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Suspense, curiosity, and surprise: How discourse structure influences the affective and cognitive processing of a story☆

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Abstract

The structural affect theory (Brewer and Lichtenstein, 1982) states that different affective responses can be evoked by manipulating the order in which a story's events are narrated. Suspense is evoked by postponing the story's outcome, curiosity is evoked by presenting the outcome before the preceding events, and surprise is evoked by an unexpected event. Apart from evoking different affective responses, the manipulation of the event order can influence the cognitive processing as well. In this paper, an experiment is described in which the affective and cognitive effects of suspense, curiosity, and surprise structures are studied using a story by a professional author. The results showed that suspense can be evoked even when readers know how the story will end. The inclusion of a surprising event is highly appreciated. Furthermore, it leads to a better representation of the story's events, as was predicted by Kintsch (1980).

1. Introduction

Thrillers, detectives, and spy novels are always high on best-seller lists. These books are not read for the information they contain, but for the pleasure they provide (you do not read John le Carré for the history of the cold war). Stein (1982) claims that this pleasure arises from the emotions these novels evoke. Brewer and Lichtenstein (1981, 1982) have developed a theory in which they predict the occurrence of certain emotions as a result of a specific ordering of the story events, the so-called

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discourse structure. In the next section, the theory put forward by Brewer and Lichtenstein is discussed and predictions about the affective and cognitive effects of certain discourse structures are derived.

2. The structural affect theory: Affective and cognitive outcomes of different story structures

Brewer and Lichtenstein (1981, 1982) developed the structural affect theory. In their view, a story is a description of a series of events. The chronological order of these events is called the event structure. Using flashbacks and flash forwards, the author can manipulate the order in which the events are narrated. The order of narrated events is called the discourse structure. Brewer and Lichtenstein state that certain discourse structures are capable of evoking certain emotions, namely suspense, curiosity, and surprise.

As an example, Brewer and Lichtenstein (1981: 365–366) present the following event structure:

1. BUTLER PUTS POISON IN WINE.
2. BUTLER CARRIES WINE TO LORD HIGGINBOTHAM.
3. LORD HIGGINBOTHAM DRINKS WINE.
4. LORD HIGGINBOTHAM DIES.

By manipulating the order in which these events are related to the reader, different emotions can be evoked. Suspense, for instance, is evoked by narrating the events in chronological order. Brewer and Lichtenstein provide the following example:

1. The butler put poison in the wine.
2. The butler carried the wine to Lord Higginbotham.
3. Lord Higginbotham drank the wine.

At this point, the reader becomes uncertain about the story's outcome: Will the lord survive drinking the poisoned wine? The suspense would not arise if the reader already knew that the lord dies or survives (cf. Kintsch, 1980). Suspense is therefore the result of uncertainty about the outcome.

Knowing a story's outcome may decrease the suspense, but on the other hand, it may evoke curiosity. By starting with the story's outcome, readers become curious about how this event came about. Brewer and Lichtenstein give as an example of a curiosity evoking discourse structure a story starting with the sentence

1. Lord Higginbotham fell over dead.

Readers want to know whether the lord died of natural or unnatural causes. In the latter case, they would be interested in who was the murderer and how he or she committed it. That is, they would be interested in the events preceding Lord Higginbotham's death.

Suspense may result from uncertainty about the outcome, whereas curiosity may be evoked by certainty about the outcome. The amount of suspense a reader experiences, as well as the amount of curiosity, can determine the story's appreciation. A story in which the outcome is related right away, is more likely to evoke curiosity than suspense. A story in which, on the other hand, the outcome is unknown, is more likely to evoke suspense than curiosity. This raises the question which feelings are more important to the appreciation of the story: curiosity or suspense? Several authors appear to attach more importance to suspense (see e.g., Brewer and Lichtenstein, 1981, 1982; Kintsch, 1980). Therefore, the first hypothesis is:

Hypothesis 1
When the story's outcome is unknown, the story will be appreciated more than when the story's outcome is known.

Knowing a story's outcome can influence the cognitive reading process as well. For instance, suppose the story about Lord Higginbotham starts with the event of the lord falling over dead. Then, the preceding events are narrated. For instance, the lord may have woken up that day wondering about which persons to invite to his dinner party next month. Knowing that the lord will not last the day, these considerations seem less important. On the other hand, the gardener mentioning the arrival of rat poison among other supplies may attract more attention when the readers know the story's outcome. Readers are capable of distinguishing between more and less important information while reading the story. Cirilo and Foss (1980) showed that readers paid more attention to the sentence 'He could no longer speak at all' when this was the outcome of a witch's curse than when it gave expression to the character's amazement. Knowing the story's outcome therefore influences the importance attached, and hence, the attention paid, to certain passages in the story.

Hypothesis 2
When the story's outcome is unknown, certain passages will receive more attention than when the story's outcome is known.

Discourse structures can evoke surprise as well. Surprise is evoked by an unexpected event. By leaving out an important event, a subsequent event may become unexpected, as is shown by Brewer and Lichtenstein's example:

1. The butler carried the wine to Lord Higginbotham.
2. Lord Higginbotham drank the wine.
3. Lord Higginbotham fell over dead.

The event of the butler poisoning the wine is left out. Knowledge of this event would have made the outcome less surprising. Surprise is one of the emotions that are supposed to heighten the story's appreciation.

Hypothesis 3
When the story contains a surprise, it will be appreciated more than when it contains no surprise.

According to Kintsch (1980: 98), a surprising event has an important effect on the cognitive reading process as well. When reading the story, readers build a mental representation of it. The occurrence of a surprising event forces readers to reassess their representation of the story up till that point, because a surprising event is by definition not a logical sequel to the preceding events. They have to check their representation to see whether they missed something. As as result of this reassessment, recall of the preceding events improves. To give an example. In many Agatha Christie novels, the murderer is exposed in the last chapter. Usually, it is someone the readers did not suspect and the murderer's identity comes as a surprise. In *And then there were none*, for instance, the murderer is believed to be dead. The revelation of his identity forces readers to reassess their representation of the story's events, perhaps making them more memorable.

Hypothesis 4
When the story contains a surprise, the preceding events will be remembered better than when it contains no surprise.

Writing a suspenseful, curiosity evoking, and surprising story proves very difficult for researchers. Therefore, we used a story written by the well-known English author P.D. James to put the hypotheses to the test.

3. Method

We conducted an experiment in which readers read different versions of a murder story in which the discourse structure was manipulated to evoke surprise, suspense or curiosity. We collected the participants' reading times, their appreciation of the story, and their recollection of it.

3.1. Materials

In the study, the first chapter of P.D. James' *Devices and desires* in the (professional) Dutch translation by J.J. de Wit was employed. The first chapter can be read as a short story. The chapter consists of 19 paragraphs containing 1998 words. It describes a 15-year old girl who misses the bus on her night out. She fears a row with her strict father which would result in being grounded for the next couple of months. She succeeds in getting a ride from two elder ladies and has them drop her off at a back road through which she can reach a bus stop. Because her bus makes a detour through some villages, she might be able to get on the bus and be home in time. As she walks down the back road, she realizes that she is an easy target for the murderer who has murdered several women in the neighbourhood. She panicks but is relieved when she sees a woman in front of her walking a dog. She runs to the woman, but what seemed to be her rescuer, proves to be the murderer in disguise. He strangles her with the leash.

The story provided us with an excellent opportunity to test the hypotheses:

- Knowing how the story ends
  Manipulation of the story's outcome was easy. The first sentence of the original story read: "The Whistler's fourth victim, Valerie Mitchell, was his youngest: fifteen years, and she died because she missed the bus leaving at twenty to ten from Easthaven for its ride to Cobb's Marsh." To manipulate the knowledge about the story's outcome, this sentence was replaced by "The new bus schedule's first victim, Valerie Mitchell, was young: fifteen years, and she hated that she missed the bus leaving at twenty to ten from Easthaven for its ride to Cobb's Marsh".

  We attempted to keep the sentences as similar as possible with regard to the number and sort of words used. Replacing the first sentence by a nearly identical one was preferred to leaving the first sentence out for two reasons. First, it kept the number of words and sentences of the two versions identical. Second, simply leaving the first sentence out would result in a different processing of the subsequent sentence: "As always she left the disco at the last moment." Removing the first sentence would have readers guessing at the identity of the character.

- A surprising event
  The story contained a surprise: The woman with her dog on a leash proved to be the killer with his murder weapon. The surprise could be removed by making the woman what she seemed to be: a woman walking her dog. To this end, only the last two paragraphs had to be changed. However, if the woman is what she seems to be, the story has a happy ending, because Valerie Mitchell gets to the bus stop safely and will be home in time. The absence of a surprise is confounded with a happy ending, and happy endings have been shown to boost a story's appreciation (see Iran-Nejad, 1987).

  To dissect the effect of a happy ending from the absence of a surprising event, another version was written. In this version, there is a surprising event (the woman with the dog is the killer in disguise), but it has a happy ending as well (Valerie succeeds in escaping because the leash breaks and the killer falls backwards into the bushes).

Four versions of the story were constructed. Each version differed in only one respect (known outcome or not, surprising event or not, happy end or not) from one other version enabling us to test our hypotheses. Table 1 displays the different versions.

Table 1
The characteristics of the different versions

Story	Outcome known	Surprising event	Happy ending
1	Yes	Yes	No
2	No	Yes	No
3	No	Yes	Yes
4	No	No	Yes

To test hypotheses 1 and 2 about the effects of knowing the outcome, stories 1 and 2 are compared. To test hypotheses 3 and 4 about the effects of a surprising event, stories 3 and 4 are compared. Story 1 is almost identical to the original story by P. D. James. We only left out one sentence that hinted at the story's outcome. The sentence was positioned midway in the story and came after the description of Valerie getting out of the car of the two elderly ladies. The sentence read: "They were the last people to see her alive, except for one".

3.2. Instrumentation

Four dependent variables were measured:

1. A manipulation check about the extent to which the story evoked feelings of suspense and surprise
   To that end, participants indicated on 7-point Likert scales the extent to which they agreed with the statements 'I found the story suspenseful' and 'I found the story surprising'. We refrained from having participants indicate whether they found the story curiosity evoking. In a pretest, it proved a difficult question to answer. Curiosity is usually associated with short term states of uncertainty, which are easily forgotten after the curiosity is satisfied (Hidi and Anderson, 1992).

2. The general appreciation of the story
   The general appreciation of the story was measured using eight 7-point Likert scales. Some of the statements used were positively formulated (I found the story interesting, nice, beautiful), others were negatively formulated (I found the story boring, poor, predictable, long-winded, dull). The reliability of the resulting scale was good (Cronbach's $\alpha = .82$).

3. Attention to paragraphs differing in importance as a result of knowledge about the outcome
   To assess whether there were such paragraphs, a pretest was conducted. At the pretest, twenty male and twenty female students received either the story with the known outcome or with the unknown outcome. They rated each sentence for its importance on a 7-point scale. The results showed that three paragraphs were perceived as more important when the outcome was unknown than when the outcome was known. One paragraph was about the upcoming row with her father as a result of missing the bus, in the second paragraph allusions were made to the dangers of hitchhiking in general, and in the third paragraph, the presence of a serial killer was revealed. The reading time of these paragraphs was measured.

4. Recollection of the events prior to the surprising event
   Twenty comprehension items were developed. The items were directed to the events prior to the surprising event, i.e., to the information that was identical in all four versions. The items consisted of a statement for which the participants had to indicate whether the statement was correct. They also had to indicate whether

they were certain about the correctness of their answer or not. In this way, the results could be corrected for guessing (see Sax, 1980).

3.3. Participants

A total of 91 participants took part (voluntarily) in the experiment. They were all students at Tilburg University in The Netherlands. Age ranged from 17 to 51 years, with a mean of 23 years. There were 52 men and 39 women.

3.4. Procedure

Participants received randomly one of the versions of the story. They read the story sentence by sentence on a computer screen. At the presentation of the next sentence, the previous one disappeared. The participants controlled the speed of presentation by pressing the (righthand) shift button on the keyboard. They could not reread previous screens. To help participants get used to this mode of presentation, they first read a short, unrelated story. After the participants had read the story about Valerie, they received a questionnaire containing the items about the suspense and surprise they had experienced, their appreciation of the story, and the comprehension items.

4. Results

Table 2 contains the mean scores on the main dependent variables (general story appreciation and recognition scores) as a function of the different versions of the story.

Table 2
The mean appreciation scores (1 = very negative, 7 = very positive) and proportion correct recognition items as a function of the story characteristics

Story	Outcome known	Surprising event	Happy ending	Appreciation	Recognition
1	Yes	Yes	No	4.63	.41
2	No	Yes	No	4.57	.47
3	No	Yes	Yes	4.86	.44
4	No	No	Yes	4.17	.34

The first hypothesis predicted that when the story's outcome is unknown, the story will be appreciated more than when the story's outcome is known. This hypothesis has to be rejected. Whether the outcome was known (appreciation = 4.63) or unknown (appreciation = 4.57) did not lead to reliable differences in appreciation (t (44) = 0.20, p = .84). This result could be explained as follows. Both curiosity and suspense influence a reader's appreciation. The amount of curiosity evoked by knowing the outcome is appreciated as high as the amount of suspense evoked by not

knowing the outcome. However, when asked to rate the suspense evoked by the story, the two versions of the story were rated equally suspenseful (outcome known: 5.26; outcome unknown: 5.26). In the discussion, we will address this unexpected finding.

The second hypothesis predicted that when the story's outcome is unknown, certain passages will receive more attention than when the story's outcome is known. In the pretest, three paragraphs had been identified as being more important when the story's outcome was unknown. For only one of these paragraphs was the hypothesis confirmed. Participants paid more attention to the paragraph discussing the upcoming row between the girl and her father when they did not know that the girl would be murdered (outcome unknown: 10.23 sec., outcome known: 9.12; F (2, 87) = 2.79, $p < .05$).[1] The other two paragraphs, one about the dangers of hitchhiking and one about the serial killer, did not receive more attention when the outcome was unknown (respectively F (2, 87) = 1.57, $p = .21$; $F < 1$).

The third hypothesis predicted that when the story contains a surprise, it will be appreciated more than when it contains no surprise. This proved to be the case. The story in which the woman with the dog was in actuality the killer in disguise was appreciated more (4.86) than the story in which the woman was what she appeared to be (4.17; t (43) = 2.67, $p < .05$). The former story was also rated as more surprising (3.96) than the latter version (3.14; t (43) = 1.83, $p < .05$).

Finally, the fourth hypothesis predicted that when the story contains a surprise, the preceding events will be remembered better than when it contains no surprise. Again, the results were in accordance with the prediction. More comprehension items were answered correctly (.44) when the story contained a surprising event than when it contained no surprise (.34; t (43) = 2.11, $p < .05$). To ensure that this difference is the result of reassessing the preceding events after encountering the surprise and not because of paying more attention to this information before encountering the surprise, the reading times of the sentences relevant to the comprehension items were compared. There were no differences in reading times of these sentences ($F < 1$). Therefore, it appears that the cause for the difference in comprehension between the versions is to be located after reading the surprising event.

5. Discussion

An interesting finding is that the story in this study evoked suspense even though the readers did know how it would end. Apparently, uncertainty about a story's outcome is not a prerequisite for the story to be suspenseful. Gerrig (1989) reports a similar effect in a study on non-fictional texts. He used short texts about well-known historical events, for instance, George Washington becoming the first American president. Despite the fact that the participants in his study knew that Washington had become the first American president, Gerrig succeeded in creating suspense by stating that Washington was tired after winning the war with England and longed for

[1] Hypothesis 2 was tested using a multivariate analysis of variance on the reading times of the individual sentences constituting the paragraph. The associated F-values of Wilks' lambda are reported.

a quiet life at this plantation in Virginia. There was even talk about electing John Adams as president. When asked to verify the statement that Washington had become the first American president, participants took longer to verify this statement when they had read about Washington's doubt. Apparently, this information made them (temporarily) uncertain about the outcome. Even when the first sentence of the text stated that Washington became president, four intervening sentences about his doubts were enough to create suspense.

Sanders (1994, 1996) provides an explanation for this phenomenon. She uses Fauconnier's mental space theory to explain the effect of perspective in narrative discourse. Fauconnier (1985) claims that readers build a mental representation of the story. Within this representation, several mental spaces can be distinguished. These spaces are hierarchically ordered. Information in certain spaces is not (always) directly accessible (or known) in other spaces. Sanders claims that a change in perspective leads to the construction of a mental space. Consider the story about Valerie Mitchell. The first sentence of the original story states that Valerie Mitchell will be the serial killer's fourth victim. The remainder of the story is told from the point of view of Valerie herself. If this change in perspective leads to the construction of a mental space, the information that she will be murdered is placed in a different mental space than the rest of the story. As a result, the information that she will die is more or less forgotten, and, therefore, suspense may still arise.

Sanders' explanation is capable of explaining the results of the Gerrig study as well. Apart from changes in perspective, changes in time frame can also lead to the construction of mental spaces. Although people nowadays know that Washington became the first president of the United States, it was uncertain for his contemporaries. The description of Washington's doubts leads to the construction of a mental space in which the outcome is still unknown, and, thus, suspense can arise. One may compare a mental space to a room. Someone may tell you at the entrance what is going to happen, but as soon as you have passed the doorstep, you forget this information. When asked to verify that Washington became the first American president, you have to leave that room in order to check whether that statement is correct. Thus, even though you may know how the story will end, a change in perspective or time frame leads you into a mental space in which the story's outcome is still unknown. And as a result, suspense is evoked.

Knowing the outcome or not was hypothesized to influence the amount of attention paid to certain information. Three paragraphs were rated to be more important when the outcome was unknown than when it was known. Only one of them received more attention from the readers. This finding raises doubts about the adequacy of using importance ratings to predict the amount of attention. However, it might be the case that measuring the duration of attention provides only a partial indicator of the amount of attention spent. Perhaps readers read these paragraphs more intensely. To test this explanation, a secondary task, in which readers, for instance, have to respond to a tone, should be employed.

The inclusion of a surprising event had the predicted effects. The event evoked feelings of surprise and it also raised the appreciation of the story. Apart from these affective effects, the inclusion of a surprising event had also the predicted cognitive

effect. After reading the story with the surprising event, readers were better at answering questions about the events preceding the surprise. This improved comprehension was not the result of readers paying more attention to that information when reading it for the first time; the reading times for that information were identical regardless whether the story contained a surprising event or not. Therefore, Kintsch's (1980) explanation seems valid that readers reassess the preceding events to check whether the surprising event fits in. In the absence of a surprising event, such a reassessment is unnecessary.

The results of this study provide some insight into the effects of different discourse structures. On the one hand, it shows that Brewer and Lichtenstein's (1981, 1982) structural affect theory and Kintsch's notions about what makes a story interesting are valid and important ideas about the processing and appreciation of suspenseful stories. On the other hand, it shows that suspense is not simply the result of uncertainty about the outcome. Important narrative techniques such as perspective manipulation appear to be capable of overriding the effects of discourse structures, as we have shown using a real story by a bestselling author.

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