated motives, are most likely to be associated with spontaneous behavior.

Individuals' level of motivational chronicity was used in Study 4 to examine the relationship between chronic

and temporarily primed motivational states. The main effect of chronicity seemed to suggest that long-standing, chronic individual differences in autonomous and heteronomous motivations spontaneously influenced perceptions and behavior on an unrelated task over and above the influence of the primes. This suggests that the effect of chronic motivational orientations developed over time through associations of autonomy and heteronomy with particular situations will be likely to influence perceptions and behavior beyond the current context. In addition, as suggested by the marginally significant interaction and as supported by the planned contrasts, autonomous and heteronomous chronics were not influenced by the temporary priming. These results were in contrast with the findings for non-chronics, who were shown to be susceptible to the effect of the primed motivations. It appears that the motivational constructs that most easily come to mind in relation to a certain situation will be the ones most likely to spontaneously guide perceptions and behavior in another situation. However, individuals for whom autonomous and heteronomous motives are available but not chronically accessible might be more susceptible to the influence of motivational primes because the most salient activated motives when engaging in an activity would be the recently primed motives.

Of importance, the findings of Study 4 showed that the effects of chronically accessible motivations replicated the effects of the primes found in Studies 1 and 4, thus supporting the similarity of the underlying processes (see Bargh & Barndollar, 1996; Bargh & Chartrand, 2000; Bargh et al., 1986, 1988). Furthermore, the main effect of motivational chronicity found in Study 4 replicated and extended the results of Study 3. In addition to the effect of motivational chronicity on spontaneous behavior (Study 3), variations in levels of chronicity were found to influence self-report measures of intrinsic motivation, enjoyment, perceptions of choice, and persistence on a subsequent unrelated task (Study 4). These findings further support the validity of the measure of chronically accessible autonomous motivations.

Taken together, the results of the present studies suggest that abstract higher order motivational orientations can be automatically activated and regulated without people's conscious guidance and lead to the same outcomes obtained through conscious self-regulation of these motivations. These findings add to the growing literature on the automaticity of goals and motives and further support the Auto-Motive Model (Bargh et al., 2001).

Although the autonomous words used as primes were generally more positive than the heteronomous words, we argue that the effects obtained were due to automatically activated motivational processes and not to a mood

priming effect. A review of the subjective well-being and mood literature shows that people in a positive mood will not tend to perform better than people in a negative mood, overestimate the likelihood of success, show less persistence on a task, and choose to do less difficult tasks than people in a negative mood (Diener, Suh, Lucas, & Smith, 1999; Forgas, 1999). In contrast, motivational states, such as achievement and autonomous motivation, have been consistently associated with persistence on a task (Bargh et al., 1996; Chaiken et al., 1996) as well as enhanced performance on creative tasks (Amabile, 1983; Deci & Ryan, 2000). The way in which the priming manipulation influenced performance on the task in Study 1 and persistence on the task in the free-choice period in Study 4 is consistent with a motivational process being activated. Participants consistently showed classic properties of being in a motivational state (e.g., interest and persistence).

Although significantly correlated with the AMS and SMS, we also found a discrepancy between the distribution of chronically accessible and scaled autonomous motives. This suggests that the chronicity and the scaled measures assess individuals' level of motivation somewhat differently. Although further research is needed to explore the meaning of this discrepancy, it might suggest that one of the measures is more likely to be influenced by self-presentational concerns.

In the present set of studies, different procedures have been used in the selection of participants. For example, in Study 1, people were not selected based on their chronically accessible motives while they were in Study 4. However, we believe that a sample not selected based on a priori characteristics, such as the one in Study 1, will be roughly composed of a similar proportion of autonomous and heteronomous chronics. In spite of the fact that we can expect a greater proportion of extrinsic chronics in the population, these people seem less likely to become actual participants in a study. In contrast, autonomous chronics who do seem to represent a smaller proportion of the population appear much more likely to actually show up and become actual participants. In the end, an approximately equal proportion of autonomous and heteronomous chronics should comprise a general sample similar to the one used in Study 1.

Although the results of the present research suggest that autonomous and heteronomous motivations can be temporarily primed and automatically regulated, consciously regulated motivation should still guide people's behavior in situations in which conscious monitoring is required. It also appears that chronic motives can operate automatically as well as consciously. The motives that are highly accessible are likely to become automatically activated. However, because these motives presumably

also enter consciousness as they are written down on paper, they have the potential to become consciously regulated as well.

The major theoretical contribution of the present research to the motivation literature is to point to the importance of studying the significance and impact of both automatically regulated and consciously regulated motivation on perceptions and behavior.

NOTES

1. Participants were removed from the sample when they indicated a 3 or lower on the 7-point scale on both awareness questions a and b (Question 2 recoded) and they expressed suspicions about the true purpose of the experiment or the nature of the primes.

2. In the final sample of $N = 108$, 7 participants had indicated a 3 or lower on either one of the two awareness check questions without expressing suspicions about the true purpose of the experiment or the nature of the primes during the debriefing. Removing these 7 participants from the sample did not substantially change the results, although the correlations between the awareness check questions and the dependent variables were now all nonsignificant (all $ps > .13$).

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