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ABSTRACT

The purpose of this study is to integrate categorical and dimensional approaches to emotion and examine both the effects of emotional type and of the emotional dimensions of valence and arousal on memory for television messages. Subjects, 105 freshmen and sophomore communication students at a Western university participating in the experiment for extra credit, were exposed to four news stories containing counterbalanced presentations of emotion (disgust, anger, fear, none) and story subject in a mixed 4x4 design. Dependent variables were subjective evaluation of arousal and valence, and free recall of the news stories. Results indicate that different emotion types differ significantly on ratings of arousal and valence and on memory for stories. Results also indicate a significant main effect for story subject on valence and story subject on memory. The finding that an interaction between story topic and emotion type on the memory data suggests that both arousal of the story topic and arousal of the emotion type combine to determine how well a story is remembered. (Contains 28 references, and three tables and two figures of data.) (Author/RS)

Categorical and Dimensional Theories of Emotion: How they predict memory for Television Messages

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The purpose of this study is to integrate categorical and dimensional approaches to emotion, and to examine both the effects of emotional type and of the emotional dimensions of valence and arousal on memory for television messages. Subjects (n=105, undergraduates) were exposed to four news stories containing counterbalanced presentations of emotion (disgust, anger, fear, none) and story subject in a mixed 4X4 design. Dependent variables were subjective evaluation of arousal and valence, and free recall of the news stories. Results indicate that different emotion types differ significantly on ratings of arousal and valence and on memory for stories. Also, a significant main effect for story subject on valence and story subject on memory was found. Finally, an interaction between story topic and emotion type on the memory data, suggests that both arousal of the story topic and arousal of the emotion type combine to determine how well a story is remembered.

Categorical and Dimensional

Theories of Emotion:

How they predict memory for Television Messages

A majority of the messages watched on television contain some element of emotion. Some are pleasant and some are unpleasant. Many are exciting or arousing, while others are calm and serene. Often when viewers watch television, they describe the emotions they experienced while watching: "I was frightened," "I was happy," "I wanted to cry." This aspect of emotion relates to how the messages make subjects feel. Sometimes these emotions are not related to the content of the message, but rather to the occurrence of the message: "I hate game shows," "News is boring," "I can't stand that actor," and "If I ever see this commercial again I'll scream."

Years of research in psychology and mass communication indicate that emotion affects how messages are processed (Zajonc, 1984; Thorson & Christ, 1992; Thorson & Friestad, 1989; Tan, 1986; Reeves, Newhagen, Maibach, Basil, & Kurz, 1991; Reeves, Lang, Thorson, & Rothschild, 1989; Frijda, 1988; Lang & Friestad, 1993; Lang, Newhagen, Miller, Strickwerda & Reeves, 1993). Many lines of research investigating the effects of advertising, broadcast news, public service announcements, and political commercials have attempted to assess the impact of viewers' emotional responses to these messages on viewers' memory for the messages, attitudes toward the messages, and behavioral responses to the messages. Within this broad area of research on emotional responses to television are a multitude of theoretical approaches to emotion and emotional processing. These theoretical approaches can be placed in one of two major theoretical categories: 1) dimensional approaches to emotion and 2) categorical approaches to emotion.

Dimensional Approaches to Emotion

Psychologists and social scientists conceptualize emotions as having at least two, and sometimes three, underlying dimensions along which the entire range of emotional responses can be arranged (Lang, 1991; Lang, Dhillon, and Dong, 1994; Osgood, Succi, and Tannenbaum, 1957; Russell & Mehrabian, 1977). The two dimensions most often specified are arousal and valence. Arousal is defined as a range from calm to excited. Valence is defined as a continuum from pleasant (positive) to unpleasant (negative). All emotional responses are thought to lie within the two-dimensional emotional space defined by these two dimensions of emotion.

Peter Lang and his colleagues (Lang, P., Bradley, M. & Cuthbert, B., 1990; Lang, P., 1979; Lang, P. & Greenwald, 1985) have developed a measure of these two dimensions of emotion called SAM the self-assessment mannequin. By having subjects view still slides of emotional images (babies, flowers, guns, dead bodies, nudes) and rate them on valence and arousal Lang has developed a set of slides called the International Affective Picture Show. The images in the slide set vary widely on arousal and valence. Subject's rating of the emotions elicited by different types of pictures are plotted into two-dimensional emotional space. For example, dead bodies and guns are rated as negative and arousing, nudes are rated as positive and arousing, beautiful vistas are positive and calm, and cemeteries are negative and calm.

Margaret Bradley and her colleagues have extended this work to assess the impact of the emotional dimensions (valence and arousal) on memory for the slides contained in the slide show. Overall, this work shows that the arousal dimension accounts for the majority of the variance in memory for the slides (Bradley, Greenwald, Petry, and Lang, 1992). Arousing slides are

remembered much better than calm slides both initially and after a delay of several weeks. The valence dimension does not have much impact on memory. To the extent it does affect memory, there is a slight memory advantage for positive slides (when arousal is controlled).

Within communication, this dimensional approach to emotion has been used by Lang, Dhillon, & Dong (1994) to assess the impact of arousal and valence on viewers memory for emotional television messages. They also found that arousal played a large role in memory for the messages. Like Bradley, they also found a slight advantage for positive messages.

Categorical Approaches to Emotion

The second major approach to emotion is the categorical approach. Theorists who use this approach attempt to define categories or types of emotion (Izard, 1977; Plutchik, 1980; Thorson & Friestad, 1989; Friestad & Thorson, 1985; Lang & Sumner, 1990; Lang, 1991). In the communication literature, this approach has been used much more frequently than the dimensional approach. For example, Thorson and Friestad (1989; Friestad & Thorson, 1985)) have used the categories of negative, positive, poignant, and neutral messages to predict memory; overall, they show that poignant messages are remembered best followed by negative, positive, and finally neutral messages.

In the area of political advertising research, messages have been categorized variously as negative and positive, attack, image, or issue; many of these categories include emotional overtones (e.g. Garramone, 1984; Roddy & Garramone, 1988; Christ, Caywood, & Thorson, 1993; Garramone, Atkin, Pinkleton, & Cole, 1990).

Similarly, studies on information campaigns and public service announcements have often

sought to evaluate the effectiveness of various emotional appeals (fear appeals, logical appeals, etc.) on changing viewers' behaviors (Tan, 1986).

Finally, categorical emotional theories have been used when studying the impact of broadcast news. Good news/bad news studies and studies that examine the effect of compelling and emotional video on viewers' memory for the news are good examples in this area. (Newhagen & Reeves, 1992; Lang, Newhagen, Miller, Strickwerda & Reeves, 1993).

One researcher, John Newhagen (1994) takes a categorical approach to studying the impact of negative images on viewers' memory for broadcast news. In a recent paper, he manipulated three categories of negative emotions and measured the impact of those categories on viewers' memory for the news and on their "approach or avoidance" for the news. The three types of negative emotion investigated in this study were disgust, anger, and fear.

Newhagen stated that these three negative emotions vary in terms of their "compellingness" (anger being the most compelling, followed by fear, and finally disgust) and in terms of approach and avoidance, and predicted that subjects would approach news stories that contained anger, followed by fear, and then by disgust. His results supported this prediction with subjects indicating the least "avoidance" response to neutral images, followed by anger, followed by fear, and finally disgust. Memory showed the same pattern with recognition being fastest for anger, followed in order by neutral, fear, and disgust. Newhagen concludes that it is the viewers' approach or avoidance reaction to a discrete emotion (anger, fear, disgust) drives the compellingness of that emotion and determines how the message is processed.

Clearly, there is an underlying similarity to these categorical approaches and the

dimensional approach discussed previously. The major similarity is that many of the categorical approaches use the valence "dimension" to categorize their stimuli (positive - negative). Newhagen uses only discrete negative emotions but one of his dependent variables is approach avoidance which is also very similar to the valence dimension.
In addition, his "compellingness" construct is something like arousal.

This study attempts to integrate the categorical and dimensional approaches and to examine both the effects of emotional category and of the emotional dimensions of valence and arousal on memory for television messages.

If both types of approaches are valid, then memory should be equally well predicted by both models using the same stimuli. Dimensional theories make an attempt to map emotional space, there is an underlying assumption that any emotion can be rated on arousal and valence and placed in its proper position in emotional space. If this is so then emotional types could be rated on arousal and valence and placed in emotional space. If the different examples of an emotion category truly share the same emotion, then they should cluster in emotional space and be separate from the ratings of other categorical emotions. This means that:

H1: Different types of emotion should differ significantly on ratings of arousal and ratings of valence.

Dimensional theories of emotion show that memory is better for arousing messages than for calm messages (Lang, Dhillon, & Dong, 1994). If this is so than when emotional types are rated for arousal, memory should be best for the most arousing emotional types and worst for the least arousing emotional types.

H2: If emotion types are ranked by arousal, memory should be best for the most arousing emotion types and worst for the least arousing emotion types.

To test this Newhagen's (1994) stimulus materials, which present news stories containing images of anger, disgust, or fear, were used. These stimuli were rated by viewers on the arousal and valence dimensions. Then viewers' memory for the messages was measured. This meant that memory could be predicted by category or type of emotion (none, fear, anger, and disgust) or by arousal and valence. In addition, this allows each category of emotion to be placed in emotional space and a determination to be made of whether these categorical types of emotion differ from one another in terms of arousal and valence.

In addition, this provides an opportunity to replicate Newhagen's (1994) findings that memory is best for anger and none followed by fear and disgust.

H3: Memory will be predicted by emotion type such that anger will be remembered best followed by none, fear, and disgust.

Finally, this study allows us to look at both the emotion caused by the emotion type manipulation and the emotion associated with the story topic. Many of the studies using dimensional approaches to emotion use different subjects (babies, weapons, flowers, household objects) to elicit varying levels of arousal and valence. This suggests that topics or subjects have a certain amount of arousal and valence associated with them in spite of any other emotional manipulations that might be included in the production of the stories. To examine this, the following research question is proposed.

Research Question 1: Does the effect of Emotion Type vary for different Story Topics?

Methods

Subjects

Subjects were 105 freshman and sophomore communication students at a Western university participating in the experiment for extra credit.

Stimuli

The stimuli used were those used by Newhagen (1994). Four tapes were created. Each tape has four news stories. Each news story has four versions (disgust, anger, fear, and none). Each tape has one version of each emotion tape and one version of each story. The actual stimulus tape orders are shown in Table 1. The four tapes counterbalance presentation order of emotion and story. Each story is about two minutes in length with the emotional manipulation in the second 30 second period. The images used to create the emotional manipulations were pretested using 7 point likert scales for anger, fear, and disgust (Newhagen, 1994).

Dependent variables

Arousal and Valence were measured using the Self-Assessment Mannequin, SAM (Lang, P. & Greenwald, 1985). This is a non-verbal pictorial scale which has been shown to be both reliable and valid for measuring valence and arousal in varying subject populations in response to emotional slides. These scales translate into nine point scales. The valence scale ranges from negative to positive while the arousal scale ranges from calm to excited.

Memory was measured using a free recall test. Subjects were given four blank pieces of paper and told to write down everything they could remember about the messages they had just seen. Protocols were coded for number of words written and percentage of major journalistic

facts recalled. For each story, coders determined the major people, places, and actions in the stories. Coders coded 1 for each fact mentioned in a protocol. These were summed and converted to a percentage. The intercoder reliability across measures was alpha = .975.

Procedure

Subjects viewed the stimulus materials in class in groups of 16-25. The tape was paused between stories to allow subjects to rate the stories on the arousal and valence scales. Following viewing the class instructor lectured for thirty minutes and then subjects completed a free recall test.

Analysis

The overall design is a mixed Order (4) X Emotion Type (4) repeated measures analysis of variance. The between subjects order represents the different stimulus orders. Across orders, different levels of order represent the four different stories. Emotion type is a within subjects factor and has the four levels none, anger, fear, and disgust. This design was run separately on the four dependent variables arousal, valence, number of words written, and percentage of journalistic facts.

Results

Hypothesis 1

This hypothesis predicts that the different emotion types will differ significantly on ratings of arousal and valence. This hypothesis is tested by the significant main effects for Emotion Type on the arousal ($F(3,297)=6.24$, P,.0004, eta squared = .050) and valence ($F(3,297)=23.46$, $p<.0001$, eta squared = .182) ratings. The means for arousal and valence are shown in Table 1.

Ranking the emotion types by arousal ratings results in Disgust being the most arousing followed by fear, anger, and none. The valence rankings show anger being the most negative followed by fear, disgust and none.

Figure 1 shows the locations in emotional space of each of the four stories for each emotion type and the mean emotion types. While the area covered by the four stories in each emotion type is fairly large, there is very little overlap between the areas. This may suggest that these emotion types do, in fact, have stable locations in emotional space.

Hypothesis 2 and 3

Hypothesis two predicts that memory will be best for the most arousing messages and worst for the least arousing messages. This is tested by ranking the emotion types by their average valence and running a repeated measures analysis of variance on the memory data (both for words and percentage of journalistic facts). The main effect for Arousal (where the four levels are the four emotion types ranked by arousal) is significant for the words measure ($\underline{F}(3,101)=5.81$, $P<.0007$) but not for the percentage of facts measure ($\underline{F}(3,101)=.27$, $p<.8485$). The means, however, are not in the predicted direction (disgust, fear, anger, none). Rather they show that the most words were written for anger (20.22) followed by none (19.914), disgust (18.695) and fear (16.438).

This order is much closer to the order predicted by hypothesis 3 which predicts that if these findings replicate Newhagen (1994), the order should be anger, none, fear, disgust.

Research Question 1

This research question asks whether the story topic alters the effect of emotion type on

arousal, valence, and memory. To investigate this question, a repeated measures analysis of variance was run using Story as the independent variable and collapsing across emotion types on all three dependent variables (valence, arousal, and memory). The main effect for Story on arousal is not significant ($F(3,297) = .99$, $p<.3989$). The stories do not differ significantly on arousal collapsed across emotion type. The main effect for Story on Valence is significant ($F(3,.300)=8.38$, $p<.0001$, eta squared = .068) and the means are shown in Table 2. The main effect for Story on memory is also significant ($F(3,300)=32.91$, $p<.0001$).

Major interactions with order are shown for all the Story and Emotion type analyses described above. The interaction is shown in Figure 1. This figure shows the percentage of facts recalled for each story in each emotion condition. Looking at this figure there is a very different pattern of results across emotion types. For the two arousing emotion types (fear and disgust) there are no significant differences in memory for the four stories. However, for the non-arousing emotion types, anger and none, there are large and significant differences between the four stories. The two arousing stories (fire and L.A. riots) are remembered significantly better than the less arousing stories (Somalia and Desert Storm).

Discussion

The pattern of results demonstrated here suggests that both categorical and dimensional theories of emotion may be useful for understanding how people process and remember television messages. The findings suggest that categorical emotion types do occupy distinct and separate areas in dimensional emotional space. Further, memory for the messages seems to be in the direction predicted by Newhagen (1994) replicating his findings. Average arousal for the

emotional types does not predict memory as was predicted by dimensional emotional theory.

However, when the emotional arousal of the story topics is considered at the same time as the arousal level of the emotional types, a different story emerges. Then it appears that if the emotion type is arousing then story topic does not affect memory. However, if the emotion type is not arousing, then the greater the arousal associated with the story topic, the better a viewer's memory for the story is.

Future research on emotion and television viewing may want to consider both how dimensional variation in arousal and valence affect the processing of television messages and how that dimensional variation interacts with the type of emotion being processed. Further, even though the effects of both emotional dimensions and categorical emotion types can be seen collapsed across different messages, the emotion associated with the topic of the story is also having an effect. This suggests that future work on television and emotions should consider three different types of emotion when investigating the effects on processing. The three types of emotion that need to be assessed independently are: 1) the emotions (categorical or dimensional) felt by the viewer while watching; 2) the emotions (categorical or dimensional) expressed by the actors in the message, and ; 3) the emotions associated with the topic of the message.

It is likely that each of these has a different impact on memory for the messages. Understanding how emotions felt by viewers, expressed by actors, and associated with topics all combine to determine what is remembered from a message can help us understand better how people respond to emotional television messages.

Table 1: Arousal and Valence Ratings by Emotion Type

Emotion	Arousal	Valence
Disgust	4.641	7.067
Fear	4.767	7.298
Anger	5.311	7.352
None	5.427	5.894

Arousal is measured on a nine point scale where one is very aroused and nine is very calm. Valence is measured on a nine point scale where one is positive, five is neutral, and nine is negative.

Table 2: Story by Valence

Story	Valence
Fire	7.505
LA	6.894
Somalia	6.385
D. Storm	6.829

Table 3: Story by Memory

Story	Percent Memory
Fire	.4571
LA	.4238
Somalia	.3079
D. Storm	.2613

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Figure 1: Emotion types located in two dimensional emotional space.

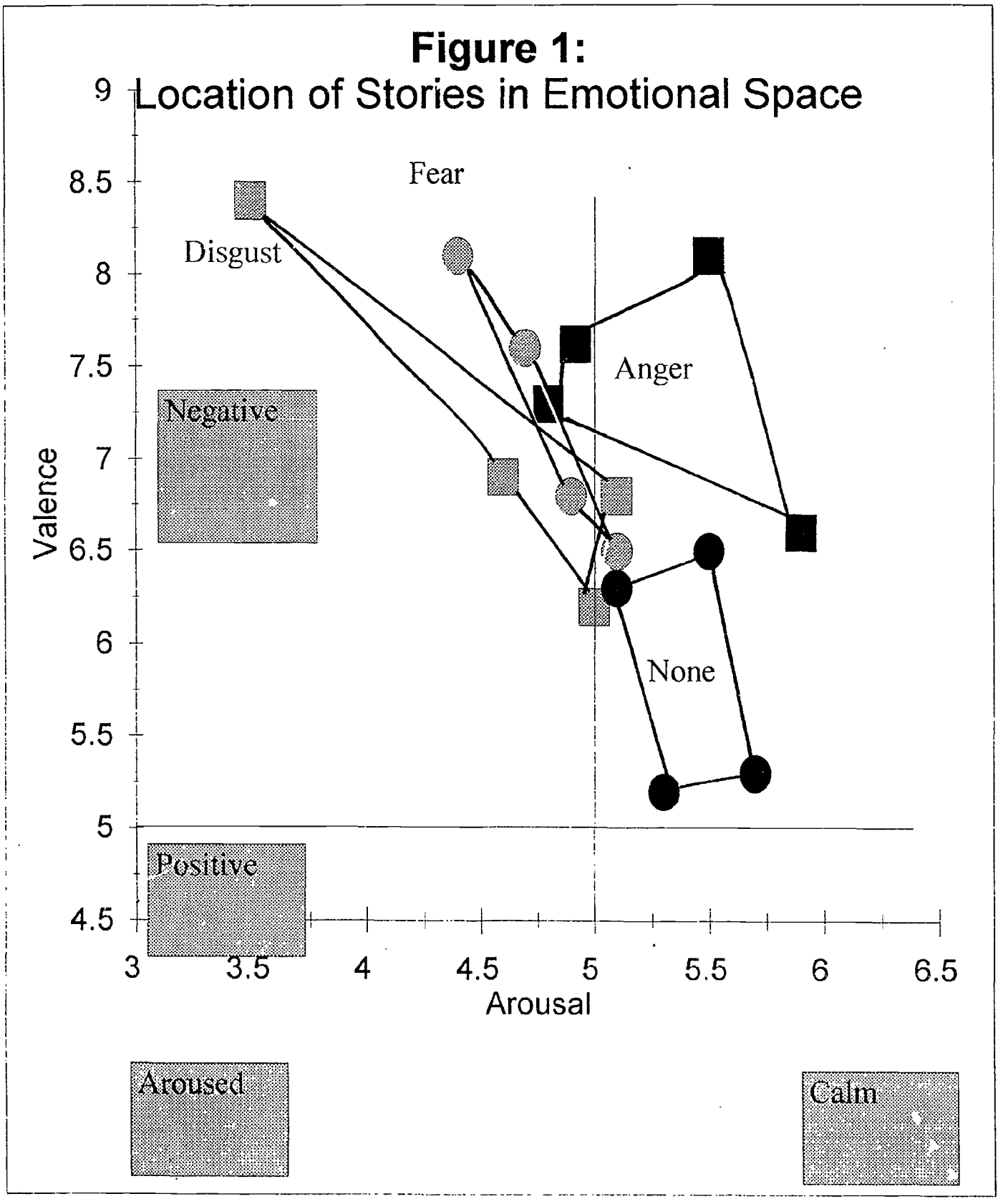
Figure 1:
Location of Stories in Emotional Space
Fear
Disgust
Anger
None
Negative
Positive
Aroused
Calm
Valence
Arousal
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
3
3.5
4
4.5
5
5.5
6
6.5

Figure 2: The interaction of emotion elicited by the story topic and emotion elicited by the emotion category on memory for television.

Figure 2:
Memory by emotion Type and Story