Deliberative and Implemental Mind-Sets: Cognitive Tuning Toward Congruous Thoughts and Information

Peter M. Gollwitzer, Heinz Heckhausen, and Birgit Steller
Max-Planck-Institut für psychologische Forschung
Munich, Federal Republic of Germany

Study 1 established either deliberative mind-set by having Ss contemplate personal change decision or implemental mind-set by having Ss plan execution of intended personal project. Ss were subsequently requested to continue beginnings of 3 fairy tales, each describing a main character with a decisional conflict. Analysis revealed that deliberative mind-set Ss ascribed more deliberative and less implementational efforts to main characters than implemental mind-set Ss. In Study 2, Ss were asked to choose between different test materials. Either before or after making their decision, Ss were given information on deliberative and implementational thoughts unrelated to their task at hand. When asked to recall these thoughts, predecisional Ss recalled more deliberative and less implementational thoughts, whereas for postdecisional Ss the reverse was true. These findings suggest that deliberative and implemental mind-sets tune thought production and information processing.

A course of action may be conceived rather narrowly as extending from its initiation (starting point) to its termination (end point). Alternatively, one may adopt a broader perspective that embraces the motivational origins of an action as the actual starting point and the individual's evaluative thoughts about the achieved action outcome as the final end point. In the present article, we take this broader perspective and segment the course of action into four distinct, sequential phases (Heckhausen, 1986).

The first segment is the *predecisional* phase, where potential action goals entailed by a person's many wants and wishes are deliberated. When a decision to pursue one of these goals is made, a transition to the *postdecisional* (preactional) phase takes place, where the individual becomes concerned with implementing the chosen goal. However, this phase ends and the *actional* phase starts when actions geared toward achieving the chosen goal are initiated. Once these actions have resulted in a particular outcome, the *postactional* phase is entered and the individual proceeds to evaluate the achieved outcome.

We postulate that each of these phases is accompanied by a distinct mind-set (Gollwitzer, 1990). Following the lead of the Würzburg School (Külpe, 1904; Marbe, 1901; Watt, 1905; for reviews, see Boring, 1950, pp. 401–406; Gibson, 1941; and Humphrey, 1951, pp. 30–131), we assume that the characteristics of each of these mind-sets are determined by the unique qualities of the different tasks to be solved within each phase. That is, the different mind-sets tailor a person's cognitive apparatus to meet phase-typical task demands, thus creating a special preparedness for solving these tasks. This preparedness should extend to a person's thought production, to the encoding and retrieval of information, and to the inferences drawn on the basis of this information. In this article, we explore the issue of mind-set congruous thought production as well as the encoding and retrieval of congruous information. As was done in a previous analysis of mind-set effects on a person's inferences (see Gollwitzer & Kinney, 1989, on illusion of control), we limit the analysis of cognitive tuning toward mind-set congruous thoughts and information to the *deliberative* mind-set of the predecisional phase and the *implemental* mind-set of the postdecisional, but preactional, phase.

What are the issues to which deliberative as compared with implemental mind-sets are attuned? To answer this question, one must consider the specific tasks that need to be tackled in the respective action phases. In the predecisional phase, people's task is to choose between action goals suggested by their wants and wishes. The likelihood of a "good" choice should be enhanced when the individual thoroughly ponders the attractiveness of the expected consequences (i.e., expected value) of these goals. Clearly, failing to think about the attractiveness of proximal and distant consequences will lead to problematic decisions associated with unexpected negative consequences. Accordingly, the deliberative mind-set should gear a person's thinking toward the expected values of potential action goals.

In the postdecisional (preactional) phase, however, people are confronted with quite a different task: The chosen goal awaits successful implementation. Postdecisional individuals should therefore benefit from an implemental mind-set that guides their thoughts toward the questions of *when, where,* and *how* to implement the chosen action goal. In this phase, thoughts about the goal's expected value should be distractive rather than useful, because they are not immediately related to implementational issues.

The classic definition of mind-set ("Einstellung") as ad-

vanced by the Würzburg School suggests that mind-set effects are based on cognitive processes that promote solving the task that stimulated the rise of the mind-set. With respect to deliberative and implemental mind-sets, these may be conceived of as cognitive procedures relating to how one chooses between various goal alternatives or to the planning of actions one must take in order to attain a chosen goal, respectively. A deliberative mind-set should, for instance, entail procedures of weighing pros and cons, whereas an implemental mind-set should entail procedures of timing and sequencing of goal-oriented actions.

As Smith and Branscombe (1987) pointed out in their procedural model of social inferences, cognitive procedures may transfer from a training (priming) task to a subsequent (test) task. If these procedures are sufficiently strengthened through intensive practice in the training task, and if there is overlap in the applicability of procedures, transfer is very likely. This model suggests the following test of the postulated effects of deliberative and implemental mind-sets: If we succeed in creating strong deliberative and implemental mind-sets by either having subjects intensively contemplate potential goals or plan the execution of a chosen project (training task), we should find the postulated mind-set effects in an unrelated subsequent task (test task). A prerequisite would be that the subsequent task allows for those cognitive procedures that were strengthened in the training task, that is, the cognitive procedures characteristic of a deliberative or implemental mind-set.

Experiment 1, testing the postulate of mind-set congruous thought production, was designed along this premise. Subjects' first task (training task) was to either thoroughly contemplate an unresolved decisional problem of their own (deliberative mind-set) or to make a detailed plan of how to pursue a pressing personal project (implemental mind-set). Then they were confronted with a second, allegedly unrelated task (test task) that requested the spontaneous production of ideas. Because these ideas could be deliberative or implementational in nature, we expected both deliberative and implemental mind-sets to guide thought production in a mind-set congruous direction.

This transfer assumption allowed us to go beyond a recent experiment reported by Heckhausen and Gollwitzer (1987), where the thoughts of deliberative and implemental mind-set subjects were sampled during the training task. In this study, the classification of the reported thoughts clearly evidenced cognitive tuning toward mind-set congruous thoughts. This study, however, lacks an unrelated test task, and therefore the results might be based on experimenter demands.

Experiment 1: Ascribing Deliberative and Implementational Efforts to Others

Asking subjects to deliberate unresolved personal problems that are pending a change decision should create strong deliberative mind-sets. Alternatively, asking subjects to plan the execution of chosen projects should evoke strong implemental mind-sets. Other experiments have indicated that deliberative and implemental mind-sets can reliably be produced through such a procedure (Gollwitzer, Heckhausen, & Ratajczak, 1990; Gollwitzer & Kinney, 1989). Accordingly, in the present experiment one third of the subjects were first asked to name an unresolved personal problem (e.g., Should I move from home? or Should I

terminate my college education?) and then asked to contemplate whether or not to make a respective change decision. Another third of the subjects were to indicate a personal goal or project they planned to execute in the near future (e.g., moving from home or terminating one's college education) and then were to plan when, where, and how they wanted to accomplish it. The final third, a control group, were asked to passively view nature slides.

We tested whether deliberative and implemental mind-sets tune people's thought production in a mind-set congruous direction by asking subjects to fabricate ideas on an unrelated second task. To this end, we presented subjects with the beginnings of three fairy tales in which the main character of each story faced a different decisional conflict (e.g., a king had to go to war, but had nobody to whom he could entrust his young daughter). Subjects were asked to spontaneously compose the next three sentences for each of these fairy tales.

The mind-set congruency hypothesis implies that deliberative efforts (i.e., contemplating possible goals) are most frequently ascribed to the main characters of the stories in the deliberative mind-set condition, less frequently in the control condition, and even less so in the implemental mind-set condition. In contrast, implementational efforts (i.e., executing a chosen solution to the conflict) should be most frequently ascribed in the implemental mind-set condition, less frequently in the control condition, and least frequently in the deliberative mind-set condition.

Method

Subjects

The 97 participants were male students at the Ruhr-Universität Bochum. Up to 4 subjects were invited to each experimental session and randomly assigned to one of three conditions. Subjects were recruited on the premise that they were willing to participate in two different studies, one on people's personal problems and projects, the other a test of their creativity. Subjects were separated by partitions, such that they could easily view the experimenter but none of the other participants. They were paid DM 10 (approximately $5.50) for participating.

Design

Subjects in either a deliberative or implemental mind-set were asked to continue three different, incomplete fairy tales. Subjects' stories were analyzed with respect to whether deliberative or implementational efforts were ascribed to the main characters of the fairy tales. Subjects in the control condition passively viewed photographs of various outdoor scenes before receiving the fairy tales.

Procedure

Cover story. The female experimenter explained that subjects would take part in two different experiments. In the first experiment, subjects would be requested to reflect on personal issues or on nature photographs. Subjects were told that this study was designed to answer the question of whether intense reflection on personal issues would help people act more effectively in everyday life. In the second experiment their creativity would be tested. For this purpose, three different creativity tasks would be used, all of which would request the spontaneous creation of ideas.

In order to ensure that subjects perceived the two experiments as unrelated, the format of the written materials was different in each study (e.g., typeface, color of paper, and writing style). In addition, the materials of each alleged experiment were distributed and collected separately.

Deliberative and implemental mind-set manipulation. Deliberative mind-set subjects were asked to weigh the pros and cons of making or not making a personal change decision. First, they had to indicate an unresolved personal problem (e.g., Should I switch my major?). Then they were to list both potential positive and negative, short-term and long-term consequences (i.e., to elaborate on the expected value). In contrast, implemental mind-set subjects were asked to plan the implementation of chosen personal projects. They were instructed to first name a personal project they intended to accomplish within the following 3 months (e.g., to move from home). Then they had to list the five most crucial implementational steps and commit themselves to when, where, and how to execute these steps.

As a manipulation check, both groups of subjects were then asked to fill out a final questionnaire consisting of the following items:

1. "On the line below, please indicate the point that best represents your distance from the act of change decision." (For this purpose, a horizontal line of 13 cm was provided. The starting point was labeled "far from having made a change decision," the 6.5-cm mark "act of change decision," and the end point "past having made a change decision.")

2. "How determined do you feel at this moment?"

3. "Do you feel that you have committed yourself to a certain implementational course of action?"

4. "Do you feel that you have committed yourself to make use of a certain occasion or opportunity to act?"

Items 2–4 were accompanied by unipolar 9-point answer scales ranging from *not at all* to *very.*

Control subjects. Subjects in the control condition received a booklet containing numerous black-and-white photographs depicting various nature scenes. Subjects were instructed to passively view the pictures for about 30 min (i.e., the amount of time deliberative and implemental subjects needed to complete their tasks). Thereafter, the alleged second experiment was started.

Dependent variable. The experimenter began the alleged second study by distributing three different fairy tales, the order of which was counterbalanced across conditions. Subjects received the following instructions:

> All of these fairy tales end at a certain point in the plot. You are to fill in the next three sentences of each fairy tale. You should *not* write a "novel," and the fairy tales need not have an ending. When continuing the stories, give free rein to your fantasy and don't hesitate to write down your own creative thoughts, however unusual they may be. After you have finished the three sentences, please go on to the next fairy tale.

The first fairy tale read as follows:

> Once upon a time there was a king who loved the queen dearly. When the queen died, he was left with his only daughter. The widowed king adored the little princess who grew up to be the most beautiful maiden that anyone had ever seen. When the princess turned 15, war broke out and her father had to go to battle. The king, however, did not know of anyone with whom he could entrust his daughter while he was away at war. The king. . . .

The second fairy tale was about a king who had a huge forest by his castle. One day he had sent out a hunter into the forest who did not return. The two hunters he sent to look for the lost hunter also failed to return. The third fairy tale described a rather hedonistic tailor who had attended a christening party out of town. Late at night and after a

few drinks too many, he was on his way home and got lost in a dark forest. He suddenly found himself standing in front of a huge rock wall with a passage just large enough to permit a person to pass.

Thought production scoring. Subjects' stories were scored by two independent blind raters. The raters proceeded as follows: First, they underlined verbs relating to the main characters of the three fairy tales. Then, they classified the episodes denoted by these verbs with respect to whether the main character tackled the predecisional task of choosing between action goals or the postdecisional task of implementing a chosen action goal. For this purpose, a coding scheme was developed; two mutually exclusive categories are depicted in the Appendix. Each category could be check-marked as often as necessary, depending on how many relevant episodes the subjects' stories contained. Eighty-one percent of the episodes could be placed into the categories provided by the coding scheme; the rest formed the category "unassignable episodes" (19%). Agreement between raters was determined by counting the number of "hits," defined as classifications on which the two raters agreed. Interrater reliability was high, with 91% of the ratings being hits.

Debriefing. When the subjects had finished working on the third fairy tale, the experiment was terminated and the subjects were debriefed. During the debriefing session, we probed whether subjects perceived the two experiments as related or not. As it turned out, subjects were only concerned with how well they had performed on the creativity task. None of the subjects raised the issue of the two experiments being potentially related or reported suspicions after being probed.

Results

Equivalence of Groups

Deliberative and implemental mind-set subjects did not differ in the domains covered by their problems and projects, respectively. Unresolved personal problems (deliberative mind-set subjects) and personal projects (implemental mind-set subjects) were classified according to three different domains: career-related (42%), lifestyle-related (31%), and interpersonal (27%), the percentages being basically identical for both unresolved personal problems and personal projects.

The three groups of subjects also did not differ significantly in the number of words they wrote when continuing the three fairy tales: $M = 110.2$ for the deliberative mind-set group, $M = 112.5$ for the implemental mind-set group, and $M = 119.7$ for the control group, $F(2, 84) = .52$, *ns.*

Manipulation Checks

Subjects had indicated their proximity (in time) to the act of making a change decision on a horizontal line. Nearly all (24 of 26) deliberative mind-set subjects indicated that they had not yet made the decision. The reverse was found for implemental mind-set subjects; 25 of 26 subjects indicated that they had already made the decision. In addition, deliberative mind-set subjects ($M = 4.6$) felt less determined than implemental mind-set subjects ($M = 8.2$), $F(1, 50) = 50.8$, $p < .001$. Implemental mind-set subjects ($M = 7.6$) felt more committed to executing a certain implementational course of action than deliberative mind-set subjects ($M = 5.0$), $F(1, 50) = 26.6$, $p < .001$; the same pattern held true for feelings of commitment with respect to making use of a certain occasion or opportunity to act ($M = 6.7$ vs. $M = 5.1$), $F(1, 50) = 4.6$, $p < .04$.

Table 1

Mean Deliberative and Implementational Efforts Ascribed to the Main Characters of the Three Fairy Tales

			Mind-set conditions		
Type of ascribed efforts	F	r	Deliberative ($n = 26$)	Control ($n = 35$)	Implemental ($n = 26$)
Deliberative	4.06*	.21*	1.00	0.71	0.38
Implementational	8.48**	.29**	5.81	6.94	7.85

Note. Means reflect the number of episodes in which subjects ascribed either deliberative or implementational efforts.

* $p \le .05$. ** $p \le .01$.

Dependent Variables

To analyze subjects' stories, episodes ascribing deliberative efforts to the main characters (i.e., deliberating action goals and turning to others for advice) were added together to create a deliberative efforts index; actual acting on a chosen goal and thinking about the implementation of the chosen goal were added together to form an implementational efforts index (see Appendix). Scores on these indices were submitted to further analyses.

To test the hypothesis that ascribing deliberative and implementational efforts varies in a mind-set congruous direction, two one-way analyses of variance (ANOVAs) with linear contrast weights (see Rosenthal & Rosnow, 1985) were conducted. For ascribing deliberative efforts, these weights tested the hypothesis that the highest frequencies would be obtained among deliberative mind-set subjects, followed by control subjects and then implemental subjects; for implemental efforts, the highest frequencies would be observed among implementational mind-set subjects, followed by control subjects and then deliberative subjects. These analyses revealed that ascribing deliberative and implementational efforts significantly varies in a mind-set congruous direction, $F(1, 84) = 4.06$, $p < .025$ (one-tailed), and $F(1, 84) = 8.48$, $p < .005$ (one-tailed), respectively. Pearson coefficients obtained by correlating ascribing deliberative and implementational efforts with the respective linear contrast coding of mind-set conditions underlined these results (see Table 1).

When the frequencies of ascribing deliberative and implementational efforts were submitted to an ANOVA with ascribed effort (deliberative vs. implementational) as a within-subjects variable and condition (deliberative, implemental, and control group) as a between-subjects variable, a significant main effect of ascribed effort emerged, $F(1, 84) = 322.5$, $p < .001$, which is qualified by the predicted interaction effect, $F(2, 84) = 4.65$, $p = .015$. We checked whether the pattern of data is different for each of the three fairy tales by computing a $3 \times 2 \times 3$ (Fairy Tale × Ascribed Effort × Condition) ANOVA. The significant Ascribed Effort × Condition interaction effect was *not* qualified by an interaction with fairy tale; that is, the three-way interaction did not reach significance ($F < 1.0$). In addition, the order in which the fairy tales were presented also failed to affect the critical interaction ($F < 1.0$). Finally, we explored how the episodes that could not be classified by our coding scheme were

distributed across conditions. There were no significant differences among the conditions ($F < .25$).

Discussion

Subjects requested to ponder a personal problem in order to determine whether or not they should make a change decision fabricated fewer implementational and more deliberative ideas when writing a creative fairy tale than subjects who had been asked to plan the execution of a chosen personal goal. Deliberating and planning created distinct mind-sets that persisted even after subjects had turned to the subsequent task of writing creative fairy tales. The ideas that spontaneously entered the subjects' minds when inventing their fairy tales corresponded to their deliberative or implemental mind-sets.

All groups of subjects imputed more implementational than deliberative efforts to the main characters of the fairy tales. Apparently, the task of writing creative endings to unfinished fairy tales predominantly relies on cognitive procedures characteristic of the implemental mind-set. As Rabkin (1979) and Rumelhart (1975, 1977) pointed out, fairy tales seem to follow a certain grammar. A "good" fairy tale is not complete until the problem faced by the main character is solved. Because such solutions commonly require the main character to take action, ascribing implementational efforts is more in the style of a good fairy tale. Still, despite few deliberative efforts ascribed overall, we observed the predicted mind-set congruency effect. However, the scarcity of ascribing deliberative efforts in the present study serves as a reminder that testing the postulated mind-set congruency effects through a subsequent (test) task has its limits. If working on a subsequent task does not allow for the cognitive procedures entailed by a deliberative or implemental mind-set (e.g., solving an arithmetic task), mind-set congruency effects cannot be observed.

Studies conducted on category accessibility effects on social judgments seem relevant to the paradigm used here (Higgins, Rholes, & Jones, 1977; Srull & Wyer, 1979). Assuming that social constructs (e.g., kindness) are stored in memory, these constructs were first primed by confronting subjects either with trait words closely related to the target construct (Higgins et al.) or descriptions of relevant behaviors (Srull & Wyer). Then, in a presumedly unrelated second experiment, subjects read descriptions of a target character who shows either ambivalent (Higgins et al.) or vague (Srull & Wyer) indications of possessing

the critical personal attribute. Finally, when subjects were asked to rate the target character, distortions in the direction of the primed category were observed. Both groups of researchers suggested that priming changes some property of the critical construct's representation in memory (i.e., activation or location in a storage bin, respectively) that makes it comparatively more accessible and more likely to be used in interpreting the behavior of the target person.

As in these priming experiments, subjects in Experiment 1 were also exposed to ambiguous information about a target character (i.e., the main character of the open-ended fairy tales) in an alleged second experiment. However, the ambiguity is about the main character's course of action and not about a potential personality attribute. We believe that subjects' ascribing of deliberative or implementational efforts was affected by cognitive procedures (or productions; Anderson, 1983) that have been strengthened through prior deliberation and planning processes. The activation of declarative knowledge (specific episodic and general semantic) through the contents touched by subjects' deliberation and planning should have played a minor role. This assumption is supported by the fact that the observed mind-set effects were rather long-lived (one quarter to half an hour), whereas conceptual priming effects were generally extremely short-lived (a matter of seconds or a few minutes). As Smith and Branscombe (1987) demonstrated, studies on category accessibility effects only manage to produce long-lasting effects (several hours) when procedural strengthening is involved.

Experiment 2: Recalling Deliberative Versus Implementational Thoughts of Others

Experiment 1 demonstrated that deliberative and implemental mind-sets favor the production of congruous thoughts. This should facilitate the task of choosing between goal options and the task of implementing a chosen goal, respectively. However, both of these tasks should also be facilitated by effective processing of task-relevant information. Therefore, one would expect that people in a deliberative mind-set show superior processing of information that speaks to the expected value of goal options, whereas people in an implemental mind-set should show superior processing of information that speaks to the issue of when, where, and how to execute goal-oriented behavior.

Our test of the superior processing of mind-set congruous information was also based on the transfer assumption of Smith and Branscombe's (1987) model of procedural strengthening and transfer. Instead of offering deliberative and implemental mind-set subjects information relevant to their decisional and implementational problem at hand, we offered information on other people's decisional and implementational problems. As this information could easily be identified as either expected value-related or implementation-related, we expected mind-set congruency effects with respect to subjects' recall of this information.

This information was depicted on eight pairs of slides. The first slide of each pair showed a person said to be experiencing a personal conflict of the following kind: Should I do x or not (e.g., sell my apartment)? The second slide presented four thoughts entertained by the person depicted on the first slide.

Two of these thoughts were deliberative in nature, as they referred to the expected value of making a change decision. The other two thoughts were of an implementational nature, both addressing the issue of when (timing) and how (sequencing) to execute goal-oriented actions. When constructing these sentences, we used pilot subjects to establish that both types of information (expected value vs. implementation) were recalled about equally well.

A deliberative mind-set was established by asking subjects to contemplate the choice between one of two available creativity tests. An implemental mind-set was assumed for subjects who had just chosen between tests and were waiting to start working. A control group received and recalled the information without expecting to make a decision or to implement one already made.

Deliberative mind-set subjects should show superior recall of the expected value-related information, despite its being unrelated to the decision subjects were contemplating. Implemental mind-set subjects should show superior recall of the implementation-related information, despite its being unrelated to working on the chosen creativity test. Control subjects were expected to recall both expected value-related information and implementation-related information about equally well.

Method

Subjects and Equipment

The participants were 69 male students from the University of Munich. Two subjects were invited to each experimental session. They received DM 15 (approximately $8.00) for participation. A female experimenter ushered subjects into separate experimental cubicles where they received tape-recorded instructions through an intercom system. Each cubicle was equipped with a projection screen.

Design

Subjects were randomly assigned to one of three conditions. In the deliberative mind-set condition, information on both expected values and implementational issues was received and recalled prior to making a choice between two available creativity tests. In the implemental mind-set condition, subjects received and recalled this information while waiting to begin working on their chosen creativity test. Finally, control subjects received and recalled this information without either expecting to make a choice or having made one.

Procedure

Cover story. Subjects were told that two different personality traits, that is, social sensitivity and artistic creativity, would be assessed during the course of the experiment. The experimenter further explained that for measuring each of these traits two alternative test materials had been prepared. It was stated that subjects would be allowed to choose between test materials, because only if subjects chose the test material more appropriate for them personally would test scores reflect their "true" social or creative potential. The experimenter then distributed a short questionnaire consisting of the following items: (a) "How creative do you think you are?" (b) "How confident are you that you are capable of creative achievements?" and (c) "How important is it for you to be a creative person?" Parallel questions were asked with respect to social sensitivity. (All items were accompanied by 9-point answer scales ranging from *not at all* to *very.*)

The first trait measured was *social sensitivity*. The experimenter presented subjects with short descriptions of two different interpersonal conflicts. Subjects were first asked to select the problem they personally found most engaging and then to suggest an appropriate solution to the conflict by writing a short essay. Subjects were told that they would later receive feedback concerning the usefulness of their suggested solutions.

Then the experimenter turned to the presumed second part of the experiment, that is, assessing subjects' *artistic creativity*. She explained that subjects would create collages from material cut out of different newspapers. It was the subjects' task to select various elements (e.g., people, animals, and objects) needed to depict a certain theme provided by the experimenter. Finally, subjects should place the selected elements on a white sheet of paper and arrange them so that a creative picture emerged. When they had discovered the most appealing arrangement, they should glue the collage segments onto the white sheet of paper and then hand it to the experimenter.

Most important, however, two different sets of collage materials (black-and-white vs. color elements) would be available for this task. Subjects would be given a choice because they could reach their full creative potential only if they chose that set of elements they found personally most appealing. To help subjects choose properly, she would present four black-and-white as well as four color slides. She explained that these slides originated from a previous study on artistic creativity in which subjects had to invent the thoughts of people depicted on the slides. Subjects should view all of the slides carefully to determine which set of slides (color or black and white) would bring out their full creative potential.

However, subjects were instructed to refrain from making a choice of test material while viewing the slides. Impulsive choices, as well as choices based on initial preferences only, were said to have proven problematic. Therefore, subjects should take their time, lean back, and ponder the best choice. In addition, shortly before viewing the sample pictures subjects were given false feedback with respect to the quality of their performance on the social sensitivity test. All subjects were told that if they had chosen the alternative test material, their score would have been higher than the rather modest score achieved. This feedback, as well as the instructions to refrain from impulse choices, was given for the sole purpose of stimulating intense deliberation.

Information materials. The sample pictures were grouped into eight pairs of slides. Each pair consisted of a first slide that pictured a person said to be pondering a decisional problem (e.g., an elderly lady). On the subsequent slide, subjects read that she was reflecting on the following decisional problem: Should I invite my grandchildren to stay at my house during the summer—or shouldn't I?

The slide also contained her thoughts on the expected value of a change decision: The first thought centered on possible positive consequences (i.e., *It would be good, because* they could help me keep up my garden); the second thought focused on possible negative consequences (i.e., *It would be bad, because* they might break my good china).

In addition, the slide depicted two thoughts related to the implementation of a potential change decision: One focused on the timing of a necessary implementational step (i.e., *If I decide yes, then* I won't talk to the kids *before* my daughter has agreed); the other thought mapped out the sequence of two further implementational steps (i.e., *If I decide yes, then I'll first* write my daughter *and then* give her a call).

Altogether, eight different persons, each facing a specific decisional conflict, were presented (e.g., a young man who pondered the question of becoming a sculptor, a young lady who reflected on whether to quit her waitressing job, and a middle-aged man who deliberated whether or not to sell his condominium). Four slides depicting persons were in color, and four were in black and white. The verbal information was always presented in the same format. The underlined parts of each

sentence (see the example of the elderly lady above) remained analogous for each person and were written in black. The rest of the sentences were written in red.

Deliberative mind-set condition. Once subjects had viewed the eight pairs of slides, the experimenter told them that she would look for a second set of slides that might make it easier for subjects to make up their minds. While she was purportedly trying to set up this second set, subjects were to fill their time by working on a couple of tasks. Then the experimenter gave the instructions for a 5-min distractor (subjects counted the planes of several different geometrical figures drawn on a sheet of paper) and a subsequent recall test (as described below). When subjects were finished, the experimenter explained that she had failed to set up the additional set of slides. Therefore, subjects should make their decision based solely on viewing the original set of slides.

Implemental mind-set condition. Subjects were introduced to the choice option between two sets of collage materials and were instructed to deliberate on the question of which set of collage elements they found most appealing. After subjects had indicated their decision, the experimenter explained that it would take several minutes for her to bring the chosen collage elements to the subject's cubicle. In the meantime, the subjects would view slides and solve a number of different tasks. The eight pairs of slides were then presented; the origin of these slides was described to the subjects in the same words as in the deliberative mind-set condition. Following the distractor, subjects worked on the recall test.

Control condition. Control subjects were not made to either expect a decision between collage elements or work on a set of collage elements. They were shown the slides after being told solely about their origin. Finally, subjects' recall performance was assessed following the completion of the distractor task.

Recall procedure. Following the 5-min distractor task, subjects were again shown the eight slides depicting the persons said to be experiencing a decisional conflict. In addition, they were given a booklet consisting of eight pages, each one entitled with the deliberation problem of one of the eight characters pictured on the slides. Subjects found those parts of the sentences printed in black on the slides that presented the depicted persons' thoughts and were instructed to complete them (i.e., fill in the parts of the sentences printed in red on the original slides). For this recall procedure, the slides depicting the characters were shown in the order in which they were originally presented.

Postexperimental questionnaire and debriefing. Deliberative and implemental mind-set subjects were asked to complete a final questionnaire that contained the following items accompanied by 9-point answer scales ranging from *not at all* to *very:* (a) "How important is it for you to show a creative performance on the collage creativity test?" (b) "How difficult was the choice between the two sets of collage elements?" (c) "How important is it for you to work with the appropriate collage elements?" (d) "How certain are you that you picked the appropriate collage elements?" (e) "I generally prefer black-and-white pictures over color ones!" (*don't agree–agree*), and (f) "I generally prefer color pictures over black-and-white ones!" (*don't agree–agree*). After the subjects had completed this questionnaire, the experimenter debriefed them and paid them for their participation.

The debriefing was started by probing for suspicions. None of the subjects guessed our hypothesis. One subject (implemental mind-set) guessed that we were testing whether the information associated with the chosen type of material (black and white vs. color) is recalled better. The rest of the subjects took the incidental recall test as a check of whether they were good subjects who collaborated in an attentive and concentrated manner. As in other studies using this paradigm (Heckhausen & Gollwitzer, 1986, 1987), subjects were primarily concerned with the upcoming creativity test, on which they wanted to give their best.

Table 2
Mean Recall of Information on Expected Value and Implementation

Mind-set condition	Type of information		
	Thoughts about expected value	Thoughts about implementation	Difference
Deliberative	7.29	4.88	2.41
Control	6.87	6.63	0.24
Implemental	6.11	8.17	−2.06

Note. Higher numbers indicate better recall performance.

Results

Equivalence of Mind-Set Groups

Subjects' answers on the preexperimental questionnaire did not differ between groups: There were no differences with respect to the belief in one's creativity (Ms = 5.65 vs. 5.66), the confidence in one's capability for creative achievements (Ms = 5.76 vs. 5.72), and the importance assigned to being a creative person (Ms = 6.94 vs. 6.67), all Fs < 1.0. The relatively high means (unipolar 9-point scales) indicate that the subjects valued being creative and were quite certain of their possessing this desirable trait.

Subjects' answers on the postexperimental questionnaire also did not indicate any differences. The importance (Ms = 4.89 vs. 5.17) and difficulty (Ms = 6.35 vs. 6.67) of succeeding in the collage creativity test were perceived as similar in both conditions, as was also the case for the perceived importance of making the correct choice (Ms = 5.53 vs. 5.17), all Fs < 1.0. These data suggest that deliberative and implemental subjects took the collage test as a valid means to demonstrate being creative, and that they felt making the correct choice would influence their performance on this test.

Although black-and-white elements were chosen more than twice as often as color collage elements (25 vs. 10), this ratio did not differ across conditions, $\chi^2 (1, N = 35) = .01$, $p = .91$; nor did their general preference for black-and-white or for color collage elements (both Fs < 1.0).

Dependent Variables

Recall performance scores for expected value-related thoughts and implementation-related thoughts were determined by counting the respective thoughts that were recalled correctly. Deliberative mind-set subjects showed the predicted superior recall for expected value-related thoughts (M = 7.29) as compared with implementation-related thoughts (M = 4.88), $t(16) = 2.25$, $p < .02$ (one-tailed). Implemental mind-set subjects also evidenced mind-set congruous recall, recalling implementation-related thoughts (M = 8.17) significantly better than expected value-related thoughts (M = 6.11), $t(17) = 2.02$, $p < .03$ (one-tailed). As expected, control subjects recalled expected value-related thoughts (M = 6.88) and implementation-related thoughts (M = 6.63) about equally well, $t(15) = .24$, ns (see Table 2).

To test the hypothesis that the recall performance for expected value-related and implementation-related information varies in a mind-set congruous direction, we conducted two separate one-way ANOVAs with linear contrast weights. With respect to the implementation-related information, the weights were set to test the hypothesis that its recall is highest for implemental mind-set subjects, followed by control subjects and then deliberative mind-set subjects. This analysis revealed a significant $F(1, 48) = 4.03$, $p = .025$ (one-tailed); the respective correlation coefficient is $r(51) = .28$, $p < .025$. For expected value-related information, the weights were set to test the hypothesis that this information is recalled best by deliberative mind-set subjects, followed by control subjects and then implemental mind-set subjects, $F(1, 48) = 1.02$, ns; $r(51) = .15$, $p = .15$.

Although these findings indicate that for expected value-related information there is comparatively less mind-set congruous recall than for implementation-related information, recall of expected value-related information and implementation-related information combined to produce strong mind-set congruous recall (as can be seen from the difference scores reported in Table 2). When this difference index is submitted to a one-way ANOVA with linear contrast weights, a highly significant $F(1, 48) = 9.15$, $p < .003$ (one-tailed), emerges; the respective correlation coefficient is $r(51) = .41$, $p < .002$. This indicates that the superior recall for expected value-related information in the deliberative mind-set group was strongly reduced in the control group and reversed in the implemental mind-set group.

Discussion

Deliberative mind-set subjects recalled expected value-related information better than implementation-related information, whereas implemental mind-set subjects showed better recall of implementation-related information than of expected value-related information. This pattern of data supports our hypothesis of superior recall of mind-set congruous information.

Possible Confoundings

This conclusion rests on the assumption that the expected value-related information as well as the implementation-related information did not differ in other features (e.g., affective tone or complexity) that might be responsible for the recall performance of deliberative and implemental mind-set subjects. It might be argued, however, that implementation-related information was more positive in tone and that implemental mind-set subjects, because they were in a comparatively more positive mood, had an easier time recalling this information than deliberative mind-set subjects. Two reasons speak against this argument. First, it is unlikely that the implementation-related information was more positive in affective valence than the expected value-related information, because both types of information entailed positive and negative aspects (i.e., pleasant and unpleasant actions vs. positive and negative consequences, respectively). Second, the implemental mind-set cannot generally be assumed to produce a better mood than the deliberative

mind-set. Planning may be as difficult and painful as deliberating; it all depends on the issue at hand.

Also, one might argue that the implementation-related information was worded such that it was more difficult to encode and retrieve than the expected value-related information. The recall performance of control subjects speaks against this argument; they recalled both types of information about equally well. Moreover, there are no convincing reasons why implemental mind-set subjects would be more effective in processing complex information as compared with deliberative mind-set subjects.

Various Kinds of Congruous Information

Future studies should try to explore recall of other kinds of mind-set congruous information other than that used in the present experiment. With respect to implementation-related information, for instance, one might offer information on *where* to act, thus overcoming the present study's limitation to *when* (timing) and *how* (sequencing). With respect to deliberation-related information, one might want to extend the present study's limitation to *expected values*. Choosing between potential goals demands reflection about one's chances to implement these goals; otherwise, one would choose goals that are attractive but cannot be reached. Information on the feasibility of potential goals is thus congruous to a deliberative mind-set and should therefore also be processed more effectively in a deliberative as compared with an implemental mind-set.

Encoding Versus Retrieval

The present study is mute to the question of whether the observed mind-set congruous recall was achieved more by encoding or retrieval. This question, however, can be answered by testing both mind-set congruous recognition and recall in deliberative and implemental subjects. Recognition would capture the availability of the critical information (i.e., whether it was encoded or not), whereas recall would speak to the accessibility of stored information (i.e., whether it was easily retrieved or not; see Bargh & Thein, 1985; Srull, 1981, 1984).

An alternative approach may be taken by solely employing a recall procedure in a four-group design. In addition to the two groups tested in the present study, a third group would encode the critical information in a deliberative mind-set and recall it in an implemental mind-set. Finally, the fourth group would encode the information in an implemental mind-set and recall it in a deliberative mind-set. Comparisons among these four groups would allow one to determine the relative contribution of encoding and retrieval for mind-set congruous recall of expected value-related and implementation-related information.

In general, one would expect mind-sets to affect people's encoding of information in a mind-set congruous direction. This should be particularly pronounced when subjects are confronted with informational competition, that is, when more information than they can process impinges on them. Then, subjects must allocate attention to only some of the information available. Subjects' mind-sets should guide selective attention and thus favor the processing of congruous information.

But retrieval processes may also contribute to mind-set con-

gruous recall. Assuming that subjects' retrieval attempts necessitate constructing descriptions of what they are trying to retrieve (Bobrow & Norman, 1975; Norman & Bobrow, 1976, 1979), it seems plausible that mind-sets provide perspectives (Bobrow & Winograd, 1977) that allow for the easy construction of specific descriptions. The deliberative mind-set, for instance, should favor descriptions phrased as pros and cons, benefits and costs, or hopes and fears. As Norman and Bobrow (1979) pointed out, quick construction of specific descriptions at the time of retrieval furthers successful retrieval. It seems possible, then, that deliberative and implemental mind-sets favor congruous recall by means of the prompt construction of appropriate descriptions (e.g., pros and cons vs. when and how).

General Discussion

The tasks people face in the various action phases create distinct mind-sets that tune people toward congruous thoughts and information. This finding is important for any theorizing on the course of action; in particular, it speaks to the question of whether the course of action should be conceptualized as homogeneous or heterogeneous, that is, compartmentalized into a number of distinct, qualitatively different phases. Lewin (Lewin, Dembo, Festinger, & Sears, 1944) suggested that the realm of goal-oriented behavior entails at least two distinct phenomena—goal setting and goal striving. He believed that goal setting may be accounted for by expectancy × value theories, whereas different theories should be developed to account for goal striving. However, researchers interested in goal-oriented behavior did not develop distinct theories to account for goal striving; rather, they stretched expectancy × value notions, making them account for both goal setting and goal striving (e.g., Atkinson, 1957). This has been criticized on the grounds that the extended expectancy × value theories have only been very modestly successful in predicting vital aspects of goal performance (see Klinger, 1977, pp. 22–24, 329–330).

The present experiments support Lewin's contention that goal setting and goal striving differ in nature. Individuals deliberating action goals were tuned toward thoughts and information that were different from those of individuals planning the implementation of a chosen goal. In recent experiments, further differences were observed between deliberating and planning individuals with respect to the inferences they made on the basis of available information (Gollwitzer & Kinney, 1989) and with respect to the absolute amount of available information they processed (Heckhausen & Gollwitzer, 1987, Study 2). These findings attest to differences in the natures of goal setting and goal striving; in addition, they bring to mind Lewin's claim that goal setting and goal striving deserve distinct theorizing.

References

Anderson, J. R. (1983). *The architecture of cognition.* Cambridge, MA: Harvard University Press.

Atkinson, J. W. (1957). Motivational determinants of risk-taking behavior. *Psychological Review, 64,* 359–372.

Bargh, J. A., & Thein, R. D. (1985). Individual construct accessibility, person memory, and the recall-judgment link: The case of informa-

tion overload. *Journal of Personality and Social Psychology, 49,* 1129–1146.

Bobrow, D. G., & Norman, D. A. (1975). Some principles of memory schemata. In D. G. Bobrow & A. Collins (Eds.), *Representation and understanding* (pp. 131–149). New York: Academic Press.

Bobrow, D. G., & Winograd, T. (1977). An overview of KRL, a knowledge representation language. *Cognitive Science, 1,* 3–46.

Boring, E. G. (1950). *A history of experimental psychology.* New York: Appleton-Century-Crofts.

Gibson, J. J. (1941). A critical review of the concept of set in contemporary experimental psychology. *Psychological Bulletin, 38,* 781–817.

Gollwitzer, P. M. (1990). Action phases and mind-sets. In E. T. Higgins & R. M. Sorrentino (Eds.), *Handbook of motivation and cognition: Foundations of social behavior* (Vol. 2, pp. 53–92). New York: Guilford Press.

Gollwitzer, P. M., Heckhausen, H., & Ratajczak, H. (1990). From weighing to willing: Approaching a change decision through pre- or postdecisional mentation. *Organizational Behavior and Human Decision Processes, 45,* 41–65.

Gollwitzer, P. M., & Kinney, R. F. (1989). Effects of deliberative and implemental mind-sets on illusion of control. *Journal of Personality and Social Psychology, 56,* 531–542.

Heckhausen, H. (1986). Why some time out might benefit achievement motivation research. In J. H. L. van den Bercken, T. C. M. Bergen, & E. E. J. De Bruyn (Eds.), *Achievement and task motivation* (pp. 7–39). Lisse, The Netherlands: Swets & Zeitlinger.

Heckhausen, H., & Gollwitzer, P. M. (1986). Information processing before and after the formation of an intent. In F. Klix & H. Hagendorf (Eds.), *In memoriam Hermann Ebbinghaus: Symposium on the structure and function of human memory* (pp. 1071–1082). Amsterdam: Elsevier/North Holland.

Heckhausen, H., & Gollwitzer, P. M. (1987). Thought contents and cognitive functioning in motivational vs. volitional states of mind. *Motivation and Emotion, 11,* 101–120.

Higgins, E. T., Rholes, W. S., & Jones, C. R. (1977). Category accessibility and impression formation. *Journal of Experimental Social Psychology, 13,* 141–154.

Humphrey, G. (1951). *Thinking.* London: Methuen.

Klinger, E. (1977). *Meaning and void.* Minneapolis: University of Minnesota Press.

Külpe, O. (1904). Versuche über Abstraktion [Experiments on abstrac-

tion]. *Bericht über den 1. Kongreß für Experimentelle Psychologie, 1,* 56–68.

Lewin, K., Dembo, T., Festinger, L. A., & Sears, P. S. (1944). Level of aspiration. In J. McV. Hunt (Ed.), *Personality and the behavior disorders* (Vol. 1, pp. 333–378). New York: Ronald.

Marbe, K. (1901). *Experimentell-psychologische Untersuchungen über das Urteil* [Experimental studies on judgment]. Leipzig: W. Engelmann.

Norman, D. A., & Bobrow, D. G. (1976). On the role of active memory processes in perception and cognition. In C. N. Cofer (Ed.), *The structure of human memory* (pp. 114–132). San Francisco: Freeman and Company.

Norman, D. A., & Bobrow, D. G. (1979). Descriptions: An intermediate stage in memory retrieval. *Cognitive Psychology, 11,* 107–123.

Rabkin, E. S. (1979). *Fantastic worlds: Myths, tales, and stories.* Oxford, England: Oxford University Press.

Rosenthal, R., & Rosnow, R. L. (1985). *Contrast analysis: Focused comparisons in the analysis of variance.* New York: Cambridge University Press.

Rumelhart, D. E. (1975). Notes on a schema for stories. In D. G. Bobrow & A. M. Collins (Eds.), *Representation and understanding* (pp. 211–236). New York: Academic Press.

Rumelhart, D. E. (1977). Understanding and summarizing brief stories. In D. LaBerge & J. Samuels (Eds.), *Basic processes in reading and comprehension* (pp. 265–303). Hillsdale, NJ: Erlbaum.

Smith, E. R., & Branscombe, N. R. (1987). Procedurally mediated social inferences: The case of category accessibility effects. *Journal of Experimental Social Psychology, 23,* 361–382.

Srull, T. K. (1981). Person memory: Some tests of associative storage and retrieval models, *Journal of Experimental Psychology: Human Learning and Memory, 7,* 440–463.

Srull, T. K. (1984). Methodological techniques for the study of person memory and social cognition. In R. S. Wyer & T. K. Srull (Eds.), *Handbook of social cognition* (Vol. 2, pp. 1–72). Hillsdale, NJ: Erlbaum.

Srull, T. K., & Wyer, R. S. (1979). The role of category accessibility in the interpretation of information about persons: Some determinants and implications. *Journal of Personality and Social Psychology, 37,* 1660–1672.

Watt, H. J. (1905). Experimentelle Beiträge zu einer Theorie des Denkens [Experiments on a theory of thinking]. *Archiv für die gesamte Psychologie, 4,* 289–436.

Appendix
Coding Scheme for Subjects' Stories

Ascribing Deliberative Efforts to Main Character

Deliberation aimed at making a goal decision: "The king racked his brains, wondering what to do. . . ."; "The king was thinking things over for many days and nights, weighing whether to stay at home. . . ."

Turning to others for advice and listening to their suggestions: "The king asked a monk to give him advice. . . ."; "The king listened to a fortune teller. . . ."

Ascribing Implementational Efforts to Main Character

Actual acting on a chosen goal: "The tailor forced himself through the rock passage. . . ."; "The king sent out more men to search the

forest. . . ."; "The king ordered a trusted officer to stay at the castle and protect his daughter. . . ."

Thinking about the implementation of the chosen goal: "The king asked himself how could he find a trusted person who would stay home and protect his daughter. . . ."; "The tailor wondered how to climb up the steep wall. . . ."