Behind the stage of deliberate self-persuasion: When changes in valence of associations to an attitude object predict attitude change

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Modern theory and research on evaluative processes, combined with a comprehensive review of deliberate self-persuasion (Maio & Thomas, 2007, *Pers. Soc. Psychol. Bull.*, *11*, 46), suggest two types of strategies people can use to construct new, more desired attitudes. Epistemic strategies change the perceived valence of associations activated by the attitude object. Teleologic strategies, in contrast, keep undesired associations from being activated in the first place, thus obviating the need to change their perceived valence. Change in perceived valence of associations therefore might predict attitude change better when people pursue epistemic than teleologic strategies for deliberate self-persuasion. This hypothesis gained convergent support from three studies in which use of epistemic versus teleologic strategies was measured as an individual difference (Study 1) and manipulated (studies 2 and 3). The results of these studies supported the theoretical distinction between the two strategies and suggested further research directions.

People often desire to change their attitudes. A more positive attitude towards one's romantic partner improves relationship satisfaction (Banse & Kowalick, 2007); a more positive attitude towards one's job improves productivity (Fleishman, 1965); a more positive attitude towards seeking professional counselling improves adjustment (Whiston & Rahardja, 2008); and a more negative attitude towards self-detrimental behaviours, such as dangerous driving habits and eating junk food, might even save lives (Tilleczek, 2011).

Recent research and theoretical advances suggest that people can achieve more desirable attitudes on their own. They can persuade themselves without outside intervention, additional information or taking any action other than thinking their way into a new attitude. A comprehensive review by Maio and Thomas (2007) identified two ways in which people effectively change their attitudes through deliberate self-persuasion. Because evaluative responses depend in part on the valence of activated associations to an attitude object (Ajzen & Sexton, 1999; Lord & Lepper, 1999; Schwarz, Strack, & Mai, 1991), one type of strategy (epistemic) is to change how positively or negatively the activated associations are viewed, thus changing their evaluative implications. The other type of strategy (teleologic) is to keep undesired associations from being activated in the first place, so that there is no need to change their perceived valence. It stands to reason, then, that change in perceived valence of activated associations might predict attitude change better when people use epistemic than teleologic strategies for deliberate self-persuasion.

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Basic evaluative processes and attitude change

People's thoughts play an important role in major theories of attitude change (Lord & Lepper, 1999; McGuire & McGuire, 1991; Petty & Cacioppo, 1986; Zanna & Rempel, 2008). Whether they are role playing (Janis & King, 1954) or reacting to persuasive arguments (Petty, Cacioppo, Strathman, & Priester, 2005), the thoughts that people generate take precedence (Briñol & Petty, 2003) in creating new attitudes. The process of deliberate self-persuasion is no exception. When people think about an attitude object, they activate cognitive associations (Schwarz, 2006, 2007; Schwarz & Bless, 1992; Tourangeau & Rasinski, 1988). A person's spouse, for example, might activate associations such as 'jealous' and 'possessive', a counselling centre might activate associations such as 'worthless' and 'embarrassed to go', or junk food might activate associations such as 'tasty' and 'easy to get'.

A specific attitude object activates only a handful of all possible associations at a time (Bellezza, 1984; Schwarz & Bless, 1992; Wilson & Hodges, 1992), and the specific associations can be the same as or different from the handful activated at a different time (Sia, Lord, Blessum, Ratcliff, & Lepper, 1997). Thus, evaluative responses to the attitude object vary from one time to the next (Lord, Paulson, Sia, Thomas, & Lepper, 2004). This brief summary of basic evaluative processes suggests two primary ways in which attitudes change: Changing the perceived valence of associations to the attitude object, or changing which associations get activated.

Attitudes might change because of changes in *perceived valence* – how positively or negatively the activated associations are viewed. Even if the same associations get activated from one time to the next, the perceived implications of those associations for an evaluative response will be different if the associations take on a different subjective valence (Asch & Zukier, 1984; Plaks, Shafer, & Shoda, 2003). A woman may be reminded every time she evaluates her spouse of his intense jealousy, but she will evaluate him more positively if she starts perceiving jealousy as a sign that he cares. Repeatedly activating the same cognitive association suggests that the association is a central one that lends attitude stability (Bellezza, 1984; Fishbein & Ajzen, 1975; Lord & Lepper, 1999; Lord *et al.*, 2004), so seeing that association differently might predict the resulting attitude more than would activating a different association that might be less central to the overall evaluation.

Attitudes can also change, however, because of differences in which associations get activated. Even if a particular association continues to have just as positive or negative implications, it will not affect the evaluative response if it never gets activated. A woman's attitude towards her spouse can change positively, despite her continuing to perceive jealousy as a negative trait, if she no longer associates jealousy with her spouse. Although it is difficult to keep unwanted constructs out of active awareness (Wegner, 1989), ordinary people can do so by distracting themselves with other thoughts that are different from the unwanted ones (Wegner, 1994; Wenzlaff & Wegner, 2000). The strategy of activating different associations following deliberate self-persuasion, however, might engage 'distractor' associations that might not be applied in the overall evaluation. Thus, the magnitude of valence change from one association to a different 'substitute' association might not be as closely related to attitude change as would the magnitude of valence change in more central recurrent associations.

Research on the Elaboration Likelihood Model (Petty & Cacioppo, 1986) has established that persuasion from others works through changing thoughts associated with the attitude object. This research has shown that repetition and cognitive work, which are necessary to changing perceived valence of an activated association, increase perceived validity of associated thoughts, and also increase the correlation between

thought valence and attitude change (Briñol, Petty, & Wagner, 2011; Cacioppo & Petty, 1979). In contrast, distraction and inconsistency, which are likely to occur when changing which associations get activated, decrease perceived validity of associated thoughts, foster ambivalence, and decrease correlation between thought valence and attitude change (DeMarree, Wheeler, Briñol, & Petty, 2014; Petty, Wells, & Brock, 1976). These factors affect the application of activated thoughts to a specific evaluation, and thus the relationship between thought valence and attitude change.

Deliberate self-persuasion

In a comprehensive review of attitude objects as diverse as the self, close relationships, painful stimuli, delay of gratification, and social groups, Maio and Thomas (2007) identified two broad types of strategies that correspond well with mechanisms of the basic evaluation process. These two types of strategies, which Maio and Thomas named 'epistemic' and 'teleologic', differ in their focus. Epistemic strategies aim to change the valence of undesired associations, whereas teleologic strategies aim to change their likelihood of activation.

Of the 10 self-persuasion strategies reviewed by Maio and Thomas (2007), six were epistemic and four were teleologic (see Table 1). When using epistemic strategies, a person re-interprets unwanted thoughts to make them consistent with the desired attitude. When using teleologic strategies, a person keeps thoughts that are inconsistent with the desired attitude out of mind, concentrating only on thoughts consistent with the desired attitude. A man who dislikes his spouse being jealous, for example, might improve his attitude towards his romantic partner by re-interpreting her behaviour – 'she is jealous because she cares about me' – which is an epistemic strategy (motivated interpretation), or by keeping the thought 'she is jealous' out of his mind, which is a teleologic strategy (suppression). Similarly, a woman who wants to quit smoking might pursue a less positive attitude by mentally connecting the effects of smoking with illegal stimulants that pose health dangers (motivated integration), or by focusing instead on how smoking makes her look older (concentration). As shown in Table 1, epistemic strategies change the meaning and valence of a cognitive association without altering its likelihood of activation, whereas the teleologic strategies substitute a different association (e.g., 'what I plan to do this afternoon') that might otherwise have a low probability of activation.

According to Maio and Thomas (2007), people switch between the two types of self-persuasion strategies depending on the external context and the cognitive resources available. Recent research suggests that, although the two types of strategies are equally effective, individuals have a preference in the type of self-persuasion strategies they commonly use. A self-report instrument called the E-T Scale was developed to measure this individual difference (Taylor *et al.*, 2014), with a separate subscale for each of the 10 specific strategies shown in Table 1. To measure preference for the epistemic strategy of motivated integration, for instance, one item asks whether the individual would try to make his or her attitude more positive by thinking that an attitude object 'has some undesirable characteristics, but those are tied to many desirable characteristics'. Similarly, to measure preference for the teleologic strategy of concentration, an item asks whether the individual would try to make his or her attitude more positive by concentrating on an attitude object's positive qualities 'so that I don't think about the negative ones'. The complete 30-item scale, which can be easily modified to measure attitude change in either a positive or negative direction, is available as an appendix in the article by Taylor *et al.* (2014).

Table 1. Descriptions of epistemic and teleologic strategies, with examples of their use to make thoughts about a romantic partner less negative, or to make thoughts about smoking less positive

Strategy type	Specific strategy	Description	'Partner is jealous'	'Smoking helps me think'
Epistemic	Motivated interpretation	Reinterpret undesired attributes into more desired ones	That means that he/she cares a lot about me	That means that the quality of my work depends on an unhealthy habit
	Motivated integration	Reintegrate undesired attributes with desired ones	Connected with wanting to be with me and only me	Connected with other stimulants that can harm health
	Motivated attribution	Reattribute undesired attributes to other factors	Only because he/she lost a loved one early in life	Only because I'm so addicted to nicotine
	Motivated hypothesis testing	Retest the validity of undesired attributes	Not really, because he/she encouraged me to go out with my friends from work	Not really, because my mind was just as clear without the help of cigarettes
	Changing comparators	Change the comparators for evaluating the attitude object	Compared to X's romantic partner, mine is not as jealous	Compared to discussions with friends, smoking is not as helpful
	Changing dimensions	Change the dimensions on which the comparison is based	That's not as important to me as that he/she is so caring, dependable, and honest	That's not as important to me as that smoking is harmful to my health and the health of family members
Teleologic	Suppression	Monitor to keep undesired elements out of awareness	Refuse to experience thoughts of my partner's jealousy by cutting them short	Refuse to experience thoughts of smoking helping me think by cutting them short
	Distraction	Operate to keep undesired elements out of awareness	Think about something else such as what I plan to do this afternoon	Think about something else such as what I plan to do this afternoon
	Concentration	Operate to keep desired elements in awareness	Concentrate instead on his/her being considerate	Concentrate instead on smoking making me look 5 years older
	Preemption	Monitor to keep desired elements in awareness	Deny admission to even a hint of thoughts about my partner's jealousy getting into my head	Deny admission to even a hint of thoughts about smoking helping me to think

The present research

Taylor *et al.* (2014) showed that individuals who prefer relatively epistemic to teleologic strategies remember an attitude object's undesired associations better after deliberate self-persuasion, but they did not address the *nature* of that thought. Remembering undesired associations after deliberate self-persuasion is not the same as changing their perceived valence. According to research on the basic evaluation process and the Maio and Thomas (2007) review, people who use relatively epistemic versus teleologic strategies change their attitudes because they come to perceive associations to the attitude object as having a different valence, not merely because they remember them better. Teleologic strategies might involve avoiding undesired associations, in which case they do not have to be perceived as having a systematically different valence to change attitudes, but epistemic strategies (see Table 1) are successful only to the extent that they change the perceived valence of associations in the desired direction. This difference between epistemic and teleologic strategies prompted the present hypothesis that the relationship between change in valence of associated thoughts and attitude change would be greater for people who use epistemic strategies than for people who use teleologic strategies. This overall prediction was addressed in three studies, one of which measured the use of epistemic versus teleologic strategies as an individual difference and the other two of which experimentally manipulated the use of epistemic versus teleologic strategies.

STUDY 1

Study 1 took an individual difference approach. Unlike Taylor *et al.* (2014), we explored the cognitive changes underlying deliberate self-persuasion by examining associations and their valence directly. Using a free association method originally developed by McGuire and McGuire (1991), we instructed participants to freely associate on the attitude object before and after the self-persuasion process, and to rate the valence of each thought they generated. The hypothesis of Study 1 was that change in the perceived valence of thoughts associated with the attitude object ('going to the counselling centre') would predict attitude change better for participants who, on the E-T scale (Taylor *et al.*, 2014), reported preferring relatively epistemic rather than teleologic strategies of deliberate self-persuasion. This hypothesis was different from that of Taylor *et al.* (2014, Study 4), because those researchers investigated individual differences in *memory* for undesired associations and not individual differences in the relationship between changes in thought valence and attitude change. 'Going to the counselling centre' was chosen as the attitude object because pretest participants expressed reluctance to use the counselling centre's facilities even though they recognized the benefits (see also Maier, Gentile, Vogel, & Kaplan, 2014). This attitude might be characterized as maladaptive, and students might be motivated to improve it on their own.

Method

Participants

A total of 303 undergraduate students (202 women, 101 men) participated for course credit. Five participants were excluded because of incomplete data. The final data set therefore consisted of 298 cases (197 women and 101 men).[1]

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[1] *Participant sex did not qualify the reported results for any of the three studies.*

Procedure

The study had five parts: An online survey to measure attitudes and preference for epistemic versus teleologic strategies; measurement of initial association valence; a session of deliberate self-persuasion; a filler task; and measurement of post-manipulation association valence and attitudes.

Online survey

As part of a large online survey at the beginning of the semester, participants reported their attitudes towards 'going to the counselling centre' on 7-point scales from −3 (very negative) to +3 (very positive). In studies 1 and 2, only students with less than +3 initial attitudes were included in the sample, because students with +3 initial attitudes could not adopt more positive attitudes. In another part of the same large online survey, participants also reported their preference for strategies of deliberate self-persuasion on the E-T Scale (Taylor *et al.*, 2014). Higher scores on the E-T Scale indicate a preference for epistemic strategies over teleologic strategies, whereas lower scores indicate the opposite.

Measurement of association valence

At the start of the main experiment, approximately 2 months after the online survey, participants freely associated on the topic 'going to the counselling centre'. To maximize the probability that we would obtain a sufficient number of associations for analyses, we used the top limit of Miller (1956) 7 ± 2 range. Participants were told to list the first nine thoughts that occurred to them when they thought about going to the counselling centre. Then, they rated the valence of each thought they had listed – the extent to which that thought would make them want to go to the counselling centre, on 7-point scales from −3 (very much not want to) to +3 (very much want to).

Deliberate self-persuasion

Participants were instructed to 'sit quietly in your chair for the next 5 min and use your mental processes to make yourself have a more positive attitude towards going to the counselling centre'.

Filler task

After the self-persuasion session, all participants completed an unrelated 13-min filler task in which they freely associated with the names of 20 foreign countries (adopted from McGuire & McGuire, 1996). The filler task was intended to prevent participants from remembering their exact answers to the pre-manipulation questions.

Post-manipulation assessments

Participants then completed the same free association measures as on the pre-manipulation survey and reported their attitudes towards going to the counselling centre again. They were then asked to guess the true purpose of the study,[2] debriefed, thanked for their participation, and dismissed.

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[2] *No participant correctly guessed that we were interested in the relationship between the deliberate self-persuasion strategies they used, thought valence change, and attitude change.*

Results

The data were analysed in terms of changes in attitudes and thought valence, and the interactive effects of E-T scores and thought valence change on attitude change.

Changes in attitudes and thought valence

The mean valence scores of the nine thoughts generated in each free association session by each participant served as an overall indicator of the extent to which participants' thoughts regarding 'going to the counselling centre' facilitated this behaviour. Consistent with previous research (Resch & Lord, 2011; Taylor *et al.*, 2014), thought valence became more positive (*M*s = 0.29 before and 0.91 after), $t(297) = 9.22$, $p < .001$, as did participants' reported attitudes (*M*s = 0.36 before and 0.57 after), $t(297) = 2.27$, $p = .02$. Reported attitudes were significantly correlated with thought valence both before ($r = .14$, $p < .05$) and after ($r = .50$, $p < .01$) self-persuasion.

Effects of E-T scores and thought valence change on attitude change

To test the central hypothesis, attitude change scores were regressed on change in mean thought valence (centred), E-T Scale scores (centred), and their interaction. The main effect of change in thought valence was significant, $b = .25$ ($SE = 0.08$), $t = 3.18$, $p = .002$, $r^2 = .03$, with a larger increase in thought valence leading to a larger positive change in attitude. This effect, however, was qualified by a significant interaction between change in thought valence and E-T Scale scores, $b = .16$ ($SE = 0.08$), $t = 2.04$, $p = .04$, $r^2 = .02$ (see Figure 1). For participants who preferred relatively epistemic strategies (with E-T scores 1 *SD* above the mean), simple slopes tests revealed that change in mean thought valence significantly predicted attitude change, $b = .42$ ($SE = 0.11$), $t = 3.69$, $p < .001$, $r^2 = .03$. However, for participants who preferred relatively teleologic strategies (with E-T scores 1 *SD* below the mean), thought valence change did not significantly predict attitude change, $b = .07$ ($SE = 0.12$), $t = 0.63$, $p = .53$, $r^2 = .001$.

Consistent with the reasoning advanced by Maio and Thomas (2007) and the scale developed by Taylor *et al.* (2014), change in perceived valence of spontaneous thoughts associated with going to the counselling centre predicted attitude change better for participants who preferred using relatively epistemic strategies for deliberate self-persuasion than for participants who preferred using relatively teleologic strategies.

STUDY 2

One limitation of Study 1 was that participants' preference for different types of self-persuasion strategies was measured as an individual difference. Participants who differed in their E-T scores might have also differed in other ways. Previous research (Taylor *et al.*, 2014) has shown that scores from the E-T Scale are modestly correlated ($r < .25$) with scores from the Big Five Inventory (McCrae & Costa, 2003), Need for Cognition (Cacioppo & Petty, 1982), and Constructive Thinking Inventory (Epstein & Meier, 1989). Therefore, the predicted epistemic–teleologic differences in relationship between thought valence change and attitude change that were found in Study 1 were not necessarily caused only by participants' preference for different types of self-persuasion strategies.
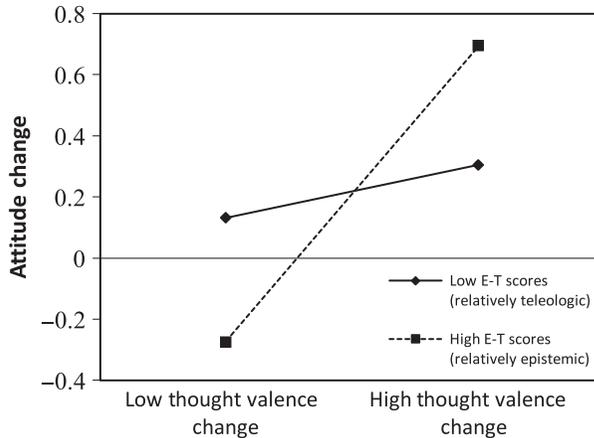
Figure 1. Attitude change as a function of change in thought valence and E-T scores (Study 1). A higher value on the *y*-axis indicates a larger attitude change in a positive direction. 'Low' in thought valence change/E-T scores was defined as one standard deviation below the mean value. 'High' in thought valence change/E-T scores was defined as one standard deviation above the mean value.

To address these issues in Study 2, we *manipulated* the strategies participants used for deliberate self-persuasion. We adapted a training procedure that had been used in a previous study to teach participants either epistemic or teleologic strategies to change attitudes towards Arabs (Resch & Lord, 2011). That previous study, however, was concerned with attitude change, not the relationship between changes in thought valence and attitude change. In fact, that previous study did not measure either associated thoughts or their valence. In the present study, we used training manuals to teach epistemic or teleologic strategies for changing attitudes towards 'going to the counselling centre'. The hypothesis of Study 2 was that change in valence of associated thoughts would predict attitude change better for participants who were taught to use epistemic strategies than for participants who were taught to use teleologic strategies.

Method

Participants
A total of 205 undergraduate students participated for course credit. One participant was excluded because of incomplete data. Four participants were excluded because they had knowledge of the study before participating in the experiment. The final data set consisted of 200 participants (152 women and 48 men).

Procedure
Experimental procedures were the same as in Study 1 (attitude report, listing nine thoughts about going to the counselling centre, rating the valence of each thought both pre- and post-manipulation, and the filler task), except that before the self-persuasion session started, participants were randomly assigned to either the epistemic strategy condition or teleologic strategy condition. Participants completed one of two self-persuasion strategy training manuals (adapted from Resch & Lord, 2011).

Participants assigned to the epistemic strategy condition (n = 94) were taught how to use the six epistemic strategies, shown in Table 1, to change their attitudes. For example, to learn motivated interpretation, participants first read a brief description of that strategy in lay terms, and an example of how the strategy can be used to improve one's attitude towards one's romantic partner. Participants were then told to write down a target person or group of their choice and an annoying characteristic of this target. Participants practiced the strategy by writing a more desirable interpretation of the annoying characteristic.

Participants assigned to the teleologic strategy condition (n = 106) were taught how to use the four teleologic strategies, shown in Table 1, to change their attitudes. For example, to learn suppression, participants first read a brief description of that strategy in lay terms, and an example of how the strategy can be used to improve one's attitude towards one's romantic partner. Then, participants were told to write down a target person or group of their choice and an annoying characteristic of this target. Participants practiced the strategy by writing about how they would refuse to entertain thoughts of this characteristic.

After participants learned to apply either the epistemic or teleologic strategies to the targets of their choice, they were told to use the same six or four strategies to make their attitudes towards 'going to the counselling centre' more positive, guided by a packet of instruction sheets. The instructions reminded participants of the essentials of each strategy and then asked them to write how they were using each strategy on 'going to the counselling centre', for example by filling in the blank in sentences like 'That's only because _____' or 'Think about something else such as _____'.

Results

As in Study 1, the data were analysed in terms of changes in attitudes and thought valence, and the interactive effects of E-T scores and thought valence change on attitude change.

Changes in attitudes and thought valence

The thought valence scores and attitude change scores were calculated as in Study 1. Consistent with the results of Study 1, thought valence became more positive for participants taught epistemic strategies (Ms = −0.44 before and −0.23 after), $t(93)$ = 1.89, p = .06, and for participants taught teleologic strategies (Ms = −0.45 before and −0.14 after), $t(105)$ = 3.26, p = .002, as did participants' reported attitudes (Ms = −0.02 before and 0.19 after for the epistemic condition, $t(93)$ = 2.86, p = .005; Ms = 0.03 before and 0.19 after for the teleologic condition, $t(105)$ = 2.64, $t(105)$ = 2.64, p = .01). Reported attitudes were significantly correlated with thought valence both before and after self-persuasion, for participants in both the epistemic (r = .50, p < .01 before; r = .67, p < .01 after) and the teleologic (r = .54, p < .01 before; r = .57, p < .01 after) strategy conditions.

Effects of E-T strategies and thought valence change on attitude change

To test the central hypothesis, attitude change scores were regressed on change in mean thought valence (centred), self-persuasion strategy condition (dummy coded), and their

interaction. Change in thought valence significantly predicted attitude change, $b = .64$ $(SE = 0.09)$, $t = 7.00$, $p < .001$, $r^2 = .20$, with a larger increase in thought valence leading to a larger positive change in attitude. Self-persuasion strategy condition also had a significant effect on attitude change, $b = .43$ $(SE = 0.19)$, $t = 2.29$, $p = .02$, $r^2 = .03$, with participants who were trained to use epistemic strategies showing more positive attitude change than participants who were trained to use teleologic strategies.

The main effects, however, were qualified by a significant interaction between change in thought valence and self-persuasion strategy, $b = .42$ $(SE = 0.18)$, $t = 2.30$, $p = .02$, $r^2 = .03$ (see Figure 2). Simple slopes tests showed that change in thought valence significantly predicted attitude change for both participants who were trained to use epistemic strategies, $b = .84$ $(SE = 0.13)$, $t = 6.71$, $p < .001$, $r^2 = .19$, and participants who were trained to use teleologic strategies, $b = .42$ $(SE = 0.13)$, $t = 3.22$, $p = .001$, $r^2 = .05$. The magnitude of this thought–attitude relation was significantly stronger for participants who were trained to use epistemic strategies than for participants who were trained to use teleologic strategies, $t(196) = 2.02$, $p = .04$.

Study 2 conceptually replicated the results of Study 1. Change in perceived valence of spontaneous thoughts associated with going to the counselling centre predicted attitude change better for participants taught to use epistemic than teleologic strategies. The alternative explanation that confounding individual differences could have produced the results of Study 1 was rendered less likely by Study 2's experimental manipulation in which participants were randomly assigned to different self-persuasion strategy conditions.

STUDY 3

Although the results of studies 1 and 2 provided convergent evidence for the central hypothesis – one study *measuring* preference for epistemic versus teleologic strategies as an individual difference and the other *manipulating* use of epistemic versus teleologic strategies – both studies employed the same attitude object (going to the counselling centre), asked participants to make their attitudes more positive, and required
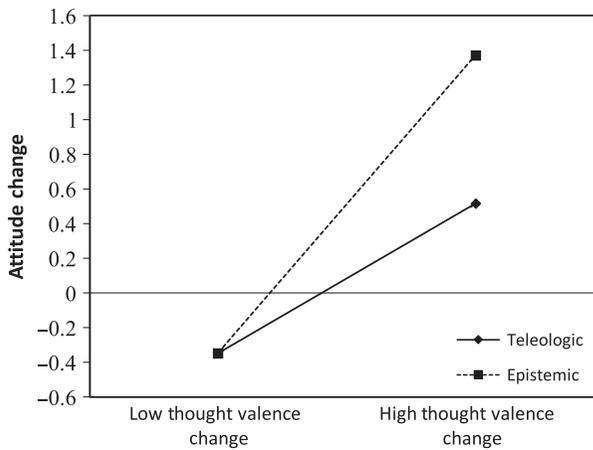

Figure 2. Attitude change as a function of change in thought valence and self-persuasion strategy conditions (Study 2). A higher value on the *y*-axis indicates a larger attitude change in a positive direction. 'Low' in thought valence change was defined as one standard deviation below the mean value. 'High' in thought valence change was defined as one standard deviation above the mean value.

participants to list and then rate the valence of *nine* cognitive associations. To generalize from the results of these two studies to the effects of epistemic versus teleologic strategies in general, it was important to test the central hypothesis on a different attitude object where the goal of deliberate self-persuasion was to adopt more *negative* attitudes. Attitudes towards consuming junk food were selected as a target because they pose significant health risks for adolescents and college students (Guidetti, Cavazza, & Graziani, 2014). Similar to attitudes towards going to the counselling centre, they are maladaptive attitudes that students might be motivated to improve on their own, especially if they become aware that junk food contributes to obesity and other health problems (Datar & Nicosia, 2012).

Study 3 also differed from the previous studies in not requiring any specific number of thought associations. In studies 1 and 2, having to list nine associations might have prompted participants to generate an unusual number of thoughts that were not central to their attitudes. In Study 3, therefore we allowed participants to generate as many thoughts as came to mind in each free association session. Moreover, an attempt to analyse the content of the thoughts generated in studies 1 and 2 suggested that when participants were asked to write down nine thoughts, the implications of those thoughts were often unclear (e.g., 'Why am I going?'). We attempted to elicit more focused associations in Study 3 by instructing participants to list their thoughts in a more specific and structured way, so we could better identify thoughts that were repeated.

Method

Participants

A total of 210 undergraduate students participated for course credit. Because the goal was to change attitudes in a negative direction, participants who initially reported an extremely negative attitude (-3) on a scale from -3 (very negative) to $+3$ (very positive) were excluded from analyses. Additionally, two participants were excluded for failing to follow instructions, leaving a final sample of 157 participants (121 women and 36 men).

Procedure

Experimental procedures were the same as in Study 2 with a few exceptions. The attitude object was changed to 'eating junk food'. In the same order as in Study 2, participants reported their attitudes and intentions towards eating junk food, listed and rated thoughts associated with eating junk food, learned to use either epistemic or teleologic strategies of deliberate self-persuasion, applied the strategies to change their attitudes and intentions towards eating junk food, engaged in an unrelated 13-min filler task, and then reported their attitudes and intentions, and listed and rated their thoughts again. An additional behavioural intentions question, different from the attitude questions used in studies 1 or 2, was 'How often will you eat junk food in the next month', with responses 1 = *never*, 2 = *once a month*, 3 = *2–3 times a month*, 4 = *once a week*, 5 = *2–3 times a week*, 6 = *4–6 times a week*, and 7 = *daily*.

After reporting their attitudes, intentions, and associations the first time, participants were randomly assigned to learn either epistemic or teleologic strategies to make their attitudes more *negative*. The training manual used the example of making one's attitude more negative towards smoking (see Table 1). Participants then applied the strategies they learned to the topic of 'eating junk food'. When listing thoughts associated with

eating junk food, participants were specifically instructed to list thoughts that had positive or negative implications for their evaluations of eating junk food rather than simply listing any and all thoughts that occurred to them. Moreover, participants were free to list as many or few thoughts as naturally came to mind (up to 12) rather than a fixed number of nine thoughts.

Results

As in studies 1 and 2, the data were analysed in terms of changes in attitudes and thought valence, and the interactive effects of E-T strategies and thought valence change on attitude change. In addition, thought repetitions were analysed to test whether epistemic strategies lend themselves more to repeated associations from before to after deliberate self-persuasion.

Changes in attitudes and thought valence

Thought valence scores and attitude change scores were calculated as in studies 1 and 2. As in those studies, thought valence became more negative for participants taught epistemic strategies ($Ms = -0.40$ before and -0.89 after), $t(77) = -4.30, p < .001$, and for participants taught teleologic strategies ($Ms = -0.26$ before and -0.54), $t(78) = -2.17, p = .03$. Reported attitudes also became more negative for participants taught epistemic strategies ($Ms = -0.88$ before and -1.37 after), $t(77) = 4.53, p < .001$, and for participants taught teleologic strategies ($Ms = -0.73$ before and -1.08 after), $t(78) = -4.19, p < .001$. Reported attitudes were significantly correlated with thought valence both before and after self-persuasion, for participants in both the epistemic ($r = .23, p < .05$ before; $r = .48, p < .01$ after) and the teleologic ($r = .39, p < .01$ before; $r = .44, p < .01$ after) strategy conditions.

Effects of E-T strategies and thought valence change on attitude change

In a test of the central hypothesis, attitude change scores were regressed on change in mean thought valence (centred), self-persuasion strategy condition (dummy coded), and the interaction of these two factors. Change in thought valence significantly predicted attitude change, $b = .25$ ($SE = 0.06$), $t = 4.09, p < .001, r^2 = .10$, whereas self-persuasion strategy condition did not, $p = .55$. More importantly, there was a significant interaction between change in thought valence and self-persuasion strategy, $b = .35$ ($SE = 0.12$), $t = 2.94, p = .004, r^2 = .05$ (see Figure 3). Simple slopes tests showed that change in thought valence significantly predicted attitude change for participants who were taught to use epistemic strategies, $b = .45$ ($SE = 0.09$), $t = 4.98, p < .001, r^2 = .14$, but not for participants who were taught to use teleologic strategies, $t < 1$.

Repeated associations

Participants in the epistemic condition were taught to perceive their junk food associations as less positive after deliberate self-persuasion – for example, changing positive associations like 'easy to get' from very to moderately positive, or changing negative associations like 'weight gain' from moderately to very negative. Participants in the teleologic condition were instead told to avoid thinking about unwanted associations,
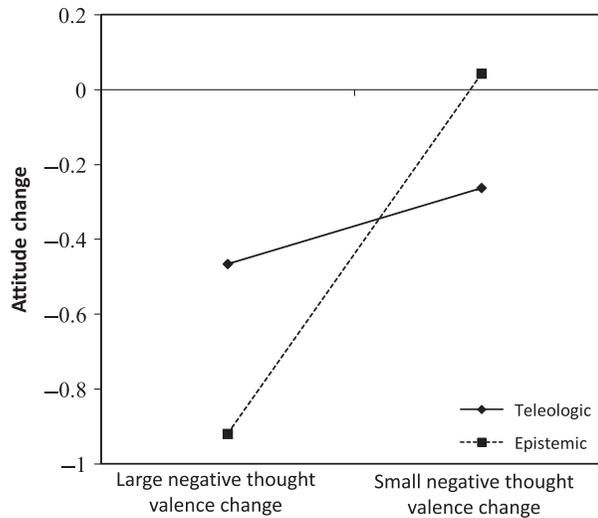
Figure 3. Attitude change as a function of change in thought valence and self-persuasion strategy conditions (Study 3). A lower value on the *y*-axis indicates a larger attitude change in a negative direction. 'Large' thought valence change in the negative direction was defined as one standard deviation below the mean value. 'Small' thought valence change in the negative direction was defined as one standard deviation above the mean value.

for instance by thinking about something else. Differences in the cognitive processes of participants in the two conditions, then, might be detected by an analysis of repeated associations – times when one or more of the participant's associations were the same after as before deliberate self-persuasion.

Because participants were allowed to generate as many or as few associations as they wanted, number of associations varied. All participants, however, generated at least three associations, so it was decided to inspect the first three associations for repetitions, which could range from 0 to 3. Table 2 shows that participants in the epistemic condition generated more repeated associations ($M = 1.29$, $SD = 0.88$) than did those in the teleologic condition ($M = 0.94$, $SD = 0.80$), $t(155) = 2.65$, $p = .009$. Additionally, participants in the epistemic condition changed the perceived valence of their repeated associations more in the direction of the new less positive attitude they were asked to adopt ($M = -0.27$, $SD = 0.77$) than did participants in the teleologic condition ($M = 0.05$, $SD = 0.93$), $t(155) = 2.35$, $p = .02$.

Table 2. Effects of repetitions from pre- to post-deliberate self-persuasion within the first three associations (Study 3)

	Teleologic condition	Epistemic condition	*t*
N	79	78	
Number of thought repetitions	0.94 (0.80)	1.29 (0.88)	2.15**
Thought valence change	0.05 (0.93)	−0.27 (0.77)	2.35*

Note. Standard deviations in parentheses.
*$p < .05$; **$p < .01$.

In an analysis confined to repeated associations within the first three, overall attitude change was regressed on change in mean valence of the repeated associations, deliberate self-persuasion strategy condition, and the interaction between these two factors. Change in valence of the repeated associations significantly predicted attitude change, $b = .20$ ($SE = 0.08$), $t = 2.48$, $p = .014$, $r^2 = .04$, whereas self-persuasion strategy condition did not, $p = .61$. There was also a significant interaction between change in valence of the repeated associations and self-persuasion strategy, $b = .51$ ($SE = 0.16$), $t = 3.29$, $p = .001$, $r^2 = .07$. Simple slopes tests showed that change in valence of the repeated associations significantly predicted overall attitude change for participants who were trained to use epistemic strategies, $b = .50$ ($SE = 0.12$), $t = 4.14$, $p < .001$, $r^2 = .10$, but not for participants who were trained to use teleologic strategies, $t < 1$.

Behavioural intentions

Study 3 also included a behavioural intention measure that had not been included in Study 1 or 2: Intentions to engage in the target activity. Mean intentions to eat junk food in the next month changed in a negative direction, from 4.68 ($SD = 1.16$) before self-persuasion to 4.44 ($SD = 1.24$) after (change score $M = -0.24$, $SD = 0.56$), $t(1, 156) = 5.42$, $p < .001$. In addition, when change in behavioural intentions regarding eating junk food was regressed on thought valence change (centred), deliberate self-persuasion strategy condition (dummy coded), and their interaction, the interaction was marginally significant, $b = .16$ ($SE = 0.08$), $t = 1.96$, $p = .052$, $r^2 = .02$. Simple slopes tests showed that change in thought valence significantly predicted change in intentions to eat junk food for participants who were trained to use epistemic strategies, $b = .43$ ($SE = 0.06$), $t = 3.69$, $p < .001$, $r^2 = .08$, but not for participants who were trained to use teleologic strategies, $t < 1$.

GENERAL DISCUSSION

Results from these three studies suggest that, compared to people who use teleologic strategies, people who use epistemic strategies have attitude changes that are more congruent with changes in the valence of thoughts they associate with an attitude object. This pattern reflects theoretically derived differences in the cognitive processes involved in epistemic versus teleologic strategies. Presumably, participants who use epistemic strategies focus on 'improving' the evaluative implications of originally undesired thoughts by performing cognitive modifications on their perceived valence. Participants who use teleologic strategies, in contrast, keep undesired thoughts from being activated, so they have less need to modify perceived valence (Maio & Thomas, 2007). The interaction between thought valence change and self-persuasion strategies validated the conceptual distinction between the two types of self-persuasion strategies with convergent evidence from one study in which using epistemic versus teleologic strategies was measured as an individual difference (Study 1) and two studies in which it was manipulated (studies 2 and 3). The same pattern of results was demonstrated both when participants were instructed to adopt more positive attitudes (studies 1 and 2) and when they were instructed to adopt more negative attitudes (Study 3).

Implications for basic evaluation process

All three experiments found a robust relationship between thought valence change and attitude change. This finding was consistent with the idea that evaluative responses depend, in part, on the evaluative implications of cognitive associations activated by an attitude object (Ajzen & Sexton, 1999; Lord & Lepper, 1999; Petty & Cacioppo, 1986; Schwarz *et al.*, 1991). Many theorists view attitudinal evaluation as a two-step process: First, activate cognitive representations associated with the attitude object, and second, perceive the evaluative implications of these associations to form an evaluative response (Lord & Lepper, 1999; Schwarz & Bless, 1992; Schwarz & Bohner, 2001; Tourangeau, 1992). This theoretical framework implies that attitude change is a result of changes in the associations activated and/or the perceived valences of the activated associations. Previous research has established that attitude change from persuasive messages depends more on the recipient's self-generated thoughts than on the message content, a mechanism further supported by the attitude-changing effects of cognitive associations that are completely self-induced (Briñol *et al.*, 2011; Petty, Ostrom, & Brock, 1981). The present studies extend these findings to the processes of deliberate self-persuasion. Change in the valence of thoughts that participants generated when they evaluated the attitude object predicted change in attitudes, and this relationship between thought valence change and attitude change was more pronounced for participants who used one rather than another of the two types of strategies described by Maio and Thomas (2007) in their theoretical review.

It is important to note that the primary dependent measure of interest in the present studies was the *relationship* between thought valence change and attitude change, not attitude change itself. Otherwise, the results of all three studies might be attributed to experimental demand. The present studies as well as previous studies with similar procedures (Resch & Lord, 2011; Taylor *et al.*, 2014) generally find no differences in attitude change for individuals who prefer and use epistemic versus teleologic strategies of deliberate self-persuasion, which suggests that experimental demand to change attitudes in the desired direction falls equally on participants who prefer or are randomly assigned to use epistemic versus teleologic strategies. In addition, participants in the present three studies were asked to guess the purpose of the study as a suspicion check. No participant guessed that the deliberate self-persuasion strategies they used were hypothesized to influence the *relationship* between attitude change and change in the valence of their associated thoughts.

Implications for deliberate self-persuasion strategies

The congruity between thought valence change and attitude change was more pronounced for participants who used epistemic strategies than for participants who used teleologic strategies, suggesting a tighter cognitive link between attitudes and the perceived evaluative implications of associated thoughts for people who use epistemic strategies. In the second step of the evaluative process, the final evaluative response is not necessarily a simple linear summation of the valences of the activated associations. The process through which a person forms the final evaluative response with activated associations can be moderated by contextual factors, such as subjective ease of activation (Wänke, Bohner, & Jurkowitsch, 1997), perceived source of the associations (Martin, 1986), and perceived relevance of the associations to the attitude object (Bless & Schwarz, 2010).

Epistemic strategies may encourage recurrent cognitive associations, as shown when participants in the epistemic condition of Study 3 repeated more associations from before to after deliberate self-persuasion. Epistemic strategies may also encourage greater cognitive work on the repeated associations, as shown when participants with epistemic preferences in previous studies recalled their original associations better than did participants with teleologic preferences (Taylor *et al.*, 2014; Study 4). Either of these effects might render the valence of those associations more likely to be *applied* to evaluating the attitude object. This possibility is suggested by recent theories of priming, in which thoughts activated by priming procedures are more likely to be applied to a judgment if they are perceived as both self-generated and relevant to the attitude object (Loersch & Payne, 2011). Repeating a specific association to an attitude object and performing cognitive work on it might make that association's valence more likely to inform the overall evaluation.

One interpretation of the present results is that the relevance of activated associations was not only *enhanced* by epistemic strategies but also possibly *weakened* by teleologic strategies. According to Maio and Thomas (2007), teleologic strategies keep undesired thoughts relatively inaccessible. When undesired thoughts are suppressed or preempted, people who use teleologic strategies might replace them with more desired thoughts (the concentration strategy) or irrelevant thoughts (the distraction strategy). In Study 3, participants who used teleologic strategies were more likely than participants who used epistemic strategies to replace their original associated thoughts with non-repeated ones after deliberate self-persuasion. Even if some undesired thoughts are not fully suppressed or preempted, the attempts at suppression or preemption may eliminate components of these thoughts that have critical evaluative implications, which might in turn compromise the relevance of these thoughts to the overall evaluation. The inconsistency of associations and possible loss of relevance may introduce noise into the relationship between thought valence change and attitude change, because evaluative responses depend not only on the valence of cognitive associations to the attitude object, but also on the extent to which the activated associations are perceived as relevant and valid (Ajzen & Sexton, 1999; Briñol *et al.*, 2011; Lord & Lepper, 1999; Schwarz *et al.*, 1991). Thus, although the precise mechanisms of teleologic strategies require further investigation, the present research provides evidence that supports the mechanisms proposed by Maio and Thomas (2007).

Future directions

The difference in the underlying mechanisms of epistemic versus teleologic strategies implies that the two types of strategies might require different levels of cognitive resources. A previous study (Resch & Lord, 2011) showed that individuals low in self-control found it hard to use teleologic strategies to change their attitudes. Epistemic strategies, in contrast, were not affected by individual differences in self-control. These results, combined with the lack of relationship between thought valence change and attitude change for participants who preferred or used teleologic strategies in the present studies, suggest that the two types of strategies might be differently affected by cognitive load (Macrae, Hewstone, & Griffiths, 1993), diminished working memory (Schmeichel & Hofmann, 2011), or ego-depletion (Mead, Alquist, & Baumeister, 2010). These strains on cognitive resources might tax teleologic strategies more than epistemic strategies by interfering with self-control. Alternatively, cognitive load might tax epistemic strategies

more than teleologic strategies by interfering with the cognitive work necessary to change perceived valence of recurrent associations.

Concluding remarks

The present studies showed that changes in the evaluative implications of thoughts associated with an attitude object predict attitude change through deliberate self-persuasion. This relationship between thought valence change and attitude change was more pronounced for individuals who changed their own attitudes by cognitively modifying the perceived valence of associated thoughts than for those who changed their attitudes by trying to control which associations were activated, regardless of whether participants tried to change their attitudes in a positive or in a negative direction, and regardless of whether they were told to list exactly nine thoughts or were free to list as many or as few as they wished. Although future studies are necessary to identify the precise cognitive mechanisms involved, the current findings afford a peek 'behind the stage' of deliberate self-persuasion.

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