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Grammatical Aspect, Temporal Adverbs, and Situation Models

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GRAMMATICAL ASPECT, TEMPORAL ADVERBS, AND SITUATION MODELS

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THESIS

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Abstract

Grammatical aspect and temporal cues have been shown to impact discourse processing. To explore this further, we contrasted temporal adverbs that move narrative timelines forward or backward. Although previous research has examined timelines independently, it was yet to be explored how timeline adverbs impact discourse processing when grammatical aspect and temporal cues are also manipulated. The experiment involved a sentence-completion task which allowed us to measure availability of target discourse concepts in situation models. Results showed main effects for grammatical aspect, temporal shifts, and narrative timeline directions. Three two-way interactions were found. The results demonstrated support for the iconicity assumption and determined that grammatical aspect, time shifts, and narrative timeline direction in texts impact discourse processing.

Keywords: Grammatical aspect, time shifts, narrative timelines, situation models

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GRAMMATICAL ASPECT, TEMPORAL ADVERBS, AND SITUATION MODELS

Different components of language have been shown to influence how individuals create

mental representations of events (Zwaan & Radvansky, 1998). These mental representations are

also known as situation models, which portray all elements associated with events and the

temporal properties related to those events (Hong, Ferretti, Craven & Hepburn, 2019). Without

temporal information or time shifts (cues that characterize time or order of events) described in

texts, readers will implement the iconicity assumption (Rinck, Hähnel, & Becker, 2001). The

iconicity assumption can be broken down into two assumptions. The first assumption is the

temporal ellipsis hypothesis which declares that access to situational information is decreased

when the time lapse between clauses is too long (Grisot, 2021). This assumption is referenced

later. The second assumption is the temporal directionality hypothesis which states that

violations of chronological order in texts decrease situational information accessibility. In other

words, temporal properties or time shifts are necessary to tell the reader exactly how events are

arranged, which is important for the construction of situation models.

In addition to time shifts, aspectual markers, such as grammatical aspect, are also

required for readers to compose situation models (Ferretti, Kutas, & McRae, 2007). Grammatical

aspect refers to the temporal development of events that is referenced by morphosyntactic

information associated with verbs (Becker, Ferretti, & Madden-Lombardi, 2013). These

aspectual cues are divided into three categories: the imperfective aspect refers to events as

ongoing (e.g., I was washing the dishes); the perfect aspect refers to events as completed with a

specific reference to the resultant states of events (e.g., I had washed the dishes); and the

perfective aspect refers to events as completed without reference to any specific event state (e.g.,

I washed the dishes). The fundamental difference between the perfect and perfective aspects is

that the perfect aspect indicates the continuing importance of the results of events (Becker et al., 2013). As discussed below, grammatical aspect is crucial for how people create and update situation models (Madden & Zwaan, 2003).

Further, lexical aspect specifies the inherent temporal meaning of events, and that can be categorized into accomplishments and activities (Becker et al., 2013). Accomplishments are telic as they advance toward a natural endpoint, therefore, they include natural boundaries (e.g., building a fence). Alternatively, activities are atelic as they do not advance toward an endpoint and do not include the natural boundaries (e.g., listening to music). Lexical aspect is also important as readers use the inherent temporal characteristics of events in their formation of situation models (Yap, Chu, Yiu, & Wong, 2009).

Background Research

Time shifts have been shown to play an essential role in how available target concepts are in situation models. As per the temporal ellipsis hypothesis of the iconicity assumption (Grisot, 2021), longer temporal shifts between events in texts may decrease situational information access. Zwaan (1996) examined this by providing participants with short stories with one sentence containing a recognition word, which was either a verb or a noun near the end of the sentence (e.g., beaming). Subsequent critical sentences included time shifts where events advanced with either a short time shift (e.g., a moment later, he turned very pale), an intermediate shift (e.g., an hour later, he turned very pale), or a long shift (e.g., a day later, he turned very pale). Probe recognition times were recorded to index the availability of the concepts in the situation models. The results showed that when short time shifts were presented, recognition responses were quicker than in the intermediate and long shift conditions. This indicates that when short time shifts were used, target concepts were more available in the

situation model. There was no significant difference between intermediate and long conditions, but recognition times were slower for long time shift conditions. This suggests that there may be a limited temporal range on shifts in texts, and that readers will create a new situation model if the time shift used is too long (Zwaan & Radvansky, 1998).

Madden and Zwaan (2003) conducted three studies to determine how grammatical aspect contributes to situation models. The researchers used a picture-sentence matching task where pictures of complete or incomplete events were presented to participants and then they had to indicate whether sentences presented in either the perfective or imperfective aspect matched the pictures. Experiment 1 displayed the picture and then two sentences (one in perfective aspect and one in imperfective aspect) and participants were to indicate which sentence best matched the picture. Experiment 2 was similar, except they presented a sentence first, and then a picture, and participants were to indicate whether the picture matched the presented sentence (yes-no). Lastly, Experiment 3 was a replication of Experiment 1, however, they also had participants indicate whether the sentence matched the displayed photo (yes-no). The three studies demonstrated that response times were quickest when perfective aspect sentences were matched with photos showing completed events. When looking at aspect individually, they found that response times were quicker for perfective sentence-photo matches or mismatches compared to imperfective sentence-photo match or mismatch trials. In all, this indicates that readers are sensitive to grammatical aspect, but more specifically, comprehension may be more constrained by perfective verbs compared to imperfective verbs.

Grammatical aspect and time durations have also been examined during an event segmentation task (Feller, Eerland, Ferretti, & Magliano, 2019). In this study, the researchers completed three experiments to determine how grammatical aspect and time durations affect

one's understanding of temporal barriers between events. In Experiment 1, the researchers predicted that event segmentation will be higher when the perfective aspect is presented in stories. In terms of time shifts, the researchers hypothesized in Experiment 2 that event segmentation will be higher only when an imperfective short-duration condition was presented in stories. Lastly, Experiment 3 used a story-completion task to determine if participants viewed imperfective events as simultaneous and perfective events as chronological. Experiments 1 and 2 concluded that the perfective aspect was related to increased event segmentation. There were no differences for time-shift duration. Experiment 3 established that the imperfective aspect is related to perception of simultaneous events while perfective aspect is related to perception of chronological events. These results show that grammatical aspect influences one's ability to interpret event boundaries in situation models.

Further, lexical aspect has also been examined in combination with grammatical aspect. Yap et al. (2009) investigated the interaction between lexical aspect and grammatical aspect in a sentence-picture matching task. They predicted higher processing costs when the temporal information from grammatical and lexical aspect mismatched (imperfective-accomplishments, perfective-activities) versus matched (imperfective-activities, perfective-accomplishments). Participants listened to sentences through headphones and then selected pictures that best matched the sentence they heard. Consistent with their predictions, they found that picture selection times were fastest when accomplishment events were presented with perfective aspect, and activity events were presented with imperfective aspect. This indicates that the way verbs are presented, and their inherent temporal meanings, combine to impact one's ability to update or create situation models.

Electrophysiological Evidence

The temporal and aspectual effects discussed above have also been supported by electrophysiological research. Specifically, the N400 and slow-cortical potentials (SCPs) have been used to demonstrate similar findings. The N400 amplitude is a negative event-related potential (ERP) that reaches its highest amplitude at about 400 ms post-stimulus and is associated with how easily words can be semantically integrated into situation models (Becker, et al., 2013). SCPs are associated with cognitive processing difficulty over longer periods of time (Hong et al., 2019) and generally, SCP amplitudes are more negative when there is difficulty with integrating text into the developing situation model.

Becker et al. (2013) conducted a novel experiment to explore how mental representations are impacted by grammatical aspect, lexical aspect, and time shifts. They did this by using electroencephalography to record differences in N400 while participants read narratives. In general, the authors predicted that N400 amplitudes would be reduced when concepts in the narratives were presented in the imperfective rather than the perfective aspects, but only for only short time shifts. The researchers also expected reduced N400 amplitudes for imperfective rather than perfective aspect for accomplishments, but not activities. This was anticipated because accomplishments include a natural endpoint which distinctly show the grammatical aspect effect (Yap, et al., 2009). Participants read stories that described an event as either an activity or an accomplishment in either imperfective or perfective aspects. Results showed that the N400 was reduced when concepts were presented in imperfective rather than perfective aspect. This effect was only displayed when events were presented in accomplishments, not activities, and only after short time shifts. The researchers concluded that their findings for activities resulted from similar event structure throughout the ongoing or completed aspects, meanwhile the accomplishment items contained changes in state from ongoing to completed aspect, which

produced reduced N400 for the short, imperfective conditions. This study demonstrates that grammatical aspect, lexical aspect, and time shifts are important when it comes to discourse comprehension.

Further research has demonstrated the role of grammatical and lexical aspects on one's ability to imagine events (Hong et al., 2019). In this study, participants were presented with phrases that were either in the imperfective or perfective aspect and contained either activity or accomplishment verbs (e.g., I was skating). Following the results of Yap et al. (2009), the researchers predicted that SCPs will be more negative for perfective than imperfective aspect for activities, whereas SCPs will be more negative for imperfective than perfective aspect for accomplishments. Participants read the phrases and then had 8 seconds to imagine the event. Hong et al. found that it was more difficult for participants to imagine events when phrases were presented in the perfective form for activities. It was also more difficult to imagine events for imperfective phrases for accomplishments. In other words, imagining events was more difficult when phrases were temporally mismatched versus when they matched.

Recently, Eerland, Feller, DiMarco, Magliano, and Ferretti (2023) examined how forward narrative shifts and grammatical aspect combine to impact the availability of target concepts in a reading task using ERP methodology, and a sentence completion task like the study reported below. Eerland et al.'s study used short passages that introduced an agent that was performing a physical action on an object in the first sentence, followed by a second sentence that began with an adverbial phrase that moved the timeline before the reintroduction of the target object from the first sentence (e.g., The boy was washing/washed the dishes. 50/11 minutes later, the dishes sparkled). Their ERP results demonstrated that target words were more available following events presented in imperfective than perfective form, but only after short temporal shifts

(similar to Becker et al., 2013). Their results also showed a Late Positivity to targets that followed perfective events and long temporal shifts. A subsequent sensibility rating study confirmed this Late Positivity was likely a result of targets in the perfective long shift condition being the least sensible. Their sentence completion study involved providing participants with passages that ended immediately before the reintroduced target in the second sentence and were instructed to complete the passages in a way that was the most natural. Eerland's completion results showed that targets were more likely to be mentioned following imperfective events, and when they followed short shifts. Taken together, these findings show that when moving the narrative timeline forward, discourse concepts are the most available in situation models when they follow ongoing events and the temporal shifts are short. The current research is a replication and extension of Eerland et al. (2023) by contrasting the impact of the temporal adverb "earlier" with "later" on the availability of discourse concepts in situation models.

Current Research

Research has often examined temporal properties by moving events forward (Ditman, Holcomb & Kuperberg, 2008; Feller et al, 2019; Zwaan 1996). In these studies, the researchers used texts where the narrative timeline is moved forward with either short or long shifts (i.e., a moment later vs. a day later). However, there has been limited research on the impact on discourse processing when time shifts move the narrative timeline backward (i.e., a moment earlier, a day earlier) versus forward (Münte, Schiltz, & Kutas, 1998). Münte et al., (1998) conducted a study to determine the effects of "before" versus "after" clauses (e.g., before/after the psychologist submitted the article, the journal changed its policy) on cognitive processing. Participants read before/after sentences during EEG recordings and the researchers found more negative slow cortical brain potentials in left frontal recording sites when participants read

"after" clauses. This indicates that reading sentences that violate chronological order (i.e., the iconicity assumption) resulted in increased difficulty in discourse processing. That is, when timeline narratives are moved backwards in texts, there is increased difficulty in the cognitive processing of situation models.

In the current research, we examined the effect of grammatical aspect and temporal shifts on the contents of situation models that captured accomplishment events. Specifically, the novel aspect of this study was that we contrasted temporal adverbs that move narrative timelines forward versus backwards, which allowed for the examination of the full iconicity assumption.

We expected that sentence completions would contain increased reference to the target discourse concept for the imperfective aspect condition compared to the perfective condition, for the short temporal shift conditions only. In addition, and based on Zwaan's (1996) findings, we presumed that target concepts would be referenced more often for short temporal shift conditions compared to long temporal shift conditions. We also anticipated that target concepts would be referenced more often during forward-moving narrative events compared to backward-moving narrative events (i.e., the iconicity assumption). This is supported by Münte et al., (1998), where sentences violating chronological order resulted in increased difficulty in discourse processing.

As for interactions, we expected three two-way interactions based on the full iconicity assumption. For grammatical aspect and temporal shifts, we expected the difference in target mentions between the imperfective and perfective conditions to be greatest following short than long temporal shifts (Becker et al., 2013; Eerland et al, 2023). For aspect and narrative timeline direction, we expected the difference between the imperfective and perfective conditions to be greater in the forward than backward direction. We also hypothesized a time shift by narrative

timeline direction interaction, whereby there would be most target mentions following short than long shifts, and this difference would be greatest in the forward direction.

Lastly, we predicted one three-way interaction where temporal shifts, grammatical aspect, and narrative timeline directions would interact to impact discourse processing. More specifically, when the timeline is moved earlier with short durations, perfective aspect would have increased likelihood of reference to the actual event period than with imperfective aspect. Alternatively, for long shifts that surpass normal event durations, both aspects should lead to fewer target references. When the timeline is moved later, the perfective aspect should reference outside of the event period with both short and long duration shifts (and so fewer target completions overall), whereas imperfective aspect should reference the event period more often for short rather than long shifts.

Method

Participants

We aimed to have at least 15 participants per experimental item. This sample size was selected as previous research found strong effect sizes with 15 participants (Eerland et al., 2023). In all, we had 240 participants in total (119 male, 113 female, 7 non-binary, ages 18-82, $M = 44$ years). One participant was removed due to inappropriate responses and an additional 21 completions were removed for non-serious answers (e.g., "the dishes washed the boy"). Participants were recruited through Prolific (https://www.prolific.co/) and were to have a prolific approval task rate of 95-100%. Participants were all native English speakers, 18 and older, and residing within the USA. Participants received monetary compensation (3.0 GBP).

Materials and Procedure

There were 120 two-sentence items (15 per experimental condition) in each of the eight item lists (see Appendix 1) that were displayed throughout the study. As the task is repetitive, the item lists were split so that each participant completed either 64 items (list a) or 56 items (list b) for practical reasons. There were 16 lists (8 of 64 items, 8 per condition; and 8 of 56 items, 7 per condition). Participants were randomly assigned to one of the lists (i.e., 1a, 1b, 2a, 2b, … 8a, 8b). The order of the items was also presented in a randomized order.

The first sentence of each item described a person conducting an action on an object (e.g., The boy washed the dishes). In the first sentence, we introduced an agent (e.g., The boy) before manipulating the grammatical aspect. To manipulate grammatical aspect, we presented the alternation of the target concept (e.g., the dishes) in either the perfective condition (e.g., The boy washed) or imperfective condition (e.g., The boy was washing). The beginning of the second sentence contained a short shift (e.g., 4 minutes earlier) or a long shift (e.g., 20 minutes earlier). The durations for each sentence were predetermined based on a previous pilot study where participants provided natural duration lengths for described events (Eerland et al., 2023). Following the adverbial phrases, the determiner "the" appeared. The second half of the sentence was left blank and was to be completed by participants during the experiment (see example 1).

1. The boy washed the dishes. 50 minutes later, the _____.

Participants were instructed to complete each sentence in a manner that seems the most natural to them. It took approximately 1 hour to complete all the sentences. The results from the sentence-completion task were coded for how frequently the target discourse concept was provided in the completions. We used this as an index for how available the discourse concepts were in the participants' situation models. Participant data was only considered if the participants

enter legitimate responses. Illegitimate responses included non-serious, unrelated, inappropriate, or repetitive (>5) completions.

Coding

Interrater reliability for coding was attained by requiring two individuals (myself and a post-doctoral researcher) to independently code a subset of the data (Kappa > 0.80). The coding assessed for two aspects of the sentence completions. First, we determined if participants included the target concept in their completions (yes/no). The 13,518 completions that contain the target concept were then assessed to see if participants described the target concept within the same event (example 2) or in a different event (example 3). Any unclear completions were discussed and resolved by the research team.

2. The boy was washing the dishes, 50 minutes later, the dishes were dry.

3. The boy was washing the dishes, 50 minutes later, the sink was full of dishes again.

Results

A 2 (Aspect: imperfective, perfective), x 2 (Duration: short, long) x 2 (Direction: later, earlier) within-subjects ANOVA was conducted to determine what the effects and interactions between the three variables would be on the likelihood of mentioning the target concept in general and mentioning the target concept within the same event. The means and standard deviations for likelihood of mentioning the target concept can be found in Table 1. Results indicated a main effect of narrative timeline direction such that there was a higher likelihood of mentioning the target concept in the later condition than the earlier condition, $F(1, 239) = 25.30$, $p < .001$, $\eta_p^2 = 0.096$. There were no other significant effects for predictors or interaction terms in sentence completions that referenced to the target concept.

Table 1

Mean likelihood of mentioning target object (SD). For example, 0.50 would represent mentioning the target concept in 50% of the completions in that condition.

	Earlier			Later	
	Short	Long		Short	Long
Imperfective	0.54 (0.50)	0.52 (0.50)	Imperfective	0.59 (0.49)	0.57 (0.49)
Perfective	0.53 (0.50)	0.54 (0.50)	Perfective	0.58 (0.49)	0.57 (0.50)

For the items that contained a reference to the target concept within the same event, we performed a second ANOVA to determine the effects of aspect, duration, and timeline direction on the likelihood that the object was mentioned within the same event. The means and standard deviations for the likelihood can be found in Table 2. Results indicated a main effect of narrative timeline direction such that there was a higher likelihood of mentioning the target concept within the same event in the later condition than the earlier condition, $F(1, 201) = 148.29$, $p < .001$, $\eta_p^2 = 0.43$. There was also a main effect of grammatical aspect where there was a higher likelihood of mentioning the target concept within the same event for imperfective than perfective aspect, $F(1, 201) = 39.51$, $p < .001$, $\eta_p^2 = 0.16$. Furthermore, there was a main effect of duration where there was a higher likelihood of mentioning the target concept within the same event for short rather than long durations, $F(1, 201) = 34.55$, $p < .001$, $\eta_p^2 = 0.15$.

Table 2

Mean likelihood of mentioning target object (SD).

	Earlier			Later	
	Short	Long		Short	Long
Imperfective	0.20 (0.40)	0.15 (0.36)	Imperfective	0.48 (0.50)	0.35 (0.48)
Perfective	0.19 (0.39)	0.17 (0.38)	Perfective	0.31 (0.46)	0.24 (0.43)

The aspect x duration interaction was significant, $F(1, 201) = 3.67$, $p < .10$, $\eta_p^2 = 0.02$ (see Table 3). The difference between the long and short conditions was greater for imperfective, $F(1, 237) = 36.77$, $p < .0001$, than perfective aspect, $F(1, 237) = 13.16$, $p < .001$. The aspect x direction interaction was also significant, $F(1, 201) = 32.60$, $p < .001$, $\eta_p^2 = 0.14$ (see Table 4). The difference between the earlier and later conditions was greater for imperfective, $F(1, 236) = 198.12$, $p < .001$, than perfective aspect, $F(1, 236) = 29.94$, $p < .001$. Lastly, the duration x direction interaction was significant, $F(1, 201) = 15.58$, $p < .001$, $\eta_p^2 = 0.07$ (see Table 5). The difference between the earlier and later conditions was greater for the short, $F(1, 234) = 162.13$, $p < .001$ than long conditions, $F(1, 234) = 68.37$, $p < .001$. The three-way interaction between aspect, duration, and direction was not significant, $F < 1$.

Table 3

Mean likelihood of mentioning the target event for the aspect x duration interaction (SD).

	Short	Long
Imperfective	0.34 (0.45)	0.25 (0.42)
Perfective	0.25 (0.43)	0.21(0.46)

Table 4

Mean likelihood of mentioning target event for the aspect x direction interaction (SD)

	Earlier	Later
Imperfective	0.18 (0.38)	0.42 (0.49)
Perfective	0.18 (0.39)	0.28 (0.25)

Table 5

Mean likelihood of mentioning target event for the duration x direction interaction (SD.

	Earlier	Later
Short	0.20 (0.40)	0.40 (0.48)
Long	0.16 (0.39)	0.30 (0.45)

Discussion

Previous studies have looked at grammatical aspect, lexical aspect, and time shifts, while very few examined the influence of narrative timeline directions on discourse processing. We extended this research by examining the interactions between these temporal variables, and how they would affect the likelihood of a) mentioning a target concept, and b) mentioning the target concept within the same event.

Target concepts had increased references in the "later" conditions versus the "earlier" conditions, which confirmed one of our hypotheses and supports the iconicity assumption. This runs parallel to the findings of Münte et al. (1998), who found that when events are described in violation of chronological order, processing becomes more difficult. Here we extend Münte et al.'s results by showing that not only does processing become more difficult, but the availability of concepts decreases.

Mean likelihood scores were also calculated to examine references to the targets within the same event mentioned in the first sentence. The present finding demonstrated that the references to the targets were more significant for the imperfective than perfective aspect. This finding is supported by Becker et al. (2013) and Eerland et al. (2023) who found reduced N400 amplitudes to target concepts in imperfective conditions. The increased references to the targets when the imperfective condition is used occurs because imperfective aspect situates that the event has not ended yet, leaving the associated discourse concepts more available in the situation model. Therefore, participants are more inclined with imperfective aspect to reference within the same event instead of creating a different event. Stated differently, when the perfective aspect is

used, it situates that the event has ended. Therefore, participants would be less likely to reference the target concept within the same event for perfective conditions (Feller et al., 2019).

There were also heightened references to the targets within the same events when short time shifts were introduced compared to the longer time shifts, which confirmed our temporal shift hypothesis. This finding is well established by previous research (Becker et al., 2013; Zwaan, 1996; Feller et al., 2019). More importantly, grammatical aspect and temporal shift produced an interaction whereby there was increased reference to the targets for imperfective than perfective aspect, but this difference was largest for short shifts. This aligns with results found by Becker et al. (2013) and Eerland et al. (2023) as they also found the most reduced N400's for target concepts in the imperfective, short shift conditions. These results occur because the perfective long shift condition leads to a reference well past the event boundary (Feller et al., 2019), and because of the temporal ellipsis hypothesis, which assumes that access to situational information decreases when the time lapse is too long. In other words, when a time shift is too long, concepts are more likely to be referenced outside of the aforementioned event.

When narrative timeline directions were examined on likelihood of mentioning the target event, a main effect was again found where the likelihood was enhanced when "later" conditions were introduced compared to the "earlier" conditions. Again, this finding is consistent with the iconicity hypothesis. When looking at narrative timeline direction and grammatical aspect, we found an interaction where references to the target events were increased in the imperfective relative to perfective aspect, but only in the "later" condition. These findings are the first to show that different forms of temporal adverbs combine with grammatical aspect to differentially impact the availability of target concepts in situation models. More specifically, the results show

the availability advantage afforded by imperfective aspect in a chronological direction is completely absent when the narrative timeline is moved earlier in time.

In addition, the present results also show the availability of discourse concepts in situation models can be impacted by time shifts and narrative timeline direction. Specifically, references to the target events were enhanced for the short versus long shifts, and this difference only was significant in the "later" direction. Similar to the grammatical aspect findings discussed above, these novel results show that moving the timeline earlier diminishes the impact of temporal information on the availability of concepts in situation models. These findings support and the full iconicity assumption, including both the temporal ellipsis hypothesis and the temporal directionality hypothesis.

This study used an online sentence-completion task to examine the interactions between grammatical aspect, temporal shifts, and narrative timeline directions in texts. The sentence-completion task provided insight about how available target concepts are in situation models in an "offline" setting. Further research is planned to record electrophysiological responses to the target concepts when participants read passages "online" with the same manipulations used in the current research. Examining the N400 and Late Positivity components to the target concepts would provide corroborating evidence for the current findings in a more naturalistic reading setting where participants do not take excess time to sit and think about the scenarios mentioned in the text.

Finally, the current study collected responses from participants through the internet rather than in an in-person setting. We took precautions to reduce problems associated with participants not doing the task properly (e.g., attention checks) and told students to not produce non-serious responses. None-the-less, we had several non-serious responses to the task which had to be

removed upon analysis. Further studies could reduce this problem by using in-person testing when collecting sentence completions.

Overall, this study was the first to demonstrate how grammatical aspect, temporal shifts, and narrative timeline direction impact the availability of discourse concepts in situation models. The findings from this study extend previous work and add to the growing body of literature on the impacts of temporal information on the construction of situation models. Our findings show that moving the narrative timeline earlier leads to a reduction in the influence of other temporal sources of information on availability of discourse concepts.

Appendix 1: Item Lists

The items below are as shown in list 1. The items below display the perfective, short, later conditions. Items also appeared in the following conditions: perfective, short, earlier; perfective, long, later; perfective, long, earlier; imperfective, short, later; imperfective, short, earlier; imperfective, long, later; and imperfective, long, earlier.

List 1	1. The man cleaned the counter. 4 minutes later, _____.
	2. The woman deposited the paycheck. 3 minutes later, _____.
	3.The girl traced the pattern. 2 minutes later, _____.
	4.The man chopped the carrot. 1 minute later, _____.
	5.The boy sanded the dresser. 6 minutes later, _____.
	6.The woman packed the suitcase. 25 minutes later, _____.
	7. The girl swept the garage. 11 minutes later, _____.
	8. The girl flossed her teeth. 2 minutes later, _____.
	9.The woman boiled the noodles. 8 minutes later, _____.
	10.The boy tied the shoelace. 24 seconds later, _____.
	11. The woman patched the tire. 25 minutes later, _____.
	12.The man opened the store. 2 days later, _____.
	13.The girl combed her bangs. 1 minute later, _____.
	14.The woman painted the door. 30 minutes later, _____.
	15.The boy filled the jar. 1 minute later, _____.
	16. The woman stitched the blanket. 110 minutes later, _____.
	17. The woman mended the jacket. 25 minutes later, _____.
	18.The woman installed the shower. 4 hours later, _____.

19. The girl sautéed the onions. 4 minutes later, _____.

20. The woman composed the poem. 2 hours later, _____.

21. The boy raked the yard. 35 minutes later, _____.

22. The girl sliced the bread. 1 minute later, _____.

23. The man waxed the van. 45 minutes later, _____.

24. The man trimmed the hedge. 20 minutes later, _____.

25. The boy shoveled the driveway. 45 minutes later, _____.

26. The woman unloaded the dishwasher. 5 minutes later, _____.

27. The man fixed the hinge. 15 minutes later, _____.

28. The girl kneaded the dough. 6 minutes later, _____.

29. The boy mixed the salad. 3 minutes later, _____.

30. The woman defrosted the freezer. 90 minutes later, _____.

31. The man developed the brochure. 100 minutes later, _____.

32. The man harvested the corn. 4 hours later, _____.

33. The woman assembled the table. 40 minutes earlier, _____.

34. The girl knitted the scarf. 2 hours later, _____.

35. The boy shook the cocktail. 21 seconds later, _____.

36. The boy thawed the chicken. 80 minutes later, _____.

37. The girl laced the sneaker. 1 minute later, _____.

38. The man shredded the exams. 4 minutes later, _____.

39. The girl whipped the cream. 4 minutes later, _____.

40. The woman signed the contracts. 5 minutes later, _____.

41. The woman grilled the fish. 12 minutes later, _____.

42. The woman rescued the cat. 14 minutes later, _____.

43. The girl counted the coins. 3 minutes later, _____.

44. The man cooked the steak. 15 minutes later, _____.

45. The boy constructed the kite. 30 minutes later, _____.

46. The boy drew the barn. 5 minutes later, _____.

47. The man fried the egg. 4 minutes later, _____.

48. The boy inflated the ball. 2 minutes later, _____.

49. The woman stacked the cargo. 45 minutes later, _____.

50. The girl wove the basket. 4 hours later, _____.

51. The man ironed the shirt. 4 minutes later, _____.

52. The man renovated the basement. 3 days later, _____.

53. The woman stained the deck. 11 minutes later, _____.

54. The man secured the trailer. 9 minutes later, _____.

55. The man corrected the essay. 17 minutes later, _____.

56. The girl emptied the garbage. 3 minutes later, _____.

57. The man made the dinner. 40 minutes later, _____.

58. The boy mashed the potatoes 3 minutes later, _____.

59. The boy vacuumed the carpet. 12 minutes later, _____.

60. The woman planted the tree. 20 minutes later, _____.

61. The boy frosted the cake. 5 minutes later, _____.

62. The man altered the hemline. 30 minutes later, _____.

63. The woman chugged the beer. 1 minute later, _____.

64. The man dealt the cards. 1 minute later, _____.

65. The man arranged the furniture. 15 minutes later, _____.

66. The woman carved the ham. 7 minutes later, _____.

67. The woman bathed the baby. 15 minutes later, _____.

68. The man edited the manuscript. 9 hours later, _____.

69. The girl decorated the cake. 18 minutes later, _____.

70. The girl peeled the apple. 2 minutes later, _____.

71. The man repaired the dryer. 80 minutes later, _____.

72. The woman dressed the child. 5 minutes later, _____.

73. The boy polished the car. 40 minutes later, _____.

74. The boy cleared the desk. 4 minutes later, _____.

75. The man shaved the beard. 6 minutes later, _____.

76. The girl stirred the coffee. 15 seconds later, _____.

77. The girl wrote the letter. 13 minutes later, _____.

78. The boy devoured the meal. 6 minutes later, _____.

79. The woman sketched the map. 14 minutes later, _____.

80. The man evacuated the building. 7 minutes later, _____.

81. The boy squeezed the oranges. 3 minutes later, _____.

82. The girl untangled the rope. 4 minutes later, _____.

83. The girl decoded the message. 25 minutes later, _____.

84. The woman programmed the computer. 9 hours later, _____.

85. The woman restrung the guitar. 18 minutes later, _____.

86. The boy dissected the frog. 30 minutes later, _____.

87. The girl curled her hair. 25 minutes later, _____.

88. The woman debugged the software. 2 hours later, _____.

89. The girl clipped the bush. 15 minutes later, _____.

90. The woman presented the project. 18 minutes later, _____.

91. The man remodeled the kitchen. 1 week later, _____.

92. The girl blended the milkshake. 2 minutes later, _____.

93. The girl organized the closet. 40 minutes later, _____.

94. The girl melted the butter. 1 minute later, _____.

95. The boy mopped the bathroom. 8 minutes later, _____.

96. The girl dyed the jeans. 25 minutes later, _____.

97. The girl drank the juice. 2 minutes later, _____.

98. The man dusted the shelf. 2 minutes later, _____.

99. The boy drained the tub. 2 minutes later, _____.

100. The girl wrapped the gift. 5 minutes later, _____.

101. The man restocked the bar. 23 minutes later, _____.

102. The man delivered the package. 25 minutes later, _____.

103. The boy brushed the cat. 4 minutes later, _____.

104. The boy mowed the lawn. 35 minutes later, _____.

105. The girl rinsed the broccoli. 40 seconds later, _____.

106. The boy created the website. 5 hours later, _____.

107. The boy typed the email. 4 minutes later, _____.

108. The man prepared the breakfast. 15 minutes later, _____.

109. The boy bent the paperclip. 1 second later, _____.

110. The man built the fence. 15 hours later, _____.

111. The man loaded the truck. 40 minutes later, _____.

112. The boy burned the book. 3 minutes later, _____.

113. The girl dug the hole. 20 minutes later, _____.

114. The woman folded the tarp. 3 minutes later, _____.

115. The woman baked the pie. 55 minutes later, _____.

116. The boy ate the sandwich. 5 minutes later, _____.

117. The boy whisked the eggs. 1 minute later, _____.

118. The boy washed the dishes. 11 minutes later, _____.

119. The woman removed the makeup. 4 minutes later, _____.

120. The girl milked the cow. 13 minutes later, _____.

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