Situated Cognition and the Wisdom of Feelings: Cognitive Tuning

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This chapter addresses the influence of moods, emotions, bodily sensations and environmental cues on individuals' spontaneously adopted reasoning style. Before you read on, I invite you to take the quiz presented in Table 1. You will probably find some of the questions rather odd -- and the correct answers at the bottom of the table surprising. Yet, these answers are supported by solid experimental research, reviewed in this chapter. Moreover, a growing body of literature suggests that emotionally intelligent persons may have a tacit understanding of some of these processes and may deliberately manage their moods to facilitate task performance (see the contributions in Ciarrochi, Forges, & Mayer, 2001). In fact, the questions presented in Table 1 bear some similarity with items of the MSCEIT (Mayer, Salovey, & Caruso, in press), a test of emotional intelligence.

Table 1

But *why* would our performance on a wide variety of cognitive tasks be influenced by variables like our moods, the color of the paper on which the task is presented, or whether we press a hand upward or downward against the table? This question is the focus of the present chapter. I propose that these variables share one crucial characteristic: They provide affective cues that inform us about the benign or problematic nature of the situation. Our thought processes, in turn, are tuned to meet these situational requirements, which is highly adaptive. When the situation is characterized as problematic, we are likely to adopt a systematic, bottom-up processing style with close attention to the details at hand. In contrast, when the situation is characterized as benign, we are likely to rely on our usual routines, adopting a top-down processing style with less attention to the details at hand. Although these spontaneously adopted processing styles can be overridden by task demands and important goals, they are likely to influence our cognitive performance under many circumstances. Next, I develop this logic in more detail and provide a selective review of relevant experimental findings.

Situated Cognition: Cognitive Processes are Tuned to Meet Situational Requirements

"My thinking is first and last and always for the sake of my doing," noted William James (1890, p. 333) more than a century ago. From this perspective, human cognition stands in the service of action, and a growing body of research supports this assertion (for a review see Smith & Semin, 2001). To serve human action in adaptive ways, our cognitive processes are responsive to the environment in which we pursue our goals. This responsiveness ranges from the higher accessibility of knowledge relevant to a given situation (see Yeh & Barsalou, 2000) to the choice of processing strategies that meet situational requirements (e.g., Wegner & Vallacher, 1986). For example, when things go smoothly and we face no hurdles in the pursuit of our goals, we are likely to rely on our pre-existing knowledge structures and routines, which have served us well in the past. Once things go wrong, however, we abandon this reliance on our usual routines and focus on the specifics at hand to determine what went wrong and what can be done about it. Hence, our actions, and the context in which we pursue them, are represented at a greater level of detail when things go wrong than when things go well (see Wegner & Vallacher, 1986).

Taken by itself, this observation is not surprising – after all, problems need attention. The very same phenomenon, however, may be at the heart of the more surprising findings

presented in Table 1, when we assume that feelings, bodily sensations, or environmental cues provide information about the benign or problematic nature of our current situation. This proposal is consistent with many theories of emotion.

Feelings Alert Us to Situational Requirements

Cognitively oriented emotion researchers generally assume that "emotions exist for the sake of signaling states of the world that have to be responded to, or that no longer need response and action" (Frijda, 1988, p. 354). Similarly, mood researchers typically assume that moods reflect the general state of the organism (Nowlis & Nowlis, 1956), an assumption that prompted Jacobsen (1957) to refer to moods as "barometers of the ego." If so, we may expect that our feelings serve *informative functions*. This expectation has been supported by a large body of research, ranging from the impact of feelings on evaluative judgment to the choice of different processing strategies (for a review see Schwarz & Clore, 1996). This chapter is solely concerned with the latter influence.

Moods

We usually feel bad when we encounter a threat of negative or a lack of positive outcomes, and feel good when we obtain positive outcomes and are not threatened by negative ones. Hence, our moods reflect the state of our environment and being in a bad mood signals a problematic situation, whereas being in a good mood signals a benign situation. These signals have cognitive and motivational consequences, which are highly adaptive under most circumstances.

When facing a problematic situation, we are usually motivated to do something about it. Any attempt to change the situation, however, initially requires a careful assessment of its features, an analysis of their causal links, detailed explorations of possible mechanisms of change, as well as an anticipation of the potential outcomes of any action that might be initiated. Consistent with these conjectures, being in a negative affective state is associated with a narrowed focus of attention (e.g., Broadbent, 1971; Bruner, Matter, & Papanek, 1955; Easterbrook, 1959) and a higher level of spontaneous causal reasoning (e.g., Bohner, Bless, Schwarz, & Strack, 1988), paralleling the observation that failure to obtain a desired outcome shifts attention to a lower level of abstraction (e.g., Wegner & Vallacher, 1986). These influences foster bottom-up, data driven processing. Moreover, it may seem unwise to rely on one's usual routines and preexisting general knowledge structures without further consideration of the specifics under these conditions, thus discouraging top-down strategies. Finally, we may be unlikely to take risks in a situation that is already marked problematic, and may therefore avoid simple heuristics and uncertain solutions.

Conversely, when we face a benign situation that poses no particular problem, we may see little need to engage in detailed analyses and may rely on our usual routines and preexisting knowledge-structures, which served us well in the past. This encourages less effortful, top-down processing as a default, *unless* current goals require otherwise. In pursuing such goals, we may be willing to take some risk, given that the general situation is considered safe. As a result, we may prefer simple heuristics over more effortful, detail oriented judgmental strategies, may explore new procedures and possibilities and pursue unusual, creative associations.

In combination, these conjectures suggest that our cognitive processes are tuned to meet the situational requirements signaled by our feelings (Schwarz, 1990; Schwarz & Clore, 1996; see also Bless, 1997; Fiedler, 1988). Note that this cognitive tuning hypothesis

does *not* entail that happy individuals are somehow unable, or generally unwilling, to engage in systematic processing. Rather, it only entails that the mood *itself* does not signal a situation that poses particular processing requirements. Hence, the spontaneously adopted heuristic processing style and reliance on preexisting knowledge structures should be easy to override, rendering processing under happy moods more flexible than processing under sad moods. In contrast, the systematic processing style fostered by negative moods should be difficult to override, reflecting that it would be maladaptive to ignore a potential "problem" signal (see Bless & Schwarz, 1999; Schwarz, 2000, for more detailed discussions).

The assumption that our moods inform us about the nature of the situation predicts that their influence should be eliminated when the informational value of the mood is called into question. Empirically, this is the case. When we are aware, for example, that we may only feel bad because of the lousy weather, our bad mood carries little information about the task at hand and its influence on task performance is attenuated or eliminated (e.g., Sinclair, Mark, & Clore 1994). This finding parallels the observation that mood effects on evaluative judgment are eliminated under similar conditions (e.g., Schwarz & Clore, 1983), consistent with the informative functions logic. Note that this finding is incompatible with competing approaches that trace mood effects on processing style to mood congruent recall. These approaches (Isen, 1987; Mackie & Worth, 1989) draw on variants of Bower's (1981) network model of affect and memory and assume that being in a good mood facilitates the recall of positive material from memory. Positive material stored in memory is believed to be more tightly organized and interconnected than negative material, resulting in the recall of a large amount of information. This extensive recall, in turn, is assumed by some authors to tax individuals' cognitive capacity, thus interfering with detail-oriented processing under happy moods, forcing individuals to rely on simplifying heuristics (e.g., Mackie & Worth, 1989). In contrast, others (e.g., Isen, 1987) assume that this extensive recall of interconnected material results in a more "complex cognitive context" (Isen, 1987, p. 237) that facilitates novel associations between disparate ideas in working memory, which are actively explored when individuals are in a good mood. The available data do not provide consistent support for either of these assumptions. In general, negative events have been found to elicit more causal analysis and rumination than positive events, presumably resulting in more interconnected representations of negative material (see Clore et al., 1994, for a more detailed discussion). Moreover, other researchers suggested that being in a sad (rather than happy) mood is more likely to tax individuals' cognitive capacity (e.g., Ellis & Ashbrook, 1988). Neither of these assumptions, however, can account for the observation that mood effects on processing style are eliminated when the informational value of the mood is undermined. In addition, memory based accounts of processing style effects are incompatible with recent research that documents parallel effects for the information provided by bodily feedback and situational cues. Before I turn to these parallels, however, it is useful to illustrate the differences in processing style elicited by being in a happy and sad mood with a prototypical example.

An Illustration: Moods and the Use of Scripts

Our knowledge about many everyday situations is represented in memory in the form of *scripts*, that is, general knowledge structures pertaining to what transpires in social settings like a restaurant (Schank & Abelson, 1977). If happy moods increase, and sad moods decrease, our tendency to rely on the "usual routines," we may expect that

individuals in a happy mood are more likely to rely on an applicable script than individuals in a sad mood. Empirically, this is the case.

Employing a dual-task paradigm, Bless, Clore, et al. (1996) had happy and sad participants listen to a tape-recorded story about having dinner at a restaurant that contained script consistent as well as script inconsistent information. While listening to the story, participants worked on a concentration test that required them to mark certain letters on a work sheet. Good performance on the concentration test requires detail-oriented processing; in contrast, the restaurant story can be understood by engaging *either* in script-driven top-down processing or in data-driven bottom-up processing. As predicted, happy participants were likely to recognize previously heard script inconsistent information and showed high rates of erroneous recognition of previously not presented script consistent information. This pattern indicates that they relied on their general knowledge about restaurant visits in encoding the information, rendering unusual acts highly salient and memorable. As usual, however, this reliance on general knowledge structures came at the expense of increased intrusion errors. Neither of these effects was obtained for sad participants, indicating that they were less likely to draw on the script. Given that top-down processing is less taxing than bottom-up processing, we may further expect that happy participants do better on a secondary task. Confirming this prediction, happy participants outperformed sad participants on the concentration test.

In combination, these findings indicate that moods influence the spontaneously adopted processing style under conditions where different processing styles are compatible with the individual' s goals and task demands, as was the case for comprehending the restaurant story. Under these conditions, sad individuals are likely to spontaneously adopt a systematic, detail-oriented, bottom-up strategy that is usually adaptive in problematic situations, whereas happy individuals rely on a less effortful top-down strategy. Yet, when task demands (as in the case of the concentration test, Bless, Clore et al., 1996) or explicit instructions (e.g., Bless et al., 1990) require detail-oriented processing, happy individuals are able and willing to engage in the effort.

Bodily Feedback

The cognitive tuning logic has recently been extended to *bodily sensations,* which may also signal benign or problematic situations (Friedman & Förster, 2000). In general, people try to approach situations that are characterized by a promise of positive, or a lack of negative, outcomes. Conversely, they try to avoid situations that entail a threat of negative outcomes or a lack of positive ones. If so, bodily responses that are typically associated with approach situations may elicit the heuristic, top-down processing style spontaneously preferred in benign situations. In contrast, bodily responses that are typically associated with avoidance situation may elicit the systematic, bottom-up processing style spontaneously preferred in problematic situations. One bodily response that is closely associated with approach is the contraction of the arm flexor, which is involved in pulling an object closer to the self. Conversely, contraction of the arm extensor is involved in pushing an object away from the self and is closely associated with avoidance. Hence, arm flexion provides bodily feedback that is usually associated with approaching positive stimuli, whereas arm extension provides bodily feedback that is usually associated with avoiding negative stimuli (see Cacioppo, Priester, & Berntson, 1993; Priester, Cacioppo, & Petty, 1996). In fact, affectively neutral stimuli encoded during arm flexion are later preferred over neutral stimuli

encoded during arm extension, presumably reflecting the approach/avoidance information provided by the bodily feedback (Cacioppo et al., 1993; see also Chen & Bargh, 1999).

In a series of ingenious experiments, Friedman and Förster (2000) took advantage of this association. They asked seated participants to press the right palm upwards against the bottom of the table (arm flexion), or downwards against the top of the table (arm extension). Although these movements engage the same muscles, they have no surface similarity to pulling an object closer, or pushing it away, thus avoiding the introduction of demand characteristics. As theoretically predicted, arm flexion fostered a heuristic processing style, whereas arm extension fostered a systematic processing style. I return to the results of these studies below.

Affective Environmental Cues

If the impact of moods and bodily sensations on processing style is mediated by the affective information they provide about the situation, we may assume that external, affectively laden situational cues may exert a similar influence. Empirically, this is again the case. For example, Soldat, Sinclair, and Mark (1997; see also Sinclair, Soldat, & Mark, 1998) presented reasoning tasks from the Graduate Record Examination on colored paper and observed that an upbeat red fostered heuristic processing, whereas a depressing blue fostered systematic processing (see Mayer, DiPaolo, & Salovey, 1990, for a discussion of the affective tone of colors). Similarly, Ottati, Terkildsen, and Hubbard (1997) observed that communicators who deliver a message with a happy, smiling face are likely to evoke a heuristic processing style in their audience, whereas communicators who deliver the same message with a somber face are likely to evoke a systematic processing style. I return to these findings below.

Summary

Our strategies of information processing are tuned to meet the requirements of the specific situation. Information that characterizes the situation as problematic fosters the spontaneous adoption of a systematic, detail-oriented, bottom-up processing style. In contrast, information that characterizes the situation as benign fosters the spontaneous adoption of a top-down processing style that relies on pre-existing knowledge structures and routines, unless currently active goals require otherwise. The "benign" or "problematic" signal can be external (e.g., situational cues or encountered hurdles) or internal (e.g., moods or bodily feedback), with similar effects observed in either case.

How the processing style elicited by these signals influences task performance depends on the characteristics of the task: Task performance is facilitated when the evoked style matches task requirements, but impeded when it mismatches task requirements. Next, I illustrate the pervasive influence of feelings on task performance, drawing on research into persuasion, stereotyping, and problem solving.

Feelings and Task Performance

Persuasion

How would your happy or sad mood influence your susceptibility to a persuasive message? A common intuition suggests that recipients in a bad mood may be more critical than recipients in a happy mood, and hence less influenced by any persuasive message. Empirically, however, this is not the case. Instead, the specific influence of mood on persuasion depends on the strength of the persuasive arguments in ways that are consistent with common dual-process models of persuasion.

As a large body of research in the context of Eagly and Chaiken' s (1993) heuristic-systematic model and Petty and Cacioppo' s (1986) elaboration likelihood model demonstrated, a message that presents strong arguments is generally more persuasive than a message that presents weak arguments. This observation only holds, however, when recipients are motivated and able to systematically process the content of the message, in which case they generate agreeing thoughts in response to strong arguments and disagreeing thoughts in response to weak arguments. If recipients do not engage in such "elaborative" or "systematic" processing of message content, the advantage of strong over weak arguments is eliminated. Accordingly, one may explore the impact of mood states on processing strategies by testing the relative impact of argument strength under different mood states. Several researchers followed this strategy (see Bless & Schwarz, 1999; Schwarz, Bless, & Bohner, 1991, and Schwarz & Clore, 1996, for more extensive reviews).

These studies consistently showed that individuals in a happy mood are less likely to engage in systematic elaboration of a counterattitudinal message than individuals in a non-manipulated or a sad mood (e.g., Bless, Bohner, Schwarz, & Strack, 1990; Bless, Mackie, & Schwarz, 1992; Bohner, Crow, Erb, & Schwarz, 1992; Mackie & Worth, 1989; Worth & Mackie, 1987). Hence, happy recipients are moderately and equally persuaded by strong as well as weak arguments. Moreover, their cognitive responses show no differences as a function of argument strength, and they report similar proportions of agreeing or disagreeing thoughts in response to strong or weak arguments. In contrast, sad recipients are strongly persuaded by strong arguments, but not by weak arguments. In addition, sad recipients report more disagreeing thoughts in response to weak, and more agreeing thoughts in response to strong messages. Figure 1 shows the usually obtained pattern.

Figure 1

Complementing these investigations into argument strength, Worth and Mackie (1987) observed that happy recipients were more likely than sad individuals to rely on heuristic strategies in assessing the validity of the message, paying attention to cues like the communicator's status or expertise in forming a judgment (e.g., Worth & Mackie, 1987). In combination, the reviewed findings indicate that a strong message fares better with a sad than with a happy audience. But if communicators have nothing compelling to say they are well advised to put recipients into a good mood, providing some cues that indicate high expertise and trustworthiness.

But how confident can we be that the observed effects reflect the informative functions of moods rather than another process?[1] According to the feelings-as-information logic (Schwarz,1990), the observed effects of mood on processing style should be eliminated when participants become aware that their feelings are due to a source that is irrelevant to their task, thus calling the feelings' informational value into question. A study by Sinclair, Mark, and Clore (1994) supports this prediction. Specifically, students were approached on early spring days when the weather was sunny and pleasant or cloudy and unpleasant and were presented with strong or weak persuasive messages. To discredit the informational implications of participants' mood, Sinclair and colleagues did or did not draw their attention to the weather, following a procedure

[1] For a comparative discussion of different theoretical approaches, which exceeds the scope of this chapter, see Martin and Clore (2001) and Schwarz and Clore (1996).

previously used by Schwarz and Clore (1983). When participants' attention was *not* drawn to the weather, the usually obtained interactive effects of mood and message quality were observed. In this case, sad participants were persuaded by strong but not weak messages, whereas happy participants were moderately but equally persuaded by both. However, when the weather was made salient as a potential cause of their momentary feelings, mood no longer played a role and a main effect of message quality emerged.

As already noted in the context of individuals' reliance on scripts (Bless, Clore et al., 1996), the impact of moods on processing style is not inevitable and can be overridden by other variables. Accordingly, explicit instructions to pay attention to the arguments (e.g., Bless et al., 1990), or the promise that carefully thinking about the message would make one feel good (e.g., Wegener, Petty, & Smith, 1995), have been found to elicit systematic message processing in happy recipients. What characterizes the information processing of happy individuals is not a general cognitive or motivational impairment, but a tendency to spontaneously rely on simplifying strategies and general knowledge structures in the absence of goals that require otherwise.

Paralleling the effects of recipients' moods, Ottati et al. (1997) observed that the same message is less likely to be scrutinized when presented by a communicator with a smiling, happy face than when presented by a communicator with a neutral, somber face. They suggested that the communicator's conveyed affect can serve informative functions that parallel recipients' own moods. Further illustrating the power of environmental affective cues, Soldat and Sinclair (2001) had participants read persuasive messages printed on colored paper. The selection of colors was based on affect ratings and participants perceived the selected hue of blue as conveying negative affect, but the selected hue of red as conveying positive affect. As expected, participants were persuaded by strong arguments, but not by weak arguments, when the message was presented on blue paper. Yet, both types of arguments were similarly persuasive when the message was presented on red paper.

In sum, both internal (moods) and external (facial expressions, color) affective signals have been found to influence the processing of persuasive messages. Throughout, negative affective signals increase systematic processing. In contrast, positive affective signals decrease systematic processing and foster reliance on heuristic cues.

Stereotyping and Impression Formation

Paralleling the distinction between heuristic and systematic processing strategies in the persuasion domain, models of person perception distinguish between two different processing strategies involved in impression formation (Brewer, 1988; Fiske & Neuberg, 1990). At the one extreme, judgments may be primarily based on the implications of the target person's category membership, with little attention to the person's specific behaviors. Such judgments are formed in a top-down manner by relying on one's general knowledge about the category, i.e. one's stereotype of the group. At the other extreme, judgments may be primarily based on individuating information about the target person, with little impact of information about the person's category membership. Such judgments are formed in a bottom-up manner, with close attention to the specific information pertaining to the person. Hence, we may expect that happy individuals are more likely to engage in stereotyping than sad individuals, in contrast to what common intuition would suggest.

A growing body of research supports this prediction (see Bless, Schwarz, & Kemmelmeier, 1996, for a review). For example, Bodenhausen (1993) presented participants in different moods with descriptions of an alleged student misconduct and asked them to determine the target person's guilt. Participants in a happy mood rated the offender as more guilty when he was identified as a member of a group that is stereotypically associated with the described offense than when he was not. In contrast, the guilt judgments of participants in a neutral or sad mood were not affected by the offender's category membership. Similarly, Edwards and Weary (1993) observed that non-depressed individuals were more likely to rely on category membership information than chronically depressed individuals, who seemed to engage in a more effortful analysis of the individuating information provided to them. In a similar vein, Sinclair (1988) found that participants in a sad mood made more use of detailed performance information. Sad participants were also less likely to show halo effects and more likely to be accurate in a performance appraisal task than those in happy moods, with neutral mood participants falling in between. In addition, sad participants have been found to show less pronounced primacy effects in impression formation tasks than happy participants (Sinclair & Mark, 1992). Finally, Hildebrandt-Saints and Weary (1989) observed that chronically depressed individuals sought more, and more diagnostic, information about another person than non-depressed participants. Moreover, depressives did so independent of whether they expected to interact with the person in the future, whereas non-depressives' information search increased when future interaction was expected.

In combination, these findings again indicate that being in a sad mood fosters the spontaneous adoption of a systematic, bottom-up processing style, whereas being in a happy mood fosters the spontaneous adoption of a heuristic, top-down processing style. Further paralleling the results observed in the persuasion domain, happy individuals' reliance on category membership information can be overridden by manipulations that increase their processing motivation, such as personal accountability for one's judgment (Bodenhausen, Kramer, & Süsser, 1994, Experiment 4) or an anticipated interaction with the target person (e.g., Hildebrandt-Saints & Weary, 1989).

Quite obviously, the observation that happy moods increase stereotyping runs counter to common intuition as well as the traditional social psychological assumption that we are more likely to stereotype a group the more negatively we feel about it (see Allport, 1954). The apparent contradiction, however, may be misleading. The negative feelings elicited by a disliked group may be quite different from the diffuse sad moods induced in the reviewed experiments (for a discussion see Bodenhausen, 1993). Unfortunately, attempts to test the influence of target-elicited (rather than incidental) feelings by presenting information about liked and disliked groups face serious methodological challenges. Most notably, the groups will necessarily differ in ways other than the feelings they evoke, rendering it difficult to isolate the role of feelings. Hopefully, future research will shed light on this issue.

Categorization

Theoretically, the detail-oriented, bottom-up processing style associated with negative moods should foster the formation of fine-grained, narrow categories, whereas the top-down, heuristic processing style associated with positive moods should foster the formation of more inclusive categories. Numerous studies are consistent with this

prediction (for reviews see Isen, 1987; Schwarz & Clore, 1996). For example, Isen and Daubman (1984) observed that happy participants were more likely to include unusual exemplars in a category than participants in a neutral mood, assigning, for example "feet" and "camel" to the category "vehicles" and "cane" to the category "clothing." Moreover, happy individuals sorted colored chips into a smaller number of piles, again indicating more inclusive categorization. Reversing the categorization task, Hirt, Levine, McDonald, Melton, and Martin (1997) provided participants with a category and asked them to list exemplars. As expected, happy participants listed more unusual exemplars than sad participants, again indicating more inclusive categorization.

Studies drawing on bodily approach/avoidance signals rather than moods again parallel these findings. Using the arm flexion/extension task described above, Friedman and Förster (2000, Exp. 6) observed that participants who were induced to flex their arms provided more inclusive categorizations on Isen and Daubman's (1984) task, relative to a control. Conversely, participants who were induced to extend their arms provided less inclusive categorizations relative to a control. These differences were observed in the absence of any differences on mood measures, suggesting that the observed results are indeed due to the information provided by the bodily feedback rather than any changes in participants' mood.

Creative Problem Solving

As may be expected on the basis of the categorization findings, happy individuals typically outperform sad or neutral-mood individuals on creativity tasks, like Mednick's (1962) remote associates test (e.g., Isen, Daubman, & Nowicki, 1987). Similarly, happy participants list more unusual first associates in response to neutral words than sad or neutral-mood participants (e.g., Isen, Johnson, Metz, & Robinson, 1985).

The results of Friedman and Förster's (2000) ingenious studies on bodily feedback again parallel these findings. As theoretically predicted, the approach feedback provided by arm flexion facilitated creative problem solving across several tasks, whereas the avoidance feedback provided by arm extension impeded it. Specifically, participants who flexed their arms were more likely to break the set than participants who extended their arms, resulting in better performance on Witkin, Oltman, Raskin, and Karp's (1971) Embedded Figure Test (Friedman & Förster, 2000, Exp. 1) as well as Ekstrom, French, Harman, and Dermen's (1976) Snowy Picture Test (Exp. 2). The Embedded Figure Test requires the identification of figures hidden in complex visual patterns, whereas the Snowy Picture Test requires the identification of familiar objects hidden in patterns of visual noise ("snow"). Performance on both tasks is facilitated by the application of familiar concepts to the hidden figures, while disregarding irrelevant detail and breaking the set imposed by the distractor. Accordingly, the top-down processing fostered by positive affective cues improves performance on these tasks, whereas the bottom-up processing fostered by negative affective cues impedes it. Finally, arm flexion improved the perceptual restructuring of fragmented visual images on Ekstrom et al.'s (1976) Gestalt Completion Test (Friedman & Förster, Exp. 3 and 4). Both, breaking the set and restructuring, have traditionally been assumed to play a central role in creative insight. Hence, the emotionally intelligent person may want to press his or her hand upward (rather than downward) against the table when the task that requires divergent and creative thinking.

In combination with the categorization findings, these results suggest that being in happy mood, or receiving approach feedback, should facilitate creative performance on insight tasks (see Isen, 1987). This proposal has received considerable support in the mood domain. For example, Isen and Daubman (1984) observed in a highly influential experiment that being in a happy mood facilitated performance on Duncker's (1945) candle task, relative to being in a neutral or sad mood (see Greene & Noice, 1988, for a replication). Isen (1987) suggested that this finding reflects that happy moods facilitate the recall of diverse material from memory, resulting in a more "complex cognitive context" that facilitates novel connections and insights. Alternatively, the cognitive tuning assumption (Schwarz, 1990) suggests that being in a good mood signals a benign situation that is conducive to playful exploration, which is discouraged by the problem signal provided by negative moods. The most diagnostic test of these competing accounts would be experiments that vary the perceived informational value of participants' mood. Unfortunately, such studies are not available, nor are studies that test the impact of bodily approach/avoidance feedback on traditional insight tasks, like Duncker's candle problem. Overall, however, the accumulating body of evidence across different reasoning tasks suggests that the cognitive tuning assumption may provide a parsimonious account for the diverse set of findings.

Analytic Reasoning Tasks

If being in a sad mood fosters systematic, detail-oriented processing, we may assume that sad moods facilitate performance on analytic reasoning tasks. The bulk of the available evidence is again consistent with this prediction (see Clore, Schwarz, & Conway, 1994; Schwarz & Skurnik, in press, for reviews). For example, Fiedler (1988) reported that sad participants produced fewer inconsistencies in multiattribute decision tasks than happy participants. Specifically, the latter were twice as likely than the former to violate transitivity by producing inconsistent triads of the form A > B and B > C, but A < C. Similarly, Melton (1995) observed that happy participants performed worse on syllogisms than participants in a neutral mood. Specifically, happy participants were more likely to select an unqualified conclusion and to give answers consistent with the atmosphere heuristic, drawing on their general knowledge about the content domain rather than on the specifics of the task.

Extending the cognitive tuning logic to bodily feedback, Friedman and Förster (2000, Experiment 7) predicted that bodily avoidance feedback would improve performance on analytical reasoning tasks taken from the Graduate Record Exam, relative to bodily approach feedback. Their data confirmed this prediction and participants in the arm extension (avoidance) condition solved nearly twice as many problems correctly as participants in the arm flexion (approach) condition. Hence, the emotionally intelligent person may want to press his or her hand downward (rather than upward) against the table while working on analytical tasks.

Finally, Soldat et al. (1997) presented analytic reasoning tasks, also taken from the Graduate Record Exam, on paper that had an upbeat red, or a somewhat depressing blue, color. Across several replications, they observed that participants performed better when the tasks were printed on blue rather than red paper, with white paper falling in between. The performance advantage of blue paper was most pronounced for complex tasks, which posed higher processing demands. Paralleling these laboratory findings,

Sinclair, Soldat, and Mark (1998) found that students did better on an exam when the exam was printed on blue rather than red paper, in particular for difficult questions.

Importantly, neither the bodily feedback in Friedman and Förster's (2000) studies nor the color cues used in Soldat and colleagues' (1997) study resulted in changes in participants' self-reported mood. In combination, these findings indicate that subtle cues, like bodily feedback or the affective connotation of the paper on which the task is presented, can serve as "problem" signals that elicit the more systematic reasoning style usually associated with negative moods.

In contrast to the above findings, mostly based on analytic reasoning tasks from the GRE, other studies revealed performance deficits under depressed affect across a variety of mathematics and complex logic tasks (for a review see Clore et al., 1994). Theoretically, mixed findings are to be expected for such tasks because none of the hypothesized processes will *necessarily* result in improved performance. For example, greater attention to detail per se will not improve performance if the application of an algorithm is needed to which the individual does not have access. Moreover, greater attention to detail may increase the risk that the individual gets side-tracked by irrelevant features. Similarly, the top-down processing strategies fostered by positive affective information may facilitate or impede performance, depending on whether the available heuristic is applicable to the current task. Hence, inconsistent results are to be expected in this domain. Nevertheless, performance on analytic reasoning tasks is likely to be facilitated by the detail-oriented processing style fostered by negative affective cues when the person has access to the relevant algorithm, making its systematic application to the details at hand the crucial feature of success. Under such conditions, an emotionally intelligent person may deliberately avoid positive moods, preferring instead the mildly negative moods that facilitate systematic processing.

Beyond Valence: Specific Emotions

To date, the influence of affective information on individuals' processing style has been primarily investigated by manipulating the global positive versus negative affective cues discussed so far. However, the feelings-as-information logic applies to specific emotions as well, although with some important constraints. These constraints derive from the nature of specific emotions.

Theoretically, emotions are thought to reflect the ongoing, implicit appraisal of situations with respect to positive or negative implications for the individual's goals and concerns (e.g., Arnold, 1960). They have a specific referent (what we feel emotional about), and are usually characterized by a short rise time, high intensity, and limited duration. In contrast, the concept of mood refers to the feeling state itself when the object or cause is not in the focus of attention. In fact, people are often unaware of the causes of their moods, which may include minor events (like finding a dime; e.g., Isen, 1987) as well as background variables like a lack of daylight or exercise (see Thayer, 1996). Hence, moods lack a specific referent and they usually come about gradually, are of low intensity and may endure for some time (for a more detailed discussions of these conceptual distinctions see Clore, Schwarz, & Conway, 1994). We may therefore misread our moods as a response to wide variety of contexts, which accounts for their pervasive influence. In contrast, we are usually aware of what we feel emotional about and are hence

less likely to misread our emotions as a response to some unrelated stimulus (see Keltner, Locke, & Audrain, 1993, for experimental support).

Accordingly, a feelings-as-information analysis suggests that the influence of emotions is more specific than the influence of global moods in two ways: First, the influence of emotions is more likely to be limited to the specific emotion eliciting event, whereas the influence of moods is likely to generalize to across many unrelated targets (e.g., Keltner et al., 1993). Second, the information provided by emotions is more specific than the information provided by moods. Theoretically, moods provide a global "benign" versus "problematic" signal, as discussed earlier. In contrast, the experience of an emotion entails that the specific appraisal pattern underlying the emotion has been met. For example, feeling angry does not merely tell us that "something" went wrong. Instead, it tells us that another person is responsible for what went wrong because the appraisal pattern underlying anger entails the attribution of responsibility to an actor. If so, the specific appraisal pattern underlying a given emotion should allow us to understand which processing requirements are conveyed by this emotion, thus paving the way for an analysis of this emotion' s likely influence on individuals' processing style.

Several authors have recently pursued such an extension of the cognitive tuning assumptions (Schwarz, 1990) to specific emotions (Lerner & Keltner, 2000; Ragunathan & Pham, 1999; Tiedens et al., in press), although the few available findings are limited to negative emotions. They converge on the conclusion that different negative emotions have different effects, which can be predicted on the basis of the underlying appraisal pattern. For example, Tiedens and colleagues (in press) observed in a persuasion paradigm that sad individuals engaged in systematic message processing, whereas angry individuals did not. They suggested that this difference reflects that the appraisal pattern underlying sadness entails uncertainty, which triggers more extensive reasoning, whereas the appraisal pattern underlying anger does not.

Given these initial results, I am optimistic that detailed analyses of the processing requirements entailed in specific appraisal patterns will go a long way in specifying the impact of emotions on individuals' spontaneously adopted processing strategy. Whether the respective strategy facilitates or impedes performance on a given task will depend on the match or mismatch between the strategy and task characteristics, as seen in the preceding review.

Concluding Remarks

As this selective review indicates, our feelings can profoundly influence how we approach a reasoning task. These influences can be conceptualized by considering the informative functions of feelings and environmental cues. When a sad mood, bodily avoidance feedback or a negative environmental cue alerts us that our current situation may be problematic, we are likely to engage in the detail-oriented, bottom-up processing that is usually adaptive in handling problematic situations. Conversely, when a happy mood, bodily approach feedback or a positive environmental cue informs us that the situation is benign, we are likely to rely on our usual routines, which have served us well in the past. These effects are not observed when the informational value of our feelings for the task at hand is called into question. Moreover, the observed influence of feelings can be overridden by the individual' s goals or explicit task demands. From this perspective, the influence of feelings on reasoning is best thought of as an element of

situated cognition: Like many other elements of a given situation, our feelings inform us about the processing requirements we face -- and our thought processes are tuned to meet these requirements.

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Table 1. Quiz

A. Suppose you need to solve *analytical tasks* taken from the Graduate Record Exam. Which of the following would you prefer?
   1. Work on the tasks while being
      (a) in a happy mood; (b) in a sad mood; (c) no preference
   2. Have the tasks presented to you on
      (a) red paper; (b) blue paper; (c) no preference
   3. While working on the tasks, press one hand
      (a) downward against the top of the table; (b) upward against the underside of the table; (c) no preference

B. Suppose you want to solve *creativity tasks* that require playful, divergent thinking? Which of the following would you prefer?
   1. Work on the tasks while being
      (a) in a happy mood; (b) in a sad mood; (c) no preference
   2. While working on the tasks, press one hand
      (a) downward against the top of the table; (b) upward against the underside of the table; (c) no preference

Table 1 cont'd

C. Suppose you read a persuasive message. Under which conditions would it be most likely that you are *not* persuaded by *weak* arguments, but *are* persuaded by *strong* arguments?
   1. When you read the arguments while in a
      (a) happy mood; (b) sad mood; (c) makes no difference
   2. When the arguments are printed on
      (a) red paper; (b) blue paper; (c) makes no difference

Correct answers: A. 1b; 2b; 3a; B. 1a; 2b; C. 1b; 2b
[Note: print correct answers upside down, at bottom of table, if possible]

Figure Captions

Figure 1: Persuasion as a Function of Mood and Argument Strength
Note: Adapted from Bless, Bohner, Schwarz, & Strack (1990, Experiment 1).