

ORIGINAL RESEARCH REPORT

The Blame Game: An investigation of Grammatical Aspect and Blame Judgments

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Imperfective aspect (i.e., Mark *was punching* John) is interpreted by the language processing system as a dynamic, unfolding sequence of actions, whereas perfective aspect (i.e., Mark *punched* John) is interpreted as a complete whole. A recent study showed that grammatical aspect can influence perceptions of intentionality for criminal actions (Hart & Albarracín, 2011). The current study builds on this finding. Five experiments examine whether grammatical aspect can also influence perceptions of blame, a concept related to intentionality. There were no effects of grammatical aspect on judgments of blame but the results showed an effect of narrated order (Experiments 1–3). First-mentioned actions made the agent more to blame for the outcomes than last-mentioned actions. This effect was not due to the order of the blame questions (Experiment 2) or influenced by the chronological order of the events (Experiment 3). Experiments 4 and 5 showed strong effects of grammatical aspect on temporal dynamics and revealed an interesting new finding. Grammatical aspect can influence the mental representation of a non-mentioned action. We discuss our results in light of the current literature on grammatical aspect effects.

Keywords: Grammatical aspect; blame attribution; situation model; language comprehension

Imagine reading the following headline on an online news site: “Airport suspends worker for punching easyJet passenger.”¹ In trying to understand the described situation, you would probably also think about whether or not the suspension of the employee was justified and whether the employee was to blame for any of the consequences of his action. Now consider the following headline: “Airport suspends worker who punched easyJet passenger.” Would your perception of the worker’s blame-worthiness be different in this case?

Subtle changes in language use, like in the headlines above, might bias how people perceive described actions. Actions described in imperfective aspect (e.g., *punching*) might be perceived as more intentional than actions described in perfective aspect (e.g., *punched*; Hart & Albarracín, 2011). This suggests that the first headline may convey that the punishment is more justified than the second headline. One possible reason is that “punching” reflects a deliberate and repeated action more so than “punched” (Sherrill, Eerland, Zwaan, & Magliano, 2015). Our current study builds on this finding by investigating the effect of *grammatical aspect* (e.g., a feature of predicates that can convey whether or not an event is

completed) on perceptions of blame, a concept related to intentionality.

Grammatical aspect conveys information about the time course and the duration of an event (Comrie, 1985; Madden & Ferretti, 2009; Vendler, 1957). Actions described in perfective aspect (e.g., *punched*) are interpreted as completed. Sentence (1) below could be followed by a sentence that implies completion (a) but not by a sentence that implies incompleteness (b). Actions described in imperfective aspect (e.g., *was punching*) are interpreted as dynamic and unfolding. This allows for the possibility that the action is not complete (Madden & Zwaan, 2003; Magliano & Schleich, 2000; Mozuraitis, Chambers, & Daneman, 2013). For example, sentence (2) could be followed by either sentence (a) or (b).

- (1) Susan drove to the mountains.
 - (a) She arrived just before noon.
 - (b) Halfway her car broke down and she took a cab.
- (2) Susan was driving to the mountains.

A related difference between the two aspectual forms is that imperfective aspect makes comprehenders focus on

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the action itself, rather than on its outcome, as is the case with perfective aspect. An emerging line of evidence suggests that grammatical aspect also primes the activation of semantic knowledge associated with event schemas, like location information (Anderson, Matlock, & Spivey, 2013; Carreiras, Carriedo, Alonso, & Fernandez, 1997; Ferretti, Kutas, & McRae, 2007; Ferretti, Rohde, Kehler, & Crutchley, 2009). For example, Ferretti et al. (2007) primed participants with verbs conveyed with an imperfective (e.g., *was skating*) or a perfective aspect (e.g., *skated*). Participants were significantly faster in naming a location where the action was described in the imperfective condition than the perfective condition. This is consistent with the thesis that imperfective aspect directs attention to the internal structure of an event (Liu & Bergen, 2016).

To understand language, people construct mental representations of a described situation, a *situation model* (Johnson-Laird, 1983; Morrow, Greenspan, & Bower, 1987; Van Dijk & Kintsch, 1983; Zwaan & Radvansky, 1998). Linguistic cues are known to influence situation-model construction (Givón, 1992; Magliano & Schleich, 2011). Thus, grammatical aspect affects situation-model construction. This gives rise to the question whether grammatical aspect might also influence cognitive processes that make use of situation model information. This seems to be the case. Grammatical aspect has been shown to influence memory (Carreiras et al., 1997; Magliano & Schleich, 2000), problem solving (Salomon, Magliano, & Radvansky, 2013), voting behavior (Fausey & Matlock, 2011), and attributions of intentionality (Hart & Albarracín, 2011). Given that this last finding is directly relevant to the current study, we will now discuss the work by Hart and Albarracín (2011) in more detail.

In their first two experiments, Hart and Albarracín (2011) demonstrated that mundane behaviors (e.g., preparing dinner) were perceived as more intentional when described in the imperfective compared to perfective aspect. Their third experiment examined the attribution of intentionality for criminal behaviors (e.g., shooting a gun). Participants read a vignette about a man being shot by another man after an argument. The actions of the perpetrator were described either in imperfective (i.e., pulling out a gun, pointing it at the victim, and shooting the gun) or perfective aspect (i.e., pulled out a gun, pointed it at the victim, and shot the gun). As for mundane behaviors, participants found the perpetrator's criminal actions more intentional when described in imperfective than when described in perfective aspect. This finding has consequences for our understanding of everyday situations but potentially also for legal decision making, where the identification of criminal intentionality (i.e., *mens rea*) is an explicit decision-making factor for jurors (Fontaine, 2007).

The current study investigated whether grammatical aspect influences perceptions of blame, a concept related to intentionality, in more everyday situations. We examined the eruption of a fist fight rather than a situation that involves the firing of a gun. In addition, we aimed to broaden the context in which Hart and Albarracín (2011) studied the effect of grammatical aspect by using a richer

discourse involving two agents engaging in the same behavior (i.e., punching) rather than one agent engaging in several behaviors. The use of two agents exchanging the same behavior (i.e., punching) was intended to make culpability ambiguous. We told participants the task was called "The Blame Game" and their job was to provide ratings of blame for each agent. This study was approved by the institutional review board of Northern Illinois University.

It is important to note that Experiments 1 and 2 in this article were conducted in 2012, before we had initiated a registered replication report of the Hart and Albarracín study (Eerland et al., 2016). A meta-analysis of the results from 11 different labs failed to replicate the result of Hart and Albarracín (2011). Experiments 1 and 2 were also conducted before the experiments described in Sherrill et al., (2015), which failed to find robust evidence for the role of grammatical aspect in the attribution of intentionality. Without the benefit of knowledge of the outcomes of these studies, we had hypothesized that actions described in imperfective aspect would make an agent more culpable for the outcomes of the action than actions described in perfective aspect would. This prediction was based on the effect of the imperfective on perceived intentionality reported by Hart and Albarracín (2011). We anticipated the effect would emerge for both agents.

Experiment 1

Method

Participants

We recruited 103 participants online through Amazon's Mechanical Turk (MTurk, <http://www.mturk.com>) of whom 102 completed the experiment. We excluded data from four participants because they refused consent (but still participated in the experiment). The remaining sample had a mean age of 34.08 ($SD = 11.74$, range = 18–74, 54 females). All participants were US residents and received \$0.05 for their participation (approximately 3 minutes).

Materials and procedure

We created a vignette (see **Table 1**) about two men ending up in a fight as a result of which a third person suffers an injury. The actions of both men (i.e., punching the other man) were described using imperfective or perfective aspect. Participants read one of the four versions of the vignette and then answered four questions regarding the blame of both men for the fight and the injury of the bystander. They also indicated who they thought kept the fight going (see **Table 1**). Finally, participants stated their gender, age, level of education, and ethnicity.

Results

A 2 (aspect) \times 2 (protagonist) between-subjects ANOVA showed no effect of grammatical aspect on any blame judgments. Whether Mark's action was described in imperfective or perfective aspect did not influence how much participants thought he was to blame for the fight ($F[1,94] = 0.03$, $p = .86$) and the injury of the bystander ($F[1,94] = 0.49$, $p = .48$). The same is true for John's action and his blame for the fight and the injury ($F[1,94] = 1.28$,

Table 1: Overview of the materials used in all experiments.

Instructions
In this study, you will read about an incident that led to the injury of a bystander. We are interested in learning how you attribute blame for the incident to the two individuals involved in it. You may decide that both individuals are more or less equally at fault or that one is more at fault than the other. It's up to you to decide. Please read the description of the incident, reflect upon it carefully, and make your judgments of blame accordingly.
Vignettes
<i>Experiment 1–2</i> At the football stadium, Mark and John were standing next to one another near a concession stand. They started to argue. First, Mark was punching/punched John. Next, John was punching/punched Mark. In the scuffle, an 80-year-old woman named Gladys Smith was knocked over and broke her hip.
<i>Experiment 3</i> At the football stadium, Mark and John were standing next to one another near a concession stand. They started to argue. First, Mark punched John. Next, John punched Mark. In the scuffle, an 80-year-old woman named Gladys Smith was knocked over and broke her hip. At the football stadium, Mark and John were standing next to one another near a concession stand. They started to argue. John punched Mark. Just prior, Mark punched John. In the scuffle, an 80-year-old woman named Gladys Smith was knocked over and broke her hip.
<i>Experiment 4–5</i> At the football stadium, Mark and John were standing next to one another near a concession stand. They started to argue. Mark was punching/punched John. In the scuffle, an 80-year-old woman named Gladys Smith was knocked over and broke her hip.
Questions
1. To what extent was Mark to blame for the fight? (1 = not at all, 11 = extremely)
2. To what extent was John to blame for the fight? (1 = not at all, 11 = extremely)
3. To what extent was Mark to blame for Gladys Smith's injury? (1 = not at all, 11 = extremely)
4. To what extent was John to blame for Gladys Smith's injury? (1 = not at all, 11 = extremely)
5. Who kept the fight going? (1 = Mark only, 5 = John only) – Experiment 1–2 only
6. Based on the description of the incident, how many times did Mark punch John? Please indicate the number of times in the text box below. – Experiment 4–5 only
7. Based on the description of the incident, do you think that John punched Mark too? If so, please indicate the number of times in the text box below. – Experiment 5 only

$p = .26$ and $F[1,94] = 0.36$, $p = .55$ respectively). Grammatical aspect of the first action seemed to influence who participants thought kept the fight going. Participants were slightly more likely to shift towards John when the initial action was described in perfective rather than imperfective aspect ($F[1,94] = 6.11$, $p = .02$, partial $\eta^2 = .06$). Grammatical aspect of the second action ($F[1,94] = 0.23$, $p = .64$) did not impact judgments regarding which of the men kept the fight going and an interaction between the two actions ($F[1,94] = 0.05$, $p = .82$). A paired samples t-test showed that overall, the first agent (Mark) was more to blame for the fight than the second agent (John; $t[97] = 7.83$, $p < .001$, Cohen's $d = .87$)² and the injury ($t[97] = 5.20$, $p < .001$, Cohen's $d = 0.54$). Descriptive statistics of Experiment 1 can be found in **Table 2**.

Discussion

The results of Experiment 1 indicate an effect of order of mention on blame attribution, given that the agent of the first punch was more to blame than the agent of the second punch. We found no effects of grammatical aspect on judgments of blame. Perhaps people judged the first agent to be more to blame than the second agent because we asked about the blame of the first agent first. To rule out this possibility, we conducted Experiment 2.

Experiment 2

This experiment is a partial replication of Experiment 1. The only difference between the two experiments is that the order of the blame questions was reversed. This change was needed to explore a possible order effect on the blame judgments. We also recruited more participants than for Experiment 1 to increase the statistical power of our experiment.

Method

Participants

We recruited 180 participants online through MTurk of whom 178 completed the experiment. We excluded data from participants who refused consent ($n = 13$) or were younger than 18 years of age ($n = 1$). The remaining sample³ had a mean age of 30.99 ($SD = 11.30$, range = 18–70, 88 females). All participants were US residents, had not participated in Experiment 1, and received \$0.10 for their participation (approximately 3 minutes).

Materials and procedure

The materials and procedure were identical to those of Experiment 1, with the exception of the order of the blame questions. Whereas in Experiment 1, we asked about the blame of the first agent first, we asked about the blame of the second agent first in Experiment 2.

Table 2: Means (SD) per condition for all dependent variables in Experiment 1.

	First punch (Mark)			
	Imperfective		Perfective	
	Second punch (John)		Second punch (John)	
	Imperfective <i>n</i> = 19	Perfective <i>n</i> = 29	Imperfective <i>n</i> = 27	Perfective <i>n</i> = 23
Blame fight				
Mark	8.53 (1.81)	8.55 (1.96)	8.30 (1.84)	8.65 (1.40)
John	6.16 (3.40)	7.00 (2.43)	6.33 (2.25)	6.70 (2.44)
Blame injury				
Mark	8.42 (2.27)	8.62 (1.45)	8.00 (1.92)	8.52 (1.65)
John	6.84 (3.34)	7.48 (2.46)	7.19 (2.11)	7.17 (2.52)
Fight continuation	2.84 (0.76)	2.93 (0.26)	3.19 (0.74)	3.22 (0.67)

Results

A 2 (aspect) × 2 (protagonist) between-subjects ANOVA showed no clear effect of grammatical aspect on blame judgments. Whether Mark's action was described in imperfective or perfective aspect did not influence his perceived blameworthiness ($F[1,160] = 0.30, p = .59$). However, we found that participants blamed Mark more for the injury of the bystander when his action was described in perfective rather than imperfective aspect ($F[1,160] = 4.27, p = .04$, partial $\eta^2 = .03$). Given that the *p*-value is just below .05 and the sample size is large, we do not consider this effect to be very informative. However, we do note that the effect is in the opposite direction than was predicted. Grammatical aspect did not influence the blame judgments for John for the fight ($F[1,160] < 0.01, p = .92$) or the injury of the bystander ($F[1,160] < 0.01, p = 1$). Also, grammatical aspect of the first action ($F[1,160] = 0.78, p = .38$), the second action ($F[1,160] = 2.24, p = .14$), and an interaction between the two ($F[1,160] < 0.01, p = .92$) did not impact judgments regarding who of the men kept the fight going. A paired samples *t*-test showed that overall the first agent (Mark) was more to blame for the fight than the second agent (John; $t[163] = 11.07, p < .001$, Cohen's $d = 1.13$) and the injury ($t[163] = 7.62, p < .001$, Cohen's $d = 0.67$). Descriptive statistics of Experiment 2 can be found in **Table 3**.

Discussion

We replicated most of the results of Experiment 1. Again, we found that the agent of the first punch was more to blame than the agent of the second punch. This effect could not be explained by the order of the blame questions, as this was counterbalanced across the two experiments. As in Experiment 1, we found no convincing effects of grammatical aspect on blame judgments. We were puzzled by these results in light of the earlier work by Hart and Albarracín (2011). As mentioned in the introduction, we conducted an alternative test (Sherrill et al., 2015) and a large-scale multi-lab direct replication of Hart and Albarracín (2011; Eerland et al., 2016). These studies demonstrated that effects of grammatical aspect on cognitive processes that make use of situation model information

(e.g., intention attribution, murder-degree judgments) are rather small and seem to depend on other linguistic influences, such as the narrated order of the events (Gernsbacher & Hargreaves, 1988; Gernsbacher, Hargreaves, & Beeman, 1989; Sherrill et al., 2015). Take for example the headline of a real life scuffle we presented earlier (i.e., Airport worker who punched/was punching easyJet passenger suspended). According to the airport worker, the passenger pushed him first. This could result in the following headline: "Airport worker who punched easyJet passenger suspended. Passenger pushed first." In this scenario, the passenger is the first one to act and should receive, according to our findings of Experiment 1 and 2, more blame for the situation than the airport worker. However, based on the finding that first mentioned events are considered to be more influential on blame judgments, one would expect the airport worker to receive more blame. In Experiment 3, we explored this possible order-of-mention effect on blame judgments, but without manipulating grammatical aspect.

Experiment 3

As in Experiment 2, we examined the order of the blame questions. In addition, we examined the narrated order of the events. As the example above illustrates, although event A (e.g., Mark punched John) precedes event B (e.g., John punched Mark) in a situation model, we can linguistically present event B before event A. Following results by Sherrill et al. (2015), we hypothesized that first-mentioned events have more impact on blame judgments than later-mentioned events. Based on the results of Experiment 2, we did not anticipate the order of questions would impact blame judgments.

Method

Participants

We conducted a power analysis using G*Power (Erdfelder, Faul, & Buchner, 1996) to estimate the sample size needed to detect a small effect size (Cohen's $d = 0.25$) in a 2 (order of events) × 2 (order of questions) between-subjects design. According to this power analysis, we needed at least 127 valid participants per condition (total required

Table 3: Means (SD) per condition for all dependent variables in Experiment 2.

	First punch (Mark)			
	Imperfective		Perfective	
	Second punch (John)		Second punch (John)	
	Imperfective <i>n</i> = 46	Perfective <i>n</i> = 43	Imperfective <i>n</i> = 39	Perfective <i>n</i> = 36
Blame fight				
Mark	8.13 (2.02)	8.51 (2.03)	8.69 (1.54)	8.28 (2.02)
John	5.54 (3.05)	5.70 (2.99)	5.82 (2.73)	5.69 (2.46)
Blame injury				
Mark	7.70 (2.04)	8.47 (2.12)	8.79 (1.76)	8.64 (1.87)
John	6.54 (2.71)	6.65 (2.99)	6.97 (2.80)	6.86 (2.83)
Fight continuation	3.15 (0.56)	3.02 (0.60)	3.08 (0.53)	2.94 (0.53)

sample size = 505) to obtain statistical power at the recommended .80 level (Cohen, 1988). We recruited 650⁴ participants online through MTurk of whom 615 completed the experiment. The sample had a mean age of 35.45⁵ ($SD = 11.40$, range = 18–76, 314 females). All participants were US residents and received \$0.50 for their participation (approximately 5 minutes). We excluded data from 18 non-native speakers of English. In addition, we excluded data from participants who also participated in Experiment 4⁶ ($n = 17$), who participated in this study twice ($n = 8$), or any combination of the reasons mentioned above ($n = 3$). With the exclusion of these participants, our sample included 569 native speakers of English.

Materials and procedure

Participants first read a vignette that either mentioned the punch by Mark first (chronological order) or the punch by John first (reversed order). We recorded the time they spend reading the vignette to be able to exclude participants who did not read the vignette properly (reading times shorter than 0.05 seconds per word). Then participants answered questions regarding the blame of Mark and John for the scuffle and the injury of the bystander on a 11-point scale. As in Experiment 2, half of the participants answered the blame questions for Mark first. The other half answered the blame questions for John first (see also **Table 1**). Participants were randomly assigned to one of four conditions. Finally, participants indicated what they thought the purpose of this task was, whether there was any noise or distractions while performing the task, what device they used to perform the task, and they stated their gender, age, level of education, native language, and the country of residence. The experiment was presented online in the Qualtrics survey research suite (<http://www.qualtrics.com>).

Results

We excluded data from ten participants who had reading times for the vignette that were shorter than 0.05 seconds per word. Because this resulted in unequal numbers of participants in the four conditions, we excluded data from

19 last-run participants to equate all conditions regarding the number of participants. We analyzed the data from the remaining 540 participants (135 per condition).

A 2x2 between subjects ANOVA showed a significant main effect for order of mentioning for the blame judgments regarding the scuffle for both Mark ($F[1,536] = 10.08$, $p = .002$, partial $\eta^2 = .02$) and John ($F[1,536] = 5.02$, $p = .03$, partial $\eta^2 = .01$). Regardless of the chronological order of events, Mark was blamed more for the scuffle when he is mentioned first ($M = 9.94$, $SD = 1.44$) than when he is mentioned second ($M = 9.49$, $SD = 1.88$). The same is true for John ($M = 8.40$, $SD = 2.46$ and $M = 7.91$, $SD = 2.59$, respectively). We found no significant main effects for order of events for the blame judgments regarding the injury for Mark ($F[1,536] = 1.31$, $p = .25$) and John ($F[1,536] = 3.44$, $p = .06$). Further, we found no significant main effects for order of questions (all $ps > .2$). There was one significant interaction effect for the judgments of blame for the scuffle for John. However, this effect was just significant ($F[1,536] = 4.00$, $p = .046$, partial $\eta^2 = .01$). We do not consider this effect to be informative given the large sample size. Descriptive statistics of Experiment 3 can be found in **Table 4**.

Discussion

The result that an agent is considered more blameworthy for an outcome of an action when he is mentioned first, regardless of the chronological order of events, supports previous findings that the order in which events are narrated is important. However, this was only true for the blame judgments for the scuffle, not the injury. This might be because the scuffle is more directly related to the actions that preceded it (the punches by both agents) than is the injury. The greater indirectness of the relation between the preceding actions and the injury leaves more room for alternative contributing factors. The absence of an effect of the order of questions on blame judgments is congruent with the results of Experiment 2.

Experiment 3 was designed to investigate order effects on blame judgments only. We did not manipulate grammatical aspect. In Experiment 4 we did not manipulate

Table 4: Means (SD) per condition for all dependent variables in Experiment 3.

	Vignette			
	Action Mark mentioned first		Action John mentioned first	
	Questions Mark first <i>n</i> = 135	Questions John first <i>n</i> = 135	Questions Mark first <i>n</i> = 135	Questions John first <i>n</i> = 135
Blame fight				
Mark	9.96 (1.37)	9.93 (1.52)	9.57 (1.83)	9.40 (1.94)
John	7.81 (2.58)	8.02 (2.60)	8.73 (2.31)	8.07 (2.56)
Blame injury				
Mark	9.62 (2.03)	9.99 (1.64)	9.59 (1.99)	9.64 (1.82)
John	8.64 (2.48)	8.59 (2.78)	9.13 (2.14)	8.89 (2.48)

Note. Chronologically, the action by Mark was the first action.

order. This allows for an investigation of grammatical aspect effects on blame judgments only.

Experiment 4

To make sure order effects could not influence blame judgments, we only included the initial action in the vignette. This action was presented in imperfective or perfective aspect. This manipulation of aspect allowed us to assess whether our materials were appropriate for producing an effect of grammatical aspect on temporal dynamics in the first place. Grammatical aspect conveys information about the completion of an action. Actions described in perfective aspect have *completion entailment*. They must be completed by the time we talk about them. Actions described in imperfective aspect are not necessarily completed by the time they are talked about (Comrie, 1976).

The use of imperfective and perfective aspect influences our perceptions of actions in yet another way if we also take *lexical aspect* into account. Lexical aspect concerns the temporal information that is conveyed by different verb classes (see for an overview Madden & Ferretti, 2009). The verb that we used (to punch) is considered an event, more specifically an *achievement* (Vendler, 1957). When these kind of actions are described in imperfective aspect, grammatical aspect coerces the event to be iterative. For example, a sentence like *John bangs the drum for an hour* is typically understood to mean that John bangs the drum multiple times within this hour. Because *to bang* is a transient action it is not possible to infer one bang that lasts for an hour. Aspectual coercion should lead to a larger number of inferred punches in the imperfective aspect vignette than in the perfective aspect vignette. Based on previous findings regarding the effects of grammatical aspect on intentionality (Eerland et al., 2016; Sherrill et al., 2015), we also expected actions described in imperfective aspect to make the agent more to blame for the outcomes than actions described in perfective aspect. Consistent with Sherrill et al. (2015), we expected effects of grammatical aspect on blame judgments to be mediated by the effect of temporal dynamics.

Method

Participants

We expected to find a medium effect of grammatical aspect on blame judgments (Cohen's $d = .38$) and a large effect of grammatical aspect on temporal dynamics (Cohen's $d = 1.13$). Both expectations were based on the smallest effects we found in our own studies (Sherrill et al., 2015). According to power analyses conducted using G*Power (Erdfelder et al., 1996), we needed at least 87 valid participants per condition (total required sample size = 174) to obtain statistical power at the recommended .80 level (Cohen, 1988) for a medium effect and at least 11 valid participants per condition (total required sample size = 22) for a large effect. Given that we needed more participants to detect an effect of grammatical aspect on blame judgments, we aimed for at least 87 valid participants per condition. We recruited 200 participants online through MTurk of whom 193 completed the experiment. The sample had a mean age of 35.57 ($SD = 12.15$, range = 18–88, 78 females). All participants were US residents and received \$0.50 for their participation (approximately 5 minutes). We excluded data from three non-native speakers of English. With the exclusion of these participants, our sample included 190 native speakers of English.

Materials and procedure

All participants first read a vignette in which only one agent (Mark) performed an action. This action was either described using imperfective aspect (Mark was punching John) or perfective aspect (Mark punched John). We recorded the time they spend reading the vignette to be able to exclude participants that did not read the vignette properly (reading times faster than 0.05 seconds per word). Then participants answered questions regarding the blame of Mark and John for the scuffle and the injury of the bystander on a 11-point scale. In addition to responding to these questions, participants also indicated how many times they thought Mark punched John. The answer to this question was used as measure of temporal dynamics (see also **Table 1**). Participants were randomly

assigned to one of two conditions. Finally, participants indicated what they thought the purpose of this task was, whether there was any noise or distractions while performing the task, what device they used to perform the task, and they stated their gender, age, level of education, native language, and the country of residence. The experiment was presented online in the Qualtrics survey research suite.

Results

We excluded data from six participants with reading times for the vignette below 0.05 seconds per word. Because this resulted in unequal numbers of participants in both conditions, we excluded data from 4 last-run participants to equal both conditions regarding the number of participants. We analyzed the data from the remaining 180 participants (90 per condition).

To our surprise, we found no significant effects of grammatical aspect on blame judgments for Mark for the scuffle ($t[178] = 0.17, p = .87$) or the injury of the bystander ($t[178] = 0.09, p = .93$). Interestingly, grammatical aspect of the action performed by Mark did influence blame judgments for John for the scuffle ($t[178] = 3.07, p = .003$, Cohen's $d = 0.46$) and the injury of the bystander ($t[178] = 2.25, p = .03$, Cohen's $d = 0.34$). In both cases, John was more to blame when the action of Mark was described using imperfective aspect than perfective aspect.

When analyzing the data regarding the temporal dynamics question, we noticed that not all participants answered this question by indicating a number (of punches). Some participants said they did not remember the number of punches or stated that the number of punches was not mentioned in the vignette (which is true). We could not include these participants ($n = 36$) in the analysis for the temporal dynamics. Any answer indicating 'several' punches was recoded as two punches, the lowest number 'several' punches can be, and therefore

leading to the most conservative estimate. We found a strong effect of grammatical aspect on temporal dynamics ($t[101.14] = 4.60, p < .001$, Cohen's $d = 0.92$) indicating that participants thought there were more punches in the imperfective than in the perfective vignette (see also **Table 5**).

A mediational analysis (1,000 bootstrap samples using the PROCESS macro for SPSS; Hayes, 2013) showed that grammatical aspect predicted blame judgments for John for the scuffle indirectly through temporal dynamics. Specifically, when the action of Mark was described in imperfective aspect (vs. perfective aspect) participants thought there were more punches ($a = -1.18, p < .0001$), which predicts more perceived blame for John for the scuffle ($b = -0.57, p < .001$). The indirect link between grammatical aspect and blame judgments for John for the scuffle was significant ($ab = 0.67$; 95% bias corrected bootstrap CI [0.29, 1.26]). The direct link was also significant ($c' = -1.99, p < .001$).

A second mediational analysis showed that grammatical aspect also predicted blame judgments for John for the injury indirectly through temporal dynamics. Again, when the action of Mark was described in imperfective compared to perfective aspect participants thought there were more punches ($a = -1.18, p < .0001$), which predicts more perceived blame for John for the injury ($b = -0.61, p < .001$). The indirect link between grammatical aspect and blame judgments for John for the injury was significant ($ab = 0.72$; 95% bias corrected bootstrap CI [0.32, 1.21]). The direct link was also significant ($c' = -1.79, p < .01$).

Discussion

This experiment replicated a well-known finding that grammatical aspect conveys information about the temporal dynamics of an action (Madden & Zwaan, 2003; Magliano & Schleich, 2000; Sherrill et al., 2015). At first,

Table 5: Means (SD) per condition for all dependent variables for Experiments 4–5.

	Experiment 4			Experiment 5		
	Imperfective $n = 90$	Perfective $n = 90$	p	Imperfective $n = 87$	Perfective $n = 87^*$	p
Blame fight						
Mark	9.44 (1.90)	9.49 (1.70)	.87	9.83 (1.48)	9.64 (1.82)	.47
John	7.91 (2.62)	6.62 (3.01)	.003	7.83 (2.66)	6.94 (2.84)	.04
Blame injury						
Mark	9.84 (1.66)	9.82 (1.53)	.93	10.10 (1.38)	9.62 (2.09)	.08
John	7.74 (2.84)	6.71 (3.30)	.03	7.41 (3.21)	6.66 (3.06)	.11
# punches*						
Mark	2.34 (1.86)	1.16 (1.11)	<.001	3.92 (2.24)	2.23 (2.33)	<.001
John	–	–	–	1.66 (1.87)	1.22 (2.19)	.16

*In Experiment 4, $n = 67$ in the imperfective condition and $n = 87$ in the perfective condition for the number of punches by Mark. In Experiment 5, one participant indicated that s/he did not know whether John punched Mark. Therefore, $n = 86$ in the perfective condition for the number of punches by Mark and John.

we were surprised not to find an effect of grammatical aspect on blame judgments for the agent but, in hindsight, this finding makes perfect sense. The vignette is very clear about Mark being the first (and only) one to punch another person. This would make him to blame for consequences of this action, a scuffle and the injury of the bystander. Whether the initiator punched the other person one or multiple times, as implied by the grammatical aspect used to talk about this action, might not contribute to his blameworthiness. It seems rather obvious that the initiator deserves to be blamed but this is not true for the non-initiator. This intuition seems to be supported by the fact that the blame judgments for Mark were numerically higher when he was the only agent (Experiment 4) than when there were two agents (Experiments 1–2).

The vignette used in this experiment described no action performed by the recipient of the punches. Yet, our results showed that this person is more to blame for the scuffle and the injury of a bystander if the initial action is described using imperfective rather than perfective aspect. These effects were mediated by the temporal dynamics of the initial action. The fact that the direct links between aspect and blame judgments were also significant suggests that temporal dynamics were not solely responsible for the link between grammatical aspect and the blame judgments for John for the scuffle. We hypothesized that comprehenders might infer a retaliation from the recipient of the punches, even though such an action was not described. In a sentence stating that person A *was punching* person B, lexical aspect implies that person A punched person B time after time. We hypothesized that this prompts the inference that the punching was reciprocal. Thus, participants who read the imperfective aspect vignette should think more often that the patient punched back than participants who read the perfective aspect vignette. We tested this hypothesis in Experiment 5.

Experiment 5

Experiment 5 is a direct replication of Experiment 4 with one additional question to investigate whether grammatical aspect can affect the mental representation of a non-mentioned action. We hypothesized that effects of grammatical aspect of the initial action on temporal dynamics can influence the temporal dynamics of a non-mentioned reaction. More specifically, we expected people to think the ‘agent’ of the non-mentioned reaction punched back more times when the first action was described in imperfective compared to perfective aspect. We also expected to find an effect of grammatical aspect on blame judgments for the recipient of the punches.

Method

Participants

Based on the power analyses we conducted for Experiment 4, we aimed at 87 valid participants per condition. Therefore, we recruited 200 participants online through MTurk. Because some participants did not click the ‘send’ button at the end of the experiment, 202 participants completed the experiment. The sample had a mean age

of 37.82 ($SD = 12.48$, range = 19–75, 105 females). All participants were US residents and received \$0.50 for their participation (approximately 5 minutes). We excluded data from four non-native speakers of English. With the exclusion of these participants, our sample included 198 native speakers of English.

Materials and procedure

The materials and procedure of Experiment 5 were the same as those of Experiment 4 with the exception of an additional question about the number of punches by John. Because the vignette does not include information about whether or not John punched Mark too, we asked participants to indicate the number of punches by John only if they thought he punched Mark too (see **Table 5**).

Results

We excluded data from participants who participated in Experiment 4 ($n = 11$), who had reading times for the vignette shorter than 0.05 seconds per word ($n = 3$), or a combination of both ($n = 1$). Also, we removed the data from one participant because the number of punches s/he indicated were >21 SD above the mean. Removal of the data of these participants resulted in unequal numbers of participants in both conditions. Therefore, we excluded data from 8 last-run participants to equal both conditions regarding the number of participants. We analyzed the data from the remaining 174 participants (87 per condition).

As in Experiment 4, we found no effect of grammatical aspect on blame judgments for Mark for the scuffle ($t[172] = 0.73$, $p = .47$) or the injury of the bystander ($t[148.99] = 1.80$, $p = .07$). Again, grammatical aspect of the action performed by Mark did influence blame judgments for John but this time only for the scuffle ($t[172] = 2.12$, $p = .035$, Cohen’s $d = 0.32$) and not for the injury of the bystander ($t[172] = 1.60$, $p = .11$). John was more to blame for the scuffle when the action of Mark was described using imperfective aspect than perfective aspect.

Of primary interest were the results regarding the temporal dynamics. As expected, we found a large effect of grammatical aspect on the temporal dynamics of the initial action (i.e., the number of punches given by Mark; $t[171] = 4.86$, $p < .001$, Cohen’s $d = 0.74$). A χ^2 -test revealed a significant relation between condition (imperfective vs. perfective aspect) and whether people think John punched Mark as well. Participants in the imperfective condition were more likely to think that John punched Mark as well (66.7%) than participants in the perfective condition (41.9%; Pearson $\chi^2 = 10.73$, $p = .001$, Cramer’s $V = 0.25$). Analysis of the number of punches by John revealed no significant difference between conditions ($t[171] = 1.41$, $p = .16$). We found this to be remarkable. Closer examination of the data showed that there were four participants (three in the imperfective aspect condition and one in the perfective aspect condition) who indicated John punched ten times, which is more than 4SD above the mean. Without these outliers we found a significant effect of grammatical aspect on temporal dynamics ($t[167] = 2.76$, $p = .006$, Cohen’s $d = 0.43$).

Participants thought there were more retaliator punches when the initiative action was described in imperfective ($M = 1.56$, $SD = 1.64$) than in perfective aspect ($M = 0.90$, $SD = 1.43$).

We performed mediational analysis for the effects of aspect on blame judgments. A first analysis showed that grammatical aspect did not predict blame judgments for John for the scuffle indirectly through temporal dynamics of the described action. While the action of Mark described in imperfective compared to perfective aspect lead participants to think the action involved more punches ($a = -1.96$, $p < .0001$), the number of punches did not predict blame judgments for John for the scuffle ($b = -0.08$, $p = .50$). While the direct link between grammatical aspect and blame judgments for John for the scuffle was significant ($c' = -1.04$, $p = .03$), the indirect effect was not ($ab = 0.15$; 95% bias corrected bootstrap CI $[-0.30, 0.70]$).

A second mediational analysis showed that grammatical aspect did predict blame judgments for John for the scuffle indirectly through temporal dynamics of the non-described action. When the action of Mark was described in imperfective compared to perfective aspect participants thought John punched Mark more times ($a = -0.65$, $p < .01$), which in turn predicts more perceived blame for John for the scuffle ($b = 0.50$, $p < .001$). The indirect link between grammatical aspect and blame judgments for John for the scuffle was significant ($ab = -0.32$; 95% bias corrected bootstrap CI $[-0.69, -0.10]$), while the direct link was not significant ($c' = -0.56$, $p = .18$).

Discussion

Overall, this experiment showed the same results as Experiment 4. Again we found an effect of grammatical aspect on temporal dynamics, no effect of grammatical aspect on blame judgments for Mark, and an effect of grammatical aspect on the blame judgments for John for the scuffle. However, the mediational analyses yielded different results across experiments. In Experiment 4 we found that the temporal dynamics of the described (or initial) action mediated this effect but here we found that the effect of grammatical aspect on the blame judgments for John for the scuffle was mediated by the temporal dynamics of the non-described action. The only possible explanation for this inconsistency is that asking about the temporal dynamics of the non-described action (as was the case in Experiment 5 only) affected people's thinking about the temporal dynamics of the described action.

Another inconsistent finding between Experiment 4 and 5 is whether or not there is an effect of grammatical aspect on blame judgments for John for the injury. In Experiment 4 we found an effect but in Experiment 5 we did not. To examine the aggregate effect, we performed random-effect meta-analyses on the combined data of Experiment 4 and 5, using the Metafor package in R (Viechtbauer, 2010) for the dependent measures of both experiments. There were significant meta-analytic effects of grammatical aspect on temporal dynamics and blame judgments for John for both the scuffle and the injury. As expected, there were no meta-analytic effects of grammatical aspect on blame judgments for Mark (see **Table 6**).

Table 6: Meta-analytic results for Experiments 4–5.

	M difference (SE)	95% CI	p
Blame fight			
Mark	0.08 (0.18)	[-0.28, 0.44]	.67
John	1.09 (0.30)	[0.51, 1.67]	<.001
Blame injury			
Mark	0.23 (0.23)	[-0.22, 0.68]	.31
John	0.90 (0.33)	[0.25, 1.54]	.007
# punches			
Mark	1.44 (0.20)	[1.05, 1.84]	<.0001

General discussion

Is someone who “was punching” another person more to blame for the negative outcomes of this action than someone who “punched” another person? Experiments 1–3 experiments demonstrated a clear effect of order of mention on blame judgments. First-mentioned agents were more to blame for the outcomes of an action (i.e., a fight and the injury of a bystander) than second-mentioned agents. Importantly given the purpose of the present study, there were no effects of grammatical aspect on blame judgments. Consistent with prior research (Madden & Zwaan, 2005; Magliano & Schleich, 2000; Sherrill et al., 2015), aspect had an impact on how events were represented in the situation models for the scenarios used across the experiments. This was most clearly reflected in the results of Experiments 4 and 5. Actions conveyed with an imperfective aspect were perceived as having more iterations than those conveyed with a perfective aspect. This finding is consistent with Madden and Ferretti (2009), who argued that an imperfective aspect leads to non durative actions (i.e. achievements in the nomenclature of Vendler, 1957) to be transformed into iterative actions.

While Hart and Albarracín (2011) argued that aspect can influence perceived intentionality such that imperfective actions are understood as being more intentional than perfective actions, the present study is consistent with a growing body of research that suggest that this is not the case (Eerland et al., 2015; Sherrill et al., 2015). However, the mediational analyses conducted in this study replicate those conducted by Sherrill et al., (2015). These analyses suggest that aspect has an indirect impact on the assessment of blame. Specifically, aspect affects the perception of temporal dynamics, which can influence how one understands and evaluates the situation (e.g., attributing blame). One can construe the task of ascribing blame in this study as involving deliberate reasoning and the mediation model is consistent with a long standing argument that complex reasoning is supported by situation models (e.g., Johnson-Laird, 1983).

Surprisingly, the effects of grammatical aspect that we did find were on the blameworthiness of the protagonist who did *not* perform the described action. These effects can be explained by our assumption that people infer that the described action (i.e., punching) was reciprocal. On this

view, people construct a situation model in which both agents punch each other even though only one action was mentioned. With both actions being represented in the situation model of the comprehender, grammatical aspect influences the frequency of both actions. This interpretation is consistent with the idea that blame judgments are based on the nature of the situation model.

It is possible that the impact of grammatical aspect on blame in the context of this study was overridden by ordering effects. We found consistent evidence that the first mentioned agent was ascribed more blame than the second mentioned agent, regardless of the chronological sequence of the events. These order effects converge with previous findings that indicate that first mentioned entities are prominently represented in a situation model (Gernsbacher & Hargreaves, 1988; Gernsbacher et al., 1988, Sherrill et al., 2015). It is possible that when answering the questions about blame, participants based judgments on the basis of how strongly represented the characters were in the situation model. This would have implications on how easily the first mention character is accessed at the time participants answer the questions (e.g., Myers & O'Brien, 1998). Blame judgments could have been based on an availability heuristic (Tversky & Kahneman, 1973), which is consistent with the thesis that blame judgments were grounded in features of the situation model.

The results of this study are also consistent with the argument that situation-model construction is supported by aspects of the surface form, such as grammatical morphemes (Givón, 1992; Magliano & Schleich, 2000; Morrow, 1986). Canonical models of situation-model construction assume that situation models are largely supported by knowledge activated by the lemmas associated with the content words and the propositions that are stripped of morphological information (e.g., Kintsch, 1988). To our knowledge, these models have not been updated to reflect the growing body of evidence that content in the surface form has an impact on situation model construction (McNamara & Magliano, 2009).

There are a few notable shortcomings of the present study. First, all experiments used only a single vignette. This is by no means a best practice in research involving discourse processes, and in part because it limits the generalizability of the results. Moreover, using one item could have led to the experiments being underpowered. We based our required sample sizes for the first two experiments on the results of Experiment 3 of Hart and Albarracín (2011). As we learned through other studies (Eerland et al., 2016; Sherrill et al., 2015), the effects of grammatical aspect on the construction and evaluation of situation models are considerably smaller than Hart and Albarracín's results suggested. Nonetheless, the fact that we replicated findings within the present study and other studies (Eerland et al., 2015; Sherrill et al., 2015) bolsters our confidence in the conclusion that aspect does not directly affect perceptions of intention and blame in the context of scenarios describing violent actions. However, it might be worth investigating other scenarios and different verb types as well. Second, we investigated effects of grammatical aspect on the judgments of negative

outcomes only (e.g., a scuffle, the injury of a bystander). It is an empirical question whether our results extend to positive outcomes of an action.

In conclusion, grammatical aspect influences situation-model construction, especially the temporal dynamics of an action. Grammatical aspect may also influence blame judgments via the construction of a situation model. These more indirect effects tend to be rather small. It might be premature to ask the question whether these effects could impact our perception and judgments in daily life or possibly even in legal decision making processes. However, the time is ripe to investigate more closely when these indirect effects of grammatical aspect occur and under what conditions.

Data Accessibility Statement

The stimuli and participant data of all experiments, and the pre-registration of Experiments 3–5 can be found on the Open Science Framework (<https://osf.io/z2utx/>).

Notes

- ¹ This headline was based on the following online news article: <http://metro.co.uk/2017/07/31/easyjet-worker-suspended-for-punching-customer-was-pushed-first-6818346/#ixzz4p3uXWFss>.
- ² Effect sizes were calculated through <https://www.uccs.edu/~lbecker/>.
- ³ Most likely due to a typo, one participant indicated s/he was 218 years of age. We excluded this value from our demographics.
- ⁴ In a first batch, we recruited 100 participants due to an error in our power analysis. We recruited 500 more participants in a second batch. However, when excluding participants who had too short reading times, non-native speakers of English, and participants who participated in a similar experiment before, we ended up with too few participants. Therefore, we recruited another 50 participants in a third batch.
- ⁵ Most likely due to a typo, one participant indicated s/he was 4 years of age. We excluded this value in our demographics.
- ⁶ Data for Experiment 4 were collected just before the data for Experiment 3.

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Competing Interests

The authors have no competing interests to declare.

Authors Contribution

- Contributed to conception and design: AE, AMS, JPM, RAZ
- Contributed to acquisition of data: AE, AMS, JPM, RAZ
- Contributed to analysis and interpretation of data: AE, AMS, JPM, RAZ

- Drafted and/or revised the article: AE, AMS, JPM, RAZ
- Approved the submitted version for publication: AE, AMS, JPM, RAZ

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Rolf Zwaan is a Senior Editor at Collabra: Psychology. He was not involved in the peer review of the article. Anita Eerland is an Editor at Collabra: Psychology. She was not involved in the peer review of the article.

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