Factors Motivating Use of Grammatical Aspect

THESIS

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By

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Abstract

Grammatical aspect defines the viewpoint that individuals take on events. Two forms of grammatical aspect are perfective and imperfective aspect. Perfective aspect presents an event as complete and focuses on the endpoint of the event. Imperfective aspect presents an event as in progress, and does not present the event with its endpoint. The goal of the present study is to determine what types of information about an event will lead subjects to describe an event with a perfective, complete view of the event, and what types of information about an event will lead subjects to describe an event with an imperfective, ongoing view of the event. We tested 130 adult subjects on the influence of three types of cues to grammatical aspect by having them complete single sentences in a forced-choice fill in the blank morphology selection task. The first cue was a temporal-linguistic cue telicity, which specifies whether or not an event has a natural endpoint. We hypothesized that atelic predicates would lead to greater selection of imperfective aspect, while telic predicates would lead to greater selection of perfective aspect. The second set of cues were knowledge-based semantic cues, and included subject animacy, presence/absence of a patient introduced using transitive/intransitive structure, and presence/absence of locative information. Here we hypothesized that sentences with animate subjects, no patients, and locative information would lead to selection of
imperfective aspect, while sentences with inanimate subjects, patients, and no locative information would lead to selection of perfective aspect. The third set of cues were discourse cues, which were presence of a narrative introduction to each sentence, and the order in which locative information was presented. We hypothesized that a narrative introduction, as well as locative information presented at the beginning of a sentence, would lead to greater selection of imperfective aspect. An ANOVA on morphology choice as well as a binary logistic regression revealed that all cues influenced aspectual choice in the expected direction, except for the presence of a narrative introduction, and that fronted locative information and transitive/intransitive structure were the strongest predictors of aspectual choice. We also performed a corpus analysis using the Corpus of Contemporary American English to assess how our experimental results relate to frequency data. We found that frequency data accounted for our findings in regards to animate/inanimate subjects as well as transitive/intransitive structure, but not for locative information.
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Chapter 1: Introduction

Grammatical aspect has long been of interests to linguists and psychologists alike. In English, two distinct forms of grammatical aspect are perfective and imperfective. The differences in meaning between the two aspectual forms are relatively straightforward and have to do with the viewpoint they impose on an event. While imperfective aspect provides a reader with an internal viewpoint on an event, perfective aspect provides a viewpoint of the event as complete, with beginning, middle, and end (Comrie, 1976; Klein, 1994). With this study, we describe temporal-linguistic, knowledge based-semantic, and discourse entities that could serve as cues to grammatical aspect using a forced-choice fill in the blank sentence completion task. This broad approach allows us to analyze the question of aspectual choice from multiple perspectives. While many prior studies have looked at the types of sentences and constructions in which each aspectual form occurs, no study we are aware of has attempted to determine which cues, if any, will motivate use of one aspectual form over another. The question we address with this study is why an individual would be motivated to describe an event using one aspectual form rather than another. Our study establishes a relationship between certain sentential features and the aspectual form that best fits with those sentential features. While we find that cues from each theoretical
perspective influence choice of grammatical aspect, and that the strongest cues to aspectual choice involve changes in syntactic structure of the sentence.

The difference between perfective and imperfective aspect has to do with the viewpoint each aspectual form imposes over an event predicate. Perfective aspect represents an event as complete, with beginning, middle, and end. It is often described as viewing an event from the outside in. In contrast, imperfective allows the reader access to the “internal temporal structure of a situation,” (Comrie, 1976). Effectively, imperfective aspect places the reader or listener inside the event, as it is unfolding. With this viewpoint, no information is given about the end-points of the event being described.

Klein (1994) provides a clear analysis of how perfective and imperfective aspect operate over events. Klein uses three main components to define temporal structure of event predicates: The utterance time (TU), the situation time (TSit), and the topic time (TT). Utterance time is straightforward, it is the time at which an individual produces an utterance. Grammatical aspect involves the relationship between TT and TSit. TT is the time about which an individual makes a claim for a certain event. In contrast, TSit is the entire time over which a specific event occurs, the whole span of the event. Perfective and imperfective aspect specify different relationships between TT and TSit. When the imperfective is used, topic time is contained within situation time, or in brief, TT is within TSit. When perfective is used, the topic time is at the situation time, or TT is at TSit. Consider the following example using the predicate build a house.

(1) John built a house.

(2) John was building a house.
For the event described by the predicate *build a house*, there is a beginning point (at some arbitrary time) and an end-point (when the house is complete). Sentence (1) uses perfective aspect, and as such, the TT to which it refers contains within it the entirety of TSit, from beginning to end. The time to which we are referring is the time of the whole event. Sentence (2) uses imperfective, and as such, the TT to which we refer is contained within TSit. This TT corresponds to some internal portion of the event, and does not refer to either the initial point or the final point of the event. Smith (1991) gives an analysis of the perfective and imperfective complementary to Klein, and in addition provides the following depiction which makes the distinction between perfective and imperfective aspect relatively clear. Here, dashed lines (---) indicate the situation time while slashes (///) indicate the topic time. Imperfective and perfective aspect can thus be understood as follows.

Imperfective:

```
                    
                    
                    
                    
                    [-----------------------------------------------]
```

Perfective:

```
                    
                    
                    
                    
                    [-----------------------------------------------]
```

*Figure 1:* The relation of topic time to situation time.

As we can see, perfective aspect represents an event as complete since it refers to
the entire run time of the event. With imperfective, we refer to some internal portion of the event in question. This results in a construal of events under the imperfective aspect as ongoing. In (1), the reading is that the house is finished, the initial, middle, and final stages were performed. In (2), the reading is that John is progressing through some middle stage of house building. We have no knowledge as to whether or not the house was in fact completed, but the view we take on the event is one in which house-building is taking place.

Psycholinguists have examined these claims about perfective and imperfective aspect experimentally. Madden and Zwaan (2003) presented readers with sentences in either the perfective or the imperfective as well as pictures that depicted an event as either completed or incomplete. Participants would read a sentence such as “The man built/was building a fire,” and view one of two subsequent pictures. The imperfective-match picture showed a man placing logs onto a fire, while the perfective-match picture showed a man sitting in front of a blazing fire. The authors found that reading a perfective sentence speeded reaction time to a corresponding completed picture relative to an incomplete picture. Reading imperfective sentences produced no speeding in response times for either completed or incomplete pictures.

The authors concluded that use of the perfective aspect constrained individuals’ representations of an event toward the completion point, while use of the imperfective constrained the representation to some intermediate portion of an event, or a representation of multiple points along an event timeline. Furthermore, the authors showed that not only do subjects distinguish between the two aspects, but that generating
these different representations occurs rapidly. With perfective aspect, there were speeded responses toward completed pictures, while no such speeded response advantage was observed with the imperfective aspect. Since perfective aspect indicates completion, subjects presumably generated a mental model of the described event consistent with the completion entailments of perfective aspect, leading to speeded responses for completed pictures. Since imperfective aspect does not entail completion, multiple parts of the event can be represented, which would not produce speeded responses to either type of picture.

Work by Ferretti, Rohde, Kehler, and Crutchley (2009) indicates that use of perfective aspect led readers to refer to outcomes of described events. In a sentence continuation task, they had subjects read sentences that were either perfective or imperfective. Subjects were instructed to write a second sentence to act as a continuation of the first sentence. For example, subjects read sentences like the ones below, and provided continuations for them:

(3) Paul was carrying/carried a tray to Julia.
(4) Brad was throwing/threw a hat to Margaret.
(5) Chelsea was passing/passed a sandwich to Ben.

For all sentences, subjects were more likely to refer to the goal of the prior sentence. However, the degree of reference to the goal between perfective and imperfective sentences was significantly different. After reading sentences that described events perfectly, subjects were more likely to write continuation sentences referencing
the goal of the previous sentence than if they had read imperfective sentences. In this study, knowledge that a prior event was completed led individuals to refer back to that completion, while uncertainty as to the completion of an event reduced references to the end state of that event.

Taken together, these two studies show that readers are sensitive to the distinction between perfective and imperfective and that readers will make use of this information. Specifically, readers appear to represent events differently when they are presented with either perfective or imperfective aspect. Completion point information takes precedence when perfective aspect is used, which is sensible given that perfective viewpoint will include an event’s endpoint under its scope. Imperfective aspect produces no response benefit either way. The data demonstrate that perfective and imperfective aspect will result in temporally distinct representations of events in a manner consistent with the linguistic explanations for how perfective and imperfective aspect function.

*Temporal-Linguistic Cues to Grammatical Aspect*

Grammatical aspect places a certain viewpoint over an event. The question we address with this study is why an individual would be motivated to describe an event using one aspectual form rather than another. Telicity and transitivity are two linguistic features that correlate with a particular aspectual form (Hopper & Thompson, 1980; Shirai & Andersen, 1995). Telicity, which will be discussed below, defines events based on the presence of a natural completion point. Telicity interacts with grammatical aspect such that the truth conditions for a predicate may change given a particular combination
Predicates can be defined on the basis of their telicity. Telicity is a linguistic property that refers to the presence or absence of a completion point for an event. Telic predicates contain a specified endpoint for some event whereas atelic predicates do not contain a specified endpoint. For example, the predicates *break a vase* or *climb a mountain* have distinct points at which the event they describe is completed (namely, a vase in pieces or someone at the top of a mountain). These are examples of telic predicates. On the other hand, atelic predicates do not specify an endpoint. Thus, *push a cart* or *ride a bike* are atelic predicates since no endpoint is specified by the lexical content of the phrase, these predicates terminate at some arbitrary, unspecified point.

A more formal way to distinguish telic from atelic predicates is by considering whether or not the described event is homogenous, that is to say, the same throughout or consisting of two states. Telic predicates can also be called 2-state predicates in that they involve two distinct parts, a source state and a target state. Atelic predicates can be referred to as 1-state predicates and only have a source state (Klein, 1994).

Below, sentences (6), (7), and (8) are telic, 2-state predicates. We can think of climbing a mountain as a process with an intial/source state, and a final/target state. The initial part of climbing the mountain consists of walking uphill. This process builds to a final state, where John is no longer climbing, but is instead at the top of the mountain. Thus, (6) describes two distinct states, one of climbing, and one of being at the top of the mountain. This is the same with (7) and (8), which have source states as well as target states. These telic, 2-state predicates contrast with atelic, 1-state predicates seen in (9),
The event of playing with toys is the same throughout, there is no change, state transition, or final point indicated by the predicate. While there are potential culminations/changes of state as a result of toy playing (i.e. moving a toy from one location to another), these are not specified by the lexical content. The same applies for walking in the park and rowing a boat, each event is homogenous with respect to its internal structure. There are no specified, distinct intervals.

(6) John climbed the mountain.
(7) John ate a burrito.
(8) John filled the bucket.
(9) John played with his toys.
(10) John walked in the park.
(11) John rowed the boat.

These differences in meaning and viewpoint between perfective and imperfective interact with telicity and form the basis of the imperfective paradox (Dowty, 1972), which refers to the phenomenon described below. When perfective aspect is combined with a telic predicate such as walk to school, there is an entailment that the event is completed. This is seen by comparing sentences (12) and (13) to sentences (14) and (15). Sentences (12) and (13) are telic predicates which specify a natural endpoint to the event being described. These sentences are also presented in perfective aspect, and perfective aspect encompasses the entire span of the event. Thus, under perfective aspect, the
endpoint of the event is included in our view of the event. When we attempt to negate the occurrence of that completion point in (14) and (15), we create a contradiction. This is not so when telic predicates are combined with imperfective aspect, there the entailment of completion is removed since the completion point is no longer included in our view of the event. This is seen in (16) and (17).

(12) Mary walked to school.
(13) John built a sandcastle.
(14) ?Mary walked to school, but never got there.
(15) ?John built a sandcastle, but didn’t finish it.
(16) Mary was walking to school, but never got there.
(17) John was building a sandcastle, but didn’t finish it.

When this is contrasted with atelic predicates, we find that there are no completion entailments to be had. This is because atelic predicates don’t have completion points, they merely terminate. With an atelic predicate, the truth conditions for the event are established as soon as it begins, a completion point is not necessary to say that the event did in fact occur. Under both perfective and imperfective aspect, a reader is able to draw the conclusion that the event was instantiated in both cases.

A number of studies have examined the relationship between telicity and grammatical aspect in regards to use and acquisition of these combinations. One of the most important findings in this regard comes from Shirai and Andersen (1995). Using
corpus data, they demonstrate that children use more “prototypical” groupings of tense and aspect, and that this holds in a number of languages (Antinucci & Miller, 1976; Bronckart & Sinclair, 1973; Shirai & Kurono, 1998). These prototypical combinations of telicity and aspect in children are said to be a result of the prototype structure that is present in adult frequency.

However, simply saying that these combinations are prototypical because they co-occur with greater frequency does not explain how those frequencies came about. Wagner (2009) offers an alternative theory as to why these prototypical combinations exist, partially supported by pragmatic and truth considerations, but also by information processing demands involved in prototypical and non-prototypical combinations. Wagner (2009) demonstrated that both adults and children prefer sentences with prototypical groupings of telicity and aspect, and can more easily match prototypical sentences to pictures of the events described by the sentence. In one study, adult participants were given a forced choice task when they were asked to pick which of two sentences was better. While both sentences were grammatically correct English sentences, adults tended to rate sentences that had prototypical groupings of telicity and aspect as better sentences than those that did not have prototypical groupings. In a separate study, children and adults performed a matching task in which they selected one of two pictures based on a descriptive sentence. The sentences were either prototypical or non-prototypical while the pictures depicted the event described at either an incomplete middle-stage or a completed end stage. Both adults and children were very good at matching prototypical groupings to the proper pictures, however when the
sentences were non-prototypical, adults and especially children struggled to make the proper match.

The explanation offered by Wagner (2009) is that prototypical combinations of telicity and aspect exert a lower demand on processing than non-prototypical combinations. If a speaker uses perfective aspect with a telic predicate, the endpoint of the event is known and included in the listener’s representation of that event. If the speaker combines imperfective aspect with a telic predicate, the endpoint is known, but has not been reached. As such, determining the state of the event is more difficult since we lack specific information related to its progress. Likewise with atelic predicates, if we use perfective aspect with an atelic predicate, the speaker is presenting the event as complete, without providing information as to how that event terminated or completed. With imperfective aspect and an atelic predicate, the speaker indicates an event is incomplete, and makes no mention of what the completion point is. Essentially, there is an alignment of aspectual cues such that the prototypical combinations require the least amount of processing (Wagner, 2009; Yap et. al, 2011).

The tendency to interpret telic predicates as perfective and complete, while interpreting atelic predicates as imperfective and incomplete, is seen in a number of languages (Bohnemeyer & Swift, 2004). These languages include German and Inuktitut. Unlike English, each of these languages can specify a verb with no aspectual value. For these languages, telic predicates implicate the completion of an event when an aspectual marker on the verb does not explicitly define viewpoint. At the same time, atelic predicates implicate lack of completion of an event when viewpoint marking is not made
explicit. Thus, the default interpretation for predicates unmarked for viewpoint aspect is that telic predicates are perfective while atelic predicates are imperfective. For these languages, telicity information can become the marker that indicates viewpoint. The authors argue that making the inference from telic to perfective and atelic to imperfective is not only pragmatic, but the easiest inference to make. Wagner (2009) argues that this finding is consistent with an information-processing theory behind these prototypical combinations. Telicity information leads to viewpoint information in unmarked cases simply because telicity information makes viewpoint easy to determine - a reader or speaker doesn’t need to overtly mark an event for viewpoint when it can be easily presumed from the telicity value of the statement.

Knowledge-Based Semantic Cues to Aspect

While the linguistic accounts of grammatical aspectual use alluded to above reference the linguistic construct telicity, knowledge-based semantic theories specify the importance of both linguistic knowledge and event knowledge in the construction of event models for perfective and imperfective descriptions. Event models, also known as situation models (Zwaan, Langston, & Graesser, 1995; Zwaan & Radvansky, 1998; Zwaan) are mental representations of described events. According to Zwaan and Radvansky (1998), situation models track numerous features of events such as time, space, causal forces, intentionality and physical entities. As an individual reads a text or listens to speech, they build a representational model in order to comprehend the incoming information. Situation models are constructed from a combination of linguistic
input, and top-down experiential information contained within the reader or listener. For example, Zwaan, Stanfield, and Yaxley (2002) found that when subjects who read the sentence “The eagle in the sky,” versus “The eagle in the nest,” responded more rapidly to a picture of an eagle with wings outstretched as if in flight versus a picture of an eagle with wings tucked in. Though the text never mentioned that the eagles’ wings were outstretched, readers inferred from their knowledge of flight and of eagles that its wings were presumably outstretched. In this way, the readers’ world knowledge contributed to their representation of linguistic input, above and beyond what was explicitly stated in the text. This combination of linguistic knowledge with top-down information is crucial to the construction of situation models.

Situation model construction is a critical component to Ferretti, Kutas, and McRae’s (2007) theory of how different aspectual forms structure event representations. They propose an event ontology under which agentive and locative information are important to an imperfective situation model, while information about patients and outcomes are important to perfective situation models. Their theory appeals to information acquired from an individual’s knowledge of events, with different parts of a given event being signaled by different grammatical aspectual forms. When readers encounter a specific aspectual form, they represent a certain portion of an event. Imperfective event representations reflect the ongoing, internal parts of an event while perfective aspect reflects the completed nature of an event. According to Ferretti et. al (2007), this linguistic knowledge combines with top down knowledge about the entities that are important to the internal portions of an event, and the entities that are important
to the end-points of an event. Within this theory, an event is broken down into three parts, (1) initiating conditions or the beginning of an event, (2) internal portions or the middle of an event, and (3) resultant states or the end of the event. According to Feretti, an individual’s event knowledge of the initiating conditions for an event stereotypically requires entities such as agents and instruments. Event knowledge of the internal portions of an event includes information about agents, instruments, patients, and locations. Event knowledge of resultant states or outcomes to an event emphasizes the patient.

Since perfective and imperfective aspect refer to different parts of an event, Ferretti et al. (2007) propose that these different aspectual forms result in situation models that more strongly emphasize certain components of events. There is already ample evidence to suggest that verbs not only activate information about entities typically associated with the actions they describe, but that aspect could potentially mediate the type of information that is activated or more strongly represented. For example, Kamide, Altmann, and Haywood (2003) found that subjects make anticipatory eye movements towards objects in a visual scene that serve as plausible verb arguments, demonstrating that thematic role knowledge about events is quickly accessed during language comprehension and used to generate expectancies from verbs in context. Evidence from other studies suggests that role specific information can be primed by verbs in perfective and imperfective forms. McRae, Hare, Elman, and Ferretti (2005) used verbs in their present participle form (-ing) or past participle to prime agents, instruments, locations, and patients. In a single-word priming task, subjects viewed a verb on a computer screen for 250 ms. A mask was presented for 50 ms, and then a target word until the subject
responded. The authors found that verbs in their -ing form generated speeded responses to agents, instruments, and locations typically associated with that verb (typical associations were generated in a norming study) relative to unrelated entities. Verbs in their past tense form generated speeded responses to related rather than unrelated patients. These findings are consistent with prior studies examining priming from verbs to agents, instruments, patients, and locations (Ferretti et. al, 2001), with a few differences in findings. One crucial difference between the two studies is that while verbs in their perfective form did not prime typical locations, verbs in their -ing form in McRae et. al (2005) did. The authors conclude by suggesting that different aspectual forms can activate different types of event information based on the idea that different elements of events are crucial to different parts of events (i.e. the middle of an event versus the end of an event).

These studies, along with data from the visual-world paradigm by Kamide et. al (2003) suggest that verbs not only activate thematic information about the events they are associated with, but that aspectual form could mediate what types of information become active. In this way, Ferretti’s theory combines two distinct lines of work. The first would be the psycholinguistic data, which indicates that verbs rapidly activate knowledge about the typical constituents of the events that they describe. The second would be the linguistic theory that describes how aspectual form focuses a reader on different parts of events. By combining these two lines of work, Ferretti emerges with a theory stating that different aspectual forms of a verb contain a wealth of information about the parts of events they typically describe. Ferretti et. al (2007) argue that since imperfective
emphasizes the processes involved in an event more than the outcomes associated with that event, information related to the process of an event will be more strongly activated when imperfective aspect is used. This aspect-specific knowledge for imperfective form includes knowledge about agents, instruments, and locations. As perfective aspect highlights the endpoint or completion point of an event, the information that a verb in its perfective form activates is different. Specifically, patients are the defining feature of a perfective event representation under Ferretti’s ontology. This theory neatly combines linguistic knowledge with an individual’s event knowledge, and asserts that individuals draw upon some type of schematic representation for events described with the imperfective and for events described with the perfective. Below is a visual model of Ferretti’s theory taken from Ferretti et al (2007).

![Figure 1](image1)

Figure 2. The relationship between grammatical aspect and the temporal structure of events. Taken from Ferretti et al (2007).
Ferretti et. al (2007) provide evidence supporting their theory by demonstrating that event information activated by imperfective aspect may not be activated by perfect aspect. In a word to word priming task, verbs primed locations they were typically associated with, but only when those verbs appeared in imperfective aspect. A sentence completion task further supported this finding. Subjects read sentences in either past imperfective or past perfect aspect. The final portion of each sentence was left blank, and subjects were instructed to fill in these blanks with any completion they wanted, so long as it made sense. Imperfective sentences such as (18) and (20) were filled in significantly more often with prepositional phrases referencing a location relative to perfect sentences such as (19) and (21). According to the authors, locative information for events is more strongly activated when events are presented as ongoing, which increases locative references in sentence completions. When the same sentences have a perfect aspect instead of imperfective aspect, information related to location is not activated, and locative references decrease.

(18) The cow was grazing _______________

(19) The cow had grazed _______________

(20) The diver was snorkeling _______________

(21) The diver had snorkeled _______________

In addition to the above findings, an ERP study demonstrated that low expectancy
locations generated significantly larger N400 signals when the location was paired with an imperfective verb relative to a perfective verb. The N400 signal has long been known as a marker of a semantic anomaly (Kutas & Hillyard, 1980). When large N400s occur, it is an indicator that there is a violation of semantic expectancy (Kutas & Iragui, 1998). Subjects in this experiment read past perfect and past imperfective sentences with either high expectancy or low expectancy locations. Example sentences below show the two aspectual forms of the verb as well as the high and low expectancy locations for each:

(22) The weightlifter was exercising/had exercised... at the
     gym(high)/beach(low).

(23) The pilot was flying/had flown... in the sky(high)/ocean(low).

(24) The golfer was slipping/had slipped... on the green(high)/throne(low).

When subjects read perfect and imperfective sentences with high expectancy locations, there was no significant difference in N400 response between the two aspectual types. However, when the locations were switched to low expectancy, N400 responses became significantly larger for imperfective sentences relative to perfective sentences. The authors argue that in sentences with imperfective aspect, readers have a stronger expectancy for locative information that is typical of the event being described. Thus, when that expectancy is violated with an atypical location, large N400 signals result. With perfect aspect, there is not a strong expectation for the locative information. Thus, when inconsistent locative information appears in the sentence, the degree of expectancy
violation is reduced relative to imperfective aspect, resulting in significantly smaller N400 signals.

While Ferretti et. al (2007) do not demonstrate any connection between imperfective aspect and agency, earlier work with children by Wagner (2009) and subsequent work by Ferretti et. al (2009) do support the idea that agency information is crucial to event interpretation. Wagner (2009) showed that from an early age, children have a difficult time properly interpreting the completion entailments of grammatical aspect in the absence of agency information, and that this difficulty continues into adulthood. In her study, 4-year-old children were given a sentence-to-picture matching task. Children viewed sets of pictures that depicted an activity as in progress or completed. Some of these pictures contained an animate-agent, while others did not. Children then heard two sentences that had either prototypical (perfective/telic and imperfective/atelic) or non-prototypical combinations of telicity and aspect. Children were successful when sentences were prototypical, but struggled when the sentences were non-prototypical. However, when information about an agent was added to telic sentences that were non-prototypical (A woman was painting a flower vs. Someone was painting a flower), children made correct responses to imperfective-telic combinations at a level above chance, whereas they had failed without agency information. This finding corroborates the idea that agency has some kind of elevated importance when interpreting sentences with imperfective aspect.

A more direct test of Ferretti’s agency-imperfective connection comes from a sentence completion task and ERP study by Ferretti et. al (2009) mentioned earlier,
which found that when subjects read sentences in imperfective and perfective aspect and were asked to write continuations for those sentences, they more often referred to agent information from the prior sentence than goal/outcome information. The study also demonstrated that imperfective aspect generates a stronger expectancy for agent-related information by performing an ERP experiment. In the ERP experiment, subjects read the same sentences that were given in the completion task, i.e. *Paul was carrying/carried a tray to Julia*. In each sentence, the subject was specified with either a male or female name. Subjects then read a second sentence. Crucially, the second sentence began with the pronoun *he* or *she*. This meant that the pronoun beginning the second sentence either referred to the agent from the prior sentence or the goal/outcome from the prior sentence. The authors predicted that imperfective aspect would generate stronger expectancies for agent related information while perfective aspect would generate stronger expectancies for goal/outcome related information. This is exactly what they found. When the subsequent sentences referred to the outcome/goal of an imperfective sentence, N400s were significantly larger than when the subsequent sentences referred to the agent. The opposite pattern was found for perfective sentences; Individuals had stronger expectancies for goal/outcome related information in these cases than for agent-oriented information.

Based on this literature, we hypothesize that sentences with animate subjects and locative information will increase use of imperfective aspect, while sentences with patients should increase use of perfective aspect. Though Ferretti et. al (2007) do not make any explicit reference to animacy in their theory, we have decided to test an
animate-inanimate distinction as a proxy for “agency”. For these authors, the reason that agents are important to the beginning and internal portions of an event is because they can act in a causal fashion to create and sustain an event. We chose to use an animacy-inanimacy distinction in this case due to the fact that human beings possess these event-initiating properties that are canonical of agents. Dowty (1992) selected a number of criterion for agency such as movement, awareness, and ability to cause change. Human beings meet an extensive number of these criterions, whereas inanimate entities like flowers and ovens meet fewer criterions. By using an animate-inanimate distinction, we have a simple and clear manipulation that influences the extent to which the subjects in our sentences possess these agentive properties crucial to Ferretti. If Ferretti is correct, sentences with animate agents and locative information should increase selection of imperfective aspect due to the idea that animate agents and locative information are more important to an imperfective event representation. Sentences with inanimate subjects and no locative information should not lead to increased imperfective selection. Likewise, sentences with patients should cue use of perfective aspect.

We also predict transitive structure will lead to choice of perfective aspect by introducing a patient. We did this by creating sentences that were both transitive and intransitive. Transitive sentences have a direct object. When a direct object is affected or undergoes some kind of change of state as a result of a particular action, that direct object is a patient. While direct object is a grammatical notion, the idea of a patient involves thematic relations between itself, an agent or a source of an action, and the action itself. Since the patient is the defining entity in a perfective event representation, we
hypothesize that transitive sentences will lead to greater selection of perfective morphology. Intransitive sentences contained no direct object and no patients, with the exception of intransitive-telic sentences. We hypothesize that intransitive sentences lacking patients will lead to greater imperfective morphology selection since they do not contain any of the defining features of a perfective event representation as outlined by Ferretti et. al (2007).

Discourse Cues to Grammatical Aspect

A final set of cues that could motivate use of the imperfective and perfective aspect come from narrative and discourse. Narrativity and discourse necessitate organized temporal information. There must be a way in which we can order events sequentially, highlight important events, indicate events that are occurring simultaneously, and indicate parts of events that are ongoing. Researchers have observed that perfective and imperfective aspect take on certain roles in foregrounding and backgrounding. Specifically, imperfective is used to background information while perfective is used to place information in the foreground (Hopper & Thompson, 1980; Magliano & Schleich, 2000; Berman & Slobin, 2004).

What is foregrounding and backgrounding? Both of these terms relate to the idea of grounding in narrative, which specifies the relationship between situations and events in discourse. Generally speaking, foregrounded information is the main focus of narrative, it makes up the “point” of the story. Foregrounded information tends to be dynamic, punctual, and completive. Foregrounded information often occurs sequentially,
moving from one event or focal point to another. Backgrounded information tends to
provide a supporting role to foregrounded information. Backgrounded information
usually involves descriptions of physical locations, inner states, and durative situations
(Hopper & Thompson, 1980; Berman & Slobin, 2004). Additionally, backgrounded
information needs some kind of temporal anchor to which it can relate, one cannot
background information in isolation since it needs to function as background for some-
thing (Aksu-Koc & von Stutterheim, 1994). The sentences in the examples below
demonstrate this difference between foregrounded and backgrounded information using
short descriptions of events. The initial sentence (in imperfective aspect) in each
example provides background, a durative component that supports the foregrounded
events (perfective aspect).

(25) It was raining outside. John walked to his car. He fumbled with his keys
and dropped them on the sidewalk.

(26) John was walking to school. He gave money to a drifter, pet a cat, and
crossed 5th avenue.

In (25), it is assumed that the rain persists throughout John walking to the car and
dropping his keys. With (26), each individual event of money giving, cat petting, and
street crossing occurs during the time in which John is walking to school. This is known
as simultaneity, and it is one feature of narrative backgrounding. The internal perspective
on events afforded by imperfective aspect effectively stretches the perceived duration of
the rain and walking events in (25) and (26). These situations are interpreted as ongoing throughout the subsequent events described by each sentence. These examples illustrate the use of imperfective aspect in backgrounding information and its effectiveness in narrative and establishment of context.

Magliano & Schleich (2000) demonstrate that the English imperfective establishes background in descriptions of events. In their experiments, they demonstrate that subjects will interpret imperfective events as occurring over a longer period of time. Subjects read short descriptions of events that began with an introduction, followed by a sentence with a verb in imperfective or perfective aspect, and then subsequent concluding sentences. Examples (27) and (28) below are taken from their materials. In (27), the critical sentence is in imperfective form, whereas in (28) the critical sentence is in perfective form. (27) Uses an imperfective sentence which provides background for the subsequent events in the narrative. (28) Does not, and as such, the events described are viewed in a more sequential fashion.

(27)...It had been years since they had seen each other. Finally, Stephanie decided it was time for a visit. She was on her way to the airport when she got a flat tire. **Stephanie was changing the flat tire.** She was worried about being late for her flight. She thought about how upset Kate would be...

(28)...It had been years since they had seen each other. Finally, Stephanie decided it was time for a visit. She was on her way to the airport when she
got a flat tire. **Stephanie changed the flat tire.** She was worried about being late for her flight. She thought about how upset Kate would be...

After reading a concluding sentence for each passage, subjects were probed about the subject’s action and current state (i.e. Is Stephanie still changing the tire?). Subjects in their study were more likely to interpret imperfective events (was changing the tire) as still ongoing relative to perfective events (changed a tire), and as a result, imperfective events were more likely to be construed as ongoing during subsequent actions (worrying about a flight, thinking about Kate as upset) relative to perfective events. By altering the aspectual form of the verb change, subject’s interpretations of the sequence of events in narrative change dramatically. This study shows that imperfective aspect is more effective when it comes to generating background information in narrative. Additional corpus and experimental work have supported the notion that aspect plays a crucial role in foregrounding and backgrounding information (Hopper & Thompson, 1980; Berman & Slobin 1994; 2004).

Another feature of discourse that could influence imperfective choice is the order in which information is presented. According to the Structure Building Framework (Gernsbacher, 1991), information presented at the beginning of a sentence is more salient to the interpretation of subsequent information in that sentence. Essentially, the first words of a sentence form an anchor. As the sentence unfolds, information is constantly related back to that anchor. This is known as the Advantage of First Mention (Gernsbacher & Hargreaves, 1988; Gernsbacher, Hargreaves, and Beeman, 1989). In
numerous experiments, these authors demonstrate that entities that are mentioned first are
more strongly represented in the mental representation of an event. When subjects read
sentences with multiple participants and are given a recognition probe at the completion
of that sentence, subjects will respond more rapidly to first-mentioned participants.
Furthermore, the response to first mentioned participants is speeded relative to
participants that have been mentioned more recently. This indicates that the first
mentioned entity is strongly represented by subjects and more quickly accessed relative
to other information.

In the present study, we hypothesize that we can manipulate the structure of our
sentences in a way that will motivate subjects to either foreground or background
information. Specifically, we believe that we can motivate use of imperfective aspect by
providing the narrative frame “Once upon a time.” This introduction, which is well
known as an introduction to many children’s stories not only signals the onset of a
narrative, but it fixes a temporal anchor at some point in the past around which readers
could create background information. Without a reference point, it is difficult to
appropriately background information – this manipulation provides that reference point.

In addition, we presented subjects with locative information switched from the
sentence final position to the sentence initial position. According to the structure-
building framework, information presented at the beginning of a sentence is more
important to the model that subjects build out of that sentence. Locative information is
hypothesized by Ferretti et. al (2007) to be crucial to an imperfective event model. By
manipulating the position of location within the sentence, we should be able to
manipulate its importance in choosing a particular aspectual form. If Gernsbacher (1991) is correct, locative information should influence the model subjects build to a greater extent if mentioned first. If location indeed influences morphology choice, we should see a much stronger effect when the information is presented at the beginning of the sentence relative to the end of the sentence. Viewing locative information first will lead to the construction of a representation that is more strongly anchored around locative information, and thus increase the likelihood that subjects will respond with imperfective aspect.
Chapter 2: Experiment 1

With Experiment 1, we aim to test the hypothesis that certain temporal-linguistic, knowledge-based semantic, and discourse cues will motivate individuals to describe an event in either perfective or imperfective aspect. Perfective and imperfective aspects represent events in two ways, as complete with emphasis on the endpoint, or as ongoing with no information about the endpoint. We will test this using a forced choice fill-in-the-blank morphology selection task. Our temporal-linguistic cue telicity is hypothesized to influence aspectual choice such that atelic predicates lead to increased imperfective selection while telic predicates lead to increased perfective selection. Our knowledge-based semantic cues in animacy, presence/absence of locative information, and presence/absence of a patient should influence aspectual choice such that sentences which have animate subjects, contain locative information, and do not possess a patient will increase imperfective use. Likewise, sentences with an inanimate subject, no locative information, and a patient should increase perfective responding. Our discourse cues in narrative introduction and order of information should also influence aspectual choice. Sentences with a narrative introduction should increase imperfective responding. In addition, information presented at the beginning of a sentence should carry more weight in influencing aspectual choice. Thus, we hypothesized that presenting locative
information at the beginning of a sentence should increase imperfective responding relative to absence of location/location in the final position in the sentence.
Method

Participants

130 introductory psychology students from Ohio State University participated in this study for credit towards their introductory psychology class. All subjects were native English speakers. An additional 47 were tested but were excluded from analysis due to being non-native English speakers (n=30), failure to answer correctly 80% of the check correctly (n=16), and computer error (n=1).

Materials

Test Sentences

48 test sentences were constructed for the experiment (See Appendix A for the full list). These sentences were divided into eight groups with six test sentences. These eight groups were made by fully crossing combinations of telicity (telic/atelic), transitivity (transitive/intransitive), and animacy (animate/inanimate). These were our within subjects factors. Our between subjects factors were narrativity (narrative/non-narrative), and location position (initial/final). For each between subjects condition two lists were created. The purpose of creating two lists was to counterbalance correct response keys and counterbalance sentences with location information within each between subjects condition. Table 1 shows an example of this below:
Table 1. Example Telic, Transitive, and Animate Sentences Used in Experiment 1

<table>
<thead>
<tr>
<th>From List 1</th>
<th>From List 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A cop arrested a criminal.</td>
<td>A cop arrested a criminal <strong>outside a bar</strong>.</td>
</tr>
<tr>
<td>A worker filled a bucket.</td>
<td>A worker filled a bucket <strong>at a construction site</strong>.</td>
</tr>
<tr>
<td>A driver parked a car.</td>
<td>A driver parked a car <strong>in a lot</strong>.</td>
</tr>
<tr>
<td>A chef melted butter <strong>in a saucer</strong>.</td>
<td>A chef melted butter.</td>
</tr>
<tr>
<td>A waiter folded 20 napkins <strong>in a restaurant</strong>.</td>
<td>A waiter folded 20 napkins.</td>
</tr>
<tr>
<td>A chef peeled an apple <strong>in a kitchen</strong>.</td>
<td>A chef peeled an apple.</td>
</tr>
</tbody>
</table>

**Tests of Telicity**

Telic/atelic sentences were determined using previously established tests of telicity (Vendler, 1957; Smith, 1991; Klein, 1994; Wagner, 2010). The test sentences we created were determined to be telic or atelic based on the following three tests. The first test is the ‘almost’ test. In this test, the word ‘almost’ is added to the sentence in front of the verb. Two interpretations can result. If the interpretation is that the event never began, or that the event was never completed, the event is considered telic. This is due to the fact that telic predicates specify an endpoint. By using almost, we can assert that the event never began, or that the endpoint was never reached. This can be seen in (29) below. This can be read such that the cook merely failed to complete peeling in its entirety, or that the cook never began peeling the apple in the first place. Atelic
predicates behave differently, the only interpretation that is produced by adding ‘almost’ is that the event never began. This is due to the lack of a completion point defined by the atelic predicate, there is no completion point one can ‘almost’ arrive at. This is seen in (30), where the reading is that the clown never successfully juggled the fruits.

(29) A cook almost peeled an apple.

(30) A clown almost juggled some fruits.

The second test we used to determine telicity is known as the completion test. In this test, sentences are read using imperfective verb aspect. Telic predicates lose their completion entailment if described with imperfective aspect. This is due to the fact that telic predicates specify a completion point. Imperfective aspect excludes that completion point from view, and the completion entailment is lost. This is seen in (31), from which we are unable to conclude that the cook peeled the apple (32). If an atelic predicate is described in imperfective aspect, the completion entailment is not lost. This is because atelic predicates are instantiated at their onset and are not defined by their completion point. Below, (32) entails that (33) took place, demonstrating that this is an atelic predicate.

(31) A cook was peeling an apple.

(32) ?A cook peeled an apple.

(32) A clown was juggling fruits.
(33) A clown juggled fruits.

The third test we used to determine telicity was the in/for test: Events that can be said to take place “in” a certain amount of time are telic, events that take place “for” a certain amount of time are atelic. This is due to the bounded and unbounded nature of the telic and atelic predicate, respectively. The completion point specified by a telic predicate denotes a boundary at which the event is completed. The use of ‘in’ with a telic predicate is natural since it focuses is on the boundary that contains the event. This is seen in sentences (34) and (36). (34) is a telic predicate, and the reading is natural. (36) is an atelic predicate, and the reading is somewhat unusual. The use of ‘for’ is natural with an atelic predicate since it focuses on the durational component of the temporal interval, and not on the bounded nature of the interval. This is seen in (35) and (37), where (35) gives an unusual reading.

(34) A cook peeled an apple in 1 minute.

(35) ?A cook peeled an apple for 1 minute.

(36) ?A clown juggled fruits in 1 minute.

(37) A clown juggled fruits for 1 minute.

Our test sentences were created using these tests of telicity. In some cases, a test might not classify a sentence as telic or atelic. Intransitive sentences were constructed by using a subject argument only in the sentence. Some of the verbs could have potentially
taken two arguments, but were placed in a frame with a subject and no direct object. Animate agents were all humans except for in one sentence (a dog). All sentences used indefinite markers for subjects and objects (see Appendix A).

*Check and Filler Sentences*

We also created 10 check sentences and 58 filler sentences. Examples of these are presented below in table 2. The 58 filler sentences involved choices of different verbs, adverbs, or nouns to complete a sentence. Unlike the test sentences, the blanks for these sentences could occur at the beginning or end of a sentence in addition to the middle portion. For the filler sentences response options ranged from both words being acceptable to one word being more acceptable. Check sentences were included to ensure that subjects paid attention to the task and did not respond at random. These sentences had response options that were either grammatically correct or incorrect. Subjects who responded with more than 2 incorrect answers (<80% correct) to check sentences were removed from analysis. Filler sentences were included to distract subjects from the test sentences, giving them a choice on a different dimension from the aspectual choices for the test sentences.
Table 2. *Example Check and Filler Sentences*

<table>
<thead>
<tr>
<th>Example Filler Sentences</th>
<th>Example Check Sentences</th>
</tr>
</thead>
<tbody>
<tr>
<td>He zipped/zipped up his backpack.</td>
<td>There were/was a dog in the park.</td>
</tr>
<tr>
<td>The football game lasted/was four hours.</td>
<td>A game/games was being played.</td>
</tr>
<tr>
<td>He is quite/very attractive.</td>
<td>He go/goes to school on Thursday.</td>
</tr>
<tr>
<td>The child/children played for hours.</td>
<td>Yesterday he bought a television/televisions.</td>
</tr>
<tr>
<td>The military attacked the forest/bunker.</td>
<td>There are three car/cars parked in the driveway.</td>
</tr>
</tbody>
</table>

*Sentence Rating Tasks*

All 48 of our test sentences were subjected to several ratings tasks by separate groups of subjects. First, we had subjects rate how well the location mentioned in each sentence fit with the event. Given that our predictions are based on how well a particular location fits with a particular event, we need to insure that location fit is evenly distributed between sentence types. In this ratings task, 24 subjects viewed each experimental sentence along with its corresponding location. Subjects were then asked to rate on a 7-point likert scale how well the location fit with the sentence.

Our second rating task was designed to assess how well the entities mentioned in each sentence fit together in a semantic sense. It is possible that sentences with entities that fit better semantically may influence the viewpoint that subject’s assign to each event. For example, sentences that have a high degree of semantic fit may be easier to
represent as ongoing. If certain groups of sentences have a larger amount of semantic fit than other groups of sentences, this could influence our results. In this ratings task, subjects viewed two words at a time. These words were always from the same sentence. Subjects were asked to rate how well the words ‘go together,’ on a 7-point likert scale.

Finally, we wanted to ensure that our animate sentences were more agentive than our inanimate sentences. Three undergraduate raters read each sentence, and rated the subject of each sentence on agentive criteria specified by Dowty (1992) and Kako (2006), and using a subset of questions employed by Kako (2006). These evaluations probed the sentential subject’s awareness, movement, volition, and ability to cause change. As an example, the questions for the sentence, “A cop arrested a criminal,” appear in table 3 below. The basic structure of the questions for each sentence was as follows: How likely is it that [subject] chose to be involved in [verbing]? How likely is it that [subject] was aware of being involved in [verbing]? How likely is it that [subject] caused a change in [object]? How likely is it that [subject] moved? For sentences with no direct object, the word ‘something’ was placed in the object position. Raters could respond to each sentence on a 5-point likert scale, consistent with Kako (2006)
Table 3. *Example Questions for Animacy Rating Task*

<table>
<thead>
<tr>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>How likely is it that the cop chose to be involved in arresting?</td>
</tr>
<tr>
<td>How likely is it that the cop was aware of being involved in arresting?</td>
</tr>
<tr>
<td>How likely is it that the cop caused a change in the criminal/cause the criminal to do something?</td>
</tr>
<tr>
<td>How likely is it that the cop moved?</td>
</tr>
</tbody>
</table>

**Procedure**

Subjects were tested on a forced-choice fill in the blank sentence completion task. We used DirectRT software to present the sentences. Subjects were seated at a computer and told they would be reading sentences with blanks in them, and would be instructed to select a verb to fill in the blank. They were then allowed to ask questions about the test and materials. Subjects began the experiment by pressing an “OK” button on the screen. After pressing the button, a window appeared that gave more specific instructions for how to perform the task. The instructions informed participants that they would view sentences with blanks, and it would be their task to select a word to fill in the blank. The instructions asked participants to read and think about the event before responding. Furthermore, subjects were told that in some instances both words could be acceptable choices, and that in these cases they should choose whichever one seemed best to them. Sentences with blanks in the verb position were presented 1/3 of the way down the screen for 2 seconds. After 2 seconds, two verb choices appeared 2/3 of the way down the
screen beneath the sentence. Subjects selected the verb on the right with the “L” key and the verb on the left with the “A” key. The words remained on the screen until subjects responded. Once the subjects made a selection, a fixation point appeared on the screen for 250ms, followed by the next sentence. Sentences were presented in random order. The test took approximately 15 minutes to complete.

Results

Ratings Tasks

Item scores for the location-fit and semantic-fit ratings can be seen with their corresponding items in Appendix 1. To assess how well our locations fit with our sentences, we calculated overall mean and standard deviation of fit scores across subjects. The results indicate that our locations fit our sentences well (M = 5.99, SD = .073). All but 1 sentence fell within two standard deviations of the mean. To assess any differences regarding semantic fit of the entities within each sentence type, we computed mean fit rating and standard deviation. Overall sentences had a high level of semantic fit (M = 4.83, SD = 1.91). Only 1 sentence fell outside of this range, and no sentences were more than 2 standard deviations from the mean.

To assess agency, we summed likert ratings for each item by subject. Since each sentence was rated on four agency criterion on a scale of 1-5, the highest agency score an item could receive was 20, while the lowest it could receive was a 4. Item scores were computed for each item and averaged across subjects. Overall, our animate sentences
were rated as more agentive than our inanimate sentences (M = 14.38, SD = 3.25) for our animate sentences and (M = 8.07, SD = 1.95) for inanimate sentences. This indicates that our animate sentences were viewed as more agentive than our inanimate sentences.

**Experimental Task**

We performed a mixed between-within subjects ANOVA with percentage of imperfective responses as our dependent variable. The independent variables of interest were telicity (telic/atelic), transitivity (transitive/intransitive), animacy (subject animate/subject inanimate), presence of locative information (present/absent), position of locative information (sentence intial/sentence final) and narrative introduction (narrative/non-narrative). Telicity, transitivity, animacy, and presence of locative information were analyzed as within-subjects factors. Position of locative information and narrative introduction were analyzed as between-subjects factors. In addition to the ANOVA, we also ran a binary logistic regression. While the ANOVA allows us to determine if morphology selection differed as a function of each factor, the regression allows us to determine the strength of influence the each of our factors had on aspectual choice. A Chi Square test of model coefficients found that they accounted for significant variation in our dependent variable ($\chi^2 = 147.06$, df = 6, p < .01). The Hosmer-Lemeshow goodness of fit test was non-significant, indicating that the model fits the data well ($\chi^2 = 13.13$, df = 8, p > .1). The results of both tests will be discussed below, with
results of the binary logistic regression presented in table 4.

Table 4. Results of Binary Logistic Regression

<table>
<thead>
<tr>
<th>IV</th>
<th>B</th>
<th>S.E.</th>
<th>Wald Chi</th>
<th>df</th>
<th>p</th>
<th>Odds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intransitive</td>
<td>-.51</td>
<td>.06</td>
<td>84.97</td>
<td>1</td>
<td>&lt; .01</td>
<td>.60</td>
</tr>
<tr>
<td>Location</td>
<td>-.36</td>
<td>.07</td>
<td>29.76</td>
<td>1</td>
<td>&lt; .01</td>
<td>.70</td>
</tr>
<tr>
<td>Fronted</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animate</td>
<td>-.18</td>
<td>.06</td>
<td>10.21</td>
<td>1</td>
<td>&lt; .01</td>
<td>.84</td>
</tr>
<tr>
<td>Atelic</td>
<td>-.16</td>
<td>.06</td>
<td>8.12</td>
<td>1</td>
<td>&lt; .01</td>
<td>.86</td>
</tr>
<tr>
<td>Location Final</td>
<td>.05</td>
<td>.07</td>
<td>.53</td>
<td>1</td>
<td>&gt; .05</td>
<td>1.05</td>
</tr>
<tr>
<td>Narrative Intro</td>
<td>.14</td>
<td>.06</td>
<td>6.63</td>
<td>1</td>
<td>.01</td>
<td>1.15</td>
</tr>
<tr>
<td>Constant</td>
<td>-.17</td>
<td>.10</td>
<td>2.82</td>
<td>1</td>
<td>&gt; .05</td>
<td>.84</td>
</tr>
</tbody>
</table>

Overall there was a strong bias to select perfective morphology over imperfective morphology. Overall, subjects selected perfective morphology 67% of the time, while selecting imperfective morphology 33% of the time, t(6239) = -29.30, p < .01. We found main effects for telicity, animacy, presence of locative information, and transitivity. All main effects were in the expected direction. Telicity influenced aspectual choice with atelic predicates being described significantly more often with imperfective aspect (34% of responses) than telic predicates (30% of responses), F(1, 126) = 9.59, p < .01. According to the regression, subjects viewing atelic sentences were 86% as likely to
select perfective morphology compared to subjects viewing telic sentences. This made
telicity the weakest overall predictor of aspectual choice, with the exception of the non-
significant factors of narrativity and location-final information. The main effect of
animacy found that sentences with animate subjects were described with imperfective
aspect significantly more often (34% of responses) than sentences with inanimate
subjects (31% of responses), $F(1, 126) = 13.42, p < .01$. According to the logistic
regression, subjects viewing animate sentences were 85% as likely to select perfective
morphology compared to subjects viewing telic sentences, meaning it too exerted a
relatively weak influence over aspectual choice. The main effect of transitivity found
that intransitive sentences were described significantly more often with imperfective
aspect (38% of responses) than transitive sentences (27% of responses), $F(1, 126) =
81.13, p < .01$. This finding is graphed in figure 2 below. Bars on this graph and
subsequent graphs reflect +/- 1 standard error. Consistent with the large differences
observed in the ANOVA, transitivity was the strongest predictor of aspectual choice in
our study. Subjects viewing intransitive sentences were 60% as likely to choose
perfective aspect relative to subjects viewing transitive sentences.
The main effect of presence of locative information found that sentences with location were described significantly more often with imperfective aspect (35% of responses) than sentences without locative information (30% of responses), $F(1, 126) = 4.51, p < .05$. However, an interaction of location presence with location position revealed that locative information increased imperfective responding, but only when presented at the beginning of a sentence $F(1, 126) = 5.39, P < .05$. Sentences with location presented at the beginning of a sentence had imperfective response rates of 39%, while sentences with location in the final position had lower imperfective response rates (30%). This interaction is graphed in figure 3 below. In addition, fronted locative
information was the second strongest predictor of aspectual choice after transitivity. Subjects viewing sentences with fronted locative information were 70% as likely to choose perfective aspect relative to sentences with no locative information.

![Graph](image)

**Figure 4.** Percentage of imperfective responses for two-way interaction between location presence and location position.

In addition to the main effects, we found several interactions as well. Transitivity interacted with telicity $F(1, 126) = 7.70, p < .01$. When sentences were transitive, imperfective response rates were equivalent between transitive/telic and transitive/atelic sentences (27% imperfective response rate). When sentences were intransitive,
imperfective responding increased for both imperfective/telic and intransitive/atelic sentences, however intransitive/atelic sentences had higher rates of imperfective responses (41% of responses) than intransitive/telic sentences (35% of responses). This interaction is presented in figure 5 below.

![Figure 5](image-url)

*Figure 5.* Percentage of imperfective responses for two-way interaction between transitivity and telicity.

Transitivity also interacted with Narrativity $F(1, 126) = 4.41, p < .05$. When sentences were transitive, imperfective response rates for narrative and non-narrative sentences were equivalent (again, 27% of responses). When sentences were intransitive,
imperfective responding increased overall, with intransitive/non-narrative sentences having higher imperfective response rates (41% of responses) than intransitive/narrative sentences (35% of responses). This interaction is shown in figure 6 below. It appears from this interaction, as well as the interaction of transitivity and narrativity, that transitive structure is a strong cue to perfectivity. When sentences are transitive, other factors do not influence aspectual choice. When sentences are intransitive, other factors we have identified exert an influence over aspectual choice. This will be discussed further in the general discussion. In addition, the finding the narrative structure increases selection of perfective aspect runs counter to our prediction that narrativity would increase the rate of imperfective responding. Though we found no main effect for narrativity, the logistic regression revealed that subjects viewing sentences with a narrative introduction were 115% as likely to choose perfective aspect relative to sentences without a narrative introduction. This, combined with the interaction of narrativity and transitivity, suggests that narrativity may have elicited an effect in the opposite direction of what we had predicted. This will be addressed further in the general discussion.
Figure 6. Percentage of imperfective responses for two-way interaction between transitivity and narrativity.

In addition, telicity interacted with animacy $F(1, 126) = 6.43, p < .05$. When sentences were telic, imperfective response rates were equivalent for animate and inanimate sentences (30% inanimate, 31% animate). When sentences were atelic, the imperfective responding increased for the animate sentences (37% of responses) but not inanimate sentences (31% of responses). This interaction is presented in figure 7 below.
Figure 7. Percentage of imperfective responses for two-way interaction between telicity and animacy.

Finally, we found a three way interaction of telicity, animacy, and narrativity $F(1, 126) = 10.14, p < .01$, as well as a four way interaction of telicity, transitivity, narrativity, and position of locative information $F(1, 126) = 5.75, p < .05)$. These two interactions were not of theoretical interest to us and don’t appear to provide any meaningful information regarding our results. These two interactions will not be interpreted further.
Experiment 1 Discussion

The goal of Experiment 1 was to determine how certain temporal-linguistic, knowledge-based semantic, and discourse cues could influence the aspectual forms subjects used to describe events. We predicted that sentences which were atelic, animate, intransitive, contained locative/fronted locative information, and contained a narrative introduction would increase selection of imperfective aspect. Consequently, we also predicted that telic, inanimate, transitive, no-location, non-narrative sentences would increase selection of perfective aspect. We confirmed these hypotheses with one exception; narrative introduction did not influence aspectual choice in the direction we had anticipated.

In addition to the main effects found for our factors, there were two two-way interactions involving transitivity. Transitivity interacted with telicity and narrative introduction. It appears that when sentences are transitive, the likelihood of responding with perfective aspect is high. Cues to imperfectivity in the presence of transitive structure do not seem to have any influence over aspectual choice. This same pattern does not hold for intransitive sentences. When sentences are intransitive, additional cues to imperfectivity such as an atelic predicate lead to an increase in the amount of imperfective selection. This suggests that transitivity constrains the influence of telicity on aspectual choice. At the same time, an additional perfective cue such as a telic predicate combined with transitive structure does not cause increased perfective selection compared to transitive, atelic sentences. It appears that transitive structure minimizes the
influence of other factors, while intransitive structure allows other factors to influence aspectual choice. This same pattern is observed for the interaction between transitivity and narrativity, though in this case narrativity dampens imperfective responding, inconsistent with our predications.

In addition, we found an interaction of telicity and animacy. In this interaction, telic predicates with both animate and inanimate subjects had roughly equivalent rates of imperfective selection. When sentences were atelic, imperfective responding increased, but only for sentences with animate subjects. There was no increase in imperfective responding for atelic inanimate sentences.

Though it is clear that our factors influenced aspectual choice in this task, there is an additional question concerning whether or not these factors can organize real-world production of speech. Experiment 1 indicates that readers will consider these factors when making a choice about viewpoint. If the factors that we have identified are important features of how individuals represent events, then we would expect to find this reflected in the way individuals produce language. To assess this, we carried out a corpus analysis in experiment 2.
Chapter 3: Corpus Analysis

In order to investigate how our findings in Experiment 1 relate to frequency, we performed a corpus analysis to determine co-occurrences between animacy, transitivity, and locative information with perfective and imperfective aspect. Frequency information has been associated with experimental performance in a number of tasks (Dahan, Magnuson, & Tanenhaus 2001; Sereno, O’Donnell, & Rayner, 2006). In Experiment 1, we found that specific types of information about an event influenced how individuals chose to describe that event. Sentences that were atelic, intransitive, had animate subjects, and contained fronted locative information increased the rate at which individuals chose to describe those events using imperfective aspect. Subjects’ morphology choice was not guided by features specific to a given event, but rather morphology choice was guided by more general properties of events. For example, animacy drove subjects to describe events imperfectively. Whether or not the subject was a little girl, a chef, or a construction worker - the fact that they were animate subjects relative to inanimate subjects drove their decision process. The same can be said of transitivity and telicity. The specifics of the subject and object were not relevant, what mattered was whether or not an event contained 1 participant or 2 participants. With telicity, the specifics of each event’s endpoint (or lack thereof) did not matter, what was
important was whether or not the event had a clear endpoint or not. Thus, it seems that these more abstract properties guided morphology choice, rather than information specific to a particular event. If the properties we have identified serve as features that organize our representations of events, we would expect to find associations between these factors and perfective/imperfective aspect in real world language use.

Method

We conducted a corpus analysis using the Corpus of Contemporary American English (Davies, 2008). This free corpus contains over 450 million words from a variety of sources including spoken word, newspapers, magazines, fiction, and academic writing. Due to the large amount of sentences and utterances contained, combined with the fact that it draws from multiple sources, we decided this would be an ideal corpus for gathering general frequency statistics. An initial search for past perfective and past imperfective mentions of the verbs used in Experiment 1 found that verbs in their past perfective form were much more frequent than verbs in their past imperfective form. Verbs in their past perfective form averaged 16,898 tokens in the COCA corpus. Verbs in their past imperfective form averaged 261 tokens in the corpus. A second search for our verbs in any form ending with –ing found that the verbs used in Experiment 1 averaged 10,244 tokens. Due to the small number of past imperfective tokens in the corpus search, we chose to accept and analyze sentences using imperfective verbs in both past and present tense form. The selection process is described below.
Materials

Corpus Sentences

We used the list search function in COCA to generate random samples of verbs ending in –ed or –ing. These searches generated sentences in random order. The results of each search were then analyzed in order until 500 sentences with a past perfective verb and 500 sentences with a past/present imperfective verb had been reached. We decided to search for verbs in present imperfective form as well as past imperfective form due to the small number of tokens we observed for verbs in their past imperfective form. By including present imperfective in the search, we were able to select from a larger amount of imperfective sentences. In order to be counted in the corpus search, the sentences had to be of the appropriate aspectual form, and had to be action verbs. Action verbs express activities that subjects can do or engage in. Verbs like drinking, running, or smashing are examples of action verbs. These types of verbs are able to take direct objects since a direct object is affected by the action of the verb. Action verbs were selected since prior studies (McRae et. al, 2005; Ferretti et. al, 2007; Ferretti et. al, 2009) as well as Experiment 1 use action verbs a majority of the time, if not all of the time.

Sentences using action verbs were then coded for subject animacy, transitivity, and presence/position of locative information. When a verb was identified as an action verb, the direct object was identified by asking who or what the verb acted upon. If a direct object was identified using this test, the sentence was counted as transitive. If no direct object was identified, the sentence was counted as intransitive. Presence/absence
and position of locative information was determined in the following way. Locative information had to be introduced with a prepositional phrase. This is consistent with Ferretti et al. (2007) who found that imperfective aspect increased references to location with the use of a prepositional phrase. A sentence such as *Uganda was fighting a civil war* would not qualify, even though Uganda is a location in the world. A sentence such as *In Uganda, rebels were fighting a civil war or Rebels were fighting a civil war in Uganda* would qualify. In the latter case, Uganda is treated as a location in which the event takes place. In the former, it does not. Furthermore, the locative information had to clearly identify a stable location in the world. A sentence such as *John was standing next to Allen* would not qualify as locative by this standard since this does not specify a fixed, stable position in the world. A sentence such as *John was standing under a tree next to Allen* would qualify as it mentions a stable location in the world for which people have experience and knowledge, the area underneath a tree. If locative information was introduced prior to the verb, it was counted as fronted position. If locative information was introduced after the verb, it was counted as ‘final’ position.

Animacy was determined by identifying if the sentence subject was a human or an animal. If the subject was a human or animal, the sentence was counted as animate. Telicity was not included in this analysis. Prior evidence shows that telic predicates occur more frequently with perfective aspect while atelic predicates occur more frequently with imperfective aspect (Shirai & Andersen, 1995). As such, there is already evidence to support the notion that telicity can influence how individuals communicate about events.
Results

We used a Chi Square test of group differences to determine if our factors appeared more or less frequently as a function of aspectual form. There were no differences in the frequency with which perfective and imperfective sentences occurred with fronted location or sentence final location. There were significant differences between the frequency with which animate subjects and intransitive structure occurred with perfective and imperfective aspect. Transitive structure was occurred significantly more often with perfective aspect relative to imperfective aspect, occurring in 62.2% of perfective sentences but only 41.4% of intransitive sentences, a significant difference ($\chi^2 = 43.23$, df = 1, $p < .001$). Animate subjects occurred significantly more often with imperfective sentences relative to perfective sentences, occurring 76.6% of the time with imperfective sentences and 68.2% of the time with perfective sentences ($\chi^2 = 8.83$, df = 1, $p < .01$). Data showing frequency with which our factors occurred with perfective and imperfective forms are shown below in table 5.
Table 5. *Frequency of Animate, Transitive, Location Initial, and Location Final Information for 500 Perfective and 500 Imperfective Verbs.*

<table>
<thead>
<tr>
<th>Sentence Type</th>
<th>Animate</th>
<th>Transitive</th>
<th>Location Initial</th>
<th>Location Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imperfective</td>
<td>76.6%</td>
<td>41.4%</td>
<td>5.8%</td>
<td>17.6%</td>
</tr>
<tr>
<td>Perfective</td>
<td>68.2%</td>
<td>62.2%</td>
<td>6.2%</td>
<td>18.2%</td>
</tr>
</tbody>
</table>

Corpus Analysis Discussion

We performed a corpus analysis to investigate whether or not our factors could influence real-world language production. The factors we looked at in this study were subject animacy, transitivity, as well as presence and position of locative information. From this analysis, we found that animate/inanimate subjects and transitive/intransitive structure co-occurred at significantly different rates with perfective and imperfective aspect. Animate subjects and intransitive structure were significantly more common with imperfective aspect, while inanimate subjects and transitive structure were significantly more common with perfective aspect. Transitivity was the strongest predictor of aspectual choice in Experiment 1, and this corpus analysis shows that it is linked to perfective and imperfective aspect in real world language production. Animacy, though a weaker predictor of imperfective choice in Experiment 1, is also linked perfective and imperfective aspect in language production. These findings suggest that subject animacy
and number of participants may serve as organizing features when determining how to communicate about an event. This idea will be covered further in the general discussion. We found no overall differences in the frequency with which sentence fronted location and sentence final location occurred with perfective and imperfective aspect. This could be due to the low number of tokens for locative information.
Chapter 4: General Discussion

The goal of the present study was to determine how certain temporal-linguistic, knowledge-based semantic, and discourse cues influenced selection of perfective and imperfective aspect to describe an event. Using a forced choice morphology selection task, we found that telicity, subject animacy, transitivity, and position of locative information within a sentence influenced aspectual choice. Specifically, sentences that were atelic, intransitive, contained an animate subject, and contained fronted locative information led to significantly greater selection of imperfective aspect, relative to sentences that were telic, transitive, contained an inanimate subject, and contained locative information at the end of each sentence or not at all. The direction of these effects were consistent with our initial predictions. Furthermore, the fact that location influenced morphology choice only when presented at the beginning of a sentence suggests an on-line component involved in representation building and subsequent morphology choice. In experiment 2 we conducted a corpus analysis to determine if these factors would relate to use of perfective and imperfective aspect in real-world language production. The corpus analysis revealed that animate subjects and intransitive structure were more frequent with imperfective aspect, while inanimate subjects and
transitive structure were more frequent with perfective aspect. This indicates that the factors we tested in Experiment 1 may influence real-world language use.

Processing and Representation

The results of Experiment 1 reveal that how individuals choose to represent events (as perfective and complete or imperfective an ongoing) is tied into the way in which humans process language. This is evident in the interaction of presence of location with position of location. Locative information did not influence aspectual choice when it was positioned at the end of a sentence. When locative information was moved to the front of a sentence, imperfective responding increased significantly, such that fronted locative information was the second strongest influence of aspectual choice. From this it is clear that content is not the only important piece of information subjects take into account when making the morphology choice. Remember that the sentences we created were the same across all subjects, the only differences being the presence or absence of a narrative introduction and the position of location within each sentence. As such, the location-initial and location-final sentences provided identical information about each event. All that differed was the presentation of this information, which led subjects to generate different models for these events. These findings can be explained by Gernsbacher’s Advantage of First Mention (Gernsbacher et. al 1989; Gernsbacher 1991). She argues that when building a mental model of an event while reading text, information read first forms an anchor or a base around which subsequent information is interpreted. This first-mentioned information is more salient and integral to the mental model an individual
builds of an event. We hypothesized that location would influence aspectual choice and it certainly did, but only when made salient by being presented at the onset of our sentences. While we did not make the same prediction for animacy, this theory provides an explanation for the animacy result.

Furthermore, this order of information effect was found in an off-line task. What this suggests is that the representations that our subjects constructed for each sentence were arrived at quickly and are stable over time. From this perspective, building a mental model is analogous to the construction of a building. The first step in creating a building is laying a foundation. The type of foundation one puts down is extremely important to the type of building that is created. Strong foundations can support tall buildings, while weaker foundations cannot. In our case, location information can serve as a strong foundation for an ongoing event representation. When our subjects saw location as the first piece of each sentence, it led subjects to construct models of the event which suggested that the event should be represented as ongoing. When location was presented at the end of the sentences, it did not motivate subjects to construct an imperfective event model.

Furthermore, when a building is properly constructed it lasts for quite some time. This is the same with the representations that subject’s in our study generated for each event. The influence of fronted locative information occurs online, the representation is built rapidly around that information. Our task in Experiment 1 was offline. Subjects were given and took several seconds to respond after reading each sentence. What this implies is that the initial interpretation subjects generated from reading the sentence was
strong enough and stable enough to influence aspectual choice several seconds after the sentence had been read. This adds to the evidence that it is order in which information is presented that is crucial to building a model for each event.

**Frequency Information**

It was important to examine the relationship between our findings in Experiment 1 and frequency data. Since the factors that we identified in Experiment 1 were influential in determining the viewpoint individuals take on an event, we would expect to see a relationship between our factors and aspectual form in production data. We found relationships for two of the four factors analyzed. Animate subjects and intransitive structure were more frequent with imperfective aspect, while inanimate subjects and transitive structure were more frequent with perfective aspect.

The corpus analysis findings suggest that information regarding the subject of an action is important when organizing speech. Animate subjects are canonical agents. They have awareness, volition, an ability to move, can cause events to happen, and can causally affect other entities. It is much more difficult for an inanimate subject to possess these qualities. A rock can move or break a window, however a rock needs someone or something to act on it in order to make this happen. A human being can move, break windows, be aware of it, and require nothing more than its own volition to carry out the act. Given that these clear differences exist between animate and inanimate subjects, it is no surprise that how we choose to communicate about the two differs. According to our predictions as well as Ferretti et. al (2007), things that are animate and highly agentive
are more likely to cause events to happen an be involved in an event as it unfolds. Since it is more difficult for an inanimate subject to bring about an event, it makes it less likely that they would be crucial to the ongoing, internal portions of that event highlighted by imperfective aspect. Thus, the semantic differences between what an animate subject can do and what an inanimate subject can do influences the organization of our real-world speech.

There are several explanations for the relationship between transitivity and aspect in the frequency data. Intransitive sentences were more common with imperfective aspect, while transitive sentences were more common with perfective aspect. This demonstrates that the number of participants or entities involved in an event can influence the viewpoint individuals choose to ascribe to an event when producing natural language. There are several reasons why we would find this. The first is that transitivity is correlated with telicity. Transitive structure is correlated with telic meanings while intransitive structure is correlated with atelic meanings. As discussed earlier, production data shows that telic predicates occur more frequently with perfective aspect, while atelic predicates occur more frequently with imperfective aspect. Though association, this would suggests that transitive and intransitive structure should also correlate with perfective and imperfective aspect. Another argument for why these patterns would occur comes from Ferretti et. al (2007), and suggests that these associations between transitivity and aspect exist because sentences that are transitive often possess a patient. When representing an event, the presence of a patient is the defining feature of a completed, perfective event representation. This should lead individuals to use perfective
descriptions more often with transitive structure – the contents of the event are consistent with a completed viewpoint on an event. Intransitive structure does not contain an overt direct object. Without this marker of a second participant, the event is more consistent with an ongoing viewpoint. This would lead subjects to use imperfective aspect more frequently with intransitive structure.

Fronted locative information did not differ between perfective and imperfective sentences in our corpus search. This factor was the second strongest predictor of aspectual choice in Experiment 1. As such, it is somewhat surprising that weaker cues to aspectual choice (animacy) would show differences in the corpus search while a seemingly stronger aspectual cue in the form of fronted locative information would exhibit no differences between perfective and imperfective aspect. There are two possible explanations for this. The first is that the number of sentences appearing with location was too small to exhibit any differences. Such a small number of instances could explain why no differences were detected. In addition, locative information is more difficult to classify than subject animacy and transitive structure. Could the presentation of locative information several sentences prior to use of a verb play a role in the aspectual form given to that verb? Our study only counted locative references within the same sentence as each perfective and imperfective verb. As such, locative references could be occurring at different rates, only we could not identify them since they occurred outside of the area we searched.
Limitations

Of the factors we tested, the only one that did not influence aspectual choice as expected was presence of the narrative introduction ‘Once upon a time.’ We had initially predicted that this introduction would establish an appropriate context for backgrounding information, a function that imperfective aspect serves in discourse. We found no main effect. In an interaction with transitivity, as well as a three-way interaction with telicity and animacy, the narrative introduction functioned to reduce imperfective responding. There are several possibilities as to why this factor did not have the expected effect. The first has to do with the test sentences that were used in the experiment. Often times, the addition of ‘Once upon a time’ to our test sentences made for unusual story-like sentences (i.e. Once upon a time, a child was complaining in school). This type of sentence may not be believable as an introduction to a story, reducing the likelihood that subjects bought into the manipulation. The second is that our experiment presented sentences in isolation. Imperfective backgrounds information in discourse, and our sentences were not presented in a larger discourse, but in isolation. The single sentence approach may not provide enough of a cue to discourse to make the manipulation effective. To address this problem, future studies could focus on morphology selection within a larger discourse. This would provide ample information to make backgrounding appropriate, and may serve as a better test of how cues to narrative background influence aspectual choice.

There are additional limitations to the present study. One such limitation is that we do not directly assess subject’s viewpoint of the described events. Our dependent
variable is morphology choice, which we take as an indicator of how subjects choose to view or represent an event. Furthermore, past perfective and past imperfective aspect are one of many combinations of tense and aspect. We have imposed this selection due to the clear differences between the two in terms of the viewpoints they generate for the events, but it does not mean that they are the interpretations that subjects would arrive at were the morphology choice unconstrained. This does not necessarily undermine our results, however it does expose the possibility that subjects would default to other tense-aspect combinations if given the opportunity.

Another limitation has to do with interpretation of our dependent variable. For any given result, we can speak of a factor as increasing imperfective responding and decreasing perfective responding, or increasing perfective responding and decreasing imperfective responding. As such, it is difficult to determine the exact nature of the effect that each factor has on response choice. We can demonstrate this using transitive and intransitive sentences. Intransitive sentences had a much higher rate of imperfective responding, while transitive sentences had a lower rate. Did intransitive structure increase the tendency for subjects to choose imperfective, or did transitive structure increase the tendency to choose perfective? Due to the forced-choice nature of the task, identifying a baseline selection from which subjects operated difficult. As such, it makes it hard to determine the specific nature of each factor’s influence on aspectual choice. This could be addressed with a verb preference task. Subjects could view a verb in its past perfective and past imperfective form and make a selection as to which form they think is better. This would allow us to establish some type of baseline preference for one
morphological form over another.

There is evidence to suggest that perfective aspect is the default response. This comes from the overall tendency of subjects in our study to choose perfective aspect more frequently. A sentence with a large number of cues to perfectivity does not cause a large increase perfective responding relative to our mean perfective response rate. However, as the number of cues to imperfectivity increase, so does the tendency to respond with imperfective aspect, moving subjects away from the overall perfective bias. This suggests that our imperfective cues push people away from their perfective default, whereas numerous cues to perfectivity reinforce the perfective bias, but do not increase perfective responding by a large extent. In addition, the frequency data we gathered shows that perfective tokens are much more common than imperfective tokens, which supports the idea that individuals may default to perfective aspect when making their choice.

Conclusions

Perfective and imperfective aspect present events in distinct ways by indicating what viewpoint an individual should take on an event. Perfective viewpoint represents an event as complete with emphasis on the endpoint, while imperfective viewpoint represents and event as incomplete and ongoing. However, our study shows that the differences in the two types of representation may go beyond viewpoint alone. Provided that each aspectual form gives a different viewpoint of an event, the features and entities involved in that part of an event also become tied into the viewpoint. Sentences that specify events with animate subjects, lack patients, contain locative information, and do
not refer to endpoints suggest an imperfective, ongoing viewpoint. Likewise, sentences that specify events with inanimate subjects, patients, completion points, and no locative information suggest a perfective, completed view of an event.

Though some of the influence in our study could be caused by greater co-occurrence of certain factors with certain aspectual forms, the influence of other factors cannot be traced to linguistic knowledge and is likely a result of how individuals think about events. It appears that subjects generate rules or heuristics for how to view an event based on their world knowledge. This indicates that our observations and representations of real world events are organized in specific ways based on the entities and information available about those events. Furthermore, the ways in which we choose to view an event can be linked to how language is processed; namely, initial information is more salient and important building a representation. The first bit of information we receive about an event seems to carry strong influence regarding how we will ultimately represent that event. In essence, representations that we build based on linguistic input are sensitive to order effects, such that how we view or understand an event can change considerably depending on where and how information is presented.


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## Appendix A: Test Sentences Used in Experiment 1

<table>
<thead>
<tr>
<th>Sentence Type</th>
<th>Location</th>
<th>Location Fit Rating</th>
<th>Semantic Fit Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Telic, Transitive, Animate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A cop arrested/was arresting a criminal…</td>
<td>Outside a bar</td>
<td>5.58</td>
<td>6.39</td>
</tr>
<tr>
<td>A worker filled/was filling a bucket…</td>
<td>At a construction site</td>
<td>6.35</td>
<td>3.64</td>
</tr>
<tr>
<td>A driver parked/was parking a car…</td>
<td>In a lot</td>
<td>6.77</td>
<td>5.96</td>
</tr>
<tr>
<td>A chef melted/was melting butter…</td>
<td>In a saucer</td>
<td>5.70</td>
<td>5.55</td>
</tr>
<tr>
<td>A waiter folded/was folding 20 napkins…</td>
<td>At a restaurant</td>
<td>6.88</td>
<td>4.70</td>
</tr>
<tr>
<td>A cook peeled/was peeling an apple…</td>
<td>In a kitchen</td>
<td>6.81</td>
<td>4.51</td>
</tr>
<tr>
<td><strong>Telic, Transitive, Inanimate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A key locked, was locking a door…</td>
<td>To a courtyard</td>
<td>3.73</td>
<td>6.72</td>
</tr>
<tr>
<td>An axe cut/was cutting a branch…</td>
<td>In the woods</td>
<td>6.5</td>
<td>5.07</td>
</tr>
<tr>
<td>A court fixed/was fixing an injustice…</td>
<td>In the halls of the capitol</td>
<td>5.31</td>
<td>4.22</td>
</tr>
<tr>
<td>A dam blocked/was blocking a river…</td>
<td>In a canyon</td>
<td>5.35</td>
<td>4.39</td>
</tr>
<tr>
<td>A racecar completed/was completing a turn…</td>
<td>On a racetrack</td>
<td>6.92</td>
<td>3.62</td>
</tr>
<tr>
<td>An oven baked/was baking a pizza…</td>
<td>In a kitchen</td>
<td>6.96</td>
<td>6.20</td>
</tr>
<tr>
<td><strong>Telic, Intransitive, Animate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some professors agreed/were agreeing…</td>
<td>In a meeting</td>
<td>6.08</td>
<td>3.43</td>
</tr>
<tr>
<td>An actor prepared/was preparing…</td>
<td>From a cell</td>
<td>6.12</td>
<td>4.87</td>
</tr>
<tr>
<td>Some students learned/were learning…</td>
<td>In a dressing room</td>
<td>6.38</td>
<td>4.82</td>
</tr>
<tr>
<td>A woman undressed/was undressing…</td>
<td>In a classroom</td>
<td>6.81</td>
<td>6.57</td>
</tr>
<tr>
<td>Some prisoners escaped/were escaping…</td>
<td>In a bedroom</td>
<td>6.5</td>
<td>4.22</td>
</tr>
<tr>
<td>A little girl died/was dying…</td>
<td>In a hospital bed</td>
<td>5.88</td>
<td>1.82</td>
</tr>
<tr>
<td><strong>Telic, Intransitive, Inanimate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A car arrived/was arriving…</td>
<td>In front of a house</td>
<td>5.96</td>
<td>4.91</td>
</tr>
<tr>
<td>A space shuttle launched/was</td>
<td>On Cape</td>
<td>5.92</td>
<td>6.35</td>
</tr>
<tr>
<td>Event 1</td>
<td>Location 1</td>
<td>Time 1</td>
<td>Event 2</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-----------------------------</td>
<td>--------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>launching…</td>
<td>Canaveral</td>
<td></td>
<td>A plane landed/was landing…</td>
</tr>
<tr>
<td>A body decomposed/was decomposing…</td>
<td>Underground</td>
<td>6.46</td>
<td>A photo developed/was developing…</td>
</tr>
<tr>
<td>A photo developed/was developing…</td>
<td>Underground</td>
<td>6.46</td>
<td>Some permafrost thawed/was thawing…</td>
</tr>
<tr>
<td><strong>Atelic, Transitive, Animate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A woman admired/was admiring a dress…</td>
<td>In a store window</td>
<td>6.27</td>
<td>A boxer fought/was fighting an opponent…</td>
</tr>
<tr>
<td>A child dragged/was dragging his toys…</td>
<td>In a sandbox</td>
<td>5.65</td>
<td>A clown juggled/was juggling fruits…</td>
</tr>
<tr>
<td>A dog followed/was following its owner…</td>
<td>In a park</td>
<td>6.35</td>
<td>An audience clapped/were clapping their hands…</td>
</tr>
<tr>
<td><strong>Atelic, Transitive, Inanimate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A chicken bone choked/was choking a customer…</td>
<td>In a Chick-fil-a</td>
<td>4.69</td>
<td>An amendment moved/was moving some voters…</td>
</tr>
<tr>
<td>A hook hung/was hanging a picture…</td>
<td>On a wall</td>
<td>6.31</td>
<td>Some flowers needed/were needing water…</td>
</tr>
<tr>
<td>Some flowers needed/were needing water…</td>
<td>In a garden</td>
<td>6.46</td>
<td>A car drove/was driving a route…</td>
</tr>
<tr>
<td>A suit protected/was protecting an astronaut…</td>
<td>In outer space</td>
<td>6.85</td>
<td></td>
</tr>
<tr>
<td><strong>Atelic, Intransitive, Animate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A worker argued/was arguing…</td>
<td>In a meeting</td>
<td>5.46</td>
<td>Her husband cared/was caring…</td>
</tr>
<tr>
<td>A child complained/was complaining…</td>
<td>In school</td>
<td>5.31</td>
<td>An old man coughed/was coughing…</td>
</tr>
<tr>
<td>An old man coughed/was coughing…</td>
<td>In a doctor’s office</td>
<td>5.65</td>
<td></td>
</tr>
<tr>
<td>A girl dreamed/was dreaming…</td>
<td>In her bed</td>
<td>6.11</td>
<td></td>
</tr>
<tr>
<td><strong>Atelic, Intransitive, Inanimate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some wine aged/was aging…</td>
<td>In a cellar</td>
<td>6.65</td>
<td>A timer buzzed/was buzzing…</td>
</tr>
<tr>
<td>A timer buzzed/was buzzing…</td>
<td>In a kitchen</td>
<td>5.58</td>
<td>An engine roared/was roaring…</td>
</tr>
<tr>
<td>Some traffic crawled/was crawling…</td>
<td>On a freeway</td>
<td>6.19</td>
<td></td>
</tr>
<tr>
<td>A river flowed/was flowing…</td>
<td>In a meadow</td>
<td>4.69</td>
<td>5.96</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-------------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Some driftwood floated/was floating…</td>
<td>On the waves</td>
<td>5.23</td>
<td>5.74</td>
</tr>
</tbody>
</table>