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Fictional characters' emotional state representation: What is its degree of specificity?

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Story events are a psychological cause of emotional reactions, which in turn, motivate subsequent actions. This study addresses the degree of specificity of readers' inferences about fictional characters' emotions. In Experiment 1 (off-line), participants read short stories and selected the emotional term that was more consistent with the protagonist's emotion. Results indicated that participants tended to favor the specific emotional word. In Experiment 2 (on-line), reading times were longer when a target sentence described the protagonist in an emotional state that differed in family from the adequate emotional state, but belonged to the same class and valence of emotions, but no differences were found between emotions belonging to the same family. Overall, these results indicate that emotional inferences are more specific than valence and class, but not specific enough to differentiate subtleties within a family of emotions.

La representación de estados emocionales de personajes de ficción: ¿cuál es su grado de especificidad? Los acontecimientos de una narración son causa psicológica de reacciones emocionales, que a su vez motivan acciones subsiguientes. El presente estudio se centra en el grado de especificidad de las inferencias de los lectores acerca de las emociones de personajes de ficción. En el Experimento 1 (off-line) los participantes leían relatos breves y seleccionaban el término emocional más adecuado para designar la emoción del protagonista. Los resultados mostraron que los participantes tendían a elegir la palabra que designaba la emoción específica. En el Experimento 2 (on-line) no hubo diferencia en los tiempos de lectura de oraciones que mencionaban estados emocionales pertenecientes a una misma familia de emociones; los tiempos de lectura fueron, en cambio, significativamente mayores para oraciones que mencionaban un estado emocional de la misma valencia que el adecuado, diferente por pertenecer a una distinta familia de emociones dentro de la misma clase general. Estos resultados muestran que las inferencias emocionales son más específicas que una mera valencia y clase de emociones, pero no tan específicas como para diferenciar sutilezas dentro de una misma familia de emociones.

Text comprehension requires the construction of a coherent mental representation, integrating text information with previous knowledge. Extensive research has addressed the processes involved in inference generation, as well as the nature of the information that is activated and encoded (Graesser, Singer, & Trabasso, 1994; van den Broek, 1994). Several studies have suggested that the emotional states of characters need not be stated explicitly: readers can infer them as a consequence of the narrative situation, characters' goals, actions, and relations to other characters. The taxonomy of causal inferences proponed by van den Broek, Fletcher, and Risden (1993) focuses on the relation, at any given point in the text, among a focal sentence and its causal antecedens and posible consequences. Gernsbacher, Goldsmith and Robertson (1992) demonstrated that, after reading short stories about an emotional situation, readers took longer to read a sentence describing the protagonist experiencing an emotion («X felt…») incongruent with the situation, than to read sentences consistent with the expected emotion. About this, Gernsbacher (1995) proposes that readers' knowledge about emotions is acquired through personal experiences, and through the reading of narratives. That is, when participants faced similar situations than the ones described in a narrative, they experienced emotional reactions. These emotional reactions became memory traces. When reading about similar situations, these memory traces are activated, and brought upon the processing of the text. De Vega, León and Díaz (1996) replicated Gernsbacher et al.'s results. They presented subjects not only with sentences involving an emotional label, but also with sentences describing behaviors which implicitly reflected emotional states. Reading times for a sentence describing an emotional behavior (e.g. «Arthur approached the girl, unsteady on his feet, without looking at her») were longer when that behavior was not congruent with the inferred emotion, than when the behavior was congruent with the inferred emotion. In addition, when the situation and its emotional consequences

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changed, readers inferred that characters had modified their emotional state.

In order to explore whether readers' emotional inferences are more specific than merely a valenced state, Gernsbacher et al. (1992) measured reading times for sentences containing congruent and incongruent emotional terms with the same valence (e.g. guilty-shy). Their selection of emotion words was guided by Frijda's theory (1986). They found significantly longer reading times for emotional words that were incongruent with the situation, but shared the same positive or negative valence. These findings led to the conclusion that emotional inferences are specific (De Vega et al., 1996; De Vega, Díaz, & León, 1997; Gernsbacher, Hallada, & Robertson, 1998).

Gygax, Oakhill, and Garnham (2003) questioned the idea that readers make specific inferences about characters' emotions. They proposed that the experimental texts used in previous research provided broad emotional information, compatible with more than one specific emotion. In order to overcome these limitations, they asked participants to read Gernsbacher et al.'s (1992) texts, and carry out a sentence completion task following each story: «[Main character] felt…». A second group was asked to rate the likelihood of the protagonist feeling these emotions, and some from Gernsbacher et al.'s opposite valence emotional terms. They found that, for each story, there were at least three words that did not differ significantly from the emotions generated by subjects in Gernsbacher et al.'s study, suggesting that there was a range of emotional terms compatible with each story (e.g. content, relaxed, happy, calm, unstressed…). In a second study, they measured reading times for critical sentences describing the protagonist's emotions («[Main character] felt…»). There were four conditions: specific emotion (an emotional word taken from Gernsbacher et al.'s study, e.g. depressed), matched synonym (the emotional term that more closely matched the former, e.g. miserable), matching similar (an emotional term differing in several dimensions, but rated likely in the previous experiment, e.g. useless), and mismatching (Gernsbacher et al.'s opposite emotion term, e.g. happy). Reading times for the specific emotion, matched synonym, and matching similar conditions did not differ significantly, but they all had significantly faster reading times than the mismatching condition. In conclusion, Gygax et al. (2003) placed emotional inferences at the *some components* level. That is, emotional inferences would be more specific than valence, but readers would not infer all the subcomponents necessary to define specific emotions.

In a follow up study, Gygax, Garnham, and Oakhill (2004) explored the idea that giving more information about the emotional situation would lead to more specific emotional inferences. If emotions are a product of appraisal, adding contextual information should consistently lead to the generation of the same emotional inference among subjects. To test this, participants were presented with the same short emotional stories as before (Gygax et al., 2003), and with longer versions. They found that subjects reached consistently more agreement in their choice of an emotional word (e.g. callous) or its synonym (e.g. stressed), over a similar emotional word (e.g. angry), or a mismatching word (e.g. caring) in the longer versions. Yet, even when reading times for sentences containing the specific emotional word differed significantly from sentences containing a mismatching emotional word, they did not differ from sentences containing the similar matching word. A new group of participants was presented with stories that involved a coherence break between the first and second part, which could be solved by an emotional inference. The first part of the stories described the protagonist exhibiting and odd or ambiguous behavior, and the second part described the protagonist's mental state. This manipulation was expected to result in an emotional inference that would render the paragraph coherent. As in the previous case, significant agreement was found for choosing an emotional word when subjects rated them off-line. When subjects read the sentences on-line, there were significant differences between the specific and mismatching emotional word, but not between the specific and matching emotional word. Gygax et al. concluded that people do not infer specific emotions while they are reading the text on-line, but are able do so when they have enough time to reflect on the protagonist's emotional state off-line.

Taken together, Gygax et al.'s (2003, 2004) studies contribute to our understanding of emotional inferences in that they explore their degree of specificity. They propose that «the emotional information inferred by readers is not composed of the components necessary to lead to inferences about specific emotions, but is not merely composed of the valence component either» (Gygax, 2004, p. 637).

In this study, we explore the degree of specificity of emotional inferences, through the cognitive structure of emotions theory (Ortony, Clore, & Collins, 1988). Consistent with other theories on the cognitive aspects of emotion (e.g., Stein & Trabasso, 1992; Smith & Lazarus, 1993), this theory proposes that emotional experiences involve a cognitive appraisal of the situation. Emotions can be divided into broad classes of affective reactions, and into families and subfamilies. Several aspects of the eliciting conditions and their cognitive processing —relative to goals, standards, and attitudes of the subject— determine class and family. Broad classes of emotions are related to whether the affective reaction is aroused by a) consequences of events, or goals; b) actions of agents, or standards; or c) aspects of objects, or attitudes. Event-based emotions share the general affective reaction of being *pleasing* or *displeasing*, based on the appraisal of the outcome compared to desirability. Agent-based emotions generate the general affective reaction of *approval* or *disapproval*, given the attribution of agency (self, others), and standards of behavior. Object-based emotions comprise the general affective reaction of *liking* or *disliking*, given the object's (person, inanimate) appraised attractiveness. The cognitive theory proposed by Ortony, Core, and Collins (1988) defines emotions as reactions with affective valence. The affective valence of the emotions we experience or we infer others are experiencing is the primary distinction. This valenced reactions are experienced in relation to different aspects of the world. This is the second distinction. Both of them are intrinsecally linked. That is, the affective valence of an emotion is determined by the interpretation of the triggering conditions as as facilitating or obstructing of an important goal or concern. The triggering conditions can be related to one of three aspects of the world: events, agents, and objects. Thus, they can be defined as a consequence of an event, an action of an agent, or an aspect or characteristic of an object. The third distinction allows us to differentiate among families and subfamilies of emotions, according to more specific dimensions. For example: relevance of the event to oneself or someone else, appraisal of the event as deserved or undeserved, predictability of the event, and expectations about the event. Further distinction

within each class comes with more specific cognitive processing. For example, in the first class of emotions, consequences appraised as relevant to another person originate emotional families such as *resentment* or *compassion*, whereas consequences relevant to oneself open a branch of emotional families, further differentiated by expectancies (hope, fear, happiness, sadness), and their confirmation (satisfaction) or disconfirmation (disappointment). A similar analysis is carried out for the second and third class of emotional reactions, generating a classification of emotional families. To sum up, Ortony et al.'s (1988) theory provides a suitable framework for the study of the specificity of emotions, because it classifies emotional reactions into broad classes and families, giving the possibility to establish proximity between a specific emotion and a similar one belonging to the same family, an emotion with same valence but belonging to a different family, or an emotion opposite in affective valence.

This paper investigates the degree of specificity of emotional inferences. We propose that emotional inferences are not only specific enough to determine affective valence for a character's emotion, but may also differentiate among classes of reactions, and even among families of emotion. We tested this idea in two experiments. In experiment 1, participants read De Vega et al.'s (1996) short stories, and chose the emotional word that best described the protagonist's emotion. Two of the three emotional words presented to the subjects belonged to the same family of emotions, and the third belonged to a different family, within the same class (Ortony et al's, 1988). In Experiment 2, a subset of the stories and emotional terms used in Experiment 1 were used to measure reading times for target sentences describing how the protagonist felt. The emotional term's class, family and valence were manipulated.

EXPERIMENT 1

Method

Participants

One hundred and fifty-six first year college students at the University of Buenos Aires volunteered to participate.

Materials

The materials were twenty-four stories from De Vega et al.'s (1996). The stories were originally written in Spain, and were adapted for local readers where needed. They described familiar situations for college students (i.e., passing or failing an exam, being invited to a party, going on a date, etc), and suggested an emotional reaction in the protagonist. Each story was composed of five sections: an introduction describing the setting and the protagonist, a central section describing the goals, actions and relationships among characters (without mentioning emotions explicitly), a filler section describing emotionally neutral context conditions, (such as spatial details or a character's routine actions), and a sentence with one out of three possible emotion labels for the protagonist's emotional reaction. There were two versions of each story, one involving a positive and a second involving a negative scenario. A sample story appears in Table 1.

The three alternative emotional reactions were: original specific (an emotional term used by De Vega et al.'s, 1996), similar specific (an emotional term belonging to the same family as the original emotional word), and nonspecific same class (an emotional term for an emotion belonging to a different family, but to the same valence and class).

Procedure

A total of 48 texts (including both versions of each story) were distributed randomly in four sets of printed booklets. Each booklet contained 12 texts: six corresponding to a positive emotion, and six corresponding to a negative emotion. Different versions of the same story did not appear in the same booklet.

In a collective session, a booklet was assigned randomly to each participant in four groups (n= 39). The order of presentation of the emotional terms was counterbalanced within each group. Participants were asked to read the stories at their own pace, and to select the emotional term that was more congruent with the story. Instructions emphasized reading for comprehension, and indicated that there were no right or wrong responses.

Results and Discussion: Experiment 1

Each of the 39 participants read twelve out of the 48 stories (six negatives and six positives), mean according to type of emotional word chosen (specific, similar specific, and nonspecific same class) are presented in Table 2. In the subject analysis, the mean represent the number of texts in which the participants' choice corresponded to every condition. In the text analysis, the mean represent the average number of subjects who chose the word corresponding to every condition.

A repeated measures analysis of variance (ANOVA) was run to determine the effect of type of emotional word (specific, similar

Table 1
Example of a story used in Experiments 1 and 2

Arthur thought about it once more.	
The most beautiful girl in the class had asked him to teach her to play tennis in the afternoons.	
He laughed to himself.	
He had no doubts about her intentions.	
Rather than wanting to learn to play tennis, she was looking for an excuse to be with him.	
He went to the tennis court in the afternoon anticipating an easy conquest.	
He saw her with her short skirt.	
She was bouncing the ball on the court.	
The tennis court was the closest one to the entrance gate.	
Beside it, there was the soccer field.	
Emotional terms to select (Experiment 1)	
Arthur felt quite (flattered … proud … indebted …)	
Target sentences (Experiment 2)	
Arthur felt quite flattered	(Specific)
Arthur felt quite proud	(Similar specific)
Arthur felt indebted to her	(Nonspecific same class)
Arthur felt quite insecure	(Opposite)
Final sentence	
When the girl saw him, she approached smiling	

specific, and nonspecific same class) on word selection. This analysis revealed that there was a significant effect of Type of Emotional Word, $F_1(2, 310)= 320.67$, $MSE= 3.05$, $p<0.001$; $F_2 (2, 94)= 22.82$, $MSE= 135.27$, $p<0.001$). Planned comparisons using Bonferroni correction revealed that the specific emotional word was chosen significantly more than the Similar Specific (over subjects: $t_1(155)= 14.14$, $p<0.01$; over texts; $t_2(47)= 3.68$, $p<0.01$), and both of them were chosen significantly more than Nonspecific Same Class (Specific vs. Nonspecific Same Class: over subjects, $t_1(155)= 25.98$, p<0.01; over texts, $t_2(47)= 6.95$, $p<0.01$; Similar Specific vs. Nonspecific Same Class: over subjects, $t_1(155)= 9.91$, $p<0.01$; over texts, $t_2(47)= 2.75$, $p<0.05$).

These results support the idea that subjects are able to infer a specific emotion for the protagonist, and tend to reject an emotional term that belongs to the same class of emotional reactions, but to a different family (Ortony et al., 1988).

Given that there were a different number of options for each specific emotion (two belonging to the same family, and one for a different family within the same class) it could be argued that participants' choice was guided by task characteristics. Anonymous participation, coupled with the fact that participants tended to reject the specific emotion originally subscribed by De Vega et al. (1996), or the local equivalent proposed by our judges, and chose a different class of emotional reaction instead, suggest that the number of options did not influence their choice. This objection is better addressed in the following study.

EXPERIMENT 2

Experiment 2 tested the degree of specificity of emotions inferred from short narrative texts, using reading time measures as in previous on-line research (Gernsbacher et al., 1992; De Vega et al., 1996; Gygax et al., 2003). We expected that, if the sentence describing the emotional state of a protagonist was incongruent with the reader's emotional inference, reading times should be significantly longer. As in Experiment 1, family defined specificity; nonspecific emotional terms came from a different family within the same class of emotional reactions (Ortony et al.'s, 1988). In addition, we included a condition in which the emotional word was opposite in terms of valence. If reading times reflect the emotional inference, this condition should exhibit the longest reading times.

Table 2
Descriptive Statistics for Type of Emotional Word chosen in each Condition in Experiment 1

	Over subjects		Over texts	
	Mean	**S. D.**	**Mean**	**S. D.**
Nonspecific same class	1.79	1.14	6.06	7.22
Similar specific	3.47	1.49	11.31	9.90
Specific	6.72	1.61	21.81	11.01

Note: Over subjects : Mean and S. D. of the Type of Emotional Word chosen over 12 texts each subject.
Over texts: Mean and S. D. of the Type of Emotional Word chosen by subjects for the 48 texts, counterbalanced across groups of 39 subjects

Method

Participants

Twenty undergraduate students at the University of Buenos Aires volunteered to participate.

Materials

One of the two versions of each of the 24 stories used in Experiment 1 was selected, resulting in 12 positive and 12 negative emotional texts. The structure of the stories was the same as in Experiment 1, except for the two last sentences: the target sentence containing the emotional term, and a final sentence. Target sentences were constructed following the same structure as in Experiment 1. Their length was between 12 and 16 syllables. There was a specific condition, a similar specific condition (involving an emotional term that belonged to the same valence and family as Condition 1), a nonspecific same class condition (involving an emotional term describing an emotion belonging to the same valence and class as Conditions 1. and 2., but to a different family), and an opposite condition (involving an emotional term, corresponding to the same story in its opposite valence version).

An example of a story and its four conditions appears in Table 1.

In addition, we constructed 14 stories (4 training texts and 10 filler texts) without emotional content, but similar in structure to the experimental texts.

The experiment was programmed with MEL 2.1 software (Schneider, 1988), and run on an IBM-compatible PC equipped with a Pentium II processor and a 15 inches VGA monitor with 800 x 600 screen resolution.

Procedure

Stories were assigned randomly to four lists and then counterbalanced for the four experimental conditions. As a result, each participant read a total of 24 experimental stories, six per condition.

Participants were tested individually, in sessions that lasted approximately 30 minutes. Instructions prompted them to read carefully, because there were going to be presented with a comprehension question. Texts were presented one sentence at a time, with a self-paced method. At the end of each text, participants were presented with a question about the story, and had to answer «yes» or «no» by pressing the corresponding key. The experimental block consisted of 24 experimental (emotional) and 10 filler (nonemotional) stories, presented in random order.

Results and Discussion: Experiment 2

Mean reading times for the critical sentences in the four conditions (Specific, Similar Specific, Nonspecific Same Class, Opposite) are shown in Table 3. Responses that were more than 2.5 standard deviations from the mean reaction time were excluded from the analysis. These responses were replaced with an equal number of points with the mean reading time of the corresponding condition.

A repeated measures analysis of variance (ANOVA) was run to determine the effect of emotional term on reading times. This analysis showed that the effect of emotional term on reading times for the critical sentence was significant, F_1 (3, 57)= 6.13, *MSE*= 1274.9, $p<0.01$), F_2 (3, 69)= 4.56; *MSE*= 2868.7; $p<0.01$. Paired analyses using Bonferroni correction for related measures revealed that the condition of Specific emotion was read significantly faster than Opposite emotion (over subjects: $t_1(19)= 4.05$, $p<0.01$; over texts: $t_2(23)= 2.99$, $p<0.5$), and Nonspecific Same Class (over subjects: $t_1(19)= 3.07$, $p<0.05$; but nonsignificant over texts: $t_2(23)= 1.38$, ns), whereas it did not differ significantly from the Similar Specific condition (over subjects: $t_1(19)= 0.70$, ns; over texts: $t_2(23)= 0.49$, ns). The sentence containing the Similar Specific emotional term was read significantly faster than the Opposite emotion (over subjects: $t_1(19)= 2.879$, $p<0.05$; over texts: $t_2(23)= 2.332$, $p<0.08$). Compared with the sentence containing the Nonspecific Same Class emotional term, the Similar Specific did not differ significantly in the analysis over subjects $t_1(19)= 2.134$, ns., and over texts $t_2(23)= 1.932$, ns.

To sum up, reading times for sentences describing the protagonist's emotional state were significantly longer when the emotional word was not congruent with the preceding story. Longer reading times were observed for emotional words that differed from the expected emotion in class and valence, but also for emotional words that belonged to the same valence and class, but to a different family. No differences were found between emotions belonging to the same family.

General Discussion

This study examined the degree of specificity of emotional inferences made by readers of short narrative texts. Ortony et al.'s (1988) theoretical framework allowed us to differentiate the protagonist's reactions into classes and families.

In Experiment 1, participants read short stories, and assessed the protagonist's emotional reaction. For most stories, they chose an emotional word that belonged to a specific family of emotions. In Experiment 2, participants read stories for which class, family and valence of emotions were manipulated, and reading times were measured for target sentences describing the protagonist's emotional state. Results indicated that reading times were longer when valence and class were different from the expected emotion, but also when the sentence described the character in an emotional state that differed in family, within the same class and valence. Same affective valence did not reduce the incongruence effect due to a different family of emotions. In other words, inferences on the protagonist's emotion were more specific than merely affective valence (positive or negative) and emotional class (consequences of events, actions of agents, or aspects of objects).

Table 3
Reading times (ms) in Experiment 2

Condition	Mean (ms)	Standard deviation
Specific	2107.04	539.27
Similar specific	2158.64	576.59
Nonspecific same class	2454.04	612.46
Opposite	2490.82	721.42

Overall, these results support the idea that readers' emotional inferences are more specific than valence and class. This conclusion is consistent with previous research (De Vega et al., 1996; Gernsbacher et al., 1992), and contributes to the clarification of Gygax et al's (2003, 2004) *emotional subcomponents* suggestion. Their findings of similar results for specific emotion, synonym, and matching similar, could be classified at the level of family of emotions in Ortony et al.'s (1988) theory.

We found no differences between the specific and similar emotion words, suggesting that emotional inferences are not specific enough to differentiate emotional subtleties within a family. Since short experimental stories do not provide enough information so as to determine the inference of one specific emotion, inference of a specific emotion of a character could be risky, and could later prove to be wrong. That is, emotional inferences are based on knowledge about the situation that the character is involved in, and the character's traits, motivations and learning history. The experimental stories that have been used to study emotional inferences tend to describe the eliciting situation to some extent, but they provide little information about antecedents. This lack of information would lead the reader to infer a broad emotional state, consistent with the described situation, but would prevent him or her from making inferences beyond that. In other words, readers' background knowledge indicates that there is a variety of ways in which a person can react to an event, but not an unlimited number of ways. Experiment 2 suggests that the specificity of an emotional inference responds to a delicate adjustment between text clues and activation of previous knowledge elements.

These results are interesting not only for theories of text comprehension, but also for theories of emotion, and emotional intelligence (Briñol, Petty, & Rucker 2006). Cognitive theories of emotion tend to assume that many cognitive computations of emotion are carried out automatically. Our second experiment showed that emotional inferences were generated on-line. This result supports the idea that the appraisal process that leads to infer a specific emotion is done in an automatic fashion. Future research can benefit from text comprehension methodologies and techniques to further specify the nature of cognitive appraisal in emotional processing.

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