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# Finding the Sweet Spot: Is There a Fixed Template for Culturally Successful Counterintuitive Narratives?

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## Abstract

This article reports an investigation involving a series of studies carried out to critically examine the hypothesis that presence of 2 or 3 counterintuitive concepts in a story makes it more memorable than stories containing fewer or more such concepts. Our results paint a more complicated picture involving a number of interacting factors with contribution of the counterintuitive concepts to the global story cohesion emerging as a key factor.

**Keywords:** Memory, culture, folktales, concept learning.

## Introduction

A number of recent studies have found that minimally counterintuitive concepts are recalled better than intuitive and maximally counterintuitive ideas (Barrett & Nyhof, 2001; Boyer, 1994, 2001; Boyer & Ramble, 2001). Better memorability for minimally counterintuitive concepts, these researchers argue, explains why such concepts form part of widespread religious beliefs and other widely shared cultural beliefs. However, as Atran (2003) has argued, these findings on their own are not sufficient to explain why most of the widespread cultural folktales contain only a small number of counterintuitive concepts<sup>1</sup> and are mostly composed of intuitive concepts. How and why do the apparently less memorable intuitive concepts continue to be successfully transmitted along with a small number of counterintuitive concepts? Does the presence of counterintuitive concepts improve overall recall for a story? If so, would an even larger number of counterintuitive concepts make the story even more memorable or would memorability drop of if counterintuitive concepts are added beyond a certain number?

Norenzayan, Atran, Faulkner, and Schaller (2006) report on an investigation carried out to study these questions. They selected 42 Grimm Brothers folktales such that half of the stories were judged to be “culturally successful” (they attracted more Google hits) and the other half were considered to be “culturally unsuccessful” (because they received fewer Google hits). Counterintuitive concepts present in each story were then counted. They found that a vast majority of the culturally successful folk tales had two or three counterintuitive ideas whereas counterintuitive ideas were more evenly distributed among the unsuccessful

folktales. Subjects were then asked to read the stories and answer a number of questions to determine if the subjects thought that the stories were familiar, memorable, easy to understand, easy to transmit, and interesting enough to tell others. Their results show that stories with more Google hits were judged by the subjects to be more memorable and worth telling their friends. On the basis of this evidence, Norenzayan *et al.* argued that stories that contain two or three counterintuitive ideas enjoy memorability advantages over stories that have fewer (0 or 1) or more (4, 5, 6, or larger) counterintuitive ideas. They further argue that this should be true for all stories and not just Grimm Brother’s tales or just Northern European folktales from the 19<sup>th</sup> century, or just for narratives of a certain length. They call stories containing 2-3 counterintuitive concepts as *MCI narratives* and state, “we propose that MCI narratives are culturally successful partly because they enjoy a stronger cognitive advantage in recall than other narrative templates” (Page 549)(Norenzayan, Atran, Faulkner, & Scaller, 2006). Let us call the hypothesis that stories containing 2 or 3 counterintuitive ideas are more memorable than stories containing fewer or more concepts as the MCI-hypothesis.

The objective of this paper is to carefully examine the MCI-hypothesis and its implications. This is accomplished through a series of studies. Initially, we replicate Norenzayan *et al.*’s methodology but then complement it with other techniques.

## Study I

This study replicates Norenzayan *et al.*’s methodology for a different set of folktales. Aesop’s fables are folktales credited to a Greek slave named Aesop who is thought to have lived from 620 to 560 BC. Most of the short stories contain between 50 and 500 words and are organized around moral themes. A number of stories contain counterintuitive concepts such as anthropomorphic animals. While Aesop’s fables have survived for hundreds (if not thousands) of years and are widely known around the world, not all tales are equally well known. This study used George Fyler Townsend’s collection (1867) containing 350 fables. Using Norenzayan *et al.*’s methodology, Google hits were computed for all 350 fables by querying for “Aesop” and the title of a story (e.g., “The Hare and the Tortoise”). Besides Google’s initial estimate of the number of matching documents (which was the only measure used by Norenzayan *et al.*), this study also computed the actual

<sup>1</sup> The rest of the article uses the terms MCI concepts or simply counterintuitive concepts when referring to minimally counterintuitive concepts.

number of documents returned once Google was asked to retrieve all of the matching documents. Unfortunately, the rankings on the two counts did not match. The present study used the actual number of documents found as a more reliable indicator of a fable's popularity. The top 21 most popular tales had an average of 488 actual and 6321 estimated hits while the bottom 21 least popular tales had 80 actual and 197 estimated hits.

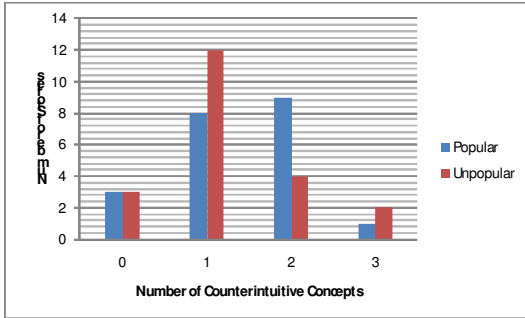


Figure 1: Distribution of counterintuitive concepts among the popular and unpopular Aesop's fables.

Next, a hypothesis-blind coder and the author coded the stories for the number of counterintuitive concepts in them. We agreed on 100% of the initial coding shown in Figure 1. It shows that contrary to predictions of the MCI hypothesis, a majority of popular fables do not have 2 or 3 counterintuitive concepts. Instead, 11 of the 21 popular stories contain 0 or 1 counterintuitive concept while remaining 10 have 2 or 3 counterintuitive concepts. A majority of unpopular stories (16 out of 21) also had 1-2 counterintuitive concepts and only 5 unpopular stories had 2-3 counterintuitive concepts.

A problem with studies reported so far is that they do not directly measure the memorability and are therefore unable to directly test the MCI hypothesis. The next study was designed to directly test the hypothesis that having 2-3 counterintuitive concepts makes a story more memorable than stories containing fewer or a larger number.

## Study II

### Material & Method

We decided not to use an existing set of stories (such as Grimm Brother's stories or Aesop's fables) because we wanted better control over (a) the number of concepts embedded in each story, and (b) subject's prior exposure to the stories. We designed three short stories containing 300-400 words each. Two of the stories, namely, "The Journey Home" and "The Trader" had been used in previous experiments (Barrett & Nyhof, 2001; Boyer & Ramble, 2001; Upal, 2005; Upal, Gonce, Tweney, & Slone, 2007) while the third story "The Night" was designed specifically for this experiment. Three versions of each story were created. Version I had one counterintuitive idea, while the second version had three and the third version had six counterintuitive ideas in it. Six packet-groups were then designed such that each packet-group contained all three stories and all three story types.

The balanced Latin square experiment required creation of thirty six distinct packets. Thirty six University of Toledo undergraduate and graduate students ranging in age from 18 to 24 were recruited to participate in the experiment. Subjects were asked to carefully read all three stories so that they could answer some questions about them. Next they were asked to solve simple arithmetic problems for one minute. Following that they were asked to write down as much of each story as they could remember. Story recall was measured by dividing each story into individual idea units constituting each story. The ideas roughly corresponded to the sentences in each story, although this wasn't always the case as some sentences were judged to have multiple concepts in them. "The Trader" was determined to have significantly smaller number of ideas (around 30) than "The Journey Home" or "The Night" each of which had roughly the same number of idea units (around 50 each).

Subject responses were coded using a binary coding scheme to measure whether a subject had recalled an element in the story or not. Story recall was measured by dividing the number of ideas a subject recalled by the total number of ideas in the story. Thus a perfectly recalled story would be assigned the recall value of 1 while a story that is not recalled at all would get the recall value of 0. The author and a hypothesis blind coder created two initial codings. We agreed on 89% of the initial coding. Disagreements were resolved through discussion to create one final coding.

### Results

The recall rates for 1, 3, and 6 counterintuitive versions of the stories (Figure 2) show that story recall does not significantly vary as a function of the number of embedded counterintuitive concepts. This is true for both the overall story recall rates and also for each of the individual stories we studied.

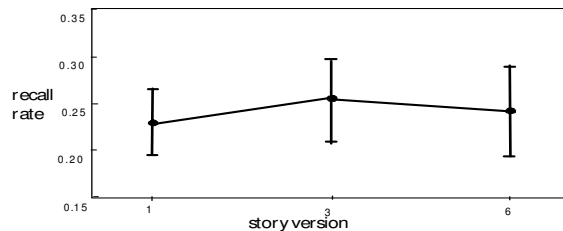


Figure 2: Overall story recall rates for 1, 3 and 6 concept versions of the stories.

### Discussion

Our results not only call into question the MCI-hypothesis, they also indicate the need to seek an alternative answer to the question of what distinguishes memorable counterintuitive stories from forgetful ones? Previously (Upal, 2005, 2010; Upal, et al., 2007), I have argued that in order to answer these questions, we need to pay attention to cognitive processes involved in comprehension of text (Graesser, Singer, & Trabasso, 1994; Kintsch, 1998). Discourse analysis researchers and psycholinguists have

identified global cohesion among the elements of a text as a key factor in memorability (Halliday & Hasan, 1976).

Cohesion of a piece of text is defined as connections among various elements of the text and is not just a function of the text itself but also of the background knowledge that the reader possesses. The connections that make a text more or less cohesive include coreferences as well as causal and logical connections among its various elements. A text is better remembered by a reader if its constituents can be made coherent by the reader (Trabasso, Suh, Payton, & Jain, 1995). Furthermore, the more effort a reader spends in making a text coherent, the more memorable the text (Kim, 1999). Building on this and other work in cognitive science (Schank, 1999; Schank & Abelson, 1977) and humour research (Suls, 1983), I proposed a hypothesis that emphasizes the role played by the context in which counterintuitive concepts are embedded in making those concepts more or less memorable. This account suggests that, similar to other expectation-violating and schema-incongruent concepts, counterintuitive ideas are better remembered because they attract a reader's attention by violating the reader's expectations about what is to come next in the text. When a reader's expectations are violated, she attempts to resolve the situation by reasoning to justify the inclusion of expectation-violating information in the text by invoking a variety of knowledge that the reader possesses. If this postdiction effort is successful, the expectation-violating concepts become richly linked to the reader's existing mental representations, which were retrieved to explain the inconsistency to derive a coherent theme. They also become richly connected to the derived story theme itself. This may make counterintuitive elements of a narrative more likely to be recalled when the story title is provided as a cue.

This view suggests that memorability for a story should be mediated through story cohesion. Thus counterintuitive stories should only be remembered well if they can be made coherent by a reader. If a counterintuitive story is too incoherent (or judged too difficult to make coherent given a reader's motivation level) then it should not be well remembered.

The next study was designed to test this hypothesis. I wanted to know whether inclusion of various types of counterintuitive concepts equally affects story memorability. Depending on the context, inclusion of some counterintuitive concepts may, for instance, increase cohesion of a story while addition of other counterintuitive concepts may decrease it. Would inclusion of both types of concepts equally affect story memorability? The above account would suggest that stories including cohesion-enhancing concepts should be remembered better than stories that contain cohesion suppressing concepts.

### Study III

#### Material and Method

I designed three short (95-125 words) Aesop-like fables. Each story involves two human or animal protagonists who

happen to meet. At the end, the moral lesson of the story (the same as the story title) is uttered by one of the main characters. Four versions of each story were designed: (1) Coherent-Counterintuitive (CC), (2) Coherent-Intuitive (CI), (3) Incoherent-Counterintuitive (IC), and (4) Incoherent-intuitive (II).

In the coherent-counterintuitive version, both of the main characters are counterintuitive but their counterintuitiveness is *causally relevant* for making sense of the story and for connecting various elements of the story and for deriving the coherent theme that is the story title. For instance, in the CC version of "obscurity brings safety", the protagonists are an invisible-man and an all-seeing-woman. The counterintuitive property of each character is causally relevant because it allows a reader to make sense of the events to follow and to connect them to the moral lesson of the story. For instance, all-seeing-ability of the woman allows a reader to understand why she is able to see an otherwise invisible man. Man's invisibility is needed to understand woman's advice to him to become visible to make his life more enjoyable and why he decides to paint himself skin-tone and then why, on being mugged after becoming visible, he regrets his actions and utters, "obscurity brings safety." These particular counterintuitive properties are causally relevant because, without them, the story and its title make little sense and are not as coherent.

In the coherent-intuitive version, the protagonists are replaced by intuitive beings. However, their intuitive properties are still causally relevant to explaining the events in the story. For instance, in the CI version of "obscurity brings safety", the invisible-man is replaced by a reclusive man and the all-seeing-woman is replaced by a kind-but blunt woman. The man's reclusiveness allows the reader to understand why he is advised by the caring woman to go out and why the man regrets following her advice.

In the incoherent-counterintuitive version, the main characters are counterintuitive but their counterintuitiveness is irrelevant to the events in the story and does not help a reader in her attempt to derive a coherent theme from the story. For instance, the IC version of "obscurity brings safety" includes "a man who has feet for hands" and a "woman who is made of iron". These properties do not help the reader to make sense of why the woman asks the man to stop being invisible and why he decides to paint himself or why he proclaims that "obscurity brings safety" upon unfolding of the story's events.

In the incoherent-intuitive version, the main characters are intuitive beings whose explicitly mentioned intuitive properties are irrelevant to the events in the story and do not allow the reader to derive the moral lesson in the story's title. For instance, the II version of "obscurity brings safety" features "a man with brown hair" and "a woman with dark circles around her eyes." Both properties have little to do with the woman's advice, the man's actions, or the story title/theme.

Each subject packet included three stories. Varying the story order and story type yielded 192 possible packets. Out

of these, 40 packets were randomly selected to be given to 40 Occidental College male and female Cognitive Science and Psychology undergraduates who participated in the experiments for extra credit. After reading all three stories, subjects were instructed to solve simple arithmetic problems for one minute. Following that they were asked to write down as much of each story as they could remember. The subject responses were coded for recall by the author and a hypothesis blind coder following the same methodology as in Study 2. We also measured the number of words recalled and also recall rates for counterintuitive and intuitive descriptions of the protagonists. The two coders agreed on 96% of the initial coding. Disagreements were resolved through discussion to create one final coding.

### Results & Discussion

The results are shown in Table 1. There was a significant effect of story cohesion while there was no significant effect of the number of counterintuitive concepts.

Table 1: (a) The first three tables show story recall data for individual stories, (b) the last table shows the overall results. The leftmost column shows the mean recall rates for propositions describing story protagonists. The middle column shows the recall rate for all of the story elements including the protagonists. The rightmost column shows the recall rate for the rest of the story elements.

(a)

	Obscurity Brings Safety		
	Protagonist recall	Overall Story Recall	Story Minus Protagonist recall
Coherent-Counterintuitive	100	82	77.5
Coherent-Intuitive	64.4	87.5	59.5
Incoherent-Counterintuitive	86.4	62.7	56.8
Incoherent-Intuitive	65	55	52.5

	Never Laugh at Someone		
	Protagonist recall	Overall Story Recall	Story Minus Protagonist recall
Coherent-Counterintuitive	100	100	100
Coherent-Intuitive	100	100	100
Incoherent-Counterintuitive	57.1	57.1	57.1
Incoherent-Intuitive	54.5	54.5	54.5

	No Gratitude From the Wicked		
	Protagonist recall	Overall Story Recall	Story Minus Protagonist recall
Coherent-Counterintuitive	72	72	72
Coherent-Intuitive	45.8	45.8	45.8
Incoherent-Counterintuitive	33.3	33.3	33.3
Incoherent-Intuitive	90	90	90

(b)

	Overall		
	Protagonist recall	Overall Story Recall	Story Minus Protagonist recall
Coherent-Counterintuitive	92.4	92.4	92.4
Coherent-Intuitive	74.1	74.1	74.1
Incoherent-Counterintuitive	61.1	61.1	61.1
Incoherent-Intuitive	65	65	65

The coherent stories were significantly better recalled than incoherent stories ( $F(1, 117) = 15.019$   $p = 0.00018$ ). Contrary to predictions of the MCI hypothesis, stories containing 2 counterintuitive concepts were not better recalled than stories containing 0 counterintuitive concepts ( $F(1, 117) = 0.38129$   $p = 0.53811$ ). In fact, while the differences were not statistically significant, stories containing 2 counterintuitive concepts were less well recalled than stories without any counterintuitive concepts in them. If we control for cohesiveness and vary the number of counterintuitive ideas in a story, we get two distinct trends. As shown in **Error! Reference source not found.**, when counterintuitive ideas enhance cohesion, their addition makes a story more memorable (although not significantly so). However, when counterintuitive concepts cannot be easily integrated to derive the story theme, their addition results in lower recall (again differences are not statistically significant).

Table 3(b) shows that coherent-counterintuitive stories were best recalled, followed by coherent-intuitive stories, which were better recalled than incoherent-intuitive stories. However, only recall for incoherent-counterintuitive stories was significantly lower than recall for coherent-counterintuitive and coherent-intuitive stories ( $F(3, 115) = 6.3828$   $p = 0.00049$ ). The subjects recalled only half of the ideas from the stories in which incoherent protagonists were not causally relevant to the story theme.

Incoherent stories also prompted some subjects to add unsolicited comments to their written responses such as, “the story was unclear”, “this was a weird story” and “I didn’t understand the story at all.” Incoherent-counterintuitive stories solicited more (2) comments than incoherent-intuitive stories (1 comment). There was also some evidence to suggest that subjects were attempting to make sense of the incoherent stories. For instance, consider the incoherent-counterintuitive version of Gratitude, where the man decides to go home and mow his lawn and have dinner with his family but the wolf is still mysteriously saved. Two subjects inferred that the man saved the wolf by helping it before going home while another subject said that the man saw the wolf on his way back and saved it! Three subjects made the incoherent version of Laugh coherent by changing it. Instead of the man making fun of the woman’s body and then surprisingly telling the woman never to laugh at people’s body, two of the subjects changed the story so that the man realizes on his own that he should never have

laughed at the woman’s body. Another subject changed the story to suggest that the woman made fun of the man!

Results of this study further call into question the notion that inclusion of 2-3 counterintuitive concepts makes a story more memorable and more transmissible. Our results indicate that counterintuitive concepts only make a story more memorable if they can be easily integrated to make the story coherent. Having gathered some support for our hypothesis that story cohesion is key to explaining story recall, I wanted to see whether difference between story cohesion could account for difference in popularity for Aesop’s Fables. The final study was designed to investigate this possibility.

### Study IV

#### Material and Method

I designed 32 study packets by randomly ordering the 42 (21 popular and 21 unpopular) stories selected in Study I. Each story was followed by seven randomly ordered questions. Replicating Norenzayan *et al.*’s methodology for their Study 2, I asked subjects to first rate each tale on the following six attributes on 7-point scale (anchored by endpoints labeled *strongly disagree* to *strongly agree*). Subject responses were used to measure their perception of each story’s:

- *familiarity* (“I have heard this story before”),
- *memorability* (“Right now if someone asked me to close my eyes and tell them the story that I just read, I think I could recall all or most of the critical elements of the story” ),
- *likelihood of transmission* (“If I told a 7-year-old this story, he or she would tell it to other children”),
- *interest value* (“This story was interesting”),
- *understandability* (“This story was easy to understand”), and
- *moral lesson* (“This story has a strong moral lesson”).

In addition to the above six factors measured by Norenzayan *et al.*, I added the query “I could easily make a few modifications to the story (such as changing the main characters) to make the story’s moral lesson even more apparent”. Believing that incohesive stories should be judged by adult English readers as more amenable to a change than cohesive stories, I thought that subject responses to this question should be inversely related to story cohesion.

Thirty two adult male and female subjects from DRDC-Toronto participated in this experiment for remuneration. These experiments were individually conducted by a Research Assistant.

#### Results & Discussion

As shown in Table 2, subjects rated popular and unpopular stories differently on all of the dimensions we measured. Subjects were more familiar with fables that attracted a higher number of Google hits than those that attracted fewer hits. This provided independent support for

labeling of the stories mentioned on more Google-indexed websites as popular. This suggests that using Google to measure popularity of an idea is a valuable tool identified by Norenzayan *et al.* This should address lack of availability of data and should prompt more research in this area.

The results also provide some justification for the assumption that memorability had something to do with the popularity of the widespread Aesop fables, as subjects rated popular stories as more memorable than unpopular ones. These results are similar to those of Norenzayan *et al.* who also found that their subjects rated popular and unpopular Grimm Brother’s tales to vary significantly along the dimensions of memorability, understandability, and likelihood of transmission.

Table 2: Mean subject ratings on various psychological variables as a function of whether a fable is popular or not.

Subject Ratings	Popular	Unpopular	t	p
Familiarity	-1.08	-2.49	14.51	<.001
Memorability	2.02	1.46	9.57	<.001
Likelihood of transmission	0.06	-0.68	10.16	<.001
Interest value	0.77	-0.09	11.27	<.001
Understandability	2.11	1.47	9.88	<.001
Moral Lesson	1.40	0.54	9.68	<.001
Cohesion	1.14	0.25	10.45	<.001

Unlike Norenzayan *et al.*, who did not find significant differences between subject’s ratings of the popular and unpopular Grimm Brother’s tales along dimension of interest value and moral lesson, our subjects rated popular stories as significantly more interesting and as significantly more likely to have “a strong moral lesson” than unpopular stories. The difference between our results and theirs could be due to the differences in the materials used (Aesop’s fables versus Grimm Brother’s folks tales) or due the experimental design factors such as differences in sample size (32 subjects × 42 stories = 1342 sample points in our experiment versus 65 subjects × 6 stories = 390 sample points for their experiment).

Our results also support the hypothesis that motivated this experiment, namely, that popular and unpopular stories differ along the dimension of story cohesion. Subjects not only rated popular stories higher on the dimension of “having a strong moral lesson,” they also thought that popular stories were harder to modify to make story’s “moral lesson more apparent” as compared to unpopular stories. To see whether differences in story cohesion can account for differences in memorability between stories, we computed an aggregated cohesiveness measure by combining the subject ratings in response to the moral lesson and “needing modification” questions, and performed a correlational analysis of aggregated cohesiveness and story memorability. We found that cohesiveness was

strongly correlated with memorability (Pearson Correlation Coefficient  $r = 0.71$ ,  $N = 42$ ,  $p < 0.001$ ). This suggests that cohesiveness of Aesop's fables can explain most of the difference in memorability among Aesop's fables while the number of counterintuitive concepts present in a story cannot. Furthermore, correlation between cohesiveness and memorability becomes even stronger when only counterintuitive stories are considered. For stories containing at least one counterintuitive concept, the correlation is stronger ( $r = 0.75$ ,  $N=34$ ,  $p < 0.001$ ), it is even stronger for stories containing at least 2 counterintuitive concepts ( $r = 0.81$ ,  $N = 16$ ,  $p < 0.001$ ), and it is higher still for stories containing 3 counterintuitive concepts of which there were only three ( $r=0.90$ ,  $N = 3$ ,  $p < 0.001$ ). These results suggest that counterintuitive elements added to a story have to make sense in the context of the story for it to be memorable and that this is especially true as more and more counterintuitive concepts are added to a story. To the extent that the inclusion of counterintuitive concepts can be justified in the context of a story, there may not be a fixed upper limit to the number of counterintuitive concepts that can be included in a memorable story. A writer's creative ability to imagine counterintuitiveness-justifying contexts may be the real limiting factor. If the context in which counterintuitive concepts are embedded does not allow a reader to justify the inclusion of those concepts and make the story cohesive, then that story will not be remembered well. This also answers Norenzayan *et al.*'s question as to why despite all of their memorability advantages counterintuitive concepts never appear alone and are always communicated along with an even larger number of intuitive concepts. The paper suggests that this may be because a context built by intuitive concepts is needed to justify, make sense of, and give meaning to the counterintuitive concepts.

### Conclusion

The results of studies reported here call into question the notions that (a) there is a single cognitively optimal template for all narratives, and that (b) inclusion of 2-3 counterintuitive concepts makes a story more memorable and hence more transmissible. This paper suggests that relationship between inclusion of counterintuitive concepts and memory for narratives may be more complicated than previously suggested. The experiments reported here support the hypothesis that inclusion of counterintuitive concepts can make a story more memorable only if they allow a reader to use her/his background knowledge to make the story more coherent. These results have important implications not only for those interested in understanding how elements of culture become widespread but also for those interested in designing memorable messages for influencing target audiences. Thus, cultural scientists cannot ignore the socio-cultural context at the time of diffusion if they want to understand how certain folktales came to be widely distributed in a population. Marketing professionals cannot just throw in a certain number of counterintuitive concepts (or more generally expectation violating or schema

incongruent elements) into a message to make it more sticky. For such elements to add value to a message, one must carefully consider all aspects of the context which include both the cultural knowledge that members of the target audience bring to the table and the structure and content of the story to which these concepts are being added.

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