Temporal transitions in narrative production with wordless picture books

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1. Introduction

When we tell a story, we don't always describe a sequence of scenes or situations in continuous time, but often introduce shifts in story time. These narrative time shifts can be explicitly marked with phrasal adverbials such as *a few hours later*, but explicit temporal adverbials and time references are not the only kinds of narrative devices for indicating the temporal structure of described events. Other ways of temporal marking – with connectives such as *when* and *while*, and lexical adverbs such as *suddenly*, *immediately*, *finally*, and *then* – can also help a storyteller structure a narrative to indicate the temporal relationship between described events. Our use of linguistic temporal markers in discourse can thus provide insight into one of the ways in which situational dimensions of target content are preserved in our linguistic coding. Because our methodology involves corpus frequencies of temporal marking relative to certain conditions, obligatory markers with little variation – e.g., in a narrative with past tense verbs throughout – are not a useful factor for conditional frequency analysis. We thus limit our discussion to the lexical and phrasal categories mentioned above, and exclude other markers such as tense and aspect.

The role of linguistic temporal markers in (narrative) discourse has been of interest to researchers in discourse analysis, cognitive psychology, and computational linguistics alike. For example, in discourse analysis, Schiffrin (1987) and Tenbrink (2007) similarly observed that clause-initial or mid-clause *then* is used in descriptions of event sequences to mark immediate succession between events, whereas clause-final *then* is used to refer back to a previously specified time. In experimental literature, Anderson, Garrod, and Sanford (1983) found an effect of the duration of story time gaps indicated by temporal adverbials in text on the frequency and type of character re-mentions in their participants' passage continuation. Specifically, a story time gap that goes beyond the typical duration of the target episode (*seven hours later* in a scenario of going to the movies) reduced the overall mention of secondary characters, and particularly pronominal anaphors referring to a secondary character, compared to a story time gap within the typical duration (*ten minutes later*). Also, Bestgen and Vonk (2000), who studied French temporal adverbials or anchors indicating a temporal location (e.g. *around eleven o'clock*) rather than duration of a gap, found that these time-locating adverbials eliminated the so-called 'boundary effect' (Haberlandt, Berian & Sandson, 1980): Participants took longer to read topically discontinuous transitions in narrative text (*I dressed myself warmly. => I cut up a slice of cooked ham.*) compared to topically continuous transitions (*I put the roast in a saucepan. => I cut up a slice of cooked ham.*), but when these transitions were preceded by the temporal marker *around eleven o'clock*, there was no significant difference in reading time between continuity vs. discontinuity transitions. The authors concluded that temporal markers serve as segmentation markers in discourse, leading the reader to bypass an attempt to integrate topically discontinuous new information with the current discourse representation by creating a new partition in representation instead. These experimental findings demonstrate the rapid impact of temporal markers on our discourse representation in working memory and subsequent narrative planning based on this representation.

In our study, we focused on the storyteller's use of temporal markers in narrative production in relation to a temporal dimension of the content to be described – namely, duration of intervals between consecutive scenes in wordless picture books. We thus investigated the relationship between perceived duration of time and the frequency and type of temporal transitions. We hypothesized that the longer the interval between depicted events, the higher the frequency of temporal marking, particularly temporal connectives (TCs – *as, when, while,* etc.) that commonly precede a dependent clause.

2. Methods

Stimuli. We used Mercer and Marianna Mayer's (Mayer, 1969; Mayer, 1974; Mayer & Mayer, 1975) wordless picture books to test our hypothesis. Each book has 22-24 pictures and depicts the adventures of a boy and his frog, with each picture depicting an event in the story. These picture books provide fixed target content with no verbal intervention for the participants to describe, and thus are well-suited for studying the impact of

non-linguistic situational dimensions in content on narrative production. Also, because the time intervals between events in consecutive scenes vary and there are multiple simultaneous actions by different characters in each scene, Mayer's books are ideal for studying the use of temporal expressions in narrative production (see Berman & Slobin, 1994).

2.1. Task 1: Interval estimation

Participants. Eight monolingual native English-speaking adults (age 20-22, mean = 21) participated.

Procedure. Participants estimated how much time had elapsed between events depicted in each pair of consecutive pictures in the wordless picture books. We deliberately did not tell the participants what unit of measurement to use (*seconds/minutes/hours*), and let participants provide the appropriate units. We used these estimates to obtain mean estimated intervals for pairs of consecutive events.

2.2. Task 2: Story-writing

Participants. A different group of 37 monolingual native English adults (age 18-22, mean = 20) participated in this task.

Procedure. All participants were told to pretend they were writing stories for children to listen to while they looked at the picture books. In the first version of the task (see below), 12 participants wrote a story for all three books in a counterbalanced order, and in the second version 25 participants only wrote a story for *Frog Goes to Dinner* (Mayer, 1974). Unlike previous studies using these wordless picture books (Berman & Slobin, 1994), our task involved no direct interaction with the experimenter.

Instructions conditions. In the first version, there were three different conditions:
(a) "Planning&Editing" Condition: Participants were instructed to look through the pictures from the current book first and were also allowed to revise earlier text; (b) "Editing" Condition: Participants were allowed to revise earlier text but not asked to look through the pictures first; (c) "NoEditing" Condition: Participants were neither allowed to revise earlier text nor instructed to look through the pictures first.

In the second version, we did not differentiate between the Planning&Editing and Editing conditions, and used just the two conditions of Planning&Editing and NoEditing.

Apparatus. Participants accessed the experiment pages on the Internet through their own system.

3. Results

3.1. Interval estimates

The interval estimates from Task 1 were consistent across the eight judges in a rank-based test of concordance [$W = .30$, $\chi^2(7, N = 49) = 103.07$, $p < .001$]. Based on these estimates, we obtained the mean interval for each consecutive scene pair and picked the eight highest mean intervals as 'Longest Intervals' (LIs; mean = 1h 7m 2s; see an example in Figure 1) and the eight lowest mean intervals as 'Shortest Intervals' (SIs; mean = 10s; see Figure 2). The first sentences after these LIs and SIs were our critical sentences for analysis of temporal marking (see Section 3.2. below).

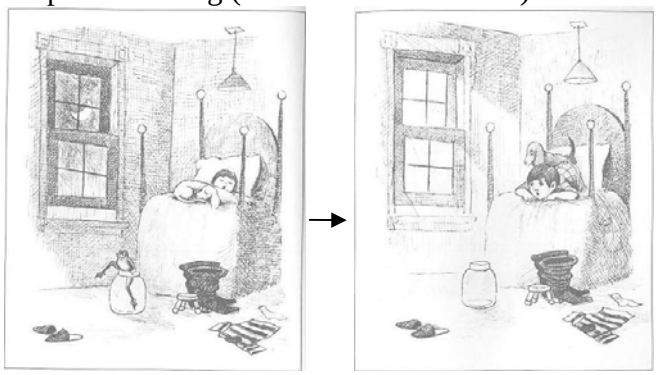

Figure 1. Sample 'longest interval' (mean estimate = 6h 48m 45s). (Taken from Mayer, 1969)

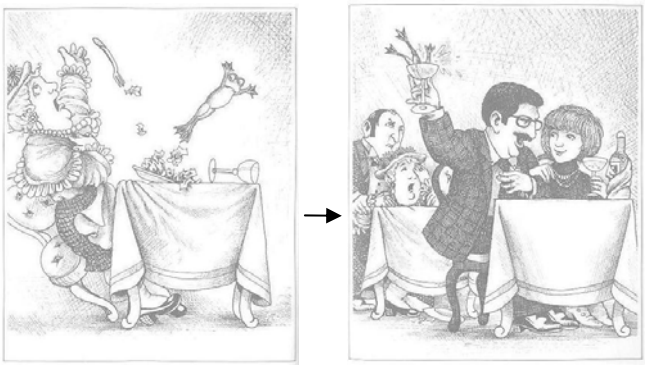

Figure 2. Sample 'shortest interval' (mean estimate = 3s). (Taken from Mayer, 1974)

3.2. Temporal marking in narratives

Three coders coded the critical sentences for presence or absence of explicit temporal marking. Only the first sentences after the LIs and SIs were analyzed for evidence of the immediate impact of scene transitions rather than any temporal dynamics for events within a scene. Critical sentences were coded as '1'

(TimeMarking) if a critical sentence contained any of the following temporal markers: (a) temporal connectives (TCs – *when, while, as*, etc.), temporal adverbs (TAs – *then, finally, now,* etc.), or explicit time reference ('Other,' mostly phrasal adverbials: *the next day, in the morning, during the night*, etc.); as '0' (NoMarking) if none of these temporal markers were present; and as '2' if explicit non-temporal marking was present (e.g., spatial marking with *in that car*, or causal marking with *because*).

In the LI category, there were 166 critical sentences and 2324 words in total; and in the SI category, there were 171 critical sentences and 1990 words in total. The grand totals of temporal markers were 107 in LI vs. 40 in SI. After excluding sentences with non-temporal marking (type '2') from analysis, a chi-square test with sentences as units of analysis revealed significantly more TimeMarking sentences after LIs and more NoMarking sentences after SIs (see Figure 3) [$\chi^2(1, n = 310) = 27.01, p < .001, \varphi = .30$]:

(1) *Once* Eric was in bed, Bob decided to sneak out of his jar. (LI, 'TimeMarking')

(2) Frankie landed in the water with a loud plop. (SI, 'NoMarking')

Welch's *t*-test also revealed consistent results, with a significant effect of interval on proportion of TimeMarking that held generally across instructions conditions and participants [$t(1, 304) = 29.79, p < .001$]. We did find a main effect of instructions conditions on proportion of TimeMarking [$t(2, 184) = 4.96, p < .01$]. Post-hoc tests revealed that the difference in proportion of TimeMarking between Planning&Editing Condition (mean = .53) and Editing Condition (mean = .32) was statistically significant [$p < .01$], and that between Planning&Editing Condition and NoEditing Condition (mean = .39) approached significance [$p = .06$]. Because the presence/absence of instructions to look through the pictures first (and thus plan the narrative ahead) seemed critical, we conducted a new Welch's *t*-test with Editing and NoEditing Conditions combined into a 'NoPlanning' Condition, which had a significantly lower proportion of TimeMarking (mean = .36) than for Planning&Editing Condition [$t(1, 251) = 8.89, p < .01$].

Not all the categories of temporal marking showed the same pattern of sensitivity to intervals: TAs were more balanced across LIs and SIs than TCs and Others, although the adverb *then* accounted for most of the TAs after SIs (see Figure 4) [$\chi^2(2, n = 149) = 10.29, p < .01, \varphi = .26$].

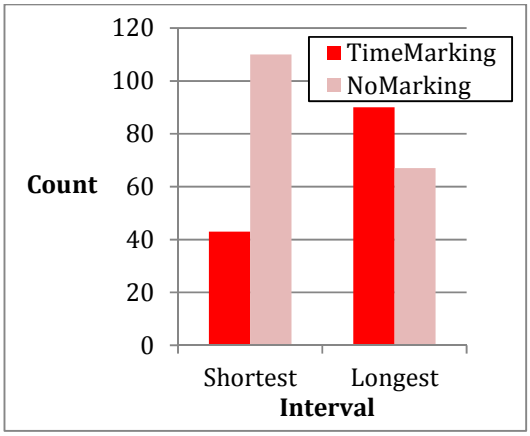

Figure 3. Frequency of TimeMarking vs. NoMarking sentences.

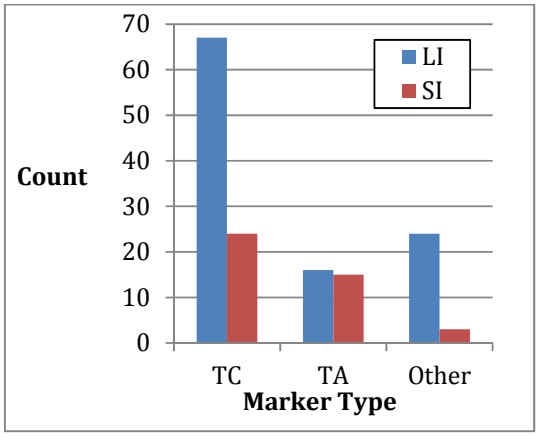

Figure 4. Frequencies of temporal marker types by Interval.

4. Discussion

In this narrative production study, we investigated the relationship between passage of time between events in a story and the storyteller's use of temporal markers. Analysis of frequency of TCs, TAs, and explicit temporal references in our written narrative corpus demonstrated that storytellers used these temporal markers more frequently after long intervals than after short intervals in the target content. The temporal structure of the events in the situational content was thus preserved in the narrator's linguistic encoding. Further, storytellers used these temporal markers more when they looked through a picture book first and thus became familiar with the storyline before beginning to write a story.

We conclude that the durations of intervals in situational content are represented in a way that influences our narrative organization – particularly, our use of linguistic devices for encoding the temporal structure of events. Storytellers use these linguistic devices to help the reader update the temporal dimension of

discourse representation. Explicit temporal references such as *after a long 30 minute drive* and *on the first day of school* are a straightforward means of updating discourse time with a new topic time specifically. TCs such as *when* and *as soon as* in subordinate clauses similarly update discourse time by specifying the time of the event in the main clause. These updates in discourse representation may facilitate the reader's discourse processing by triggering a new partition in the mental representation of the discourse (see Bestgen & Vonk, 2000). TAs, on the other hand, play a more heterogeneous role in narrative time dynamics, as diverse lexical meanings in this category seem to have direct consequences for their discourse role of relating a new topic time to the previous topic time (in this case, predicating of the temporal relationship between scenes across an interval). For example, *then* – the only temporal marker that appeared noticeably more often after SIs in our data – appeared 11 times after SIs but only twice after LIs, and thus typically indicated immediate succession or proximity in time, whereas *finally* appeared only once after SIs and four times after LIs. Interestingly, *immediately / at once*, which we expected to observe more after SIs because of the lexical meaning, occurred four times and only after LIs, as all of these cases involved multi-clause sentences in which there was an earlier time introduced by another temporal marker and *immediately* described immediate succession between two events within the same sentence (thus with a discourse function similar to *as soon as*), rather than between two events across a scene transition:

(3) The minute they got home[,] Zach's dad told Zach to go to his room *immediately*.

Although Bestgen and Vonk (2000) emphasized the role of *then* as a marker of discourse discontinuity – indicating a topic shift – our data suggest it plays a role in marking temporal continuity in the described situations, consistent with Schiffrin's (1987) and Tenbrink's (2007) analysis, and thus reinforcing the default incremental narrative time progression (e.g., Dowty, 1986).

The linguistic encoding of the temporal dimension of situational content by storytellers is consistent with the view of communication as alignment of situation models between interlocutors (Pickering & Garrod, 2006), and thus adds a production component to the situation model of language (Zwaan, 1999), usually discussed in regard to language comprehension.

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