

# Optimal Eventfulness of Narratives

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## Abstract

This study examines whether there is an optimal degree of eventfulness of short narratives. We ask whether there is a specific degree of eventfulness (unexpectedness) that makes them “stick” better than other stories so that they are maintained more faithfully in serial reproduction (telephone games). The result is: probably not. The finding is that there is an impressive correlation of eventfulness rankings of original stories and resulting retellings in serial reproduction, despite the change of many other story elements and almost regardless of low or high eventfulness. Put more simply, people remember and retell “eventfulness” accurately, even when the actual events and circumstances of a story are changed.

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## 1 Introduction

One of the most central questions of narrative and its cognitive functions is the question of the event. It is hard to imagine narratives without events. There is, however, large disagreement as to what constitutes an event. Are small textual units of actions equal to “events”? Or is an event something larger that occurs in the mind of the recipients who react to a story? In the former case, the event would be a small unit, element, or building block in a sequence of events. In the latter case, events provide the center of gravity that hold all other elements together, like a sun and its planets.

There is certainly space for definitions of events on several levels [6]. Still, in this article we want to explore the second idea that events provide the central point around which entire stories are constructed. However, not every event is able to “tie the knot” equally well. If events have the capacity to tie together larger stories and texts, the question is how one can determine which features make certain events more successful than others in doing so.

To determine the success of narratives, we measure the stability or absence of stability of narratives in conditions of retelling. We define a successfully eventful narrative as narrative that maintains its eventfulness relatively unchanged after retellings.

In this study, we focus on one aspect of eventfulness only, namely its degree of unexpectedness or surprise. Of course, eventfulness encompasses dimensions other than unexpectedness, including relevance, persistence, irreversibility and non-iterativity [13]. Nevertheless, we argue that unexpectedness is a central dimension of eventfulness. In contrast to other aspects of eventfulness, unexpectedness corresponds to a specific experience by recipients. Recipients know when they are surprised, but are less prone to directly experience and report relevance, persistence, irreversibility and non-iterativity, expect in cases when these are strikingly absent. Our study will examine how precisely people reproduce different degrees of unexpectedness when retelling stories.



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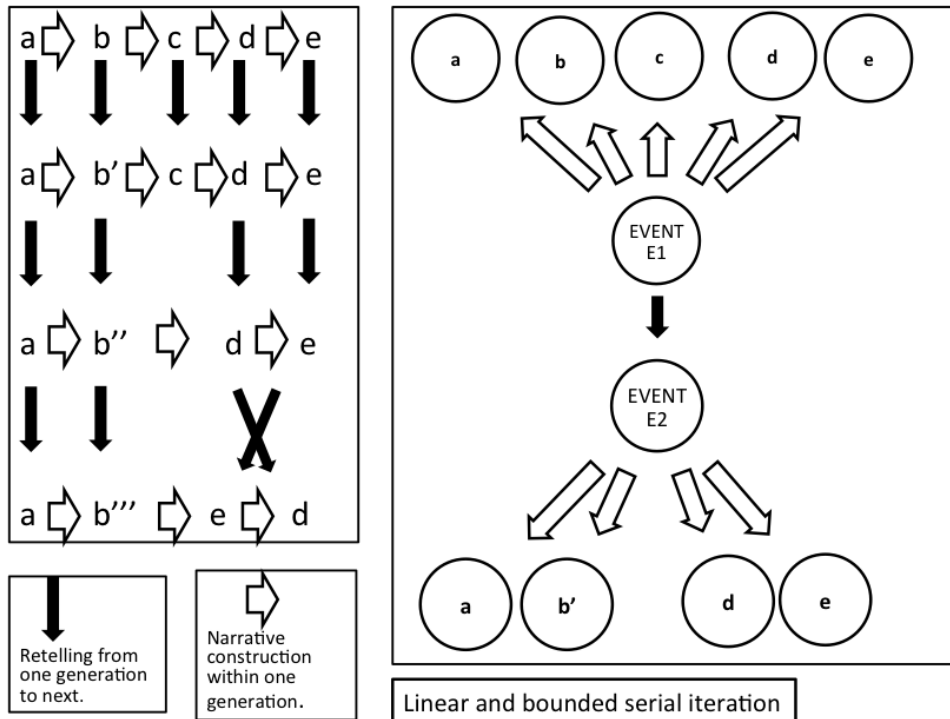
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■ **Figure 1** Linear and bounded serial iteration of narratives.

We distinguish two processes or strategies of retelling. In the first process, the story appears as a string of elements with one leading to the next. Retelling means to reconstruct this linear flow of small events from one to the next. Omissions, errors, and transformations occur on the local level, but can affect entire strings that fork off from the original track. In the second process, the narrative is constructed around a core idea. Retelling a story around such a core event means to construct (and invent) all surrounding elements of an event, such as the conditions that lead to the event and the characters. Omissions, errors, and inventions would occur as a consequence of the genetic construction of elements one could expect around the central event. We call these two approaches linear and bounded iterations (Figure 1).

In linear iteration, each element (a, b, c, d, e) would be treated equally and could disappear or change without necessarily affecting the other elements. In bounded iteration, all elements only matter inasmuch as they lead to the construction of the core event (E1) or can be deduced from the retold event (E2). Elements that are not well connected to the core event are likely to disappear.

It is likely that human retelling uses a combination of both strategies. A one-sided use of linear iteration would likely result in enumerations of seemingly redundant or meaningless elements. A one-sided use of bounded iteration would likely leave out many details and descriptions and thus be impoverished.

In this study, we measure the presence of events and thus bounded iteration after several retellings indirectly by degrees of eventfulness (unexpectedness/surprise). In general, linear and bounded iteration can be measured by means of comparing general survival rate of all story elements on the one hand and those story elements directly related to the events on the

other hand. Such a comparison has to take evolutions (changes) of all elements and events into account as well.

A mid-level approach that connects aspects of both strategies can be found in Propp's famous analysis of Russian magic fairytales [10, 3]. Propp's single elements of stories tend to cluster in specific orders or sequences that come closer to bounded narratives. In a similar way Fisseni and Löwe describe super-events that connect sub-events [4].

Logics of linear iteration are somewhat better understood and simpler to describe. However, bounded iteration and the construction of core events is less clearly understood, though much debated [8, 2, 12, 9, 11, 5].

Jerome Bruner articulates the duality between linearity and boundedness of narratives in an elegant way: "What is a narrative? ... A narrative involves a sequence of events. The sequence carries the meaning ... But not every sequence of events is worth recounting. Narrative is discourse, and the prime rule of discourse is that there be a reason for it that distinguishes it from silence. Narrative ... tells about something unexpected, or something that one's auditor has reason to doubt. The "point" of the narrative is to resolve the unexpected, to settle the auditor's doubt, or in some manner to redress or explicate the "imbalance" that prompted the telling of the story in the first place. A story, then, has two sides to it: a sequence of events, and an implied evaluation of the events recounted" (Bruner, 1996: 121) [2].

Bruner does not consider any string of events a narrative, but instead requires that it contain something unexpected or unresolved that focuses our interest. Narratives do not simply list, contain, represent, or express events, but also produce doubt, surprise, suspense, and curiosity in recipients, and this is an essential part of the event, perhaps the event itself.

In this article, we examine whether there is an optimal level of eventfulness that makes a narrative cognitively intelligible, allows for successful recall, and thus permits for coherent retellings. Put simply, is there an optimal level of eventfulness that makes a story stick?

## 1.1 Optimal eventfulness and serial reproduction

Previously, [9] suggested that stories with minimally counter-intuitive narratives seem to be favored by memory and be cognitively optimal. [9] distinguish intuitive, minimally counterintuitive, and maximally counterintuitive stories on the basis of the mixture of fully intuitive events (corresponding to experience and ontological expectations of the world) and counterintuitive events (not corresponding to experience and ontological expectations of the world). They record how trained experts and a participant group of students rate the number of intuitive and counterintuitive events within a range of well-known and not well-known Grimm fairytales. With this approach they establish there is a sweet spot of just a few but not too many counterintuitive events in those stories that have been culturally most successfully (the best-known Grimm fairytales). These successful stories, it turns out, contain a mix of intuitive and just a few counterintuitive events that mark them as "minimally counterintuitive."

The study by [9] only tangentially deals with issues of story-worlds and genre specific expectations. Fairytales are among the most stylized and culturally coded forms of narrative and may thus be exactly the worst candidate for an examination of narrative in general. It is tricky to imagine how people rate the intuitiveness of events within a fairytale that is clearly marked as a fairytale. Godmothers granting wishes magically to good girls may be quite "intuitive" within fairytales and for people growing up with Disney. However, other participants may mark such a godmother as unlikely and counterintuitive. The forced choice between intuitive and counterintuitive events also may establish, more than anything, the

ambiguity of participants having to decide which frame of reference to use: the typical fairytale story-world or the so-called real world.

Nevertheless, the study provides an interesting glimpse into optimal eventfulness of stories. The results by [9] are flanked by a set of studies by Barrett and Nyhof (2001) [1]. Barret and Nyhof used serial reproduction (telephone games) to retell stories. The finding of their studies is that intuitive events that are not bizarre tend to disappear more often than counterintuitive events or intuitive but bizarre events.

Based on [9] and [1], it seems reasonable to speculate that high or midlevel eventfulness is favored for memory and recall in retelling conditions. Hence, we decided to study whether we can establish a more specific level of optimal eventfulness that distinguishes not only between two or three categories, but provides a graded scale.

Accordingly, we established varied levels of eventfulness within the same framing story from very low eventfulness to very high eventfulness. We expected that some of the story versions would survive the retellings better than others and we reasoned that such survival would indicate optimal eventfulness. [9] found that in short-term recall, maximally counterintuitive event sequences were preserved best, while in long-term recall the minimally counterintuitive event sequences were preserved best. Given this distinction between minimally counterintuitive and maximally counterintuitive events, we expected to see some preference for the highly eventful stories since our retelling task was immediate (short-term recall). (We should note again that [9] defined maximally counterintuitive stories as stories with a high concentration of counterintuitive events; as far as we can see, their scale only used a binary distinction between intuitive and counterintuitive single events).

In contrast to these studies, we decided to focus on single-event mini stories. Single-event stories seem better suited to study eventfulness than multiple event stories since multiple event stories may simply cluster events too thickly. Even so, each event may in itself be optimally eventful if it did not stand in too close a proximity to the other events.

We selected stories in which a character is facing a challenging situation. The challenging situation gets resolved by means of events. In this sense, the events serve as connector between challenge and solution. More specifically, the events provide the transition from a state A (challenge) to a state B (solution), from problem to solution, or before and after in line with Hamilton & Breithaupt [5]. Within this story design of an event as connector, eventfulness as surprise can be isolated and formalized by the degree of predictability: The event conforms more or less to typical occurrences within the situation and represents a more or less predictable solution to the challenge. In this story design, the other aspects of eventfulness ([13], see above) are not significant. All events are equally relevant since they solve the challenge (relevance criterion), while persistence, irreversibility, non-iterativity, and genre do not play a strong role due to the brevity of short stories. (An additional aspect of the eventfulness of these stories could be called consistence, as fitting within a single set of event borders [11]).

## 1.2 Method

### 1.2.1 Participants

Our participants were found on Amazon Mechanical Turk. We set the Mechanical Turk filter for participants of at least 18 years of age and who were in the United States. Each participant received three different stories of a randomized variation in a randomized order for retelling. Retelling was immediate after each story variation the participant read. Each story branch was retold for three retellings or generations. Each first retelling was routed

to just one second reteller and then to a single third reteller. We set filters so that each participant could only participate once in the entire study at any stage.

### 1.2.2 Materials

We generated a set of three short stories and built seven variations of the key event for each story. These events varied from very minimally eventful (intuitive) to highly eventful (counterintuitive).

The stories were each 3–7 sentences long. Each included a character who found himself or herself in a challenging situation. The opening of the story outlined the situation and the final clause pointed to the solving of the problem or the end of the situation. An example is a “shy” boy who has a crush on a girl, but is too shy to ask her out. Another example is a daughter who has an argument with her mother and runs out of the house into the forest. At the end, the shy boy asks the girl whether she would go on a date with him, and the daughter has built up enough resolve to confront her mother.

For each story, we generated sets of interchangeable middle sentences of varied eventfulness. These middle parts established a transition from the problem or challenge to the ending solution. For example, in the story with the shy boy, we created a range of events that establish how he accidentally meets her under specific circumstances. This could be standing next to her in a line or saving her from a car accident. In pretesting, we asked participants to rank and rate these variations in terms of eventfulness. From the set of variations, we selected seven for each story that in pre-testing appeared to provide a graded variety of eventfulness from very low to very high.

In the basic stories below, XXX marks the part that varies between the versions. The seven versions with a code name (such as “Jason A”) and the corresponding severity ranking in brackets (such as “[2.85]”) are added behind. The severity rankings given are the median values by participants.

1. Jason liked a girl in his class. He was very shy, however, and was too afraid to talk to her. One day, XXX. He mumbled that she looked nice and asked her if she would like to eat lunch with him.
  - they were standing next to each other in a line (Jason A [2.2])
  - as he was walking down the hallway he saw the girl and noticed that they had on the same outfit (Jason B [2.95])
  - as he was doodling in class, she caught him drawing a perfect likeness of her (Jason C [3.85])
  - as he was walking in front of her desk, he tripped on his shoelaces and fell right in front of her (Jason D [3.85])
  - he decided that to overcome his fear of talking to her he needed to assume an alternate identity. He dressed up as superhero and walked over to where she was sitting (Jason E [5.2])
  - as he was sitting in the classroom, he piled a bunch of different fruits on top of his head and danced over to the girl, while singing her name (Jason F [5.6])
  - as he was walking behind her on the crosswalk to school, he noticed that a car was coming very fast towards them. He quickly ran and pushed her out of the way into safety (Jason G [6])
2. Sarah had a fight with her mother. She ran out of the house. She decided to go into the woods. In the woods, XXX. That made her feel better and gave her the confidence to talk to her mother again. After that, she went back home and apologized.

- she read a book (Sarah A [0.75])
  - she stomped around angrily and hit a tree (Sarah B [2.4]).
  - she caught a strange looking snake (Sarah C [3.6])
  - she dove into the pond and swam around with all her clothes on (Sarah D [4.8])
  - she made a fire and burnt everything her mother had ever given her (Sarah E [5.2])
  - she found an old racecar that worked and drove it at high speed into a tree (Sarah F [5.6])
  - she built a tree house and collected food for a month to stay there (Sarah G [6.1])
3. Robert sat down in class to take his final exam. He knew the exam would be difficult, but he was shocked to see how hard it was. He may not have studied enough, but this exam was simply not fair and he started sweating. With an hour left, he asked for a bathroom break and left the room. In the bathroom, XXX. Then he returned to the testing room to complete the exam.
- he splashed his face with water (Robert A [0.15])
  - he gave himself a pep talk while washing his hands and loudly sang his favorite song regardless of the other people hearing him (Robert B [2.1])
  - he pulled out his phone and searched the Internet for a couple exam questions (Robert C [3.45])
  - a man he did not know gave him the textbook for his class with all relevant pages for the final marked (Robert D [5.1])
  - he did sprints in front of the stalls to get his brain going. While running, he hit his head on a door, but instead of confusing him, it seemed to cause everything to make sense. (Robert E [5.6])
  - he loudly asked the exam question to the mirror and a voice gave him the answer (Robert F [6.6])
  - he found an envelope with his name on it. Inside was the answer key, signed “with love” from his teacher (Robert G [6.7])

### 1.2.3 Procedure

We asked participants on Amazon’s Mechanical Turk to retell the stories in their own words. We used a variation of instructions from Kashima 2000 [7] that stress that participants should retell stories in their “own words.”

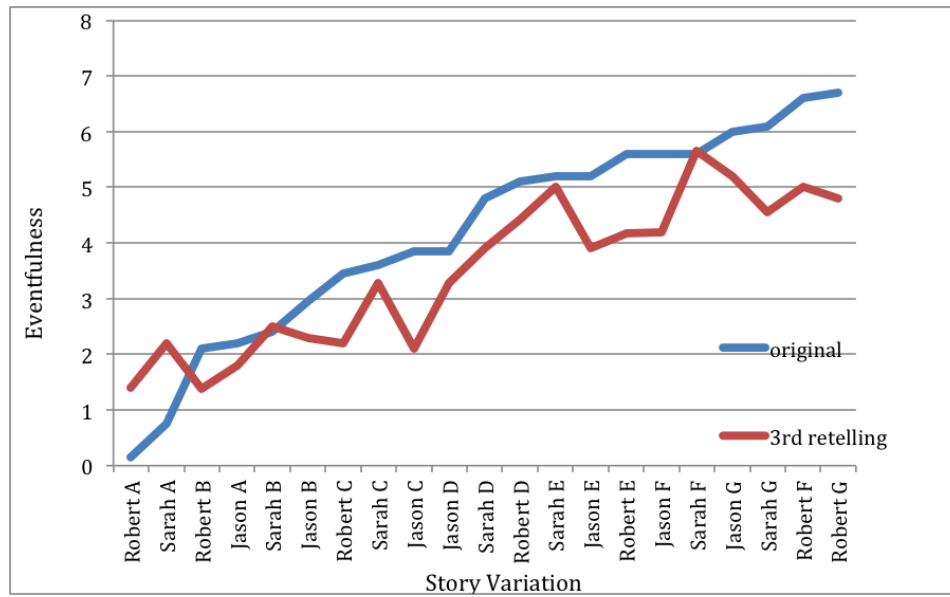
The quality of retelling was high. From the selection of retellings discussed in this study, we only disqualified a single retelling on the ground that it was too elaborate (it appeared that the participant wanted to show his or her qualities as writer to embellish a short text into a full page).

Once we received the third retelling, we routed these retellings to (different) participants on Mechanical Turk to evaluate the eventfulness of these stories. Each participant received 20 of the retellings, fully randomized, and was asked to rate the eventfulness on a scale from 0 to 7. We used a slider that also showed the numeric number with one decimal number after the period, such as 5.1. In the instructions, we defined eventfulness as follows:

“A story that is eventful usually contains elements that are surprising or unexpected. In a story that is not eventful, things occur as expected with little or no surprise.”

On each screen with a retelling, we also gave the following instructions:

“Please evaluate the eventfulness of the story below from 1–7. 1 would be least eventful; 7 most eventful/surprising. You can use each rating as many times as you feel necessary. If there is no event at all, please mark it as 0.”



■ **Figure 2** Eventfulness of original and third retellings. The x-axis lists the code names of individual stories. These stories are ordered by eventfulness of the source stories. For example, the source story “Jason C” was rated as less eventful than “Jason D”. The y-axis represents the average ratings of eventfulness from 0–7. The chart shows the correlation of source story and the resulting third retelling.

We also used the same approach and instructions to establish the eventfulness of our original or source stories in all variations. Participants who rated the source stories only evaluated source stories in randomized order. Each source story variation received an average of 18 rankings, while the participant retellings received an average of 9 rankings each.

For our calculation of results, we used the median readings of the source stories and compared them with the rankings from the third retellings. For the ranking of the retellings, we established the median value for each individual third retelling and then calculated the median of all individual third-generation retellings that resulted from one story variation. Using the median value is the standard procedure in cases where equidistance between numbers cannot be established. Median values are also less sensitive to outliers than average values, given that a small number of participants may have given random rankings. (Average values, however, returned similar results).

For this present study, we used a set of stories that resulted in a combined 367 third retellings based on the 21 original story variations. That is, the total number of retellings considered here is 1101 (367 first iteration, 367 second iteration, and 367 third iteration). There were between 13 and 24 third generation retellings for each source story (such as “Jason A”). The eventfulness rankings of the third generation stories used a total of 3,375 participant scores.

In the story variations, we decided not to control strictly for length, but instead measure and compare length of different variations. The results of our study focus on eventfulness readings (eventfulness, variance, lengths).

### 1.3 Results

Three generations of retellings bring about many severe changes in narratives. Typically, the length of stories dropped by around 50%. Much detail disappeared or was radically transformed, as we will indicate below.

Given the wide range of changes, the core finding of this study is even more astonishing. We found a strong correlation between eventfulness rankings of original stories and third retellings, see Figure 2.

Below are the median ranking values of all story variations.

	Jason A	Jason B	Jason C	Jason D	Jason E	Jason F	Jason G
Original	2.2	2.95	3.85	3.85	5.2	5.6	6
3rd retelling	1.8	2.3	2.1	3.275	3.9	4.2	5.2

	Sarah A	Sarah B	Sarah C	Sarah D	Sarah E	Sarah F	Sarah G
Original	0.75	2.4	3.6	4.8	5.2	5.6	6.1
3rd retelling	2.2	2.5	3.275	3.9	5	5.65	4.55

	Robert A	Robert B	Robert C	Robert D	Robert E	Robert F	Robert G
Original	0.15	2.1	3.45	5.1	5.6	6.6	6.7
3rd retelling	1.4	1.375	2.2	4.425	4.175	5	4.8

The results indicate that the eventfulness of a narrative is highly salient for comprehension and retelling, even when many other elements are strongly transformed or dropped at an overall rate of around 50%. The overall correlation coefficient ( $r$ ) is 0.897659424, thus indicating a strong overall correlation. (Our question of interest is the correlation between source stories and retold versions, hence a non-significant t-test would not allow us to rule out that there is no significant difference).

Furthermore, the results indicate that there is not simply one optimal eventfulness level. Rather, it seems people pay close attention to a given eventfulness level in a story, and preserve and reproduce it accurately, for the most part, even while all other elements are in flux.

The starting hypothesis of a “sweet spot” of optimal eventfulness was not verified. Instead, we noted a strong attentiveness to specific levels of eventfulness.

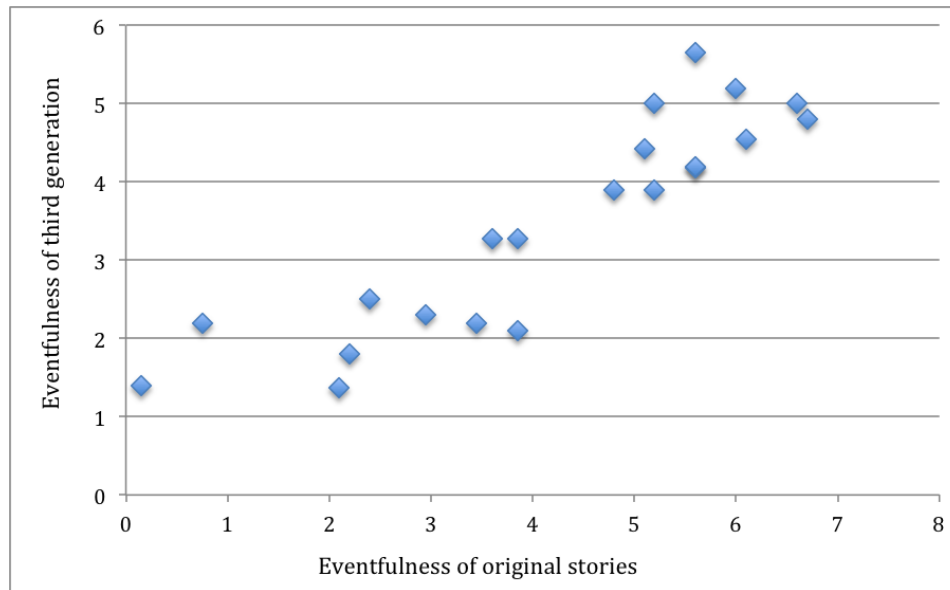
Only at the extremes of very low and very high eventfulness, below 2 and above 5, do the data suggest a tendency in the retellings to move toward the middle. The ratings of our original stories included extreme ratings of 0.25 and 6.7 for specific stories whereas the ratings after the retelling move closer to the 1.5 to 5.5 eventfulness rating segment.

Based on our original hypothesis, we also speculated that we would find longer lengths of stories to be of an optimal level of eventfulness. This was not the case. The length of third retellings was not correlated with eventfulness, but weakly correlated with the length of the original story, see Figure 4. Correlation values varied for the stories (Jason -0.23; Sarah -0.013; Robert 0.746). The shrinkage was above 50% for the Jason and Robert stories, whereas it was less than 50% for Sarah stories, the shortest original story.

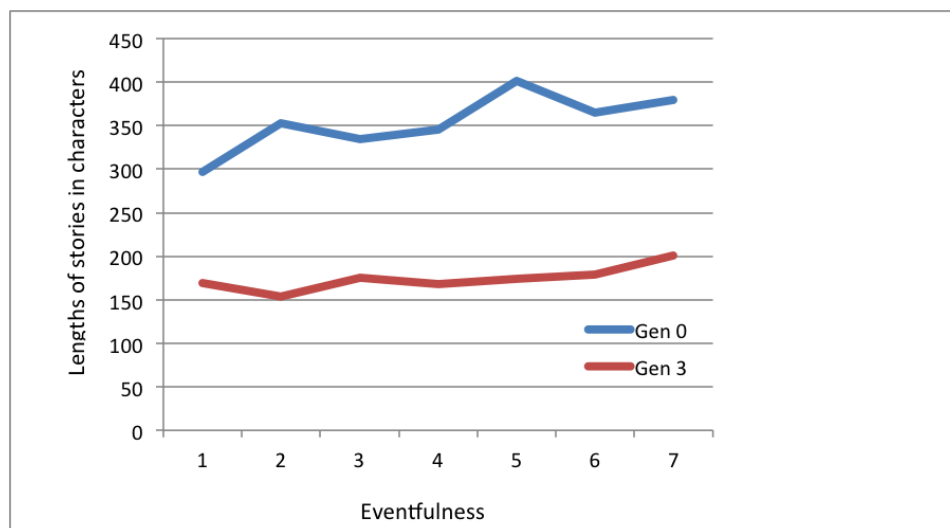
Another predictor we speculated about was story variation. We speculated that some story variations would show a larger variance of eventfulness readings of the individual branches in the third retelling. Again, this was not the case. The variance of eventfulness of individual retelling branches was similar at the extreme ends and the middle ground of the eventfulness scale.

In a future study with more experiments, we will report on full preservation of all elements of the stories. At this point, we should report the high degree of change between original





■ **Figure 3** Overall correlation of source stories and 3<sup>rd</sup> retelling. The x-axis represents the median eventfulness by the source stories prior to retelling. The y-axis represents the median eventfulness of the third retellings.



■ **Figure 4** Length correlations between original stories and third retellings, measured in characters.

story and third retelling. As an example, consider one story variation of the shy boy. It started with this text:

“Jason liked a girl in his class. He was very shy, however, and was too afraid to talk to her. One day, as he was sitting in the classroom, he piled a bunch of different fruits on top of his head and danced over to the girl, while singing her name. He mumbled that she looked nice and asked her if she would like to eat lunch with him.”

After three retellings, it turned into the following in one of its many branches:

“John fancied a girl in his class. His way to get her attention was to wear a fruit hat and dance his way to her. Mumbling and fumffering, he complimented her appearance and asked for a dance.” (J197)

Here, it is interesting to note that the emphasized characteristic of Jason-John as “very shy” disappears, whereas the oddity of his behavior finds a correlate in the neologism “fumffering” (or perhaps from Yiddish *funfer*, meaning to stutter). Obviously, the original story included the counterintuitive element that a shy boy would do this. Many retellings adjusted this tension by either eliminating the feature of shyness or by dropping details of Jason’s odd performance.

This individual string from *shy Jason* to *John the dancer* also illustrates a case in point for the bounded iteration (Figure 1). Linear iteration would have preserved something of the string with the starting proposition (a boy named Jason is shy), the middle action (“one day, . . . he piled fruit on his head. . .”) and the conclusion (he asks her for a lunch date). Instead, the core event around which the retelling is built is the dancing performance of a boy to get the attention of a girl. In classic bounded iteration fashion, other elements are built to fit this middle event, including: he fancied her (beginning) and asked her for a dance (conclusion).

## 2 Discussion

Our findings suggest that human recipients and retellers of narratives are highly sensitive to specific levels of eventfulness. The specific sensitivity of recognizing and reproducing specific levels of eventfulness accurately allows single-event narratives to maintain eventfulness over multiple generations of retelling. Hence, instead of a single level of optimal eventfulness of narratives, we argue for a broad-range sensitivity of eventfulness of narratives.

Our findings do not dispute that there may be some bias toward some optimal mid-level eventfulness in the cases of multiple events [9, 1]. However, in the condition of single-event retelling, we found much more evidence for an accurate representation of given eventfulness levels. It is possible that the discrepancy of our study and these other studies is a result of changed experimental design. Other studies used multiple-event retellings whereas we focused on single-event retelling. Based on our findings, the more remarkable finding is not the somewhat weaker correlation of very low and very high eventful narratives, but rather the remarkable overall consistency.

Given the impressive degree of correlation between original story eventfulness and third-retelling eventfulness paired with changes of all other story elements, we also suggest that the study supports the idea that narrative retelling makes strong use of bounded iteration. Bounded iteration is a retelling based on the construction of super-events that tie many elements of a given story together. In the process of retelling, the new story is built around and in accordance with the constructed event.

We are currently in the process of validating these findings with different experimental settings and with similar experiments using longer stories. The preliminary findings of the

retellings of longer stories are quite encouraging. In the longer stories (12 sentences), the preservation of eventfulness after three retellings is even stronger than in the case of the short stories from this study, while the preservation of the actual events is significantly lower. The preliminary findings strongly support the above finding that eventfulness is better preserved than the actual event.

These findings have significant consequences for generation and comprehension of narratives. They also suggest that we as recipients pay close attention to the eventfulness of narratives. Retelling does not simply preserve semantic or plot-related qualities of narratives, but includes affective dimensions, such as surprise. The degree of eventfulness is linked to expectation and probability. There may be two forces at work here simultaneously that each point in a different direction. One is curiosity. We may constantly look out for something unexpected, unresolved, or surprising. The other force is doubt. When we receive a story, we may constantly monitor its trustworthiness and flag the surprising stories as suspicious. Taken together, this leaves us in a position of having to pay close attention to both the most ordinary account and the most stunning and tall story.

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