
Contingent Effects of Anxiety on Message Elaboration and Persuasion

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This research examined the effects of anxiety on subsequent message processing. Experiment 1, conducted just before the handover of Hong Kong to China in 1997, manipulated anxiety by presenting Hong Kong participants with negative or positive potential consequences of the handover. Consistent with research documenting the cognitive deficits produced by anxiety, lower levels of message elaboration were obtained under high (vs. low) anxiety for an anxiety-unrelated message. However, for an anxiety-related message (e.g., a message about the upcoming handover ceremony), anxiety did not lower message elaboration, presumably because increased processing motivation compensated for cognitive deficits. Experiment 2 then revealed that, even for a motivating anxiety-related message (regarding job prospects), high anxiety results in a different type of processing compared to low anxiety. Specifically, capacity pressures caused heuristic cues in the message to bias the nature of systematic processing under high-anxiety conditions.

Research on the effects of anxiety has repeatedly documented that performance in tasks that demand cognitive resources is diminished under high anxiety (e.g., Deffenbacher, 1977; Ganzer, 1968; Zatz & Chassin, 1985). According to Eysenck (1979, 1982), high anxiety engages cognitive resources in activities such as worrying, thus leaving less capacity to devote to the task at hand. The debilitating effects of high anxiety have been demonstrated in the context of recall tasks (Hodges & Spielberger, 1969; Miller, Mueller, Goldstein, & Potter, 1978; Mueller, 1976). Research has also documented anxiety-related performance decrements in the context of anagram solving (Deffenbacher, 1978); mathematical problem solving (Hamilton, 1975); and more recently, inferential reasoning (Darke, 1988). In all of these studies (see Eysenck, 1982, for a review), high anxiety has been found to reduce task performance in terms of

either speed or accuracy. In this article, we extend this result to a domain that has received relatively little attention in the anxiety literature, that of message elaboration and comprehension. We also propose, and test, a boundary condition for the debilitating effect of anxiety and examine the amount as well as type of processing induced by high versus low anxiety.

THEORETICAL FRAMEWORK

As described above, a great deal of research has documented that anxious people exhibit poorer performance on cognitive tasks. For example, in a series of experiments, Darke (1988) showed that high- (vs. low-) anxiety participants take a longer time to draw inferences. In one such experiment, participants were exposed to sentence pairs such as "Bob is taller than Bill" and "Tom is taller than Bob." Immediately afterward, all participants were asked to respond either true or false to a verification sentence, "Bill is smaller than Tom," which required the integration of the previous sentences (Darke, 1988,

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Experiment 3). Clearly, this task requires cognitive resources, and as expected, high-anxiety participants took a longer time to accomplish the integration than did low-anxiety participants.

Such negative consequences have been documented for trait anxiety, defined as "relatively stable individual differences in anxiety proneness," as well as for state anxiety, defined as "subjective, consciously perceived feelings of tension and apprehension, and heightened autonomic nervous system activity" (Spielberger, Gorsuch, & Lushene, 1970, p. 3). Based on his review of the literature, Eysenck (1979) suggested that the effects of trait anxiety on working memory performances are relatively erratic and inconsistent as compared to those of state anxiety. Accordingly, whereas much of the material reviewed here relates to both trait and state anxiety, our experimental focus is on state anxiety as resulting from environmental stress (Hodges, 1968).

Eysenck (1979, 1982) proposed that anxiety comprises two major components—worry and emotionality (Liebert & Morris, 1967)—that affect task performance. Worry represents the cognitive component of anxiety and leads to distraction from the main task (Deffenbacher, 1978; Nottelman & Hill, 1977). In other words, worrying reduces the working memory capacity that can be devoted to the task at hand, resulting in poorer task performance. Emotionality involves changes in levels of physiological functioning resulting from nervousness and arousal (which can be measured by heart rate, skin conductance levels, etc.) and produces lower levels of cognitive processing (Mueller, 1979; Sanbonmatsu & Kardes, 1988). Although both worry and emotionality can lead to reductions in cognitive capacity, several authors have suggested that anxiety-induced decrements are primarily due to worry rather than arousal (Eysenck, 1982; Morris, Brown, & Halbert, 1977; Wine, 1971).

The reduced capacity that characterizes high anxiety carries straightforward implications for message elaboration, which can be viewed in terms of the amount of thought/scrutiny devoted to a message (e.g., Petty & Cacioppo, 1986). The persuasion literature posits that message elaboration is driven by ability as well as motivation to process a message (Chaiken, Liberman, & Eagly, 1989; Petty & Cacioppo, 1986). Other things being equal, therefore, a decrease in either ability or motivation leads to lowered elaboration. Because of lowered cognitive capacity, high anxiety reduces processing ability. Thus, we predict that, in general, anxiety will impede message elaboration, resulting in a lower number of topic-related thoughts and reduced claim recall. This reduction in message processing can also affect attitudes toward the issue discussed in the message.

Will high anxiety always lead to decrements in cognitive processing and, consequently, message elaboration? Some empirical evidence suggests otherwise (Dornic, 1977; Spence & Spence, 1966). For instance, Dornic (1977) reported a series of studies in which cognitive performance was no different for high-anxiety versus low-anxiety participants (see also Pham, 1996, for similar findings on arousal effects). Furthermore, an analysis of studies using the dual-task paradigm (which investigates performance on the main task as well as a concurrent subsidiary task) (Kahnemann, 1973) showed that decrements were usually observed only for the subsidiary task and not for the main task (Eysenck, 1982). These results imply that the debilitating effects of anxiety on message processing may be moderated by situational variables.

Our research focuses on one such moderating variable, namely, processing motivation or message involvement. Specifically, given that elaboration is driven by motivation as well as ability, we suggest that anxiety is less likely to have a debilitating effect when heightened message involvement compensates for ability deficits. Such compensation for ability-related decrements can occur in two ways. First, as stated above, both ability and motivation determine the amount of elaboration. Thus, unless ability is below critical threshold levels, an increase in motivation (via involvement) should increase elaboration or systematic processing. Second, when ability is constrained, people are likely to doubt whether systematic message processing can help them attain their goal of holding valid attitudes. Accordingly, "ability-impairing variables probably undermine people's *motivation* for systematic processing, as well as their capacity for systematic processing" (Chaiken et al., 1989, p. 224). An increase in motivation should therefore offset this motivation-impairing effect of ability.

The argument that increased motivation can compensate for lowered ability and result in equivalent performance under high and low anxiety is consistent with prior explanations offered for null effects of anxiety. For example, Eysenck (1979, 1982) suggested that high-anxiety participants may sometimes attempt to compensate for worry-induced distraction by putting more effort into the task, thus negating the impact of reduced ability (see also Dornic, 1977). This effort-based explanation accounts for findings related to the dual-task paradigm discussed earlier. Performance differences between high- and low-anxiety participants are not observed for the main task because anxious people attempt to compensate for the effects of worrying by increasing effort on the main (but not subsidiary) task. Dual-task findings are thus consistent with our proposition that increased motivation (effort) can compensate for capacity deficits.

Although processing motivation can be heightened by a variety of factors, we focus on the role of anxiety

relatedness. If the topic of the message has some bearing on the source of the anxiety, participants should be more motivated to engage in effortful processing than when the message topic is irrelevant to the anxiety source. An anxiety-related message should lead to heightened message involvement (and, thus, greater motivation) for high-anxiety participants simply because such a message focuses on a topic that is particularly salient to this group of people and is therefore more personally relevant than an unrelated message. This proposition is consistent with Eysenck's (1979) speculation that greater anxiety will lead to greater effort only when the source of felt anxiety is intrinsic to the task.

To summarize, our review of the literature suggests that high anxiety is generally associated with reduced cognitive capacity, thus leading to inferior performance on tasks involving cognitive resources, such as message elaboration and comprehension. However, given that message elaboration is driven by motivation as well as capacity, heightened motivation may compensate for capacity deficits under high-anxiety conditions. A message that is related to the source of anxiety is likely to be more personally relevant (and, thus, more motivating) to high-anxiety participants than an anxiety-unrelated message. Therefore, we predict that the debilitating effects of anxiety on message elaboration should be observed for anxiety-unrelated but not anxiety-related messages.

EXPERIMENT 1

The experiment utilized a 2 (anxiety level: high vs. low) \times 2 (message relatedness: related vs. unrelated) design and was conducted in April 1997 with 66 undergraduate students at a large university in Hong Kong. Participants were randomly assigned to one of the four cells in the design.

Manipulations

Anxiety. State anxiety was manipulated by exploiting a naturally occurring situation that carried overtones of stress and tension (e.g., Mogg, Mathews, & Bird, 1990). The experiment was conducted a few months before Hong Kong's recent reunification with (or handover to) China (on July 1, 1997). The information used to manipulate anxiety consisted of (fictitious) newspaper headlines touching on handover-related issues. High-anxiety participants were exposed to seven headlines warning of negative consequences of the handover (e.g., "Handover Likely to Intensify Competition for Jobs in Hong Kong"). In contrast, the equivalent statement in the low-anxiety condition alleviated worry about the post-handover situation (e.g., "Handover Likely to Increase Jobs in Hong Kong"). Both headlines were credible in that different newspapers at that time reported con-

flicting information about the impact of the transition on Hong Kong. A between-subjects pretest ($n = 82$) confirmed that high-anxiety headlines induced greater anxiety than did low-anxiety headlines ($M_s = 4.50$ vs. 3.82 on a 7-point scale), $F(1, 80) = 7.45$, $p < .01$. As desired, only moderate levels of anxiety were induced even in the high-anxiety condition. Our theorizing is not meant to apply to extremely high levels of anxiety, where factors such as defensive avoidance of the message may exert an important influence on message processing (e.g., Jepson & Chaiken, 1990).

Message relatedness. This factor (message related vs. not related to the source of anxiety) was manipulated via a newspaper extract that participants read after reading the seven headlines manipulating anxiety. The related (unrelated) message was titled "July 1st Handover Ceremony" ("University Graduation Ceremony") and contained criticisms made of extravagance in government (university) spending for the handover (graduation) ceremony as well as rebuttals made by the administration. A pretest in which 119 participants rated both extracts on the degree to which each was related to the handover of Hong Kong to China (i.e., the source of anxiety) on a 7-point scale (1 = *unrelated*, 7 = *related*) confirmed that the handover ceremony extract was more related to the handover ($M = 5.35$) than was the graduation ceremony extract ($M = 2.93$), $F(1, 118) = 12.94$, $p < .01$. The two messages were equated on content and length. Furthermore, the two topics were also pretested to be equally important to our population (handover ceremony $M = 6.25$, graduation ceremony $M = 6.71$), $F(1, 38) < 1$, *ns*, on a 9-point scale with higher numbers indicating greater importance.

Finally, pretest data on retrospective thoughts after exposure to the message revealed that both messages evoked an overall negative reaction. Across the two topics, the valenced thought index (VTI) (the difference between number of positive and negative message-related thoughts) was significantly lower than 0 ($M_{diff} = -.50$), $t_{diff}(1, 63) = -2.97$, $p < .01$. The value of this index did not vary significantly between the unrelated topic ($M = -0.62$) and the related topic ($M = -0.37$), $F < 1$, *ns*.

Procedure

Participants were told that they would take part in two different studies and received a booklet containing the cover story, stimulus materials, and two different questionnaires. The first questionnaire was presented as a study about clarity of English-language newspaper headlines, and participants rated each of the seven headline statements that manipulated, anxiety for clarity. They then indicated how anxious they had felt while reading the headlines on a 7-point scale ranging from *not at all anxious* to *very anxious*. Next, participants were exposed

TABLE 1: Results: Experiment 1

| | Unrelated Topic | | Related Topic | |
|-------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| | Low Anxiety | High Anxiety | Low Anxiety | High Anxiety |
| Anxiety | 3.29 _a (1.20) | 4.35 _b (1.46) | 3.35 _a (1.41) | 4.28 _b (1.18) |
| Message thoughts | 2.86 _a (1.33) | 1.65 _b (1.58) | 2.59 _a (1.06) | 3.11 _a (1.94) |
| Valenced thoughts index | -1.14 _a (1.56) | -0.35 _b (0.99) | -0.94 _a (1.20) | -1.22 _a (1.59) |
| Recognition | 5.52 _a (0.74) | 4.61 _b (0.96) | 5.44 _a (0.77) | 5.40 _a (0.76) |
| Attitude | 4.26 _a (1.28) | 5.01 _b (1.03) | 4.25 _a (1.03) | 3.97 _a (0.77) |

NOTE: Standard deviations are in parentheses. Means within each topic with different subscripts are significantly different from each other at $p < .05$.

to Questionnaire 2 under the guise of a study about comprehension of newspaper extracts. The first page of the questionnaire contained a newspaper extract (comprising three short paragraphs) focusing either on the upcoming handover or on the graduation ceremony. Participants were asked to read the extract as if they were reading it in a newspaper. At the end of 1 minute (found to be sufficient for passage comprehension in a pretest), participants were asked to stop reading the passage and go on to the next page of the booklet. They then completed a standard 17-item inventory measuring trait anxiety (Sarason, 1958) and indicated how important the message topic (handover or graduation ceremony) was to them on a 9-point semantic differential scale ranging from *unimportant* to *important*.

Participants then completed a recognition test where they were presented with eight statements and were asked to rate on a 7-point scale anchored at *definitely false* (1) and *definitely true* (7) whether the extract had made each specific claim. Intermediate points on the scale also were associated with descriptive phrases (e.g., if participants felt the statement was *most probably false*, they circled "2"). Participants were told that they should base their responses only on the extract they had read. Half the statements were actually contained in the extract and should therefore have been rated toward the high end of the recognition scale. Next, participants wrote down the thoughts they had while reading the extract and then indicated their attitudes toward the issue that they had read about (handover/graduation ceremony) on a set of four 7-point semantic differential scales anchored by *not at all angry/very angry*, *not at all happy/very happy*, *not at all irritated/very irritated*, and *not at all pleased/very pleased*. The first and third scale items were reverse-scored and an attitude index was formed by averaging scores on the four scales (Cronbach's $\alpha = .80$). Finally, a detailed debriefing was carried out before participants were thanked and dismissed.

Results and Discussion

Analyses were conducted in the context of a 2 (anxiety level) \times 2 (message relatedness) ANOVA. Trait anxiety

was used as a covariate and did not affect any of the analyses. Table 1 lists the mean scores across conditions.

Manipulation checks. As desired, high-anxiety participants reported a higher level of anxiety than did low-anxiety participants ($M_s = 4.31$ vs. 3.32), $F(1, 62) = 9.55$, $p < .01$. No other effects were significant on these checks. As in the pretest, the two topics were rated to be equally important (handover topic $M = 6.77$, graduation topic $M = 7.32$), $F(1, 62) = 1.57$, $p > .20$.

Cognitive responses. Two coders who were blind to the hypotheses classified these responses on the basis of message relevance. For example, for the handover message, thoughts about the ceremony, or about the organizers, or about the handover itself, were coded as relevant and other thoughts (e.g., "the article was not very long") as irrelevant. Cognitive responses were also coded on the basis of valence (positive, negative, and neutral). Intercoder agreement in each category exceeded 80%, and disagreements were resolved by discussion. The number of message-relevant thoughts was used as an indicator of amount of elaboration (cf. Maheswaran & Chaiken, 1991). A 2×2 ANOVA on this index revealed only a significant interaction effect of anxiety and message, $F(1, 62) = 5.02$, $p < .05$. Consistent with predictions, planned contrasts within each level of message topic revealed that anxiety had a debilitating effect on processing for the unrelated topic (M_s low anxiety = 2.86, high anxiety = 1.65), $F(1, 62) = 4.60$, $p < .05$, but not for the related topic (M_s low anxiety = 2.59, high anxiety = 3.11), $F < 1$.

Recognition. A mean recognition accuracy score was computed across the four true statements for each subject. As expected, high anxiety led to a decrease in accurate recognition, $F(1, 62) = 5.26$, $p < .05$ (M_s low anxiety = 5.47, high anxiety = 5.07). More important, the interaction of message relatedness and anxiety was significant, $F(1, 62) = 4.72$, $p < .05$. Planned contrasts confirmed the prediction that high anxiety would decrease recognition accuracy only for the unrelated topic (M_s low anxiety = 5.52, high anxiety = 4.61), $F(1, 62) = 9.65$, $p < .01$. For the related topic, as predicted, high- and low-anxiety

participants did not differ in their recognition accuracy (M_s low anxiety = 5.44, high anxiety = 5.40), $F < 1$.

No effects were obtained on another recognition index computed by averaging the (reverse-scored) ratings on the four false statements. This index did not differ across anxiety conditions (M_s low anxiety = 5.03, high anxiety = 4.85), $F(1, 62) < 1$, and the interaction of anxiety with topic also was nonsignificant, $F < 1$. This pattern of results may be due to a floor effect arising from the fact that the false statements were created by making fairly minor changes to the text. As an example, the anxiety-related passage (on the handover) indicated that the deputy secretary for home affairs was named Lee Lap-Sun and also quoted a local citizen named Edwin Chang. A false statement asserted, "The deputy secretary for home affairs is named Edwin Chang." Irrespective of condition, participants were possibly unable to correctly distinguish false statements such as these, which contained substantial references to the text, as being false. This argument is supported by the finding that once the high-anxiety unrelated topic condition (where recognition was predicted to be low for the true index as well) was omitted, higher scores were obtained on the true recognition index than the false recognition index ($M_s = 5.44$ vs. 4.96), $t_{diff}(1, 48) = 3.32, p < .01$.

Attitude index. Pretest findings had revealed that both the handover and the graduation ceremony messages evoked predominantly negative thoughts. Accordingly, for both messages, the lower the level of message elaboration, the fewer should be the negative thoughts, and consequently, the more favorable should be the attitude toward the topic of the message. Within the related message (handover ceremony), elaboration does not differ across anxiety conditions, and hence, attitudes should not differ either. However, for the unrelated message (graduation ceremony), high anxiety lowers the level of elaboration and should therefore be associated with more positive attitudes than low anxiety. Results on topic attitudes revealed a main effect of message, with more favorable attitudes for the unrelated graduation ceremony topic versus the related handover ceremony topic (M_s unrelated = 4.71, related = 4.15), $F(1, 62) = 4.39, p < .05$. More important, the interaction of message relatedness and anxiety was significant, $F(1, 62) = 4.09, p < .05$. Planned contrasts revealed that, as expected, attitudes did not differ within the related topic condition (M_s low anxiety = 4.25, high anxiety = 3.97), $F < 1$, suggesting that anxiety levels within the related topic did not affect the amount of message elaboration. Also as expected, attitudes were more favorable for high-anxiety subjects compared to low-anxiety subjects for the unrelated topic (M_s low anxiety = 4.26, high anxiety = 5.01), $F(1, 62) = 4.09, p < .05$, suggesting lower elaboration by high- versus low-anxiety subjects.

Mediational analyses (Baron & Kenny, 1986) were conducted in the unrelated topic condition to test the premise that attitude differences arose from differences in amount of message elaboration. As expected, the VTI (valenced thought index) did not differ in the related topic condition, where high- ($M = -1.22$) and low-anxiety ($M = -0.94$) participants were hypothesized to process the message to the same extent. Also as expected, in the unrelated topic condition, high-anxiety participants processed the negative message in less detail and therefore had less unfavorable thoughts compared to low-anxiety participants (M_s low anxiety = -1.14 , high anxiety = $-.35$), $t(29) = 1.71, p < .10$. We also confirmed that VTI explained a significant amount of attitude variance within the unrelated topic, $F(1, 29) = 25.11, p < .001$. The final check for mediation consisted of testing whether the previous effect of anxiety on attitudes within the unrelated topic, $F(1, 29) = 3.25, p < .10$, was substantially reduced by the inclusion of VTI. As desired, when both anxiety and VTI were included in the model, the effect of the VTI mediator was still significant, $F(1, 28) = 20.21, p < .001$, whereas the effect of anxiety became nonsignificant, $F < 1, ns$.

Overall, the pattern of findings obtained in Experiment 1 both replicated and extended previous results documenting the debilitating effects of anxiety to the domain of message comprehension and elaboration. Given a message unrelated to the source of anxiety, high-anxiety participants elaborated less than did low-anxiety participants and exhibited poorer claim recognition. However, when the message was related to the source of anxiety, high-anxiety participants displayed increased levels of message elaboration and comprehension, similar to that of low-anxiety participants.

Further evidence for the effects of anxiety on elaboration comes from an internal analysis that examined message elaboration as a function of felt anxiety (as reported on the anxiety manipulation check). Convergence with the experimental results would require that anxiety result in decreased message elaboration (e.g., fewer message-relevant thoughts) when the topic of the message is unrelated to the source of anxiety but not when it is related. Regression analyses with measured felt anxiety and manipulated message relatedness (dummy-coded) as independent variables and number of message-relevant thoughts as the dependent variable revealed the expected interaction effect, $F(1, 62) = 7.98, p < .001$. Follow-up analyses indicated that when the topic was unrelated to the source of anxiety, there was a significantly negative relationship between elaboration and anxiety ($b = -0.41$), $t(29) = -2.06, p < .05$. However, for the anxiety-related topic, such a negative relationship was not observed ($b = .37$), $t(33) = 1.92, p > .06$.

Although the correlational results using felt anxiety supplement the experimental results, we found no effects of trait anxiety on message elaboration. This is consistent with our earlier observation regarding the erratic and inconsistent effects of trait anxiety on cognitive performance (Eysenck, 1979, 1982). For example, Eysenck's (1979) review pointed out that trait anxiety has generally had little or no effect on digit span performance (a typical working memory task) (e.g., Hodges & Spielberger, 1969; Mueller, 1976; Quarter & Marcus, 1971). Researchers have suggested that trait anxiety effects are only likely to be observed when the particular trait scale is congruent with the type of stress existing in the situation (Ender, Edwards, Vitelli, & Parker, 1989; King & Ender, 1990). Based on this reasoning, it may simply have been the case that the anxiety scale used in our experiments (the General Anxiety Scale) was not congruent with the situational stress (handover anxiety) provoked by the newspaper headlines. Thus, a priori, we did not expect significant findings on our trait anxiety measure but included it as a covariate.

Experiment 1 findings may be taken to indicate that there are no differences between high- and low-anxiety processing of an anxiety-related message. However, such a conclusion would be premature. This is because, even for an anxiety-related message, high- and low-anxiety conditions differ in terms of the antecedents of message elaboration. Whereas low-anxiety participants do not suffer from any capacity decrements, our theorizing suggests that high-anxiety participants are able to engage in high levels of elaboration only because high motivation compensates for their reduced cognitive capacity. Experiment 2 aims to demonstrate that these differences in the antecedents of elaboration for an anxiety-related message lead to significant differences in the type of processing for high-versus low-anxiety conditions (even though the amount of processing does not differ across anxiety conditions).

EXPERIMENT 2

Research based on the Heuristic-Systematic Model (HSM) of persuasion (Chaiken et al., 1989) has examined the nature of processing differences caused by differences in the antecedents of elaboration. According to this model, systematic processing involves active elaboration of message arguments, whereas heuristic processing is a much less cognitively taxing mode in which people focus on heuristics (or simple cues) to form judgments. A central tenet of this model is that heuristic processing can co-occur with systematic processing and exercise interdependent effects on persuasion (Chaiken & Maheswaran, 1994; Maheswaran & Chaiken, 1991). In

one instance of such interdependence, Chaiken and Maheswaran (1994) found that under conditions of high message involvement, the valence of a heuristic cue (source credibility) biased the direction of systematic processing such that the credible source led to more positive attitudes than did the noncredible source. The heuristic cue exercised this impact on persuasion even though the amount of message elaboration was high, indicating systematic processing.

Chaiken et al. (1989) suggested that such biased processing is particularly likely to occur if high motivation is accompanied by lowered cognitive capacity. Under such conditions, even though message recipients are highly motivated to engage in processing, they lack the ability "to confidently judge the intrinsic validity of persuasive arguments" (Chaiken et al., 1989, p. 245). Therefore, a cue that is easily processed can bias the systematic processing that is induced by high motivation. Such conditions (high motivation and low ability) were present in the Chaiken and Maheswaran (1994) study, in which high motivation was operationalized through high involvement and low processing ability was induced via participants' unfamiliarity with the message topic. Our research suggests that high motivation and low ability conditions also are present when high-anxiety participants process an anxiety-related message. In such a context, the valence of a simple heuristic (or cue) that sets up evaluative expectations of the message content (e.g., a valenced message headline) should bias message elaboration for high-anxiety participants but not for low-anxiety participants.

In addition to high involvement and low capacity, a third factor needs to be present for the biasing effect to be observed (Chaiken et al., 1989; Chaiken & Maheswaran, 1994). The message should be sufficiently ambiguous in nature so that the output of systematic processing can actually be interpreted in various ways, depending on the valence of the heuristic cue. If the message content is unambiguous (e.g., a very strong message or a very weak message), recipients will be able to confidently judge the intrinsic validity of the message and the heuristic cue is unlikely to exercise any biasing effect (Chaiken & Maheswaran, 1994).

Experiment 2 compares message elaboration and resultant persuasion for high-versus low-anxiety participants in the context of an anxiety-related ambiguous message. We predict similar amounts of elaboration for high- and low-anxiety participants but expect that the type of elaboration (and consequently persuasion) will differ. Biased elaboration will be reflected in the content of systematic processing (i.e., interpretation of message claims) such that these interpretations will be biased in the direction of the heuristic cue for high- (but not low-)

anxiety participants. As a result of such biased processing, the cue should influence postmessage attitudes for high-anxiety participants but not for low-anxiety participants.

Overview

This experiment utilized a 2 (anxiety level: high vs. low) \times 2 (message headline cue valence: positive vs. negative) between-subjects design and an ambiguous, anxiety-related message. At the time of the experiment (March 1998), Southeast Asia was going through a major economic recession that had important implications for the job prospects of participants in our subject pool of Hong Kong undergraduate business students. We exploited this situation and manipulated state anxiety prior to message exposure by presenting participants with fictitious newspaper headlines that painted a pessimistic (optimistic) picture of the economy's impact on the job market. Given our focus on the processing of an anxiety-related message, the message to be processed also concerned job prospects. The message theme was deliberately chosen to have a high degree of intrinsic relevance to our participant population. In contrast, the message used in Experiment 1 was low in personal relevance. Because intrinsic personal relevance itself contributes to message involvement, it is possible that processing was quite low even in the low-anxiety condition in Experiment 1. This may have facilitated our key result that high-anxiety participants engage in as much processing as low-anxiety participants. By studying the processing of an anxiety-related message that also was high in intrinsic relevance, Experiment 2 sought to address this concern.

Manipulations

Anxiety. Two stages of pretesting were undertaken to select appropriate "newspaper headlines" for the low- and high-anxiety conditions. In the first stage, 17 participants were exposed to a set of (fictitious) positively or negatively valenced newspaper headlines relating to the impact of the economic crisis on local job prospects. Negative headlines warned of the negative consequences of the economic crisis (e.g., "IMF reforms will hurt regional job markets") whereas positive headlines alleviated worry about job prospects (e.g., "IMF reforms will help regional job markets"). Participants were asked to rate each headline for how positive or negative it made them feel about their own job prospects, on a scale from 1 (*makes me feel negative*) to 7 (*makes me feel positive*). Significant differences between the positive and negative versions were obtained on seven of the headlines used in this stage (all p 's $< .05$). In the second stage of pretesting, participants ($n = 40$) read and rated the set of headlines (all positive or all negative) on clarity and then

reported how they felt reading the headlines. These responses were recorded on three 7-point scales (*not at all anxious/very anxious*, *not at all nervous/very nervous*, *not at all uncomfortable/very uncomfortable*, $\alpha = .87$). Analysis of the scale revealed that the negatively valenced headlines induced more anxiety ($M = 4.60$) than the positively valenced headlines ($M = 3.17$), $F(1, 38) = 14.82$, $p < .01$.

Message headline cue valence. The message to be processed (see below) was presented as a newspaper extract reporting findings from a Hong Kong survey on the link between students' undergraduate specializations and career prospects. The headline was presented in a bold and bigger font than the extract itself, and its valence served as the cue manipulation. In the negative (positive) condition, the headline stated, "Undergraduate Business Degree Leads to Poor (Excellent) Career Prospects." A pretest confirmed that participants were more likely to expect a positive message on job prospects when they saw the positive headline ($M = 5.55$) as compared to the negative headline ($M = 2.45$, 7-item scale), $t_{diff}(9) = 3.23$, $p < .05$.

Stimuli

All participants received an ambiguous message containing details of a (fictitious) Hong Kong survey on the link between an undergraduate business specialization and career prospects. Following Chaiken and Maheswaran (1994), the ambiguous message contained positive arguments (i.e., information suggesting that a business degree led to favorable career prospects) on two important attributes (job availability and starting salaries) and one unimportant attribute (French survey results). Similarly, negative arguments (i.e., information suggesting that a business degree does not lead to favorable career prospects) were also presented on two important attributes (job performance records and promotion prospects) and one unimportant attribute (engineering students' opinions). To make the arguments more concrete, the business degree was compared with an engineering degree on most of the arguments presented. For example, a positive argument relating to job availability (an important attribute) indicated that "students with undergraduate degrees in business administration have 60% more choices available to them when they finish their programs, as compared to students with degrees in other areas such as engineering."

The important and unimportant attributes used to construct the message were identified on the basis of a pretest. Twenty participants rated 10 attributes on the following 7-point scale: "If you were asked to judge the link between an undergraduate business degree and job prospects in Hong Kong, how much importance would you give to each of the following pieces of information

when making your judgment?" All three important attributes used in the ambiguous message received importance scores greater than 4.8, whereas all three unimportant attributes received scores less than 3.4 (all p s < .05).

Pilot Study

The goal of this study ($n = 116$) was to confirm that both high- and low-anxiety participants would engage in similarly high amounts of processing for the message topic discussed above. A direct test of amount of processing can be provided by observing differences in attitudes obtained by unambiguously strong versus unambiguously weak messages (Chaiken, 1980; Petty & Cacioppo, 1986). If high- and low-anxiety participants engage in systematic processing (i.e., high elaboration), both groups should be more persuaded by a strong message as compared to a weak message. Furthermore, this advantage of a strong message (over a weak one) should not differ between the two groups. Finally, if high levels of elaboration prevail, postmessage attitudes should primarily be influenced by the message content and not by a peripheral cue such as the valence of the message headline.

Headline cue valence (positive/negative), anxiety level (high/low), and message strength (unambiguous strong/unambiguous weak) were manipulated between subjects. The strong (weak) message was created by presenting positive (negative) information on important attributes and negative (positive) information on unimportant attributes (Chaiken & Maheswaran, 1994). Analyses of postmessage attitudes revealed only a main effect of message strength, $F(1, 108) = 6.11, p < .05$, with the strong message producing a more favorable attitude ($M = 4.20$) than the weak message ($M = 3.69$). The interaction of message strength and anxiety level was not significant ($F < 1$), indicating that message elaboration did not differ across levels of anxiety. Furthermore, as would be expected under conditions of high elaboration, cue valence had no effect on attitudes, $F(1, 108) = 1.22, p > .26$, and did not interact with the other factors. These results are consistent with the premise that high- and low-anxiety participants both engaged in substantial amounts of systematic message processing. Finally, also supportive of the notion that anxiety did not lead to differences in amount of processing, there were no main or interaction effects of anxiety on the number of message-related thoughts (M s high anxiety = 4.17, low anxiety = 3.88), $F = 1.13, p > .29$, or on open-ended message recall (M s high anxiety = 2.25, low anxiety = 2.33), $F < 1$. The main experiment uses an ambiguous message to test the proposition that high- and low-anxiety participants are likely to differ in the type of processing that they undertake, even if they display equal amounts of processing. Specifically, this experiment seeks to demonstrate

that the output of systematic processing for an ambiguous message is biased by cue valence under high-anxiety conditions.

Main Study Procedure

Following the same procedure as in Experiment 1, participants ($n = 83$) were exposed to the anxiety headlines in the first stimulus booklet and rated the headlines on clarity. A second stimulus booklet was then handed out as an experiment on "newspaper extract comprehension." The first page of this booklet contained the ambiguous version of the message, consisting of six bulleted items of information (purportedly taken from a survey) on the link between undergraduate specializations and job prospects in Hong Kong. After reading the extract, participants indicated their degree of agreement (1 = *disagree*, 7 = *agree*) with the following two attitudinal statements: (a) A business degree is better than other specializations in terms of job prospects in Hong Kong, and (b) Completing a business degree in Hong Kong will lead to good job prospects. An index of issue attitude was computed as the mean of these two responses ($r = .54$). The attitude analyses were conducted on this index; however, identical results were obtained when the individual scale items were used as the attitudinal measure. Following these scales, participants were asked to write down the thoughts they had while reading the extract. These thoughts were coded into two categories: message-relevant and message-irrelevant. The next page contained an open-ended recall measure in which participants were asked to write down everything they could remember from the survey. The recall protocols were coded for the total number of claims correctly recalled from the message as well as the valence of the recalled information. Next, participants' reactions to the six specific items of information presented in the message were probed by asking them how well these specific claims supported the overall theme of good job prospects for Hong Kong business graduates (for a similar measure, see Liberman & Chaiken, 1992). For each item of information (e.g., information about job availability), participants were asked to indicate their level of agreement with the assertion that, according to that piece of information, "Hong Kong business graduates have good job prospects as compared to graduates who have specialized in other areas." Responses to these 7-point scales (1 = *disagree*, 7 = *agree*) reflected participants' interpretations of specific message arguments and served as an indicator of the type of processing. If attitudes are formed on the basis of systematic message processing, a high correlation should be obtained between these attitudes and message claim interpretations (Liberman & Chaiken, 1992; Miniard, Bhatla, Lord, Dickson, & Unnava, 1991).¹

TABLE 2: Results: Experiment 2

| | Low Anxiety | | High Anxiety | |
|------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Negative Cue | Positive Cue | Negative Cue | Positive Cue |
| Recall | 2.22 _a (1.13) | 2.16 _a (1.30) | 1.90 _a (1.09) | 2.15 _a (1.39) |
| Attitude | 4.26 _a (1.21) | 3.89 _a (1.19) | 3.67 _a (1.14) | 4.48 _b (0.90) |
| Processing index | 4.28 _a (0.64) | 4.22 _a (0.88) | 3.80 _a (0.86) | 4.29 _b (0.62) |

NOTE: Standard deviations are in parentheses. Means within each anxiety condition with different subscripts are significantly different from each other at $p < .05$.

After responding to the agreement measures, participants were asked to indicate message involvement on a 7-point scale measuring how carefully they had read the survey (1 = *not at all carefully*, 7 = *very carefully*). This measure was followed by the 17-item measure of trait anxiety. As in Experiment 1, trait anxiety did not affect the results and is not discussed further. Finally, participants were debriefed and dismissed. Unlike Experiment 1, Experiment 2 did not measure headline-induced anxiety in the main study because of concerns that anxiety measurement might affect actual levels of felt anxiety.

Results and Discussion

Analyses were conducted in the context of a 2 (anxiety level: high vs. low) \times 2 (message headline cue valence: positive vs. negative) ANOVA. Means by condition are listed in Table 2.

Manipulation checks. Both high-anxiety ($M = 5.58$) and low-anxiety participants ($M = 5.40$) reported that they read the extract quite carefully, $F < 1$, indicating that high-anxiety and low-anxiety participants engaged in high amounts of processing.

Message-relevant thoughts. High-anxiety participants ($M = 3.83$) and low-anxiety participants ($M = 3.50$) did not differ in terms of the number of message-relevant thoughts, $F = 1.01$, $p > .30$, once again suggesting similar amounts of elaboration across anxiety conditions. All other effects on the number of thoughts also were nonsignificant.

Open-ended recall. Research based on the levels of processing framework (Craik & Lockhart, 1972) and associative network models of memory (Anderson, 1990) suggests that greater cognitive elaboration should lead to greater recall. Consistent with this perspective, persuasion research has obtained significant support for the positive impact of elaboration on message recall (Cacioppo, Petty, & Morris, 1983; Chaiken, 1980; Haugtvedt & Petty, 1992), particularly when recall is measured soon after message exposure (as was done in the current study). Thus, if anxiety led to differences in the amount of elaboration, we would expect differences in message recall across anxiety conditions. However, high-anxiety participants ($M = 2.02$) and low-anxiety

participants ($M = 2.19$) did not differ in terms of message claim recall ($F < 1$), suggesting that anxiety did not influence the amount of message elaboration (see also Eagly & Chaiken, 1993; Hastie & Kumar, 1979; Wyer & Srull, 1989). Valence of recall also did not differ by anxiety condition, with high-anxiety ($M = 0.12$) and low-anxiety participants ($M = 0.05$) reporting similar amounts of net positive recall, $F < 1$. All other effects on these recall measures also were nonsignificant.

Attitudes. Analysis on the crucial postmessage attitude index revealed only the expected significant interaction of anxiety level and cue valence, $F(1, 79) = 5.67$, $p < .05$. Planned contrasts showed that cue valence did not exert a significant impact on attitudes for low-anxiety participants (positive headline $M = 4.26$, negative headline $M = 3.89$), $F(1, 79) = 1.11$, $p > .29$. As predicted, however, cue valence had a significant impact on postmessage attitudes for high-anxiety participants, $F(1, 79) = 5.33$, $p < .05$, with the positive headline leading to more favorable attitudes ($M = 4.47$) as compared to the negative headline ($M = 3.67$).

According to our theory, the heuristic cue actually exerted an impact on the content of systematic processing (e.g., interpretation of specific message claims) en route to influencing attitudes under high anxiety. To explore this possibility, we examined participants' reactions to specific message claims under conditions of high anxiety. If the effect of the cue on high-anxiety attitudes was mediated by careful processing of message arguments, the cue should have also exerted an impact on participants' interpretations of these claims (Liberian & Chaiken, 1992; Miniard et al., 1991). A message-processing index was computed by summing the responses to the scales that measured participants' reactions to each of the specific message claims. Higher scores on the processing index reflect greater agreement with the premise that the message claims indicated favorable job prospects for business graduates, that is, higher scores represent a more positive interpretation of message claims. Because agreement with the final message claim (regarding long-term job prospects) was poorly correlated with agreement with the other five claims ($r = .17$), this scale item was excluded from the index; however, its inclusion did not change any of the results reported below.

As expected, under high anxiety, cue valence exerted a significant impact on the processing index, $F(1, 39) = 4.34$, with higher scores (more positive interpretation) being reported in the positive cue ($M = 4.29$) compared to the negative cue ($M = 3.80$) condition. In keeping with the pattern of attitude results, cue valence did not influence the processing index under conditions of low anxiety (M s: negative cue = 4.28, positive cue = 4.22), $F < 1$, *ns*.

Mediation analysis with the processing index as the mediator of the cue effect on attitudes was used to test the proposition that biased systematic processing was responsible for the attitudinal effect of the cue under high-anxiety conditions. This analysis was carried out for the high-anxiety participants and involved testing for a significant link between the processing index and attitudes and diminution of the significant impact of message headline cue valence on attitudes when the processing index is included in the model (Baron & Kenny, 1986). As expected, the processing index was found to produce a significant impact on postmessage attitudes, $F(1, 39) = 14.44$, $p < .001$. Inclusion of the processing index as a mediator of cue effects in the attitude analysis reduced the impact of the cue on attitudes to nonsignificance, $F(1, 39) = 2.69$, $p > .10$, as compared with the significant cue effect when the processing index was not included, $F(1, 38) = 6.3$, $p < .05$. These analyses indicate that the headline cue did not have a direct effect on postmessage attitudes under conditions of high anxiety; rather, its effect was mediated by biased processing of message claims.

One limitation of this mediation analysis is that the processing index was measured after attitudes and, hence, may have been influenced by attitudes. It may be argued that high-anxiety participants actually engaged in peripheral processing, with attitudes being directly affected by the headline cue. These attitudes could then have affected the processing index. Such a pattern of results also would be consistent with the analysis above. However, this conclusion requires the assumption that high-anxiety participants engaged in a lower amount of processing than low-anxiety participants. Several of our findings regarding the amount of elaboration across anxiety conditions refute such an argument. As mentioned earlier, both high- and low-anxiety participants reported processing the message carefully, and there were no differences in message-evoked thoughts and message recall for the two sets of participants. Finally, as reported earlier, attitude, thoughts, and recall results from the pilot study strongly support the position that high-anxiety and low-anxiety participants both engaged in high levels of elaboration. Given the substantial evidence for the existence of similar amounts of systematic processing under low- and high-anxiety conditions, the significant effect of the cue on high-anxiety attitudes

appears to be a result of biased systematic processing rather than peripheral processing.²

Specifically, high-anxiety participants in this study seem to have used the valence of the message headline to disambiguate message claims. They interpreted ambiguous claims more positively when the headline was positive (vs. negative). These findings parallel earlier research documenting the biasing effect of a cue on systematic processing (Chaiken & Maheswaran, 1994) and support our premise that high-anxiety processing for an involving message is determined by high motivation but low ability. Under low-anxiety conditions, on the other hand, where cognitive deficits are not expected to occur, message processing and attitudes were not influenced by the headline cue.

So far, we have theorized that message processing for high-anxiety participants in this experiment was subject to a cognitive bias (induced by cue valence); however, it is not unreasonable to expect that anxiety should lead to motivationally biased processing. As an anonymous reviewer pointed out, high-anxiety participants may seek out information that alleviates their anxiety and avoid other information. First, the recall of positive information contained in the message did not differ between high- and low-anxiety conditions. Second, a general motivational bias to hold self-serving beliefs (Lieberman & Chaiken, 1992) would be manifested in a main effect of anxiety on postmessage attitudes such that high- (vs. low-) anxiety participants hold more favorable attitude toward the business specialization, irrespective of cue valence. As reported earlier, such a main effect was not obtained. Rather, we found a significant interaction of anxiety and cue valence, a pattern more consistent with our proposed process mechanism involving the cognitive bias induced by the headline cue. One reason why motivational bias may have been less likely to occur in the current research as compared to that of Liberman and Chaiken (1992) has to do with the relatively moderate levels of anxiety that were evoked in our studies. Consistent with this premise, Eagly and Chaiken (1993; see also Chaiken et al., 1989) suggested that motivationally biased processing is only likely to be observed under conditions of high fear.

GENERAL DISCUSSION

Contrary to previous empirical work on the effects of anxiety, high levels of anxiety need not always deter cognitive activity. Enhanced motivation to process can compensate for deficits in cognitive capacity induced by high anxiety. Such a compensatory effect was demonstrated in the case of messages that are related to the source of anxiety and are personally relevant to participants. However, motivational compensation for reduced cognitive capacity comes at a price. Capacity pressures may cause

heuristic cues in the message to bias the systematic processing of message arguments, thus producing an effect on attitudes as well.

The bias findings in Experiment 2 are particularly interesting in light of the relative dearth of such findings in the extant literature. Research based on the HSM makes the general point that heuristic processing and systematic processing may occur simultaneously and interact with each other. A substantial amount of evidence has been found for two such processes—one whereby attitudes are additively affected by the effects of heuristic as well as systematic processing and another whereby the effects of heuristic processing are attenuated by those of systematic processing (Aaker & Sengupta, 2000; Maheswaran & Chaiken, 1991; Maheswaran, Mackie, & Chaiken, 1992). Chaiken et al. (1989) pointed out the possibility of a third type of interactive processing, whereby heuristic processing biases the output of systematic processing. However, apart from the current findings, and those of Chaiken and Maheswaran (1994), this type of interaction does not appear to have been documented elsewhere. It has been argued (Chaiken et al., 1989) that this lack of evidence for biasing effects may be a result of the fairly narrow conditions that are necessary to observe such effects. These conditions include high motivation (required for systematic processing), reduced capacity (which enhances heuristic processing), and an ambiguous message that lends itself to more than one interpretation. The heuristic cue is then used to disambiguate message information, as observed in the high-anxiety conditions in Experiment 2.

Our findings for the anxiety-related message (in terms of amount as well as type of processing) represent the major contribution of this research. In addition, results obtained for the anxiety-unrelated message in Experiment 1 extend earlier findings on high-anxiety-related deficits to the context of message elaboration and comprehension. These findings seem to contradict some results obtained in the mood literature. Bad mood generally produces greater processing and heightened elaboration as compared to a good or neutral mood (Mackie & Worth, 1989; Schwarz, Bless, & Bohner, 1991). Anxiety may be thought of as a type of bad mood (Foa, McNally, & Murdock, 1989). However, research on anxiety effects (including the current work) has consistently found that high (vs. low or neutral) anxiety reduces cognitive capacity and diminishes elaboration. Future research is needed to resolve this discrepancy. One such resolution may be based on the mood management perspective, which suggests that the message topic itself may influence whether a happy mood leads to greater or less processing than a sad mood (Wegener, Petty, & Smith, 1995). This notion is consistent with our findings and

represents an opportunity for future research interested in reconciling some of the findings in the mood literature.

NOTES

1. Prior research in this area (Chaiken & Maheswaran, 1994) has documented systematic processing by checking for the mediating impact of attribute-related thoughts (as distinct from cue-related thoughts). However, pilot testing revealed that the particular cue (message headline valence) that was used in the current experiment was not distinct enough for thoughts to be separated into claim-related thoughts versus cue-related thoughts, thus precluding the use of a thoughts-based mediating factor. Accordingly, the claims-interpretation measure was used instead (see Liberman & Chaiken, 1992; Miniard, Bhatla, Lord, Dickson, & Unnava, 1991, for similar analyses).

2. As additional support for our position, we also carried out analyses of message-induced thoughts and message recall on the pooled data set resulting from the pilot study and the main study. These analyses were run in the context of a 2 (high/low anxiety) \times 2 (unambiguous/ambiguous message) \times 2 (positive/negative cue) ANOVA. As expected, there were no significant effects for any of these factors on overall thoughts and recall, suggesting that the amount of processing was similar across conditions. Taken in conjunction with the pilot findings that provided fairly strong support for systematic processing, even for high-anxiety conditions (significant effect of argument strength on attitudes, no effect of cue), this result further bolsters the claim that high anxiety in the main study did not lead to lowered processing. The means for total thoughts and recall for the pooled data set across anxiety conditions are provided here as a matter of interest: thoughts (high anxiety = 4.03, low anxiety = 3.71), recall (high anxiety = 2.16, low anxiety = 2.27).

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