AGENTS' GOALS AFFECT PLACEMENT OF EVENT ENDPOINTS

by

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ABSTRACT

Day-to-day life can be thought of as a series of events. It has been hypothesized that the boundaries of events are characterized by change, including a change in the agent's goal, but the role of higher-order goal information on event boundaries has not been addressed experimentally. In a series of experiments, we tested whether goals can affect how viewers place event boundaries. Participants read a context sentence containing an agent's goal (e.g., "Jasmine wants to eat an orange with her breakfast" vs. "Jasmine wants to use an orange to garnish the dessert"). Participants then saw an image of an event outcome (e.g., a partly peeled orange) and were asked to identify whether the event had occurred ("Did she peel the orange?"). Participants were more likely to accept a partly complete outcome if the outcome satisfied the agent's goal (Experiments 1 and 2). These effects depended on specific interactions of contexts and visual outcomes (Experiment 3). In a further manipulation, participants were more likely to reject a mostly complete outcome if it failed to satisfy the agent's goal (Experiment 4). We conclude that higher-order goal information affects the way events are conceptualized.

Chapter 1

INTRODUCTION

Day-to-day life is composed of a series of events. The morning might begin with making a pot of coffee, cooking breakfast, or making the bed before going to work for the day. Evening hours might include arriving home from work, eating dinner, and getting ready for bed. These are general ideas of daily occurrences that could be considered events, however each of these overarching events is comprised of many smaller subevents (Zacks, Tversky, & Iyer, 2001). In order to make a pot of coffee, the reservoir must be filled with water, the coffee grounds must be placed into the basket, and the coffee maker must be turned on. Literature on how this series of events is separated into individual components has largely emphasized the segmentation of a stream of input such as a movie (Magliano, Kopp, McNerney, Radvansky, & Zacks, 2012).

The term "event" has been given numerous definitions. Zacks and Tversky (2001) define an event in terms of having a specific time and location. An event under this definition must also be seen as having a beginning and ending point as determined by an observer. While this definition does well in providing a basic idea of what an event is, the idea of what might constitute a beginning and an ending point is vague. Studies asking individuals to segment events often make the distinction between fine-grained, smallest logical units, and coarse-grained, largest logical units, segmentation (Zacks et al., 2001). In a fine-grained segmentation of the event "making coffee", the endpoint of each event, called an event boundary, might be marked after the reservoir

is filled, after the basket is filled, and after the machine is turned on. A coarse-grained segmentation, on the other hand, would likely place an event boundary only after the carafe is filled with coffee indicating the coffee has been made.

Evidence from the domain of event segmentation has suggested change as a common indicator of event boundaries (Speer, Zacks, & Reynolds, 2004; 2007). Changes in time and location, as suggested by Zacks' and Tversky's (2001) definition, were not the only indicators of event boundaries, but also changes in movement, characters, interactions, and most important to the current study, goals. Events presented in a stream, such as in Magliano et al. (2012), provide physical cues to trigger segmentation, such as a change in movement from pouring water to reaching for the coffee grounds. A question that can be asked is at what point, absent of subsequent information in the stream, can an event or subevent be considered complete. For example, at what point is the coffee basket full? Presumably, this depends on the amount of coffee being made. On one occasion, a few tablespoons would be sufficient, such as making a quick cup of coffee before walking out the door in the morning. On another occasion, such as making coffee for friends at a brunch, the basket would need to be full before the event could be considered complete. The current study asks whether the endpoint of an event can be affected by an agent's goals. In particular, we ask whether an agent's goal can affect how people identify whether an event is complete.

There is extensive evidence showing that people conceive of events as hierarchies of goals and subgoals (Zacks et al., 2001). Infants as young as 6-months-old appear to have developed at least a basic understanding of goal-directed action with a human agent (Luo & Johnson, 2008; Woodward, 1998), while infants have

been shown to recognize goal-directed actions regardless of the agent's success by 10-months of age (Brandone & Wellman, 2009). By 12 months, infants can actively infer the goals from observed incomplete actions (Csibra, Bíró, Koós, & Gergely, 2003; see also Csibra & Gergely, 2007). When imitating others' actions, young children may reorganize the actions and change the surface order according to the actor's goal (e.g., Meltzoff, 1995; Loucks, Mutschler, & Meltzoff, 2017; Williamson & Markman, 2006). Furthermore, when an action is performed without an object or other relevant goal cues, viewers infer that the actor's goal is to complete the movement (Schachner & Carey, 2013). Knowledge about goals and intentions also plays a role in identifying event boundaries. Before one year of age, infants can parse everyday actions by placing boundaries at the points where a goal is achieved (Baldwin, Baird, Saylor, & Clark, 2001). Adults adjust their level of segmentation (i.e., the density of event boundaries) depending on their familiarity with the actor's intent – a stream of actions will be divided into smaller units when viewers are uncertain about the goal of making these actions (Newtson, 1973; Vallacher & Wegner, 1987; Wilder, 1978). Finally, children and adults sometimes accept incomplete events for descriptions requiring a culminated event. Recognition of event culmination requires, in part, the ability to recognize whether an event has an inherent endpoint (van Hout, 2018). Within the field of linguistics, it has been suggested that extralinguistic information, such as an agent's goal or intention, might have an effect on whether events in descriptions are interpreted as having an inherent endpoint: even though *warm the soup* lacks an inherent boundary, people usually assume that the event culminates at the point at which the temperature of the soup satisfies someone's taste or needs (Depraetere, 2007).

One limitation of classic segmentation studies using film clips is the inability to completely isolate changes in goal from co-occurring cues. A change in goal, such as completing the goal of filling the coffee maker with water and then moving to turn it on, is also accompanied by a distinct change in movement, the change in motion away from the reservoir towards the on button. Levine, Hirsch-Pasek, Pace, and Golinkoff (2017) attempted to eliminate such spatiotemporal cues in a film segmentation task by playing the clip in reverse, however participants shown the reversed film continued to segment similarly to those shown the original film. The authors note that, while reversing the film reduced the available spatiotemporal cues by disrupting, the cohesion of the agent's movements was not eliminated. The use of picture sequences, often seen in studies of event culmination (e.g., Schulz & Penner, 2002), provides an alternative presentation method that further restricts available cues, including cohesion of movement. However, agentive cues that might suggest an ongoing action, such as proximity to the target object, remain present.

An additional limitation in relation to the current objective of examining different types of goals is the difficulty of presenting an agent's goals explicitly and naturally in a film segment. In order to address the hypothesis that a salient goal might affect placement of event endpoints, the goal information presented with the event must be both explicit and able to be manipulated in isolation from other components of the event. The use of a partially narrative format to present goal information allows for the agent's goal to be made explicit while also allowing the manipulation of the goal to be isolated from additional cues. Studies of event segmentation indicate similar patterns of event boundary placement (Magliano, et al., 2012) and similar patterns in fMRI data (Speer et al., 2007; Zacks, Braver, et al., 2001) regardless of whether the

event was presented visually or in a narrative text, suggesting the presence of a narrative component should not inherently affect the placement of event endpoints.

The solution employed in the current experiments was to use a combination of narrative text and static images of event outcomes at various stages of completion. The use of narrative text allows for the isolation and manipulation of the goal contexts, while the use of a static image allows for the manipulation of ambiguity absent of cues indicating change that would be inherently present in an animate stimulus. Further, agents were not included as part of the static images to prevent unintended cues indicating event completion or incompletion.

We took advantage of the fact that, when asked whether someone colored a picture, people are often likely to say *yes* even when the coloring is not complete (van Hout, 2018). This phenomenon has been observed in different languages (Jeschull, 2007; Li & Bowerman, 1998; Schulz & Penner, 2002; Weist, Wysocka, & Lyytinen, 1991) and characterizes both adults' and children's responses (van Hout, 2018; Jeschull, 2007; Schulz & Penner, 2002), but its origins are poorly understood. Previous linguistic studies have suggested that, even for descriptions of telic events such as *color a picture* that have a definitive endpoint (as opposed to, say, *color pictures*), contextual factors seem to play a role in whether people think that the description applies to a half-finished event (van Hout, 2018). Such contextual effects are more likely to occur when the event is not totally incomplete or totally complete. Here in our basic paradigm we asked people to look at images of events at a visual stage of partial completion and judge whether an agent had performed the relevant action (e.g., "Did she do X?"). Critically, these trials began with a context sentence that introduced an overarching goal of the agent for which the event in the test

question was needed as an intermediate step (or subevent). We manipulated the amount of development required for the subevent to fulfill the overarching goal by changing the goal presented in the context sentence. We were interested in whether participants would be more likely to give non-culmination responses (i.e., to deny that the event had occurred) when given goals that involved a higher degree of subevent development. The varying degrees of subevent development should reflect differing placement of the endpoint boundary following the "change in agent's goals" criterion (Speer et al., 2004; 2007).

In sum, in a series of experiments we tested whether the contextually supplied knowledge about the goals of an agent within an event affects how viewers place event endpoints. Experiments 1 and 2 tested whether the type of goal affected endpoint placement for a partly (less than halfway) complete event outcome. Experiment 3 and 4 tested whether the type of goal affected endpoint placement for a mostly complete event outcome (i.e., a slice of the event occurring later in the event timeline).

Chapter 2

EXPERIMENT 1

2.1 Methods

2.1.1 Participants

Participants were 46 native English speakers recruited from the University of Delaware Psychology department subject pool. Participation in the study fulfilled a course requirement. One participant was excluded from analysis due to computer error.

2.1.2 Stimuli

2.1.2.1 Visual stimuli

A total of 30 images were included in Experiment 1. Each image represented a unique event. Of these, 20 images were filler stimuli and represented either an incomplete visual outcome (the event had not even begun, e.g., an apple had not been packed) or a complete visual outcome (the event had culminated, e.g., a balloon had been popped) along the event timeline (see Figure 2.1). The remaining 10 images corresponded to target stimuli and depicted partly complete visual outcomes around the midpoint of the event timeline (e.g., an orange had been peeled halfway; see Figure 2.1). These stimuli were chosen using data from two norming studies that

incomplete (filler)
(Event: pack the apple)

complete (filler)
(Event: pop the balloon)

partly complete
(Event: peel the orange)

Figure 2.1: Example images by category (Experiment 1).

evaluated degree of completion depicted in the visual stimuli. A first ('timeline') norming study included a broader set of 75 images (51 fillers and 24 targets) that could potentially be described with telic verb phrases (e.g., "peel the orange"; Depraetere, 1979). Twenty-five native English-speakers from the University of Delaware Psychology department subject pool participated to fulfill a course requirement. The study was compiled using Qualtrics Survey Software (Qualtrics, Provo, UT). Below each image, participants saw a verbal prompt (e.g., "Jasmine wants to peel the orange. What percent did she peel?") and were asked to respond on a sliding scale from 0% - 100% in increments of 10%. The scale was presented directly below the verbal prompt. This resulted in a metric of the visually determined progress of the event along a temporal timeline. The image, prompt, and sliding scale appeared onscreen simultaneously and remained until a response was received. Trial presentation order was randomized for each participant in Qualtrics.

Table 2.1: Mean norming scores (and standard deviations) by category for images included in Experiment 1.

Visual Outcome	'What percent …?'	SD	'Did she do it?'	SD
Incomplete	6.6%	1.6%	0%	0%
Partly complete	38.32%	9.25%	36.2%	12.13%
Complete	92.72%	5.31%	91.42%	5.4%

For the second, forced-choice norming study, we used only 74 images from the timeline norming study (18 incomplete filler images, 18 complete filler images, and 38 endpoint of the scale as well as filler images falling between 20% and 80% in the target images): we excluded partly complete images rated within 20% of either timeline norming study. The study was programmed and administered using OpenSesame (Mathôt, Schreij, & Theeuwes, 2012). A separate group of 20 native English speakers from the University of Delaware Psychology department subject pool participated to fulfill a course requirement. Participants were provided with a context sentence stating an agent's intent or desire to perform an action (e.g., "Jasmine wants to peel the orange"). They were then shown an image (e.g., a partly peeled orange) and had to answer a question (e.g., "Did she peel the orange?") by pressing a key. This study assessed whether a visual stimulus depicted culmination in a binary judgment task (since the context sentence did not introduce a goal other than the base event, one could consider this a neutral-goal baseline). Images chosen for inclusion in Experiment 1 represented visual outcomes that were clearly complete or incomplete (fillers) or partly complete (targets) on the basis of all norming data (see Table 2.1).

2.1.2.2 Verbal stimuli

For the main phase of the experiment, each image was paired with a test question that was identical to the one used in the forced-choice norming study (e.g., "Did she peel the orange?").

Each image was also paired with a context sentence. As in the forced-choice norming study, this sentence contained a goal stated in terms of what the agent *planned*, *wanted* or *needed*. Unlike the earlier study, however, the context sentence introduced an overarching goal that (implicitly) included the event in the test question as a subevent. Examples of context sentences can be seen in Figure 2.2. For filler stimuli, only one type of context sentence was included. We expected that, overall, participants would continue to respond negatively in incomplete filler trials (since no amount of the action had taken place, and *a fortiori* the agent's goal could not be achieved). Similarly, we expected that participants would continue to respond affirmatively for the completed filler trials (since the action had been completed and thus the stated goal could also be achieved).

For each of the target stimuli, we created two types of context sentences. *Low-goal* contexts introduced an overarching goal that could be satisfied even by a relatively modest degree of progress along the subevent timeline (e.g., "Jasmine wants to use an orange to garnish the dessert", where a small amount of peeling an orange can yield enough for a garnish). *High-goal* contexts introduced a goal for which a greater development of the subevent was needed (e.g., "Jasmine wants to eat an orange with her breakfast", where the orange needs to be completely or almost

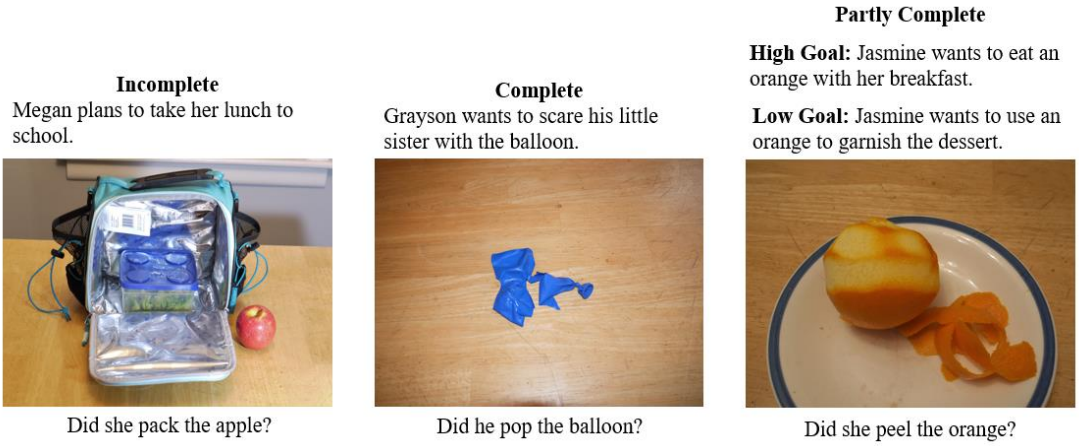

Figure 2.2: Context and test sentence examples for filler (incomplete and complete) and target (partly complete) stimuli in Experiment 1.

completely peeled to be eaten). Each low-goal/ high-goal context pair was formed using the same agent name and state of desire (wants to, needs to, plans to). Pairs were roughly matched for length with context length differing by no more than five syllables. Of interest was whether participants would be more likely to accept that an event had culminated when shown a low-goal compared to a high-goal context.

2.1.3 Procedure

Visual outcome (incomplete, complete, partly complete) and - for partly complete outcomes only - linguistic context (low-goal, high-goal) were within-subjects variables. Two lists were created with the linguistic contexts for partly complete images counterbalanced so all participants saw a total of 30 trials: 10 incomplete, 10 complete, 5 low-goal partly complete, and 5 high-goal partly complete.

Experiment 1 was programmed and administered in OpenSesame. Participants were asked to "read the following scenarios, look at the accompanying image, and answer each question" prior to beginning the experiment. Each trial began with a fixation point which was self-advanced by pressing the spacebar on the keyboard. The context sentence was then shown in the upper quarter of the screen. Participants were instructed to press the spacebar after reading the sentence. Next the visual event outcome appeared below the context sentence. The test question and response options (*Yes/No*) automatically appeared below the image after an additional 500ms. The context sentence, image, and test question remained on screen until a response was given by pressing "d" for *Yes* and "k" for *No*.

2.2 Results

A first analysis was completed to determine whether participants' identification of event culmination differed by visual event outcome. For this analysis, we collapsed across linguistic contexts for the partly complete items. A repeated measures ANOVA was run on the mean proportion of "yes" responses (or 'culmination score') with visual outcome (incomplete, partly complete, complete) as a within-subject variable (see Figure 2.3). There was a significant effect of visual outcome, $F(1.74, 76.72) = 315.58$, $p < .001$. (The Greenhouse-Geisser Correction was used as the assumption of sphericity was found to be violated.) Post hoc comparisons indicated significant differences between all levels of the variable at $p < .001$.

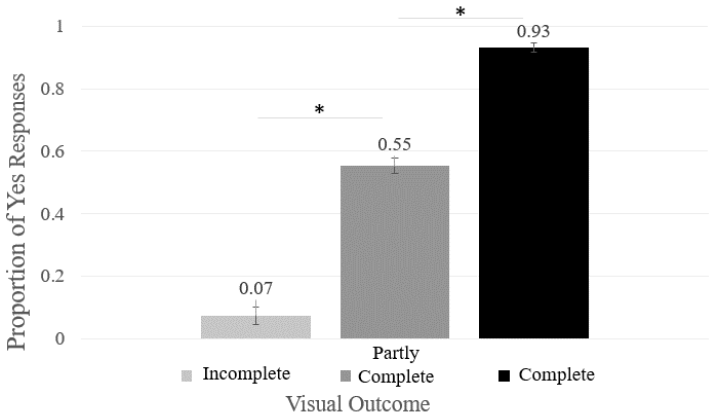

Figure 2.3: Event culmination scores by visual outcome for Experiment 1.

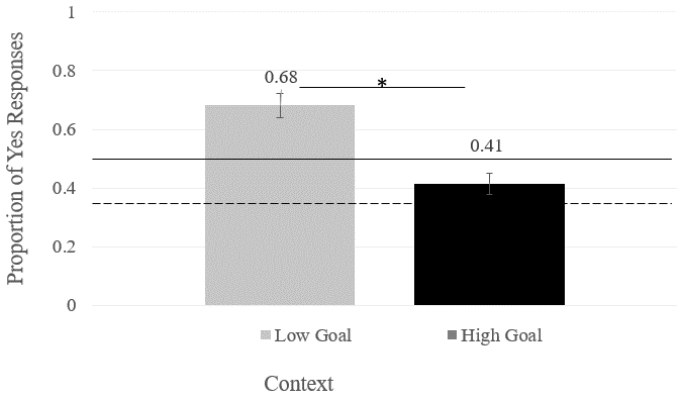

Figure 2.4: Event culmination scores by context for partly complete visual outcomes in Experiment 1. Chance (0.5) is represented by the solid line. The norming baseline (0.36) is represented by the dashed line.

Unsurprisingly, purely on the basis of the visual stimuli, complete outcomes were treated as culminated significantly more often (M = 0.93, SD = 0.1) than partly complete outcomes (M = 0.55, SD = 0.17), and partly complete outcomes were treated

as culminated significantly more often than incomplete outcomes (M = 0.07, SD = 0.19).

A paired samples t-test was used to compare the role of context for target trials (see Figure 2.4). "Yes" responses in target (partly complete) outcome trials were significantly higher for low-goal contexts (M = .68, SD = .22) than for high-goal contexts (M = .42, SD = .27), $t(44) = 4.97$, $p < .001$.

Additional one-sample t-tests were conducted to compare the proportion of "Yes" responses for low-goal and high-goal contexts separately to both chance (.50) and to the context-free baseline average for partly complete images found in the forced-choice norming study (M = 0.36). The low-goal contexts differed significantly from both chance, $t(44) = 5.53$, $p < .001$, and baseline, $t(44) = 9.74$, $p < .001$. The high-goal contexts did not differ significantly from either chance, $t(44) = -1.95$, $p = .05$, or baseline, $t(44) = 71.56$, $p = .125$.

2.3 Discussion

In Experiment 1 we found that participants were more likely to accept that an event had culminated despite a partly complete visual outcome when the extent of the event progress satisfied a known goal of the agent in the event. This is in line with the suggestion that a salient goal can affect the placement of event boundaries (Levine, et al., 2017; Speer et al., 2004; 2007; cf. Depraetere, 2007). Comparison of low- and high-goal contexts to chance (and to the neutral-goal context norming data) provides preliminary evidence suggesting that the shift in the event boundary placement is

primarily driven by the low-goal context. Specifically, the presence of the low-goal context appears to allow the event boundary to be placed earlier in the event timeline. This finding is limited as the neutral-goal data were collected from a separate and smaller group of participants during norming. In Experiment 2 we addressed this concern.

Chapter 3

EXPERIMENT 2

In Experiment 1 we found that goal information affected participants' placement of an event boundary, probably because the low-goal context allowed an event to be perceived as culminated at an earlier point within the event timeline. In Experiment 2, we tested this assumption directly by manipulating goal types within subjects. We also collected response time data to test whether the shift in placement of event boundaries would result in a difference in response times compared to the neutral-goal context. Finally, we created partly new stimuli to address these changes and additions.

3.1 Methods

3.1.1 Participants

Forty-three native English speakers were recruited from the University of Delaware Psychology department subject pool. Participation in the study fulfilled a course requirement.

3.1.2 Stimuli

3.1.2.1 Visual stimuli

A total of 54 images were included in Experiment 2. Of these, 36 corresponded to filler items. Filler items consisted of the 10 incomplete and 10 complete outcome images from Experiment 1 and an additional 8 images for each category chosen from the norming materials of Experiment 1.

The remaining 18 items were target items depicting partly complete visual event outcomes. These were selected through two norming studies identical in format to those used for Experiment 1 (minus the filler items). Each norming study consisted of 225 images representing 32 events. Images were taken from incremental points along the timeline of each event (e.g., "peel the orange"). Each event was depicted in either five (19 events) or ten (13 events) images dependent on its overall length. New groups of participants (N = 18 for the timeline and N = 20 for the forced-choice norming study) were drawn from the same pool as the previous norming studies and completed the studies online through Qualtrics Survey Software (Qualtrics, Provo, UT) as part of a course requirement. Image presentation was randomized within Qualtrics for each participant. Of the 18 chosen items, nine were chosen from events depicted in five steps, and nine were from events depicted in 10 steps. Table 3.1 contains the mean score and standard deviation for the images included in Experiment 2. These scores were comparable to the norming data in Experiment 1 (cf. Table 2.1).

3.1.2.2 Verbal stimuli

Incomplete and complete visual events were paired with a single linguistic context as shown in Figure 2.2. Partly complete visual events were paired with 3 linguistic contexts. As in Experiment 1, a low-goal and high-goal context were created for each visual event. Example low- and high- goal contexts can be found in Figure 2.2. An additional neutral-goal linguistic context was paired with each visual event. The neutral-goal contexts were identical to those used in the forced-choice norming study.

Table 3.1: Mean norming scores (and standard deviations) by category for visual images included in Experiments 2, 3, and 4.

Visual Outcome	'What percent …?'	SD	'Did she do it?'	SD
Incomplete	7.91%	4.76%	2.5%	6%
Partly complete (Exp.2 only)	27.02%	7.91%	35.37%	17.08%
Mostly complete (Exp.3/4 only)	69.84%	7.1%	78.61%	15.98%
Complete	92.78%	5.43%	80%	27.1%

3.1.3 Procedure

Visual outcome (incomplete, complete, and partly complete) and linguistic context for partly complete images (low-goal, neutral, and high-goal) were within-subjects variables. Three lists were created with the linguistic contexts for partly complete images counterbalanced so all participants saw a total of 54 trials: 18 incomplete, 18 complete, and 18 partly complete (6 low-goal, 6 high-goal, and 6 neutral-goal). Experiment 2 was programmed and administered in OpenSesame. Trial

order was randomized separately for each participant within the OpenSesame software. Response time data were collected in addition to the overt response data. Otherwise, the procedure for Experiment 2 was similar to that of Experiment 1.

3.2 Results

A repeated measures ANOVA confirmed that the proportion of "yes" responses differed depending on visual outcome, $F(2,84) = 266.4$, $p<.001$ (see Figure 3.1; data were collapsed across types of linguistic context for partly complete items.) Post hoc comparisons indicate significant differences between all levels of the variable at $p < .001$. Participants accepted as culminated complete visual outcomes ($M = 0.85$, $SD = 0.13$) significantly more often than partly complete outcomes ($M = 0.39$, $SD = 0.18$), and partly complete outcomes significantly more often than incomplete event outcomes ($M = 0.05$, $SD = 0.12$).

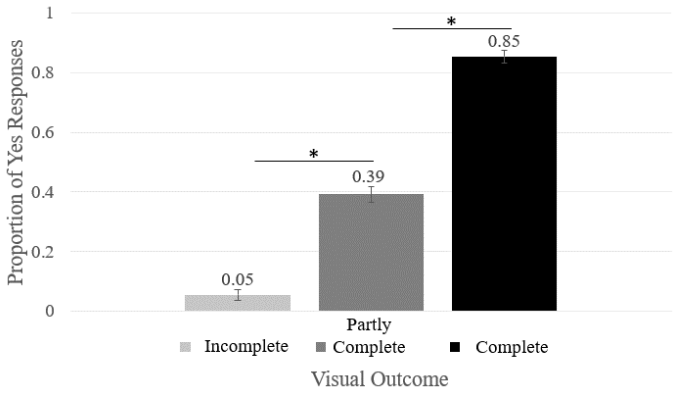

Figure 3.1: Event culmination scores by visual event outcomes in Experiment 2.

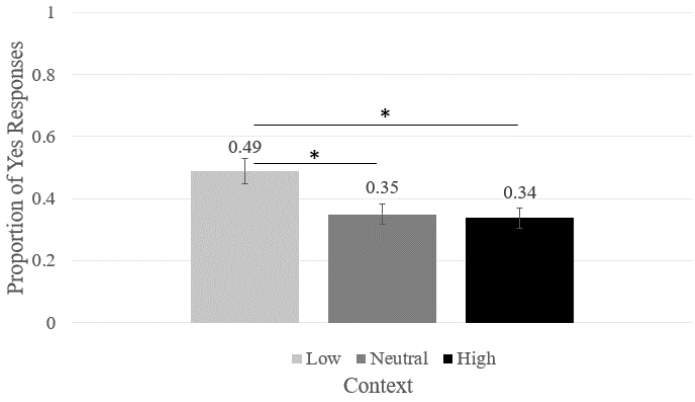

Figure 3.2: Event culmination scores by context for partly complete outcomes in Experiment 2.

A second repeated measures ANOVA was run to compare "Yes" responses for target items in low-, neutral-, and high-goal contexts. For this analysis, only data from partly complete outcome trials were included (see Figure 3.2). The proportion of "Yes" responses for low-goal trials (M = 0.49, SD = 0.26) was significantly higher than that of neutral-goal trials (M = 0.35, SD = 0.22, p = .005) or high-goal trials (M = 0.34, SD = 0.21, p = .001). Neutral- and high-goal trials did not differ from each other (p > .5), $F(2,84) = 9.58$, p < .001.

3.3 Discussion

In Experiment 2 we replicated the findings of Experiment 1: participants were more likely to treat events accompanied by low-goal contexts as culminated compared to events accompanied by neutral- or high-goal contexts. Simply put, participants were more likely to accept a partly complete outcome as culminated if the outcome satisfied the agent's goal. The neutral- and high-goal contexts did not differ from each other,

suggesting that low-goal contexts shift the placement of event boundaries that would otherwise be placed later in the event timeline. Overall, these findings suggest that, when visual information is sufficiently ambiguous, higher-order (goal) information can affect the perceived position of an event boundary.

Chapter 4

EXPERIMENT 3

In Experiment 3 we sought to extend the findings obtained with partly complete visual outcomes in Experiments 1 and 2 to mostly complete visual outcomes (e.g., cases in which an orange is mostly peeled). We anticipated that, for images closer to the end of the event timeline, the context effect observed earlier should be weaker or non-existent: mostly complete visual events should be seen as culminated regardless of context, especially since our high-goal contexts did not present a reason to expect total visual completion of the event (e.g., if someone is allergic to orange peel, then peeling most of the orange to eat the orange should not fulfill that goal).

4.1 Methods

4.1.1 Participants

Forty native English speakers were recruited from the University of Delaware Psychology department subject pool. Participation in the study fulfilled a course requirement. No additional payment was provided for participation.

4.1.2 Stimuli

The visual and verbal stimuli were identical to Experiment 2 but the (partly complete) target images from Experiment 2 were replaced with mostly complete target

images for the same events as defined by the norming studies of Experiment 2. For instance, the event of peeling the orange was now represented with a time-slice that fell well after the midpoint of the event. Table 3.1 shows norming information for the images in Experiment 3.

4.1.3 Procedure

The procedure was identical to Experiment 2.

4.2 Results

A repeated measures ANOVA showed that participants' identification of event culmination across target and filler items, indicated by proportion of "Yes" responses, differed by type of visual outcome, $F(1.37,53.49) = 1022$, $p<.001$ (see Figure 4.1). (The Greenhouse-Geisser Correction was used as the assumption of sphericity was found to be violated. Data were collapsed across contexts for mostly complete items.) Post hoc comparisons indicated significant

differences between all levels of the variable at $p < .001$. Participants treated complete visual outcomes as culminated ($M = 0.90$, $SD = 0.05$) significantly more often than mostly complete visual outcomes ($M = 0.76$, $SD = 0.06$). Mostly complete outcomes were treated as complete significantly more often than incomplete event outcomes ($M = 0.054$, $SD = 0.06$).

A second repeated measures ANOVA was run to compare "Yes" responses in low-, neutral-, and high-goal contexts. For this analysis, only data from mostly

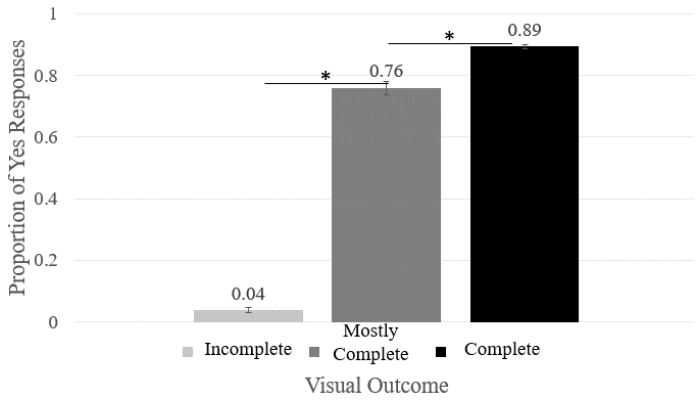

Figure 4.1: Event culmination scores by visual event outcomes in Experiment 3.

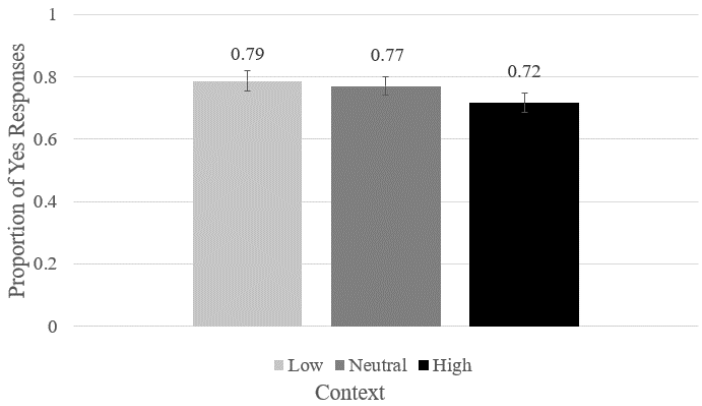

Figure 4.2: Event culmination scores by context for mostly complete outcomes in Experiment 3.

complete event outcome trials were included (see Figure 4.2). No significant difference was seen across context conditions, $F(2,68) = 2.63$, $p > .05$.

4.3 Discussion

In Experiment 3 we attempted to extend the findings for partly complete event outcomes (Experiments 1 and 2) to mostly complete outcomes occurring later in an event timeline. As predicted, no effect of context was found. We suggest the lack of context effect is likely due to our current high-goal contexts. The high-goal contexts used in both Experiments 2 and 3 did not present a reason to expect that total visual completion of the event was required to fulfill the agent's goal. Alternatively, an event outcome located far enough along an event timeline might be interpreted as "complete enough" for a majority of participants to indicate the event is complete regardless of an agent's goal. These possible explanations were addressed in Experiment 4.

Chapter 5

EXPERIMENT 4

In Experiment 4 we addressed a potential explanation for the lack of goal context effect in Experiment 3, insufficient high-goal contexts. We anticipated that adjusting high-goal contexts so that a subevent must be entirely complete (e.g., the orange must be entirely peeled) in order to achieve the agent's goal would restore the context effect found in Experiments 1 and 2.

5.1 Methods

5.1.1 Participants

Forty native English speakers were recruited from the University of Delaware Psychology department subject pool. Participation in the study fulfilled a course requirement. No additional payment was provided for participation.

5.1.2 Stimuli

The visual and verbal stimuli were identical to Experiment 3 with the exception that the high-goal contexts were adjusted so that the subevent must be entirely complete for the goal to be achieved. A brief pilot study (N=5) was run through Qualtrics Survey Software (Qualtrics, Provo, UT). Participants were recruited from the University of Delaware Psychology department subject pool. Trial format

was identical to that used in the forced choice norming studies for Experiments 1 and 2. Participants saw all (complete and incomplete) filler items as presented in Experiment 3, however all (mostly complete) target items were paired with revised high-goal context sentences. Low and neutral goal contexts were not included in the pilot study. Revised sentences added an additional cost to not completing the subevent. For example, “Jasmine wants to eat an orange with her breakfast” was revised to “Jasmine wants to eat the orange but is allergic to the skin”. In the revised version, Jasmine runs the risk of an allergic reaction should she fail to completely peel the orange. Revised contexts were not matched for length with low-goal contexts.

The average of yes responses was calculated for each item and compared with the average obtained for the Experiment 3 high-context trials. Inclusion in Experiment 4 was determined by which context sentence was rated most complete (i.e., the “yes response” average was closer to 1). Eleven high-goal contexts were included from the pilot study. Five contexts were kept from Experiment 3 due to higher averages. In the two cases that contexts for an event were rated the same in both Experiment 3 and the pilot study, the context from Experiment 3 was used.

5.1.3 Procedure

The procedure was identical to Experiments 2 and 3.

5.2 Results

A repeated measures ANOVA confirmed that participants’ identification of event culmination across target and filler items, indicated by proportion of “Yes”

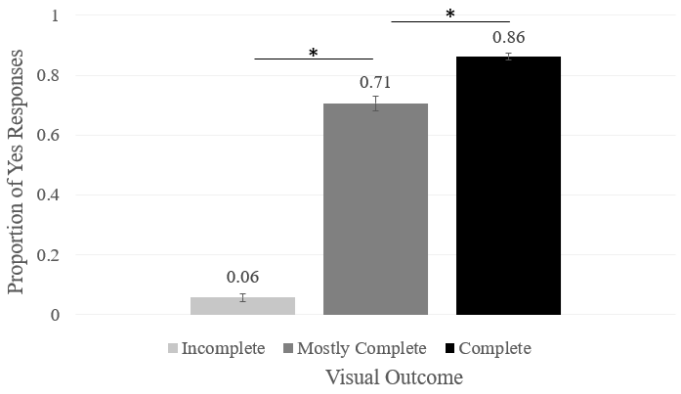

Figure 5.1: Event culmination scores by visual event outcomes in Experiment 4.

responses, differed by type of visual outcome, $F(1.58,61.41) = 599.5$, $p < .001$(see Figure 5.1; data were collapsed across types of linguistic context for mostly complete items). Post hoc comparisons indicate significant differences between all levels of the variable at $p < .001$. Participants accepted complete visual outcomes ($M = .86$, $SD = .08$) as culminated significantly more often than mostly complete outcomes ($M = .71$, $SD = .16$), and mostly complete outcomes significantly more often than incomplete outcomes ($M = .06$, $SD = .08$).

A second repeated measures ANOVA was run to compare participants' identification of event culmination for target items in low-, neutral-, and high-goal contexts (see Figure 5.2). For this analysis, only data from mostly complete outcome trials were included. The proportion of "Yes" responses for high-goal trials ($M = .60$, $SD = .21$) was significantly lower than that of both neutral-goal trials ($M = .73$, $SD = .19$, $p = .004$) and low-goal trials ($M = .80$, $SD = .24$, $p < .001$), Neutral- and low-goal trials did not differ from each other ($p > .05$), $F(2,74) = 14.592$, $p< .001$.

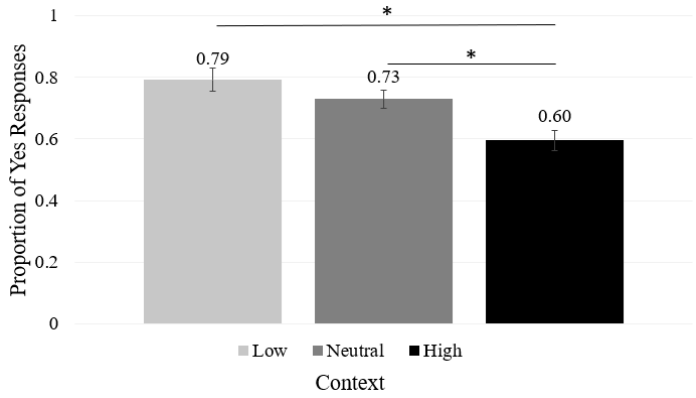

Figure 5.2: Event culmination scores by context for mostly complete outcomes in Experiment 4.

5.3 Discussion

In Experiment 4 we found that participants were more likely to reject a mostly complete outcome if it failed to satisfy the agent's goal. As predicted, when high-goal contexts were revised to require an event outcome be visually complete in order to achieve an agent's goal, participants were willing to accept the event as culminated less often than for low- and neutral- goal contexts. These findings are again in line with the suggestion that a salient goal can affect event boundary placement (Levine et al., 2017; Speer et al., 2004; 2007; cf. Depraetere, 2007). Of further note, the finding that low- and neutral-goal contexts did not differentially affect identification of an event outcome as complete speaks to the finding from Experiments 1 and 2 that low-goal contexts appeared to drive the shift in event boundaries for partly complete outcomes. The findings of Experiment 4, in which high-goal contexts appear to drive

this effect, suggest the shift in event boundaries may be better attributed to the goal context most closely associated with the point in the timeline from which the event outcome was taken.

Chapter 6

GENERAL DISCUSSION

Streams of events make up every component of our daily lives from making a cup of coffee in the morning to getting ready for bed at night. One cue that helps us to recognize when one event ends and another begins is the knowledge that an agent's goal has changed (Zacks & Tversky, 2001). Even prior to one year of age, infants have been shown to use goal information in segmenting everyday actions (Baldwin et al., 2001), while adults might use goal information in determining the density of event boundaries during segmentation (Newtson, 1973; Vallacher & Wegner, 1987; Wilder, 1978). In general, research has found that both children and adults sometimes accept incomplete events when a description indicates a culminated event is required, possibly due to errors in recognition of whether an event has an inherent endpoint (van Hout, 2018). Extralinguistic information, such as an agent's goal or intention, has been suggested to have an effect on whether an event is interpreted as having an inherent endpoint (Depraetere, 2007). In a novel paradigm combining explicitly stated linguistic goal information and static agentless images of event outcomes, we explored the effect of higher-order goal information on the interpretation of an event as having culminated.

Across a series of experiments, we asked whether goals can affect viewers' placement of event boundaries. In Experiments 1 and 2, we found that type of goal

information affected endpoint placement for partly complete event outcomes. Experiment 2 further suggested the shift in endpoint placement might be attributed to the low-goal contexts. Experiments 3 and 4 asked whether this effect of goal type would generalize to mostly complete event outcomes. While goal type did not affect acceptance of a mostly complete outcome in Experiment 3, revision of the high-context goals to require the subevent to be fully complete restored the effect of goal type in Experiment 4. Further, the findings of Experiment 4 suggested the shift in endpoint placement is dependent on both the goal type and the point along an event timeline at which the event outcome is located. Overall, these findings support our prediction that higher-order goal information affects how viewers place event endpoints.

These findings are consistent with suggestions that salient goals can affect the placement of event boundaries (Levine, et al., 2017; Speer et al., 2004; 2007; cf. Depraetere, 2007). The current findings are also consistent with the suggestion that contextual factors, such as knowledge of an agent's goals or intentions, influence whether an event description can be interpreted as applying to a partly complete event (van Hout, 2018). These results go beyond previous findings by eliminating spatiotemporal and agentive cues, requiring viewers to rely on the explicitly stated goal-related information in order to form a decision on whether an event had reached culmination. The isolation of goal-related cues allows us to explore potentially goal-specific effects in event conceptualization, and specifically these effects on the

recognition of event culmination. In doing so, we conclude that higher-order goal information affects the way events are conceptualized.

The current study explores the effect of goal information on in-the-moment placement of event boundaries and interpretation of event culmination. Prior research has demonstrated that event boundaries can act as a marker for event memory. For example, event boundaries appear to facilitate the updating of event information in working, long term, and procedural memories (Kurby & Zacks, 2008) while objects located at event boundaries are shown to be remembered better than those located outside of an event boundary (Swallow, Zacks, & Abrams, 2009). Future research should address whether salient goal information can affect memory for an event outcome, and whether the interpretation of an event outcome as culminated or having reached an endpoint based on goal information will facilitate memory for objects located within the scene.

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Appendix

IRB APPROVAL

Nicole Farnese-McFarlane <no-reply@irbnet.org>

Mon 4/2/2018 3:49 PM

Mark as unread

To: Yue Ji <jiyue@udel.edu>; Anna Papafragou <annap@udel.edu>; Sarah Fairchild <sarahcfairchild@gmail.com>; Ercenur Unal <eunal@udel.edu>; Ariel Mathis <apmathis@udel.edu>; Myrto Grigoroglou <mgrigor@udel.edu>;

Please note that University of Delaware IRB (HUMANS) has taken the following action on IRBNet:

Project Title: [165481-19] The interface between spatial cognition and language
Principal Investigator: Anna Papafragou

Submission Type: Amendment/Modification
Date Submitted: March 8, 2018

Action: APPROVED
Effective Date: April 2, 2018
Review Type: Expedited Review

Should you have any questions you may contact Nicole Farnese-McFarlane at nicolefm@udel.edu.

Thank you,
The IRBNet Support Team

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