Can Language Direct Speakers' Attention in Causal Events?:
An Empirical Study between Japanese and English Speakers

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Abstract

This thesis sheds lights on the relationship between descriptions of causal events and their effects on speakers' memory. English and Japanese are similar in that speakers can use the same constructions when describing intentional events – both comfortably use transitive sentences. However, they are different when describing non-intentional events. English speakers can use the same construction as intentional events, while Japanese speakers prefer to mark that the event is accident. They tend to add accidental markers to cancel the agent's intention frequently. In Experiment 1, I confirm differences in describing causal events between these two languages. Then, Japanese speakers are expected to remember event nature (i.e., intentional or non-intentional) more accurately than English speakers. However, Experiment 2 fails to support the hypothesis. I present two possible reasons why language effects are not observed. First, marking non-intentionality is not obligatory but only preferred by Japanese speakers. Thus, language effects are not strong enough to affect speakers' memory. Second, language does not affect speakers' memory, especially in causal-event descriptions, even though it does in other domains, such as color terminology.

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Chapter 1. Introduction

It is said that around 7,000 languages are spoken across the globe – and they all vary in the way they express information. For example, word order is different in Japanese and English: a verb is located at the end of the sentence in Japanese, whereas it follows the subject in English. Another example is grammatical gender, which is assigned to almost every noun in such languages as French and Spanish. This feature requires speakers to mark grammatical gender through articles and adjectives, whereas this is not the case in English and Japanese.

Recent psycholinguistic research has examined the possibility that such differences are not mere distinctions observed in language but have an impact on our cognitive processes. The assumption that language affects human cognitive processes, including memory, is called “linguistic relativity” or the “Whorfian hypothesis,” named after the person who first suggested this principle. Many studies have been conducted to investigate the hypothesis in a variety of domains, such as color and space. For instance, Kay and Kempton (1984) compared English speakers with speakers of Tarahumara, an Uto-Aztecan language spoken in northern Mexico. Tarahumara has only one word for English *blue* and *green*. The researchers concluded that English speakers were poorer at judging the distance between colors than Tarahumara speakers due to the color terminology. As for space, Pederson et al. (1998) and others showed that people who spoke a language that used the absolute frame of reference (i.e., using east, west, north, south, etc. to express direction) were more likely to remember and reconstruct the way in which objects were arranged

according to cardinal directions than people who spoke a language that used the relative frame of reference (i.e., using left and right). Present-day scholars have been trying to move beyond the black-and-white question of whether language influences our cognitive abilities and are working on the more penetrating questions of when and how language affects the way we think, assuming that language has some impact on cognitive processes (e.g., Casasanto et al. 2005; Fuhrman et al. 2011; Boroditsky 2011). Moreover, researchers from novel domains, such as cognitive science and bilingualism, have recently joined in the discussion. However, they have not reached agreement on these questions yet.

This thesis sheds lights on the expression of intentionality in Japanese and English and its effects on memory. Although a series of previous studies focused on event intentionality, as reviewed in Chapter 3, the target languages were limited. Moreover, a past study that compared English and Japanese lacked linguistic analysis. This thesis compares certain distinctive features of English and Japanese: English speakers may use transitive verbs for non-intentional events without marking event contingency, while Japanese speakers prefer to use an auxiliary verb *-teshimau* (literally, “end up doing”) for marking non-intentionality (see the beginning of Chapter 4 for the definitions of the terminology). In Chapter 4, I conduct a detailed analysis of causal-event descriptions in these two languages. In Chapter 5, I discuss the psychological experiments that I conducted to examine whether the difference in the way that Japanese and English speakers describe causal events causes any corresponding differences in their memory of the events. If any differences in memory are identified, I should examine how these differences are generated; if not, the reason why differences are not confirmed should be explored. The correlations between marking of

event intentionality and its effect on memory have not received much attention in the discussion about language effects on memory. What is also characteristic of this study is that it emphasizes how important it is to analyze the target languages, a task that has been disregarded in many previous studies. In fact, I spend more than half of Chapter 4 performing a linguistic analysis of the target languages of this study, namely English and Japanese, while most previous studies omitted performing an equivalent study of the target languages involved. This thesis concludes with the finding that language is not powerful enough to influence memory, at least as far as the expression of intentionality is concerned. In the final chapter, I present two possible reasons why language effects were not observed.

This thesis is composed of five chapters. In Chapter 2, I review the history of the discussion on linguistic relativity and point out the shortcomings of previous research. In Chapter 3, I review previous studies that explored language effects on memory in a variety of domains. One study focused on motion events, while another examined grammatical gender. The other studies that I refer to considered causal events, therefore these studies relate most closely to this thesis. In fact, the experiments I conducted in this thesis replicate those conducted in one of the recent studies of causal events. In Chapter 4 and 5, I report on the experiments that I conducted to compare Japanese and English speakers. Finally, I make a conclusion and statement of future prospects in Chapter 6.

Chapter 2. Linguistic relativity

In this chapter, I briefly discuss the research history of linguistic relativity since the term was first coined. The introduction of the hypothesis that language affects human cognitive processes sparked a great deal of psycholinguistic research, and the discussion has been back and forth ever since. Following this discussion, I introduce Dan Slobin's *thinking for speaking* theory, which represented a turning point in the discussion. Finally, I comment on the shortcomings of previous studies.

2.1 What is linguistic relativity?

Does language impact the way people think? More specifically, do people who speak different languages think differently? The question has attracted a great deal of interest from both amateurs and scientists for centuries. The idea that language affects the way we think is called "linguistic relativism," and it is often attributed to Benjamin Lee Whorf, who coined the term "linguistic relativity principle." Whorf stated: "... users of markedly different grammars are pointed by their grammars toward different types of observations and different evaluations of externally similar acts of observation, and hence are not equivalent as observers but must arrive at somewhat different views of the world" (Whorf 1956: 282-3). His idea was rejected at first because he provided no scientific evidence. Specifically, Whorf argued that the Eskimo were good at distinguishing the different kinds of snow because they have a range of words that denote "snow." Nevertheless, he did not conduct any tests to objectively measure their ability to distinguish between different types

of snow.

Around a half century ago, scholars started to test Whorf's hypothesis scientifically, and the discussion about the relationship between language and cognition has resurged for decades. Although it remains unclear what Whorf meant by "somewhat different views of the world," scholars have interpreted the phrase as "people's cognition" and relied on psychological experiments to examine language effects on cognition. A number of researchers focused on comparing the lexical differences of color terms in a few languages (Kay and Kempton 1984; Berlin and Kay 1969; Lucy and Shweder 1979; Winawer et al. 2007), while others observed how the differences in spatial terms (i.e., using the absolute or relative frame of reference) affected the way speakers saw the world (Brown and Levinson 1993; Li and Gleitman 2002; Pederson et al. 1998). Some empirical studies on linguistic relativity confirmed language effects on cognition, while others did not support the hypothesis (Wolff and Holmes 2011; Lucy 2016; Gentner and Goldin-Meadow 2003; Everett 2013 for review).

Recently, scholars have looked beyond the black-and-white question of *whether language affects cognition* to explore and discussed the more advanced questions of *how and when language affects the way people think*. These scholars are referred to as "neo-Whorfians" (Pinker 2007). I present Slobin's *thinking for speaking* as one of the neo-Whorfian theories.

2.2 Thinking for speaking

Dan Slobin introduced the new notion to the debates on the relationship between language

and cognition. He suggested that “in the process of speaking or writing, experiences are filtered through language into verbalized events” (Slobin 2000: 107). Slobin argued that “a special form of thought that is mobilized for communication” (Slobin 1996: 76), and this form should be called “thinking for speaking.” This form of thinking concerns the processing of particular information to be verbalized, and the selection of those aspects is determined by what must be expressed in the language. Thus, we are unconsciously directed to attend to the dimensions that have to be encoded in the language: if people are exposed to a language with grammatical gender, for example, they are likely to pay more attention to the gender of an object than speakers of languages without this linguistic feature.

In fact, an idea that closely resembles *thinking for speaking* was formulated more than half a century ago by Roman Jakobson (1959 [1971]). He wrote, “Languages differ essentially in what they must convey and not in what they may convey. [...] Naturally the attention of native speakers and listeners will be constantly focused on such items as are compulsory in their verbal code” (Jakobson 1959 [1971]: 264-5). However, Slobin systematically explored a specific form of thought to be mobilized while formulating verbal messages, and he contributed to advancing the discussion on linguistic relativity. In his empirical studies on motion events, which were related to Talmy’s dichotomy of verb types (1985, 1991), Slobin argued that what needs to be attended to in *thinking for speaking* “may also have long-term and pervasive effects on mental representation and conceptual processes” (Slobin 2003: 179). For example, manner is more codable than path in English, while path is more codable than manner in French. In English, speakers encode manner in

the main verb, and it is optional to present the information about path. English speakers do not encode path except when it is at issue. Consequently, Slobin showed in a series of studies (1997, 2000) that English speakers were less sensitive to this dimension (i.e., path) overall. Moreover, he argued that what was salient in a particular language (e.g., manner/path in motion events) was likely to be retained in speakers' memory (Slobin 2003). I will review one of the studies that successfully confirmed the effect on speakers' short- and long-term memory in the next chapter, in parallel with other studies that discussed language effects on memory. However, before reviewing previous studies, it is necessary to understand the criticisms that have been leveled by anti-Whorfians. Their criticism relates mainly to the linguistic relativity hypothesis itself and to methodology.

2.3 Criticism of empirical studies on linguistic relativity

Previous studies on linguistic relativity have faced several issues posed by anti-Whorfians. In particular, scholars have been struggling with how they can invent pertinent design of experiment. In this section, I summarize three major issues that empirical studies could have and the strategies against them. Furthermore, I note how I deal with those issues in my research.

2.3.1 Is language a sole factor in influencing our cognition?

The first and most crucial criticism is leveled at the notion that language is the main factor that channels the way people think. Other factors, such as culture, the environment in which a speaker grows up, and a speaker's personal history, may also shape their thought.

However, linguistic relativity is the idea that language strongly affects our mind while other

factors are excluded. To establish “pure” linguistic relativity, it is necessary to remove all other potential factors in empirical studies. The question is: is that even possible?

When researchers face the above-mentioned criticism, they introduce several measures to exclude other possible factors (beyond language) that may influence cognition. First, participants can be trained to change the way they express certain concepts, making it similar to the way speakers of other languages express the concept in question. For example, Boroditsky (2001) shed lights on the difference in spatiotemporal metaphor between speakers of English and Mandarin Chinese. In English, people say, “We can move the meeting *forward*” or “I will put the deadline *back*.” This indicates that they apply horizontal terms to describe temporal relationships. In contrast, Mandarin Chinese speakers systematically use vertical terms – *up* for earlier, *down* for later events – in addition to horizontal terms (Scott 1989). To show that the language is a key factor in how they conceptualize time, Boroditsky trained English speakers to describe time vertically, as Mandarin Chinese speakers do. When English speakers were tested, their results were similar to those of Mandarin Chinese participants. In other words, after English speakers were trained to use “Chinese-like” spatiotemporal metaphors, they also thought of time vertically, as Mandarin Chinese speakers do. The fact that English speakers trained to use Chinese-like ways of expression showed the same result as authentic Chinese speakers when tested reveals that the difference between the ways in which English and Chinese speakers conceptualize time is caused by linguistic difference: English describes time horizontally whereas Chinese does so vertically.

Second, it is possible to compare language groups that share a degree of cultural

development with but do not share linguistic characteristics. Below I present studies that compared languages with classifiers.

Lucy (1992) conducted comparative experiments between American English and Yucatec Mayan speakers. While Yucatec Mayan is a classifier language, English divides all nouns into two groups: count and mass nouns. Lucy hypothesized that this difference between the two languages should cause them to pay attention to different aspects of entities in the world. Through the similarity judgment task, he revealed that English speakers focused on the shape of an object, while Yucatec Mayan speakers paid attention to material composition over shape. From this contrastive result, Lucy (1992) concluded that the two populations' preferences for either shape or material is attributable to the structural differences of the two languages. However, it is difficult to determine whether the material bias observed among Yucatec Mayan speakers should be attributed to linguistic factors in the first place (Imai and Mazuka 2003: 438). After all, the cultural background of Yucatec Mayan speakers living in unindustrialized regions in Mexico is quite different from that of English speakers living in the US. In a later study, Imai and Mazuka (2003) replaced Yucatec Mayan with Japanese, which is also a classifier language, to compare with American English speakers. If Japanese speakers display the same preference as Yucatec Mayan speakers, one could comfortably attribute linguistic factors to the difference in results, because the sociocultural and educational background of Japanese speakers is comparable with that of English speakers living in the US (Imai and Mazuka 2003: 438). Finally, Imai and Mazuka (2003) successfully supported their hypothesis through the similarity judgment tasks. Specifically, English speakers tended to work on the tasks based

on the shape of an object, whereas Japanese speakers did so based on the material that the object consisted of. It is possible to argue that the relativistic conclusion reached by Imai and Mazuka (2003) is more reliable than that of Lucy (1992), because Yucatec Mayans and Americans have widely different cultural backgrounds as well as different linguistic characters.

It is clear, therefore, that it is of vital importance to compare two different language groups that share cultural or other backgrounds in order to exclude the possibility that factors other than language influence cognition. Even if it is not possible to absolutely exclude all factors but language, it is possible to make the idea that language influences cognition more plausible.

In this thesis, I adopt the second strategy: the participants in this study live in countries with similar levels of cultural development. Specifically, all the Japanese speakers live in Japan and all the English speakers live in the United States.

2.3.2 Do speakers of a language understand the instructions in the same way as speakers of other languages?

Basically, researchers of linguistic relativity conduct their experiments in different languages. For example, when comparing English and Japanese speakers, English speakers participate in the experiments in English, and Japanese speakers in Japanese. As Boroditsky (2001: 3) pointed out, using different languages between language groups may pose a serious issue: it cannot be guaranteed that the instructions and the stimuli given in two languages are understood in exactly the same way by the two sets of speakers. For example,

when speakers of Language X and Y are asked, “Which one is the same?”, we cannot be sure that speakers of Language X understand the instructions in the same way as speakers of Language Y. Language X speakers might interpret “same” as “identical,” while Language Y speakers might interpret the term as “rationally similar.” If the results are significantly different between Language X and Y speakers, the difference could stem from the way in which the instructions are interpreted in the languages in question, rather than from the fact that participants’ thoughts are different.

Another example of a question that might be interpreted in diverse ways is “What happened?” In English, it is natural to ask someone “What happened?” when we simply want to know of events. We could answer this question by saying, “The boy cut a piece of paper,” or “She broke the vase.” On the other hand, the counterpart of the interrogative sentence in Japanese, literally translated as “*Naniga okorimashitaka?*” implies that something negative or serious has happened. For example, if I were asked “*Naniga okorimashitaka?*” after watching a video stimulus where a boy happily cuts up a piece of paper, I would feel strange because nothing negative happened. Therefore, a specific phrase would not guarantee that speakers understand it in the same way, once it has been translated into another language.

To solve the problem, one can conduct experiments in a common language between two language groups, as Boroditsky (2001) did. She compared English and Mandarin Chinese speakers but conducted the experiment in English even with Chinese speakers.

In this thesis, I consider the possibility that the instruction sentence could affect the

way the speakers answer, and I attempt not to control event descriptions. Specifically, I do not use the interrogative sentence “What happened?” to collect linguistic descriptions. Instead, I use more natural expressions that do not impact the way that causal events are described.

2.3.4 Are non-linguistic tasks free from language effects?

To investigate language effects on non-linguistic behavior, previous research often required participants to work on non-linguistic tasks. However, Boroditsky (2001) cast doubt on the validity of the performance of non-linguistic tasks in order to examine non-linguistic behaviors, because non-linguistic tasks may actually motivate our linguistic thinking.

Sorting into categories and making similarity judgments are canonical examples of non-linguistic tasks used in several previous studies (e.g., Saalbach and Imai 2007; Winawer et al. 2007). These tasks inevitably require participants to apply some strategy to work on. For example, Saalbach and Imai (2007) asked participants to make similarity judgments from 1 (very dissimilar) to 7 (very similar) between various pairs of objects. Some object pairs shared nominal classifiers in Japanese but not in Chinese, while other pairs shared nominal classifiers in Chinese but not in Japanese. In addition, some object pairs shared both Japanese and Chinese classifiers, while other pairs did not share nominal classifiers but were in the same category, such as a cucumber and a tomato (the vegetable category). The rest of the object pairs shared neither nominal classifiers nor category. Had I been presented with a pair consisting of a cucumber and a tomato, for example, and I had been asked how similar they were to each other, my thought process would have been:

“How should I score the similarity between them? A cucumber is thin and long, while a tomato is round. They are not similar at all in terms of shape and color, but they are both vegetables. I will therefore score 5 for this pair.” As is evident, such processes involve linguistic thinking. For this reason, non-linguistic tasks, such as similarity judgment tasks, are inappropriate and not convincing as evidence of non-linguistic behaviors. Many kinds of non-linguistic tasks have been used in the research, for example, memory tests and discrimination distance tasks¹. Some non-linguistic tasks, such as memory tests, are relatively free from language use, while others, such as similarity judgment tasks, may require linguistic thinking.

After all, it is almost impossible to set completely “pure” non-linguistic tasks. Unless participants work on the tasks fully arbitrarily, it is not possible to prevent them from using language during the tasks. However, language use by the participants can be blocked or decreased using a trick. One of the ways to block language use is through verbal interference. Winawer et al. (2007) had the participants work on non-linguistic tasks – namely, color discrimination tasks – under different conditions. One condition was a verbal interference condition, in which participants rehearsed digit strings while completing the tasks. Another was a normal condition where participants were required to work on color discrimination tasks without any obstacles. The researchers’ hypothesis was that Russian speakers, who distinguish between light and dark blue in their vocabulary, were more likely

¹ The discrimination distance task was often used in studies about color. For example, Kay and Kempton (1984) first presented a focal color chip between blue and green, and then presented the two neighboring color chips. The participants were required to choose one that was closer to the focal color chip.

to be aware of color differences than English speakers, who do not make a linguistic distinction between the two color terms. The results were that Russian speakers completed the task significantly faster than English speakers under normal conditions, as expected, but not under the verbal interference condition. Winawer et al. (2007: 7783) concluded that categories in language can affect the performance of basic perceptual color discrimination tasks, because the differences in results disappeared under the verbal interference condition. Under the verbal interference condition, the Russian-speaking participants cannot access language and consequently their minds operate similarly to those of the English participants. In addition, Lupyan's experiments (2009) demonstrated that under the verbal interference, healthy adults' patterns of deficit in cognitive tasks were strikingly similar to that of aphasic patients. The number of errors made by the healthy participants under the verbal interference and the reaction time increased significantly. To sum up, non-linguistic tasks can be made more convincing as evidence for language effects on cognition by introducing verbal interference in which people cannot access their language.

In this thesis, I use a memory test that seems to limit linguistic thinking more so than other non-linguistic tasks, such as a similarity judgment task.

2.4 Summary

In this chapter, I summarized the history of arguments that have been put forward in respect of linguistic relativity. Slobin's *thinking for speaking* theory deserves particular attention because it undoubtedly advanced the discussion of linguistic relativity. Lastly, I explored the points of criticism raised by anti-Whorfians and noted how I would deal with them in

my study. Every criticism has value and should not be dismissed when discussing language effects on cognition. Previous studies have provided strategies against each point of criticism, and I will follow their methodology in my experiments discussed in Chapter 4 and 5. In the next chapter, I will review the studies that have contributed to discussions about language effects on memory.

Chapter 3. Review of previous research about language effects on memory

In this chapter, I review a series of previous studies about language effects on memory. Since the work of Loftus and Palmer (1974), studies on linguistic relativity that focus specifically on the relationship between language and memory have been conducted in a variety of domains. For example, grammatical gender is an often-debated topic. I review a selection of the studies that have confirmed language effects on memory. In addition, I review papers that focused on the features of verbs. I have replicated one of those studies for the purposes of this thesis.

3.1 Loftus and Palmer (1974): General research about language effects on cognition

While the work done by Loftus and Palmer (1974) was not a study of linguistic relativity, they produced a seminal paper discussing language effects on speakers' memory. In their two experiments, English-speaking participants viewed seven videos depicting a traffic accident and were then asked, "About how fast were the cars going when they *hit* each other?" They were required to provide a number (miles per hour) as their answer. Of critical importance was the choice of verb that the question contained. Equal numbers of participants were given the question where *hit* was replaced with the verbs *smashed*, *collided*, *bumped*, and *contacted*. The result indicated that the mean speed estimates varied significantly among the verbs: the participants exposed to the verb *smashed* tended to estimate a higher speed than the participants exposed to any of the other verbs. In contrast, those exposed to the verb *contacted* estimated the lowest speed.

To investigate whether the question form per se causes a change in the participants' memory of the accident, the authors conducted another experiment with novel participants. If the participants were influenced by the verb *smashed*, for example, to the extent that they regarded the accident as being more severe than it actually was, their memory of other details of the event should also be affected by the verb.

In the second experiment, participants were assigned questions that contained either the verb *smashed* or *hit*. One week after watching the video, they were asked, "Did you see any broken glass?" Participants were required to answer by ticking "Yes" or "No." In fact, the video did not depict any broken glass. However, participants interrogated with *smashed* were predicted to answer "Yes" because the verb suggested severity. This prediction was supported in the experiment. Specifically, more people whose question contained the verb *smashed* answered "Yes" than those whose verb was *hit*. When the researchers considered the answers to the first question (i.e., "About how fast were the cars going when they *hit* together?") in combination with the answers to the second question, they found that the choice of verb per se resulted in higher speed estimates and the recollection of more severe accidents.

This study is important because the authors empirically elucidated that verbal labels (in this case, a single verb) had the power to alter the memory in the direction more similar to a representation depicted by the label. In other words, the authors made it clear that language could affect cognition – specifically memory, in this case.

3.2 Pourcel (2009): Effects on memory caused by preferred types of narratives

According to Leonard Talmy, there are two kinds of languages on the globe in terms of a motion verb in a sentence (Talmy 1985). One group of languages, which includes information of path into a verb, is called “verb-framed languages,” or “V-languages” (Talmy 1991). The canonical examples are observed in Romance languages, such as Spanish and French. In those languages, only when manner is at issue do speakers express it in an optional adjunct phrase, as in (3.1) in French.

(3.1) French

Nous sommes entrés dans un café en courant.

we entered in a café running

Lit. We entered a café, running. (Constructed)

In contrast, other languages, of which English is one, prefer to encode manner in a verb and path in an additional phrase (e.g., adverbs, prepositional phrases).

(3.2) English

We ran into a café. (Constructed)

In English, we put manner information (“running”) into the main verb and the path

information outside of the verb, as in (3.2). Such languages are called “satellite-framed languages”, or “S-languages” in Talmy’s terminology. A significant portion of the research that focused on this typology revealed the “pervasive effects of language on selective attention and memory” (Slobin 2003: 159). Below, I present Pourcel (2009)’s empirical study that compared French and English speakers.

As stated previously, French is a V-language, while English is an S-language. The two languages differ in the information described by the main verb – path in V-languages, manner in S-languages – so what is more salient also differs. Pourcel predicted that this difference would cause English speakers to better memorize manner details than French speakers – that is, greater mention of manner of motion in English narratives would generate greater recall accuracy for manner details by English speakers.

Pourcel (2009) set two sequential tasks. In the first task, English and French speakers were shown a silent video and asked to describe the content of the video in their native language shortly after the presentation. Pourcel confirmed that French and English speakers had different tendencies in information encoded by a main verb. Next, Pourcel analyzed the narratives in terms of the accuracy of the information the participants offered in the immediate recall task. Verbal descriptions were considered erroneous if participants stated what was not present in the stimulus, or if they presented it incorrectly. The resulting manner and path error data showed significant cross-linguistic disparities. The information of manner was recalled and reported more accurately by English speakers than French speakers, while path information was reported more accurately by French speakers than English speakers. These cross-linguistic disparities caused Pourcel to suggest “greater

attention to manner details by English speakers and to path properties by French speakers” (Pourcel 2009: 500).

In addition to the immediate recall task, Pourcel conducted another experiment to examine participants’ late recall. Participants were asked to recall the video 24 hours after first describing the events. They were asked to answer questions to assess the accuracy of memory for specific conceptual aspects of the stimulus (e.g. *Does Charlie walk down the stairs one step at a time?* for manner; *Where does the policeman come from? And where is he going?* for path). The error rates revealed that the French participants made significantly more errors in answering manner questions than the English participants. However, English speakers made significantly more errors in answering path questions than the French speakers. Those findings are consistent with the author’s relativistic hypothesis that aspects salient in narratives (e.g., manner, path) are also salient in memory.

Although Pourcel’s result confirmed language effects on memory, it remains unclear if the verbalization itself engendered cross-linguistic disparities in memory between English and French speakers. All the participants were asked to describe video contents verbally and subsequently tested for the accuracy of manner and path information in their descriptions. It means that we are unable to determine whether the language effects are pervasive only in the verbalized environment and disappear when participants are not asked to verbalize the events, or they remain even without the verbalization. If the participants had been asked to watch the video stimuli but not to describe them in their language, would Pourcel have observed the same cross-linguistic disparities in memory? To this day, scholars have not arrived at an agreement (Lucy 2016: 505) and further studies are required

to resolve this problem.

3.3 Boroditsky, Schmidt, and Phillips (2003): Grammatical gender and memory

Previous studies on the relationship between grammatical gender and the speakers' cognition were predominantly based on "non-linguistic" tasks that were in fact not non-linguistic at all. The most common example of such a non-linguistic task is the so-called "similarity judgment," in which participants are presented with two objects and asked to answer how similar they are to each other. Obviously, since the task does not have a correct answer, participants are confused by such an odd question and rely on their subjective judgment. Thus, evidence collected from past studies that required participants to answer subjectively cannot reveal whether grammatical gender (or other comparisons, such as object vs. substance) is actually part of people's conceptual representation of an object, or whether they decided to apply grammatical gender as a strategy to tackle the strange task presented in the experiment (Boroditsky, Schmidt, and Phillips 2003: 67).

To investigate if the grammatical genders assigned to objects by language influence people's mental representations of objects, Boroditsky, Schmidt, and Phillips (2003) conducted an experiment that was not based on participants' subjective judgment. They compared German and Spanish speakers – both of these languages have grammatical gender but they do not always assign the same grammatical gender to the corresponding noun. The authors of the study gave proper human names to objects and taught those names to a group of native Spanish and German speakers – for example, an apple was named Patrick. The participants were asked to remember such object-name pairs. For both German

and Spanish speakers, half of the object-name pairs were consistent in terms of grammatical gender, while the other half were inconsistent. The authors predicted that the “apple-Patrick” pair, for example, which was consistent in terms of grammatical gender for German speakers but inconsistent for Spanish speakers, would be recalled better by German speakers than Spanish speakers.

Before introducing the results, it should be noted that the experiment was conducted entirely in English, regardless of the participants’ native language. The authors did so to ensure that the words or expressions used in the experiment conveyed exactly the same message. Moreover, using English as a common language in the experiment also allowed the authors to assess the language effects on people’s thinking (in this case, memory) more generally. If the language effects are still observed under the environment where the participants cannot necessarily access their native language in their mind, their thinking shaped by their native language remains available even when they are exposed to another language.

The result of the experiment that investigated the participants’ memory of object-name pairs showed cross-linguistic differences in terms of what was better recalled between German and Spanish speakers. As predicted, both the populations’ memory for object-name pairs was better for pairs where the gender of the proper name was the same as the grammatical gender of the object name than when the two genders were not the same. Furthermore, a group of English speakers who joined in the experiment as a control group recalled the object-name pairs correctly overall. That is, object-name inconsistent pairs either in German or in Spanish were recalled well by English speakers. Based on this result,

the authors argued that previous language experiences interfered with the participants' ability to remember object-name pairs when the pairs were conceptually inconsistent in grammatical gender (Boroditsky, Schmidt, and Phillips 2003: 69). The result does *not* imply that grammatical gender *helps* speakers to memorize object-name pairs accurately when the pairs are consistent in gender. This is because the English speakers, who do not have grammatical gender in their language, remembered the object-name pairs well.

This experiment is significant in that it confirmed that language effects on memory were persistent even when people were using a language that was not native to them. The previous language experience of German or Spanish speakers affected their thinking even when they were not using their language.

3.4 Fausey and Boroditsky (2011)

Previous linguistic analyses have suggested that some languages prefer agentive descriptions, while others use non-agentive descriptions when an event is non-intentional (Cunningham, Vaid and Chen 2010; Slobin and Bocaz 1988). For example, English prefers agentive descriptions, such as “He broke the vase,” even when the action is obviously non-intentional. In contrast, Spanish prefers non-agentive descriptions, such as “The vase broke,” when the action is non-intentional. Fausey and Boroditsky (2011), whose work was based on Fausey’s dissertation (2010), investigated whether this linguistic preference for agentivity in event descriptions affected speakers’ eye-witness memory¹. They explored the

¹ The term “eye-witness memory” is often used in forensic psychology and the judicial system, and refers to a person’s episodic memory for a crime or an event that they witnessed (Laney and Loftus 2019). For example,

following research question: if events are described less agentively in a language, would the speakers be less likely to pay attention to the agents and have difficulty in remembering the agent than speakers who describe events agentively? If so, that result would be substantial evidence of the Whorfian effect.

First, Fausey and Boroditsky examined whether there were any differences between event descriptions in English and Spanish. They then tested whether the differences in language had any effects on eye-witness memory. In the study's video stimuli, two actors, dressed in different colors, either intentionally or non-intentionally acted on an object. In the verbal description task, both English and Spanish speakers, who had been asked, "What happened?" ("*¿Qué pasó?*"), described intentional events equally agentively, for example, "He popped the balloon." Non-intentional events, however, were more often described agentively by English speakers than by Spanish speakers. Most of the non-agentive Spanish sentences were marked by the clitic *se*, as in "*Se rompió el florero*" (literally, "The vase broke itself"), when describing the non-intentional events. In short, in this study English and Spanish speakers described intentional events in a similar way but differed in their description of non-intentional events.

A different group of English and Spanish speakers participated in the eye-witness memory task. In the exposure phase, participants watched the same videos used in the verbal description task. Participants were not required to describe the events verbally, and they were not given any linguistic descriptions. In the next phase, they were shown an additional set of videos depicting all the same events in which a new, third actor performed

it can refer to an individual's memory of the criminal's face.

the same actions. Participants were then shown photographs of the two people who appeared in the previous exposure phase and asked to identify either actor as the person “who did it the first time.” The results showed that, on the one hand, both English and Spanish speakers remembered intentional agents well. On the other hand, non-intentional agents were significantly better remembered by English speakers than by Spanish speakers.

Those results led Fausey and Boroditsky to conclude that eye-witness memory for even such transient events might be sensitive enough to be influenced by linguistic patterns that differ across languages. Linguistic preference toward event descriptions can predict patterns in people’s eye-witness memory of the agents even when the person is not using language.

3.5 Fausey et al. (2010)

Fausey and colleagues performed another experiment to examine the eye-witness memory of English and Japanese speakers, using the same paradigm as Fausey and Boroditsky (2011) used. Like Spanish speakers, Japanese speakers tend to use different verb forms when describing non-intentional events and intentional events. The authors wanted to determine whether the difference in eye-witness memory between English and Spanish speakers would be confirmed between English and Japanese speakers as well.

In the verbal description task, English and Japanese speakers watched videos of intentional and non-intentional events and were required to describe these events by answering the question “What happened?” or in Japanese “*Naniga okorimashitaka?*” As expected, both English and Japanese speakers described intentional events agentively.

However, Japanese speakers tended to describe non-intentional events less agentively than English speakers.

Another group of participants joined in the eye-witness memory task. The procedure was identical to that of Fausey and Boroditsky (2011). The results showed that both English and Japanese speakers had good recall of the agents in intentional events. In non-intentional events, however, English speakers remembered the agents significantly better than Japanese speakers. The authors concluded that the cross-linguistic difference was caused not by the participants' cultural background (i.e., Americans, Japanese) but by other factors, such as language.

The authors of this study went on to raise an important question: do patterns in language per se (in this case, agentive or non-agentive language) shape people's attention to agents? The question is significant because English and Japanese speakers live in distinct cultures. Even if the difference in the memory task between English and Japanese speakers are observed only in non-intentional events, the difference could not be ascribed to language patterns only. The reason is that the preferred language patterns might be formed by culture or other factors. It is possible that cultural ways of thinking lead to patterns in languages, or the other way around, or both.

To more directly test whether patterns in language cause people to pay more or less attention to agents, the authors set an additional experiment. Only English speakers participated in the experiment. Half of the participants were exposed to agentive linguistic expressions, and the rest to non-agentive linguistic expressions in the listening session. While listening to the prime sentences describing various events (e.g., "He burned the

toast.” / “The toast burned.”), the participants were asked to choose a still image that was consistent with what they had heard. After the session, all the participants worked on the same agent memory task that Japanese and English speakers had performed previously. Specifically, they were required to watch causal event stimuli and answer the question “Who did it the first time?” when presented with photographs of the two people. Finally, the hypothesis that exposure to an agentive language leads people to remember the agent better than exposure to the non-agentive language was supported. It appears that the linguistic environment impacts how well people remember the agent. From the results, the authors extrapolated that patterns in language use predicted patterns in eye-witness memory in the two groups. Moreover, exposure to a particular language pattern can cause people to shift the points that they prefer to pay attention to.

The study by Fausey and others should be appreciated for first considering culture as a possible factor in the generation of the difference between the two groups. However, the study is flawed in several respects, and these defects might stem mainly from the lack of linguistic analysis of the Japanese language. First, the interrogative sentence used to measure the speakers’ eye-witness memory of agents in events is poorly formed. As stated earlier, participants were asked, “Who did it the first time?” I believe that it is not possible to provide an exact translation of that question in Japanese. Fausey and colleagues asked Japanese speakers either “*Saishoni darega soreo shimashitaka?*” or “*Daiikkaimeni darega soreo shimashitaka?*” as a translation of “Who did it the first time?” Although they used this question after discussion with native Japanese speakers, some Japanese speakers, including myself, still find both expressions unidiomatic.

Second, the authors' video stimuli included several non-intentional events where Japanese speakers could use only an intransitive or transitive construction. That is, English speakers could choose either an agentive or a non-agentive sentence (and they ended up preferring an agentive description), while Japanese speakers had no such option in some of the non-intentional due to idiomatic limitation. To fairly examine language effects on the speakers' eye-witness memory of agents, both English and Japanese speakers should have been able to pick either construction completely free from idiomatic limitation. Not only Fausey et al. (2010) but also other previous studies lacked a detailed examination of the target languages. Consequently, the studies were based on some inappropriate assumptions, and the experiments were poorly designed.

3.6 Filipović (2013, 2018)

Filipović (2013) compared English and Spanish speakers' eye-witness memory. As Fausey and Boroditsky (2011) demonstrated, English speakers tend to describe both intentional and non-intentional events agentively, whereas Spanish speakers are prone to describe non-intentional events non-agentively. Filipović set out to examine if the difference in descriptions affected how English and Spanish speakers recalled events, but not in terms of the agents. She hypothesized that Spanish speakers would recall event nature (i.e., intentional or accidental) more accurately than English speakers when asked whether the event was non-intentional or intentional since they use different constructions for intentional and non-intentional events.

In the study, Filipović first recorded the descriptions of several intentional and

non-intentional events, then she tested the memory of event nature. The results of the verbal description were consistent with those of Fausey and Boroditsky (2011). English speakers described every event agentively and did not specify the intentionality of the events, while Spanish speakers distinguished between intentional and non-intentional events through the use of different constructions.

A new group of participants joined in the recall test. Half of them were asked to verbally describe each event presented, while the other half was not. The common task was to recall if the event was intentional or non-intentional. For example, participants were asked, “Did you see a blue balloon pop?” and required to put a tick one of the two boxes that were marked “intentional” and “non-intentional” on the answer sheets. The results showed that the presence/absence of verbalization did not affect participants’ memory performance, while language did play a role in the accuracy of recall. English and Spanish speakers did not differ in the number of correct answers for intentional events. However, in the case of non-intentional events, Spanish speakers produced significantly more correct answers than English speakers – that is, Spanish speakers remembered if the event was intentional or non-intentional more accurately than English speakers did.

In a study of English speakers learning Spanish and Spanish speakers learning English, Filipović (2018) found similar language effects. In the verbalization task, bilingual speakers who had learned Spanish or English for six months preferred to use the constructions of their first language (L1) even when tested in their second language (L2). Specifically, native English speakers learning Spanish preferred “English-like” constructions when tested in Spanish, and vice versa. In the memory test, too, the L1 effect

was more robust than the L2 effect. The result of native Spanish speakers learning English was similar to that of monolingual speakers of Spanish, and not to the result of native English speakers. The native Spanish speakers learning English remembered if the events were intentional or non-intentional better than L1 English/L2 Spanish speakers. The results are consistent with the pervasive idea that bilingual speakers speak L2 while thinking in L1.

Based on those results, Filipović suggested that the difference in the recall test between English and Spanish speakers was caused by habitual ways of framing events in each language. However, her research lacked an examination of the target languages. In her 2013 study, Filipović reported that no Spanish descriptions were ambiguous constructions in terms of event intentionality (i.e., her figure was 0%). However, she failed to clarify how she classified the event descriptions, and it is even possible that she sorted them arbitrarily.

3.7 Summary

In this chapter, I reviewed seven studies that examined language effects on memory. Research that confirmed language effects on memory could be interpreted as evidence for Slobin's *thinking for speaking* effect that "language directs us to attend while speaking to the dimensions of experience that are enshrined in grammatical categories" (Slobin 1996: 71), although they did not necessarily frame the results in this manner. In other words, systematic linguistic differences in the expression engender "long-term and pervasive effects on mental representation and conceptual processes" (Slobin 2003: 179). Consequently, speakers whose language requires them to make a distinction in a particular domain (e.g., color, agentivity) become sensitive to such a distinction and have good recall

in that domain. In Filipović's work, for example, Spanish speakers habitually paid attention to the event nature (i.e., whether the event is intentional or accidental) in the process of speaking the language. In the next chapter, I will replicate the study conducted by Filipović (2013) using Japanese and English speakers.

Chapter 4. Linguistic descriptions of causal events by Japanese and English speakers

4.1 Purpose of Chapter 4

The main aim of this thesis is to elucidate how Japanese and English speakers describe causal events differently and to explore whether the differences in the languages generate any differences in speakers' eye-witness memory. In this chapter, I report on the results of the experiment, in which Japanese and English speakers were shown video clips of causal events, and in the next chapter I will report on the eye-witness memory test. Before reporting on the experiment, to avoid a rambling discussion, I shall define the terms used in this thesis. First of all, "causal events" are defined here as events where a human acts on an object and causes a state change. In general, causal events are categorized into two groups: intentional events and non-intentional events. Here, the former is defined as events where a human intentionally acts on an object and it changes as they predict. In contrast, non-intentional events include events where a human intentionally acts on an object but something unexpected happens to the object itself or to objects around it. For example, when someone reaches for a book on the top shelf and successfully grabs the book, the causal event should be considered intentional. However, when they reach for a book but fail to grab it, causing the book to drop to the floor, the event is non-intentional. In both of these events, the book changes its location; however, in the latter event, the agent did not predict that the book would change its location in that way.

- d. Hon-ga ochi-ta.
book-NOM drop.INTR-PST
'The book dropped.'
(Constructed)

As the sentences in (4.1a) and (4.2a) show, English can use transitive constructions without accidental markers for both intentional and non-intentional events. However, in Japanese, transitive sentences without such markers are less acceptable in non-intentional events. Transitive verbs in Japanese, in general, imply that the action is performed on purpose. Even though constructions like (4.2b) are not grammatically incorrect, Japanese prefers to use an agentive verb with *-teshimau*, a marker of non-volitionality, as in (4.2c), or it uses an unaccusative verb implying the lack of intention, as in (4.2c).

Spanish is different from Japanese, as Filipović (2013, 2018) explained, in that they prefer sentences with reflexive verbs for non-intentional events to transitive verbs with accidental markers. That is, Spanish preferably uses sentences like (4.2d). Moreover, Japanese could use transitive sentences without any markers in some cases. Specifically, it is possible to say “*Saifuo otoshita*” (“I dropped my wallet”) even when it is accidental. The reason why accidental markers in this case are not always required seems to be that it is clear that nobody drops their wallet on purpose. In the two respects mentioned above, Japanese and Spanish are distinct from each other, which makes it meaningful to replicate Filipović’s previous research with Japanese and English speakers.

In Experiment 1, I elicited event descriptions of causal events – intentional and non-intentional – from English and Japanese speakers in order to investigate how they described causal events.

4.2 Experiment 1

In Experiment 1, native Japanese and English speakers watched short videos of intentional and non-intentional events and described the content of each video in their native language. In addition to the event descriptions, they were required to report whether the event was intentional or non-intentional.

4.2.1 Method

Participants

Twenty-three English speakers (12 males and 11 females, $M = 42.00$ years, $SD = 13.39$) and 29 Japanese speakers (16 males and 13 females, $M = 21.69$ years, $SD = 2.95$) participated in Experiment 1 in exchange for payment. English participants living in the United States were recruited on Amazon Mechanical Turk (MTurk), and Japanese participants living in Japan were recruited from students at Kyoto University. Two of the English participants reported that they were able to speak Chinese but with low fluency. All Japanese participants were functionally monolingual.

Materials

Participants read instructions in their native language. They were shown 22 short and silent videos. The 22 videos included nine intentional events, eight non-intentional events, and five filler items (see Table 4.1 for target items). In the videos of intentional and non-intentional events, a man physically acted on an object. In the non-intentional events, the man's reaction was added to show non-intentionality. For example, in the non-intentional version of the balloon popping, he displayed a surprised facial expression after the balloon accidentally popped.

Table 4.1 Causal event stimuli in Experiment 1

Causal event	Intentional	Non-intentional
Knock down domino	Man set up domino and knock them down	Man set up domino on desk, bump desk when standing up, causing domino to knock down
Turn on lamp	Man turn on lamp on desk	Man turn on lamp when reaching for something
Tear paper	Man tear paper in half	Man tear paper when erasing something on paper
Drop box	Man knock tissue box off desk	Man drop box when opening book
Turn off light	Man turn off light by pressing button	Man turn off light when leaning against wall
Close book	Man shut book closed	
Pop balloon_1	Man pop balloon with needle	Man pop balloon when trying to tie it up
Pop balloon_2	Man pop balloon with finger	Man twist balloon, causing it to pop
Drop book	Man drop book onto floor	Man reach for book on top of bookshelf, but fail to grasp it, dropping it

Procedure

Participants watched 22 videos and were asked to provide an event description for each video. The instruction was “*Dougano naiyoo kanketsuni setumei shitekudasai*” (“Please describe the video content briefly”) in Japanese and the counterpart in English was “Describe the video content briefly.” It is important to note that I did not ask the

participants, “*Naniga okorimashitaka?*” (“What happened?”) There are two reasons for this. First, asking Japanese speakers what happened in this way implies that something negative or serious occurred, as pointed out in 2.3.2. The interrogative sentence, once translated, is therefore interpreted differently by Japanese and English speakers. Second, “*Naniga okorimashitaka?*” (“What happened?”) could unnecessarily cause Japanese speakers to answer the question using intransitive constructions even when both transitive and intransitive verbs are available. Participants typed up their descriptions, and when these had been completed, they were asked to judge whether the man’s action was volitional or not.

Watch this video once.

Describe the video content briefly. *

記述式テキスト（長文回答）

Was the man's action volitional? *

☐ Non-volitional

☐ Volitional

Figure 4.1 Capture from Experiment 1 for English participants

They were required to start watching each video by themselves.

4.2.2 Analysis of event descriptions

Event descriptions that did not refer to the result state and obviously failed to explain the video content were excluded from analysis. Descriptions that correctly depicted causal events but failed to judge the event's intentionality/contingency were excluded from analysis as well.

After excluding inappropriate descriptions, I classified all the descriptions into three groups according to the extent to which they explicitly marked event intentionality/contingency. The first group, called “Explicit,” includes the descriptions that clearly indicate by using lexical items whether the event is intentional or accidental. The second group, called “Implicit,” includes the descriptions that do not indicate the intentionality/contingency of events by using lexical items but do allow us to infer easily whether the event is intentional or accidental. Finally, in the last category, “Ambiguous,” it is impossible to judge whether the event is intentional or accidental upon reading the sentence. I discuss how to classify the event descriptions into the three groups in the section below. In this thesis, the terms “Explicit,” “Implicit” and “Ambiguous,” starting with capital letters, indicate the category to which each description belongs. When the words start with lowercase (i.e., explicit, implicit, and ambiguous), they are being used as adjectives in their original meaning.

4.2.2.1 English

Explicit descriptions

A. Intentional/Accidental Marker

Typical examples of Explicit descriptions include intentional/accidental markers, such as *purposely* and *accidentally*.

(4.3) Intentional²

- a. He purposely popped a balloon.
- b. The man intentionally tears a sheet of paper in half.

(4.4) Non-intentional

- a. A man played with a balloon and accidentally popped it.
- b. Setting up dominoes and knocking them over by accident.

B. Negative/Positive Feeling

Non-intentional descriptions that include the agent's negative feeling are also in the Explicit group. They should be Explicit because they cannot co-occur with an intentional marker like *purposely*.

² Henceforth, "Intentional" refers to the event descriptions observed in Experiment 1 for intentional stimuli and "Non-intentional" refers to those for non-intentional stimuli. It should be noted that both of the terms do not indicate how the sentences are interpreted.

(4.5) Non-intentional

- a. Man lines up blocks by color, stands up, knocks down blocks and puts hands on head in frustration.
- b. *Man lines up blocks by color, stands up, purposely knocks down blocks and puts hands on head in frustration.

Negative Feeling also includes a neutral expression in terms of feelings as in (4.6a).

(4.6) Non-intentional

- a. A man turns on a light and jumps back, surprised.
- b. *A man purposely turns on a light and jumps back, surprised.

Obviously, (4.5a) and (4.6a) cannot co-occur with *purposely* because we know that nobody intentionally does something surprising or frustrating. For the same reason, intentional descriptions with positive feelings should also be Explicit.

(4.7) Intentional

- a. He turned the light off with a happy expression on his face.
- b. *He accidentally turned the light off with a happy expression on his face.

The sentence (4.7b) is unacceptable again. Therefore, the event descriptions with positive expressions should be Explicit.

C. *By*-gerund sentence

One can add ‘*by*-gerund’ to a transitive verb. Sentences modified by a *by*-phrase are judged unacceptable by native English speakers when they co-occur with an accidental marker.³

(4.8) Intentional

- a. The man turned off the light by touching it.
- b. *The man accidentally turned off the light by touching it.

(4.8b) is unacceptable, perhaps because the intentional interpretation of the transitive verb *turn off* is reinforced by the *by*-gerund phrase.

D. *Use*-sentence

The term “*use*-sentence” refers to the sentences that include the verb *use* as a main verb, followed by a *to*-infinitive phrase. The object of *use* is as an instrument to complete the action.

³ Three native speakers of English worked on the acceptability judgment test. None of them participated in Experiment 1. Two of them were from the United States, and the other was from Canada.

(4.9) Intentional

- a. A young man uses his finger to turn off two light switches.
- b. A man used a pin to pop a green balloon.

According to Rissman and Rawlins (2017: 519), *use*-sentences usually depict intentional actions. They demonstrated that English has two types of sentences to depict an instrument in sentences: *use*-sentences and *with*-sentences. In contrast to *use*-sentences, *with*-sentences could be interpreted as either intentional or accidental actions although both of them describe an instrument. *With*-sentences will be discussed later.

E. *But*-sentence

Non-intentional descriptions in which an intentional phase and a non-intentional phase are connected by *but* should be Explicit.

(4.10) Non-intentional

- a. A young man blew up a balloon but popped it when he was trying to tie it.
- b. A person blows up a balloon, attempts to tie it, but pops it.

Sentences connected by *but* are judged Explicit because the conjunctive *but* is used when the subsequent clause implies an unexpected event (Kennedy 2003: 263; Harley 2006: 190)⁴. That is, the two events in the two clauses connected by *but* have no expected relationship between them. Thus, *but*-sentences explicitly mark that the latter event is accidental and unexpected.

Implicit descriptions

A. *Try*-sentence

As mentioned at the beginning of the chapter, the non-intentional events are where an agent intentionally acts on an object but something happens that they did not expect. Because of this, many participants described the original purpose for the agent to act on the object and mentioned that the purpose was not accomplished. “*Try*-sentence” refers to the sentences that depict the original purpose by *try* [*trying/tried*] *to*-infinitive.

Try-sentences are classified into two groups according to verb types used in the clause describing the result state – transitive or intransitive verbs. The descriptions where the main verb causing the result state is transitive are discussed first.

(4.11) Non-intentional

- a. The man wrote on the paper then ripped it as he tried to erase.

⁴ In general, *but* as a coordinate conjunctive has two roles: unexpected contrast and contradiction (Kennedy 2003: 263). For example, in *this is not green but blue*, the *but* refers to a contradiction.

- b. A man is trying to make a balloon and pops the balloon.
- c. The man popped the balloon while trying to tie it.
- d. A man dropped a book as he tried to reach it on a top shelf.

To decide which group they should be in, I inserted *accidentally/purposely* immediately before the transitive verbs, and then tested whether they were acceptable.

- (4.11') a. The man wrote on the paper then accidentally ripped it as he tried to erase.
- b. ??The wrote on the paper then purposely ripped it as he tried to erase.
- c. The man accidentally popped the balloon while trying to tie it.
- d. ??The man purposely popped the balloon while trying to tie it.

As (4.11') shows, when a transitive verb is used as a main verb that causes the result state, *accidentally* is acceptable, but not *purposely*. The reason why *try*-sentences do not accept *purposely* is that the original sentences imply that the result state was not expected but accidental. For this reason, *try*-sentences with a transitive verb should be Implicit.

Second, the other *try*-sentences include an intransitive as a verb describing the result state. (4.12) are the examples.

(4.12) Non-intentional

- a. Man is trying to tie a balloon animal and the balloon pops.
- b. He tried to take a book off the shelf and it fell.
- c. The balloon popped when he's trying to tie the balloon. [sic.]

As in (4.11'), I conducted the insertion test but with a different lexical item. Since *purposely* cannot co-occur with any intransitive verb, here I inserted *expectedly* before the main verb and tested whether they were acceptable.

- (4.12') a. Man is trying to tie a balloon animal and the balloon accidentally pops.
- b. ??Man is trying to tie a balloon animal and the balloon expectedly pops.
- c. The balloon accidentally popped when he's trying to tie the balloon.
- d. ??The balloon expectedly popped when he's trying to tie the balloon.

As is the case in (4.11'), the original sentences accept *accidentally* but not *expectedly*.

Again, it means that the original sentences may imply that the event is accidental even without accidental markers. In short, *try*-sentences should be in the Implicit group regardless of the kind of verb used as a main verb causing/describing the result state.

B. Result-state sentence

A few participants described the original result state in sentences like (4.13a), which are similar to *try*-sentences.

(4.13) Non-intentional

- a. Man twists balloon into segments, and balloon breaks.

In this case, unlike *try*-sentences, the main verb was always intransitive and the latter clause was often connected by *and*. I then replaced *and* with *but/so* separately and tested whether they were acceptable. As mentioned, *but* implies that something unexpected happens, given the clause that follows *but* (Kennedy 2003: 263; Harley 2006: 190). In contrast, *so* implies that something that was expected happened. Therefore, if it is possible to replace *and* with *but* but not with *so*, the original sentence implicitly marks event contingency. If it is possible to replace *and* with *so* but not with *but*, then the original *and*-sentence implicitly marks event intentionality.

- (4.13') a. Man twists balloon into segments, but balloon breaks.
 b. ??Man twists balloon into segments, so balloon breaks.

The result-state sentences can accept *and* but not *so*. It means that there is not an expected relationship between the former and the latter clause in the original sentences. Specifically,

the relationship where the balloon-bursting event is not expected from the twisting-balloon event is already implied in the original sentence. For the same reason that applies to *try*-sentences, the result-state sentences should be in the Implicit group.

C. *And*-sentence

“*And*-sentence” refers to the sentences where a transitive clause and an intransitive clause are connected by *and*, such as (4.14) and (4.15).

(4.14) Intentional

- a. A young man pushed two buttons and it appeared that two lights turned off or dimmed.
- b. A man struck an inflated balloon on the desk in front of him and it popped.

(4.15) Non-intentional

- a. He opened a book and something fell off the desk.
- b. The man reached for a book and then the book fell on the ground.
- c. Man twists balloon and it pops.

To judge intentionality, I conducted the replacement test with *but* and *so* again.

- (4.14') a. A young man pushed two buttons so it appeared that two lights turned off or dimmed.
- b. *A young man pushed two buttons but it appeared that two lights turned off or dimmed.
- (4.15') a. *He opened a book so something fell off the desk.
- b. He opened a book but something fell off the desk.
- c. Man twists balloon so it pops.
- d. *Man twists balloon but it pops.

(4.14'a) is acceptable because the light turning off which is included in the latter clause is expected when the pushing of the buttons described in the former clause is executed. In other words, the two events are in an expected relationship. Naturally, (4.14'b), replaced with *but*, is unacceptable. In this case, even if the two clauses are connected by *and*, which is neutral in meaning, we can infer with ease that the man purposely pushes the button and what he expected comes true.

As for (4.15'a) and (4.15'b), (4.15'a) is unacceptable because opening a book and something falling off are not in an expected relationship. For *and* to be replaced with *so*, the latter event should be expected given that the former event happens. In this case, the replacement with *but* is acceptable, as in (4.15'b). Even if the two clauses are connected by a neutral conjunctive, we can easily guess that the man does not expect something to fall off the desk when he opens the book.

The fact that (4.15'c) is acceptable while (4.15'd) is not is interesting because it means that the original sentence (4.15c) appears intentional without context. Specifically, twisting the balloon in the former clause and its popping are in an expected relationship, which is why the replacement with *so* is acceptable. In this case, what implicitly marks event intentionality is used to describe the non-intentional event.

Ambiguous descriptions

A. Bare Transitive Sentence

“Bare Transitive Sentence” refers to those sentences that use a transitive verb as a main verb without any modifications.

(4.16) Intentional

- a. A man turns a switch off.
- b. Man pushes tissue box off desk.

(4.17) Non-intentional

- a. A man knocks over the pieces on the desk.
- b. Man turning on and knocking light.

In general, Bare Transitive Sentences are considered to depict intentional acts; however, in (4.16) and (4.17), it is not possible to judge whether the sentence depicts an intentional or

accidental event because of the lack of context. Further, we can add both *accidentally* and *purposely* to all of those sentences. Thus, sentences like (4.16) and (4.17) should be Ambiguous.

B. *With*-sentence

As mentioned earlier, English has two means to depict an instrument: the *use*-sentence and the *with*-sentence. *With*-sentences are those that depict an instrument in a *with*-phrase, as in (4.18) and (4.19). Unlike *use*-sentences, the intentionality that can be understood in *with*-sentences is both intentional and non-intentional and is undetermined without context.

(4.18) Intentional

- a. A man knocked a Kleenex box off the desk with his hand.
- b. A man popped a balloon with a pin.

(4.19) Non-intentional

- a. Guy knocks tissue off desk with elbow.

Rissman and Rawlins (2017: 526) argued that events depicted in *with*-sentences could be interpreted either as intentional or non-intentional based on context. That is, in order to judge intentionality of sentences like (4.18) and (4.19), context is required.

When two native English speakers, who did not participate in Experiment 1, were presented with (4.19a), without the video, both of them judged it as an intentional event. Interestingly, when *elbow* was replaced with other body parts, such as *head*, *leg*, *finger*, and *hip*, their interpretations diverged. The sentence with *finger* was judged intentional by both speakers, while the others were considered intentional by one and accidental by the other. It is evident, therefore, that intentionality cannot uniformly be judged based only on the sentence; context is required. That is the very reason for *with*-sentence to be in the Ambiguous group.

4.2.2.2 Japanese

Explicit descriptions

A. Intentional/Accidental Marker

Typical examples of Explicit descriptions include an intentional/accidental adverb, such as *itotekini* (purposely) and *ukkari* (inadvertently).

(4.20) Intentional

- a. Tisshubako-o itotekini tsukue-kara hatakiotoshi-ta.
 tissue box-ACC purposely desk-from knock off.TR-PST
 ‘(He) purposely knocked the tissue box off the desk.’

(4.21) Non-intentional

- a. Ukkari denki-o keshi-ta.
 inadvertently light-ACC turn off.TR-PST
 ‘(He) inadvertently turned off the light.’

Japanese speakers tended to prefer such accidental markers with *-teshimau*. This will be discussed next.

B. *-Teshimau*

-Teshimau is a grammaticalized form composed of *-te* (conjunctive) and *shimau* (the verb meaning *put away*). It has an aspectual and a subjective meaning. When used as an aspectual marker, it means perfective. When not, it can convey a variety of meanings: lack of intention, regret, pity, and so forth. In fact, the subjective meanings of *-teshimau* have been discussed extensively by linguists in Japan (Chang 2017; Isshiki 2011; Kindaichi 1976; and others). Moreover, it is still under discussion whether *-teshimau* per se plays the role of removing intentionality, or if it functions to do so only in particular contexts.

Whatever the case, in the experiment for this study, *-teshimau* played the role of cancelling the agent's intention.

(4.22) Non-intentional

- a. Domino-o taoshi-teshimat-ta.
 domino-ACC knock down.TR-teshimau-PST
 '(He) accidentally knocked down the dominoes.'
- b. Baruun-o hinet-te i-te
 balloon-ACC twist.TR-CONJ PROG-CONJ
 ware-teshimau.
 pop.INTR-teshimau
 '(He) is twisting the balloon and (it) accidentally pops.'

Naturally, *-teshimau* frequently co-occurred with accidental markers.

(4.23) Non-intentional

- a. Domino-o ayamatte taoshi-teshimat-ta.
 domino-ACC mistakenly knock over.TR-teshimau-PST
 '(He) mistakenly knocked over the dominoes.'

- b. Dansei-ga nagabosoi fuusen-o
 man-NOM long and thin balloon-ACC
 nejir-ou to shi-ta sai, itosezu
 twist.TR-try to CONJ do-PST when unintentionally
 ware-teshimat-ta.
 pop.INTR-teshimau-PST
 ‘When the man tried to twist the long and thin balloon, (it) unintentionally
 popped.’

In this analysis, the sentences with *-teshimau* are included in the *-teshimau* category that explicitly marks the lack of intention, regardless of the presence/absence of accidental markers.

B. Bare Intransitive Sentence

“Bare Intransitive Sentence” refers to the sentences that use an unaccusative verb as a main verb with no markers.

(4.24) Non-intentional

- a. Hako-ga ochi-ta.
 box-NOM drop.INTR-PST
 ‘The box dropped.’
- b. Senaka-ga atat-te denki-ga kie-ta.
 back-NOM hit.INTR-CONJ light-NOM turn off.INTR-PST
 ‘(His) back hit (the wall), and the light turned off.’

They are Explicit because unaccusative verbs are non-intentional by definition.

C. *De*-instrumental

In Japanese, we can describe an instrument using the case particle *de*. Here the sentences that use a transitive verb as the verb that is modified by *de* are called *de*-instrumental.

(4.25) Intentional

- a. Fuusen-o te-de wat-ta.
 balloon-ACC hand-INS pop.tr-PST
 ‘(He) popped the balloon with (his) hand(s).’

- b. Domino-o yubi-de oshi-te
 domino-ACC finger-INS push-CONJ
 taoshi-ta.
 knock down.TR-PST
 ‘(He) pushed and knocked down dominoes with (his) finger.’

Suzuki (2006: 245) and Moriyama (1988: 205) argued that a transitive sentence with *de*-case involving the change-of-state of an object was always interpreted as an intentional action. Thus, *de*-instrumental should be Explicit. Interestingly, although the Japanese *de*-case is almost parallel to English *with*-phrase, they are different in terms of intentionality. However, there is an odd sentence of *de*-instrumental in the non-intentional descriptions.

(4.26) Non-intentional

- a. Keshigomu-de kami-o yabui-ta.
 eraser-INS paper-ACC tear.TR-PST
 ‘(He) tore paper with the eraser.’

When presented with (4.26a) without the stimulus, most Japanese speakers would usually imagine a situation where someone purposely tore a piece of paper using an eraser. This

sentence should therefore be regarded as a rare case where what explicitly marks intentionality was used to describe the non-intentional stimulus.

E. Manner Sentence

“Manner Sentence” indicates sentences that include the information about how the agent acts on the object. Those including an adverb *ikioiyoku* (with force) are in the Explicit group, because they cannot co-occur with *ukkari* (inadvertently).

(4.27) Intentional

a.	Hon-o	<u>ikioiyoku</u>	toji-ta.
	book-ACC	with force	close.TR-PST
	‘(He) closed the book with force.’		
b.	?? <u>Ukkari</u>	hon-o	<u>ikioiyoku</u> toji-ta.
	inadvertently	book-ACC	with force close.TR-PST

F. Negative/Positive Feeling

As was the case of the English speakers, there were sentences that included the agent’s feelings. Since those expressing positive feelings cannot co-occur with *ukkari* (inadvertently), they should explicitly depict intentional events.

(4.28) Intentional

- a. Dansei-ga egao-de tisshubako-o haraiotoshi-ta.
 man-NOM smile-with tissue box-ACC knock off.TR-PST
 ‘The man knocked off the tissue box with a smile.’
- b. ??Dansei-ga egao-de ukkari tisshubako-o
 man-NOM smile-with inadvertently tissue box-ACC
 haraiotoshi-ta.
 knock off.TR-PST

In addition to positive feeling, descriptions with negative feeling were also observed. Yet, they almost always co-occurred with *-teshimau*. Such sentences are regarded as being in the *-teshimau* category. The sole depiction with negative feeling without *-teshimau* is (4.29a).

(4.29) Non-intentional

- a. ... dengen-ga hairi, odoroi-ta.
 ... switch-NOM turn on.INTR be surprised-PST
 ‘[...] the switch turned on, and (he) was surprised.’

G. *Hyoshini/Hazumide*

One of the unique features of Japanese is *hyoshini* and *hazumide*. The former is composed of *hyoshi* (a beat) and a particle *-ni*, and it means “at the moment.” The latter also consists of *hazumi* (a momentum) and a particle *-de*, and it means “by force of.” They are usually followed by a non-voluntary verb.

(4.30) Non-intentional

- a. Dansei-ga burokku-o narabe, tat-ta
 man-NOM block-ACC arrange stand up-PST
 hyoshini kuzure-ta.
 at the moment knock over.INTR-PST
 ‘When the man arranged the blocks and stood up, (they) knocked over.’
- b. Hon-o hirai-ta hyoshini
 book-ACC open.TR-PST at the moment
 tisshubako-o otoshi-ta.
 tissue box-ACC drop.TR-PST
 ‘At the moment (he) opened the book, (he) dropped the tissue box.’

- c. Fuusen-o fukuramase, nemoto-o
 balloon-ACC inflate.TR root-ACC
 musub-ou to shi-tara hazumide
 tie.TR-try to CONJ do-CONJ by force of
 ware-ta.
 pop.INTR-PST
 ‘When (he) inflated the balloon and was trying to tie it up, it popped.’

Tanaka (2010: 247-8) discussed the meanings of *hyoshini* and *hazumide* and concluded that they were used when a certain expected action was disturbed by an external stimulus. Thus, the part that follows *hyoshini* and *hazumide* depicts events that arise from a cause beyond the agent’s control. In fact, I can validate Tanaka’s conclusion by referring to the corpus of written Japanese (Balanced Corpus of Contemporary Written Japanese; BCCWJ). All sentences in the corpus that include *hyoshini* and *hazumide* describe non-intentional actions. Thus, sentences like (4.30) explicitly describe the lack of intention.

H. -*Temiru*

-*Temiru* is a grammaticalized form composed of the conjunctive *-te* and *miru* (to look). It generally means trying to do something. Its meanings were discussed by Yoshikawa (1975) and its grammaticalization path was discussed in detail by Shimada (2009). Except when it

is used in the conditional phrase, the construction that includes *-temiru* requires the agent's intention (Shimada 2009: 134).

(4.31) Intentional

- a. Fuusen-o haretsusase-temi-ta.
balloon-ACC explode.TR-temiru-PST
'(He) tried exploding the balloon.'
- b. *Fuusen-o ukkari haretsusase-temi-ta.
balloon-ACC inadvertently explode.TR-temiru-PST
- c. Domino-o taoshi-temi-ta.
domino-ACC knock down.TR-temiru-PST
'(He) tried knocking down the dominoes.'
- d. *Domino-o ukkari taoshi-temi-ta.
domino-ACC inadvertently knock down.TR-temiru-PST

As (4.31b) and (4.31d) show, *-temiru* sentences would not accept accidental markers like *ukkari* (inadvertently). Since *-temiru* sentences are available only in the intentional contexts, they should be Explicit.

I. *Saini*

The last Explicit example includes *saini*, which was not frequent. *Saini* literally means “at the time,” but the two clauses connected by it seem to be characterized by “unexpectedness,” especially when the former clause includes an unergative verb and the latter includes an intransitive verb.

(4.32) Non-intentional

- a. Keshigomu-de kesu saini kami-ga
 eraser-INS erase at the time paper-NOM
 yabure-ta.
 tear.INTR-PST

‘At the time of erasing (something), the paper tore.’

- b. ??Suicchi-o oshi-ta saini
 switch-ACC push.TR-PST at the time
 denki-ga tsui-ta.
 light-NOM turn on.INTR-PST

‘At the time of pushing the switch, the light turned on.’ (Constructed)

(4.32a) sounds natural, while (4.32b) does not. This seems to be because there is an expected relationship in (4.32b) – pushing the switch and the light turning on – while there

is not in (4.32a) – erasing something on paper and the paper tearing. As (4.32) shows, *saini* is unavailable or avoided in an expected event (i.e., an intentional event). Therefore, an ergative verb and an unaccusative verb connected by *saini* should be Explicit.

Implicit descriptions

A. Sentence with Conjunctive

“Sentence with Conjunctive” is generally the counterpart of *and*-sentence in English. Two clauses are connected by the conjunctives *-te*, *-tara*, *-to*, and *-tokoro*. The former clause includes a transitive verb, while the latter clause includes an intransitive verb.

(4.33) Intentional

- a. Sutando-no suicchi-o osu-to
 desk lamp-GEN switch-ACC push.TR-CONJ
 denki-ga tsui-ta.
 light-NOM turn on.INTR-PST

‘When (he) pushed the switch of the desk lamp, the light turned on.’

- b. Dansei-ga fuusen-o tatai-ta tokoro
 man-NOM balloon-ACC tap.TR-PST CONJ
 fuusen-ga ware-ta.
 balloon-NOM pop.INTR-PST

‘When the man tapped the balloon, it popped.’

(4.34) Non-intentional

- a. Keshigomu-o tsukat-tara kami-ga yabure-ta.
 eraser-ACC use-CONJ paper-NOM tear.INTR-PST

‘(He) used the eraser and the paper tore.’

- b. Nanika-o tsukut-te i-ta tokoro
 something-ACC make-CONJ PROG-PST CONJ
 ware-ta.
 pop.INTR-PST

‘When (he) was making something, (the balloon) popped.’

Many studies have examined the meanings of those conjunctives. For example, Hasunuma (1993) and Miyabe (2017) extensively discussed the meanings of *-tara*. Their argument is opposite to the arguments put forward by Kuno (1973) and Arita (1999), who stressed that *-tara* implied that an event in the following clause occurred out of expectation. I support the

arguments posited by Hasunuma (1993) and Miyabe (2017) because *-tara* is available for both intentional and non-intentional events.

The conjunctive *-to* is also available for both intentional and non-intentional events. Although *-to* and *-tara* are often interchangeable in some contexts, they have subtle differences in usage (see Hasunuma 1993).

Nakazato (1994) performed a semantic analysis of *-tokoro*. She argued that the clauses connected by *-tokoro* may depict either an expected or an unexpected event. For example, it is possible to say “*Kusurio nonda tokoro, yokunatta/warukunatta*” (“When I took the medicine, I felt better/worse”) with *-tokoro*, similar to the use of *when* in English.

Finally, the conjunctive *-te* is the closest to *and* in English. *-To*, *-tara*, *-tokoro*, and *-te* are available for both intentional and non-intentional events. How, then, is it possible to judge the event intentionality when presented with those sentences?

As I did with *and*-sentences in English, I conducted the insertion test. More specifically, I added *yosougaini* (contrary to expectation; unexpectedly) and *yosoudoori* (expectedly) to the original sentences, and tested if they were acceptable.

(4.33')	a.	Sutando-no	suicchi-o	osu-to	<u>yosoudoori</u>
		desk lamp-GEN	switch-ACC	push.TR-CONJ	expectedly
		denki-ga	tsui-ta.		
		light-NOM	turn on.INTR-PST		

- b. ??Sutando-no suicchi-o osu-to
 desk lamp-GEN switch-ACC push.TR-CONJ
 yosougaini denki-ga tsui-ta.
 unexpectedly light-NOM turn on.INTR-PST
- (4.34') a. ??Keshigomu-o tsukat-tara yosoudoori
 eraser-ACC use-CONJ expectedly
 kami-ga yabure-ta.
 paper-NOM break.INTR-PST
- b. Keshigomu-o tsukat-tara yosougaini
 eraser-ACC use-CONJ unexpectedly
 kami-ga yabure-ta.
 paper-NOM break.INTR-PST

As (4.33') shows, in the case of intentional descriptions, they accept *yosoudoori* (expectedly) but not *yosougaini* (unexpectedly). This implies that the original sentences depict expected results as a whole. In contrast, in the case of non-intentional descriptions, they accept *yosougaini* (unexpectedly) but not *yosoudoori* (expectedly). Again, this implies that the original sentences depict unexpected results. Therefore, Sentences with Conjunctive observed in Experiment 1 implicitly mark event intentionality/contingency without lexical items.

In fact, the insertion test (and any other tests) does not work well in a few sentences describing the popping-balloon event.

(4.35) Non-intentional

- a. Fuusen-o nejit-te i-tara, ware-ta.
 balloon-ACC twist.TR-CONJ PROG-CONJ pop.INTR-PST
 ‘(He) was twisting the balloon, and (it) popped.’
- b. Fuusen-o nejit-te i-ta tokoro,
 balloon-ACC twist.TR-CONJ PROG-CONJ CONJ
 ware-ta.
 pop.INTR-PST
 ‘(He) was twisting the balloon, and (it) popped.’

Some participants used sentences like (4.35), which was the only case where it could not be established with certainty if the original sentences accepted *yosougaini* (unexpectedly) and *yosoudoori* (expectedly). Since the verb *nejiru* (to twist) does not imply its purpose (i.e., why the agent is twisting the balloon), the acceptability largely depends on speakers. Some native Japanese speakers would say that the original sentence accepts both *yosougaini* (unexpectedly) and *yosoudoori* (expectedly), while others would say it accepts only *yosougaini* (unexpectedly). Even though the number of native speakers was limited, what

they found acceptable in regard to the tested sentences were not uniform. Therefore, it is difficult to judge objectively whether the original sentences mark event contingency implicitly, or not (i.e., Ambiguous).

B. *Try*-sentence

In Japanese, “*try*-sentence” refers to the sentences that include *-[y]outosuru*. Whereas in English *and* follows *try to*, in Japanese there are three kinds of conjunctive words (i.e., *-to*, *-tara*, *-tokoro*), as discussed above. As I did with the English descriptions, I first discuss the descriptions where the main verb causing the result state is transitive, followed by those where the main verb depicting the result state is intransitive.

(4.36) Non-intentional

a.	Dansei-ga	fuusen-ni	kuuki-o	ire-te
	man-NOM	balloon-in	air-ACC	put.TR-CONJ
	shibar-ou	to	shi-te	wat-ta.
	tie.TR-try to	CONJ	do-CONJ	pop.TR-PST

‘The man tried to tie the balloon by putting air in it, and (he) popped (it).’

- b. Hon-o yom-ou to shi-tara,
 book-ACC read-try to CONJ do-CONJ
 tisshubako-o otoshi-ta.
 tissue box-ACC drop.TR-PST
 ‘When (he) tried to read a book, (he) dropped the tissue box.’
- c. Takai tokoro-no hon-o tor-ou to
 high place-LOC book-ACC take-try to CONJ
 shi-tara otoshi-ta.
 do-CONJ drop.TR-PST
 ‘When (he) tried to take a book from the high place, (he) dropped (it).’

To decide in which group the sentences in (4.36) should be, I inserted *tamatama* (accidentally)/*wazato* (purposely) immediately before the main transitive verbs. I then tested whether they were acceptable.

- (4.36') a. Hon-o yom-ou to shi-tara,
 book-ACC read-try to CONJ do-CONJ
 tisshubako-o tamatama otoshi-ta.
 tissue box-ACC accidentally drop.TR-PST

- b. ??Hon-o yom-ou to shi-tara,
 book-ACC read-try to CONJ do-CONJ
 tisshubako-o wazato otoshi-ta.
 tissue box-ACC purposely drop.TR-PST
- c. Takai tokoro-no hon-o tor-ou to
 high place-LOC book-ACC take-try to CONJ
 shi-tara tamatama otoshi-ta.
 do-CONJ accidentally drop.TR-PST
- d. ??Takai tokoro-no hon-o tor-ou to
 high place-LOC book-ACC take-try to CONJ
 shi-tara wazato otoshi-ta.
 do-CONJ purposely drop.TR-PST

As was the case in English, *try*-sentences with a transitive verb accept *tamatama* (accidentally) but not *wazato* (purposely). This fact may show that the original sentences imply the event contingency and thus cannot co-occur with *wazato* (purposely). Therefore, *try*-sentences with a transitive verb should implicitly mark event contingency.

Second, I discuss the descriptions where the main verb is an intransitive.

(4.37) Non-intentional

- a. Keshigomu-de kes-ou to shi-tara,
 eraser-INS erase-try to CONJ do-CONJ
 kami-ga yabuke-ta.
 paper-NOM tear.INTR-PST
 ‘Trying to erase (something), paper tore.’
- b. Dansei-ga ... kuchi-o musub-ou to shi-ta
 man-NOM ... mouth-ACC tie.TR-try to CONJ do-PST
 tokoro fuusen-ga ware-ta.
 CONJ balloon-NOM pop.INTR-PST
 ‘When the man tried to tie (the balloon) up, the balloon popped.’

To judge the sentences’ intentionality reasonably, I put both an intentional and accidental marker in the original sentences. Since *wazato* (purposely) is unavailable with an intransitive verb, I put *yosoudoori* (expectedly) as an intentional marker instead.

- (4.37') a. ??Keshigomu-de kes-ou to shi-tara,
 eraser-INS erase-try to CONJ do-CONJ
 kami-ga yosoudoori yabuke-ta.
 paper-NOM expectedly tear.INTR-PST
- b. Keshigomu-de kes-ou to shi-tara,
 eraser-INS erase-try to CONJ do-CONJ
 kami-ga tamatama yabuke-ta.
 paper-NOM accidentally tear.INTR-PST

As (4.37'b) shows, the original sentence (4.37a) would not accept an intentional marker but an accidental marker only. The same thing can be said in the case of the original (4.37b).

Ambiguous descriptions

A. Bare Transitive Sentence

As in English, Japanese transitive verbs could be used both for intentional and non-intentional events alone, although Japanese speakers frequently use *-teshimau* and other accidental markers. Using transitive verbs alone makes it difficult to judge the event nature.

(4.38) Intentional

- a. Domino-o taoshi-ta.
domino-ACC knock down.TR-PST
'(He) knocked down the dominoes.'
- b. Otokonohito-ga hon-o otoshi-ta.
man-NOM book-ACC drop.TR-PST
'The man dropped the book.'

(4.39) Non-intentional

- a. Tisshu-o otoshi-ta.
tissue-ACC drop.TR-PST
'(He) dropped the tissue box.'
- b. Hon-o hirai-ta tokini mono-o
book-ACC open.TR-PST when thing-ACC
otoshi-ta.
drop.TR-PST
'When (he) opened the book, (he) dropped a thing.'

In (4.38) and (4.39), it is not possible to judge whether the man performed the action on purpose or accidentally. The number of Bare Transitive Sentences was smaller than in English, especially in non-intentional events.

B. Try-sentence with *-te*

As mentioned earlier, Japanese speakers frequently used *try*-sentences for non-intentional events. While many of those used an intransitive verb as a main verb following the conjunctives, such as *-tara*, *-to*, and *-tokoro*, a few of them used a transitive verb following the conjunctive *-te*.

(4.40) Non-intentional

- a. Takai tokoro-no hon-o tor-ou to
 high place-LOC book-ACC take-try to CONJ
 shi-te otoshi-ta.
 do-CONJ drop.TR-PST
 ‘Trying to take the book from the high place, (he) dropped (it).’
- b. Takai tokoro-no hon-o tor-ou to
 high place-LOC book-ACC take-try to CONJ
 shi-te wazato otoshi-ta.
 do-CONJ on purpose drop.TR-PST

c.	Takai	tokoro-no	hon-o	tor-ou	to
	high	place-LOC	book-ACC	take-try to	CONJ
	shi-te	<u>tamatama</u>	otoshi-ta.		
	do-CONJ	accidentally	drop.TR-PST		

(4.40a) is the original sentence from Experiment 1, while in the other sentences I added an intentional/accidental marker to the original sentence. As those show, both markers can easily be added to the original sentence, which is quite different from the standard *try*-sentence. Therefore, sentences like (4.40) should be Ambiguous in terms of intentionality.

4.2.3 Results and discussions

I counted how many descriptions were classified in Explicit, Implicit, and Ambiguous in each language group. Then I conducted the chi-square test and the Fisher's exact test to identify if the difference among the three groups was statistically significant.

In the case of intentional events (see Table 4.2), the Fisher's exact test revealed that the Explicitness of the event intentionality did not differ between the two languages ($p = .173$). In other words, both Japanese and English speakers preferred Ambiguous descriptions when describing intentional events. However, in the case of non-intentional events (see Table 4.3), the chi-square test revealed a significant difference in preferred descriptions ($\chi^2 (2) = 51.284, p < .001$, Cramer's $V = .382$). According to the residual

analysis, Japanese speakers preferred Explicit descriptions, while English speakers preferred Ambiguous and Implicit descriptions.

Table 4.2 Explicitness of intentional descriptions

	Ambiguous	Implicit	Explicit
Japanese	200	2	47
English	158	5	28

Table 4.3 Explicitness of non-intentional descriptions

	Ambiguous	Implicit	Explicit
Japanese	8	28	168
English	39	36	73

Table 4.4 Adjusted standardized residuals for non-intentional descriptions

	Ambiguous	Implicit	Explicit
Japanese	-6.107**	-2.545*	6.583**
English	6.107**	2.545*	-6.583**

Note: * $p < .05$, ** $p < .001$

The results of Experiment 1 confirmed the significant difference between English and Japanese in terms of intentionality. Whereas both languages preferred Ambiguous

descriptions in intentional events, Japanese speakers marked event contingency significantly more frequently than English speakers did. This fact generally matches the original expectation. However, English speakers used Explicit descriptions more frequently than expected when describing non-intentional events. I believe that this may be attributed to the design of the experiment. In Experiment 1, the participants were asked if the event was intentional or non-intentional shortly after being asked to provide a description of the event. Perhaps they were able to guess what I intended to achieve, which was to examine what kind of sentences they would use to describe causal events. As a result, they dared to use different constructions for intentional and non-intentional events even though this was not necessarily required in English.

Below, I discuss in detail the means that Japanese and English speakers used to mark event contingency. There are many possible ways to describe the lack of the agent's intention in Japanese and English; however, Japanese speakers tended to use several different ways to mark this, while English speakers tended to use only a few particular ways.

First, Japanese speakers used transitive verbs followed by *-teshimau* the most frequently (43.45% of all Explicit descriptions). This is followed by the use of intransitive verbs with *-teshimau* (15.48%) and transitive verbs with adverbs (e.g., *ayamatte* (mistakenly)) and *-teshimau* (14.88%). Bare Intransitive Sentences were used with similar frequency (13.10%). Adverbs, such as *ayamatte* (mistakenly) and *tamatama* (accidentally), were seldom used without *-teshimau*. In short, Japanese speakers have several ways to mark the lack of intention, and the usage was varied quite widely.

Second, English speakers most frequently used transitive verbs with adverbs, such as *accidentally* (71.23% of all Explicit descriptions). Moreover, the adverb used most frequently was *accidentally*, while *unknowingly* was used in a few cases. In general, these adverbs did not co-occur with intransitive verbs (2.74%). Other than transitive verbs with *accidentally*, *but*-sentences accounted for 10.96%. However, this construction was used only in two non-intentional events (i.e., popping balloon when tying it up and dropping book). Event descriptions with negative feeling were also observed, but the proportion was small (6.85%). Further, prepositional phrases like *on accident* were seldom used (2.74%). In short, English speakers had to rely on a few means to mark the lack of intention.

Japanese and English are different in how they mark event contingency: Japanese has many ways to mark the lack of intention by lexical items, whereas English does not. In other words, Japanese has more choices to mark the lack of intention than English speakers, and it is easier and more accessible for Japanese speakers to do so than English speakers. Naturally, English speakers prefer – or, to put it more accurately, are required – to make Implicit descriptions.

Furthermore, there was a difference in the way transitive verbs were used. Overall, both Japanese and English speakers preferred transitive verbs to intransitive verbs when describing non-intentional events. However, Japanese speakers marked the lack of intention more frequently when using transitive verbs than English speakers did. More specifically, Japanese descriptions with transitive verbs that were judged Explicit accounted for 88.79% of all transitive descriptions, while English Explicit descriptions with transitive verbs

accounted for 57.14%. In general, transitive verbs imply intentional action in both languages, but English speakers did not tend to cancel the agent's intention by lexical items.

In the next chapter, I will discuss whether the difference in the two languages engender any difference in speakers' memory.

Chapter 5. Language and eye-witness memory in Japanese and English speakers

In the previous chapter I discussed the results of Experiment 1, which I conducted to explore how Japanese and English speakers described causal events differently. In Experiment 1, English speakers marked event contingency less frequently than Japanese speakers did. Does this difference in language cause any differences in speakers' cognition? More specifically, do Japanese speakers tend to focus on an event's contingency/intentionality more than English speakers? To find an answer to this question, I conducted an eye-witness memory test in Experiment 2 between Japanese and English speakers. The experiment methodology was similar to that Filipović (2013) used, except that I did not group participants with/without verbal descriptions. I hypothesized that Japanese speakers, who habitually marked event contingency, would remember if the event was accidental or not significantly better than English speakers, who did not mark such contingency. If the hypothesis turns out to be true, one could argue that the result supports Slobin's *thinking for speaking* theory. That is, Japanese speakers, who habitually describe accidental events with additional markers like *-teshimau*, unconsciously focus on an event's contingency when watching events.

5.1 Design of Experiment 2

In Experiment 2, native Japanese and English speakers watched short videos of intentional and non-intentional events. After the exposure, they were required to recall whether the

event they watched was intentional or non-intentional. As a strategy against the outbreak of COVID-19, I conducted Experiment 2 via Zoom with Japanese speakers. The experiment with English speakers was conducted in the same way by a native English speaker living in the United States.

Participants

Twenty-five English speakers (16 males and 9 females, $M = 22.04$ years, $SD = 3.94$) and 30 Japanese speakers (16 males and 14 females, $M = 21.27$ years, $SD = 1.86$) participated in Experiment 2 in exchange for payment. None of them had taken part in Experiment 1. The English participants lived in the United States, while the Japanese speakers lived in Japan and were students at Kyoto University.

Materials

Participants read instructions in their native language. They were presented with 23 short and silent videos. The 23 videos included nine intentional events, nine non-intentional events, and five filler items (see Table 5.1 for target items). The event stimuli included those that had been used in Experiment 1 as well as new items.

Table 5.1 Causal event stimuli in Experiment 2

Causal event	Intentional	Non-intentional
Knock down domino		Man set up domino on desk, bump desk when standing up, causing domino to knock down
Turn on lamp		Man turn on lamp when reaching for something
Tear paper	Man tear paper in half	
Drop box	Man knock tissue box off desk	
Turn off light		Man turn off light when leaning against wall
Close book	Man shut book closed	
Pop pink balloon		Man twist balloon, causing it to pop
Pop green balloon	Man pop balloon with needle	
Drop book		Man reach for book on top of bookshelf, but fail to grasp it, dropping it
Drop key	Man put key on desk	
Open drawer	Man open drawer of desk	

Spill water		While reading book on sofa, man reach out for cup of water, but fail to grasp it and spill water
Open white umbrella	Man open white umbrella	
Open black umbrella		Man struggle to open umbrella and it suddenly open
Drop notebook		Entering room, man hit wall and drop notebook
Spin chair	Man spin chair joyfully	
Uncord battery	Man take battery out of socket	
Drop eraser		Man write something on paper, erase it, and when trying to remove dust, he drop eraser

Procedure

The entire experiment was composed of five tasks: General Memory Test, Watching Task, Distractor Task, Eye-witness Memory Test, and Judgment Task. It took less than an hour to finish all the tasks. Throughout the experiment, participants were instructed in their native language.

General Memory Test was conducted to make sure that participants were similar in their ability to memorize, regardless of language. In this test, participants were presented with 15 simple words simultaneously and required to memorize them within a minute. Participants were then asked to recall the words they had been presented previously within two minutes. This set was repeated three times.

Figure 5.1 General Memory Test

In Watching Task, participants were instructed to watch 23 event stimuli carefully, because they would subsequently be questioned about the contents. The 23 video clips included nine intentional events, nine non-intentional events, and five filler items (see Table 5.1). Each clip played automatically, with intervals of seven seconds

between them. After participants had watched all the clips, they worked on Distractor Task, in which they were required to count the number of a particular letter that appeared in a random set of letters. English speakers were asked to report the number of “M” that appeared in the randomized letters. Since Japanese speakers do not use alphabetical letters in everyday life, they were instead asked to report the number of “あ” in randomized Japanese letters.

Figure 5.2 Distractor Task for English speakers

After Distractor Task, the participants were asked to recall the events they had previously viewed by answering two questions. They were first asked, “Did you see a green balloon pop? /*midoriirono fuusenga wareta dougao mimashitaka?*” and were required to select “Yes (*hai*),” “No (*ie*),” or “I don’t remember (*oboeteinai*).” Thereafter, English speakers were asked “What is the nature of the event?” while Japanese speakers were asked “*Sono dekimotowa itoteki deshita?*” To prevent participants from answering by guessing, they were requested to choose one of three options: “Intentional (*itoteki*),” “Non-intentional (*hi-itoteki*),” or “I don’t remember (*oboeteinai*).” Responses were judged as incorrect if the participants gave a

contradictory answer (in other words, they answered “intentional” when the correct answer was “non-intentional”) or if they failed to recall the event nature.

Judgment Task was carried out as a follow-up procedure, in which the participants watched the video stimuli again and judged whether each event was intentional or non-intentional. They were asked, “What is the nature of the event?” here, rather than “Was the man’s action volitional?” used in Experiment 1. In fact, the question used in Experiment 1 was inappropriate in that in all videos the agent volitionally acted on the object, regardless of event nature. The difference between intentional and non-intentional stimuli was situated in whether his expectation came true. Therefore, I replaced the question with the novel one in order to ask whether each event was intentional or non-intentional.

As mentioned before, all the tasks were conducted online to avoid face-to-face communication because of the threat of COVID-19. Participants worked on the first three tasks – namely, General Memory Test, Watching Task, and Distractor Task – via Zoom by sharing the experimenter’s screen. They did the last two tasks (i.e., Eye-witness Memory Test and Judgment Task) on Google Forms. After Distractor Task, the experimenter shared the link to the Google Form with the participant, and they worked on Eye-witness Memory Test first. The test included the link to Judgment Task on the last page of Eye-witness Memory Test, and then the participant moved on to Judgment Task at their own pace.

Because of this strategy, I was not able to control the experimental environment. For example, by letting the participants use their own laptops, I was not able to control the size of the display or the brightness of the screen. In addition, participants were sometimes forced to watch the video stimuli at a low frame rate, even

with a stable internet connection. In the section below, I interpret the results, assuming that the experiment had been conducted in a controlled environment.

5.2 Results

Two Japanese speakers' results were excluded from analysis because they were unable to view a clear image of the video stimuli due to an unstable internet connection.

General Memory Test

First, General Memory Test revealed that participants had similar levels of recall, regardless of language. That is, English speakers remembered the same number of words as the Japanese speakers did [Japanese: $M = 33.50$, $SD = 6.39$; English: $M = 32.08$, $SD = 7.06$; $t(51) = .77$, $p = .46$, $d = .21$].

Eye-witness Memory Test

In my analysis of the responses to Eye-witness Memory Test, I calculated each participant's proportion of correct answers. Not everyone recalled watching all the video stimuli, so I set the number of stimuli they reported to remember watching as a denominator and the number of correct answers as a numerator. I applied this method because it seemed inappropriate to confuse people who remembered watching the video stimuli but failed to remember its nature with people who did not remember watching it at all.

Overall, in Eye-witness Memory Test, participants were able to recall the nature of the video stimuli, regardless of language, as illustrated below in Figure 5.3.

Figure 5.3 Proportion of correct recall for target items
(I: Intentional, NI: Non-intentional)

Regardless of language, participants were more likely to recall event nature when asked about intentional events than when asked about non-intentional events.

Although most video stimuli were recalled well by all participants, a few stimuli were often misremembered: Pop balloon (NI) and Turn on lamp (NI) for both groups of speakers, and Drop notebook (NI) only for Japanese speakers. Moreover, Open drawer (I) and Spin chair (I) were recalled correctly by every participant who remembered watching the videos.

In summary, although there were differences in the ease with which the various video stimuli were recalled, this study failed to support my central hypothesis that Japanese speakers were more likely to remember the nature of the event – whether the events are intentional or non-intentional – than English speakers.

Judgment Task

The intentionality of most videos was judged correctly. However, the accidental version of the opening-umbrella event was judged intentional by approximately half of the participants. Therefore, it was excluded from the analysis of Eye-witness Memory Test.

5.3 Discussion

Overall, Experiment 2 did not support my central hypothesis that Japanese speakers, who were inclined to mark event contingency, were more likely to remember event intentionality than English speakers, who were not. The experiment merely showed that some video stimuli were easily recalled while others were more difficult to remember, regardless of language. In this section, I discuss why a few video stimuli in particular were not recalled, while others were recalled perfectly. In the next chapter, I will present two possible reasons why my hypothesis was not supported.

First of all, the event nature of the accidental versions of Pop balloon and Turn on lamp were incorrectly identified by many participants. More accurately, the event nature of these two video stimuli were not misremembered but misunderstood. It is probably because the event nature of both these stimuli were so ambiguous, especially when they were viewed on a poor-quality internet connection, that participants misjudged event intentionality in the exposure phase, namely, Watching Task. For example, in the popping-balloon video, the man accidentally pops the balloon while twisting it. However, some of the participants may have judged the event to be intentional. Therefore, when they were asked if the popping-balloon event was

intentional or non-intentional, their honest answer was “intentional.” However, this was an inaccurate response.

The same inference could be made in the case of Turn on lamp (NI). After viewing the video, participants judged the event as intentional and answered “intentional” with great confidence. However, the correct answer was “non-intentional.”

Figure 5.4 Video of turning on lamp accidentally

In addition to the above two stimuli, Japanese speakers tended to provide wrong answers in Drop notebook (NI). There was a significant difference between English and Japanese speakers in the first question: English speakers strongly recalled watching the video, as well as other target videos, whereas many Japanese speakers reported that they did not remember watching it. Given that both sets of speakers possessed equal recall skills, as shown in General Memory Test, it is implausible that the video was especially difficult to remember only for Japanese speakers. For some reason – cultural factors, perhaps – Japanese speakers did not recognize the notebook presented in the question sentence as such. Instead, they judged it to be a different kind of book or a notepad. Consequently, although they recalled watching the video, they did not clearly link the first question with the video that they had watched, or they

incorrectly connected the question with another similar target video, such as Drop book.

Figure 5.5 Video of dropping notebook accidentally

There were two videos in which all participants correctly recalled event nature, namely Open drawer and Spin chair. Both of these actions were intentional and were answered correctly by all the participants, regardless of language. The universal feature that something conspicuous is easy to remember probably contributed to the results. Moreover, since it is difficult to imagine “opening a drawer accidentally” or “spinning a chair inadvertently,” people were able to provide correct answers even if they did not remember the event nature accurately.

Figure 5.6 Video of opening drawer

Figure 5.7 Video of spinning chair

5.4 Summary

In this chapter, I reported on Experiment 2, which I had conducted to investigate language effects on memory. More specifically, I examined the hypothesis that Japanese speakers, who tended to mark event contingency more frequently than English speakers, would prove to recall event nature better than English speakers. Finally, Experiment 2 did not support my hypothesis. I have discussed why some videos were difficult to recall while others were perfectly remembered. In the next chapter, I will consider why Experiment 2 failed to support my central hypothesis.

Chapter 6. Conclusion and future prospects

This thesis sheds lights on language effects on memory, and I conducted psychological experiments to elucidate such effects. I started by highlighting the issues that have been raised in discussions of linguistic relativity and reviewing the literature on language effects on memory. Experiment 1, summarized in Chapter 4, showed that Japanese speakers were more likely to mark event contingency when they described non-intentional events than English speakers. More specifically, whereas English speakers were unlikely to depict non-intentional events using the constructions, such as “The man accidentally dropped the book,” Japanese speakers tended to use either the constructions like “*Danseiga hono otoshiteshimatta*” (“The man accidentally dropped the book”) or the constructions like “*Honga ochita*” (“The book dropped”). In Chapter 5, I examined whether the difference in preferred event descriptions caused a difference in speakers’ memory of the event. The relativistic hypothesis was that Japanese speakers, who frequently showed event contingency, were likely to pay attention to event nature – whether the event was accidental or intentional – and consequently remembered it more accurately than English speakers, who preferred ambiguous descriptions in terms of intentionality. Finally, the results of Experiment 2 did not support the central hypothesis: participants were able to recall event nature, regardless of language. In this chapter, I propose two possible reasons why the experiment failed to support the hypothesis. Thereafter, I remark future prospects of the discussion about the interface between language and cognition.

The first possible reason why the hypothesis did not prove true is that Japanese speakers “prefer” to mark event contingency but are not “required” to do so. As Experiment 1 shows, Japanese speakers can mark event contingency either explicitly by means of *teshimau* and other lexical items, or implicitly without such tools. Furthermore, in Japanese, it is possible to describe non-intentional events with a transitive verb without any accidental markers if the events are obviously accidents¹.

(6.1) When someone reports that they missed the goal in a shoot-out

a.	PKsen-de	gooru-o	hazushi-ta.
	shoot out-when	goal-ACC	miss.TR-PST
b.	??PKsen-de	gooru-ga	hazure-ta.
	shoot out-when	goal-NOM	miss.INTR-PST

‘I missed the goal in a shoot-out.’ (Constructed)

¹ Some researchers argue that Japanese speakers prefer transitive verbs for non-intentional event descriptions when the agent is responsible for the accident (Pardeshi 2002; Nishimitsu 2010; Yoshinari, Pardeshi, and Chung 2010; Yoshinari, Pardeshi, and Chung 2014). More specifically, when someone drops their wallet in the town, a transitive construction is preferred because the agent is responsible for dropping the wallet, not because the event is obviously accidental. However, their argument is not supported in a few non-intentional events and the choice of transitive or intransitive verbs may depend on other factors, such as irreversibility and contact between an object and an agent, in addition to responsibility.

(6.2) When someone reports that they dropped their wallet in the town

a. Machinaka-de saifu-o otoshi-ta.

town-LOC wallet-ACC drop.TR-PST

b. *Machinaka-de saifu-ga ochi-ta.

town-LOC wallet-NOM drop.INTR-PST

‘I dropped my wallet in the town.’ (Constructed)

For example, in (6.1), a transitive verb is preferred to an intransitive verb to describe the situation, even though it is accidental. Moreover, we do not always put *-teshimau*. That is, *-teshimau* is completely optional. In addition, (6.2), which depicts a dropping-wallet event, does not allow an intransitive verb like (6.2b). Also, (6.2a), as well as (6.1a), does not necessarily need *-teshimau*. The reason appears to be that speakers know that nobody is purposefully involved in an accidental event that disadvantages the agent. Thus, Japanese speakers do not always need accidental markers – although they prefer to use them. Indeed, in Experiment 1, there were implicit descriptions that implied event contingency. In this experiment, at least, it is not clear how speakers pay attention to event intentionality/contingency.

The second possible reason is that language does not contribute to the recall of event nature by either enabling or preventing such recall. Importantly, whether speakers tend to mark event contingency in linguistic descriptions is not a reflection of speakers’ cognition being biased by language but that it is determined by language preference. More

specifically, the fact that English speakers can easily say, “I broke the vase” for an accidental event is never an indication that they have no interest in its event nature. Rather, the language (i.e., English) allows speakers to describe the event in a Bare Transitive Sentence, and accordingly they use such constructions comfortably.

The same can be said of Japanese speakers. Although they tend to show event contingency more frequently than English speakers, as shown in Experiment 1, it does not follow that Japanese speakers are more interested in event nature than English speakers. Therefore, whether the participants remember event nature or not may be largely dependent on their attentiveness during the experiment.

However, the second reason does not reject linguistic relativity in all aspects. A great deal of existing research has supported linguistic relativity in a variety of domains, as mentioned in Chapter 1. Judging from an overview of the research, it is evident that language has some power – whether strong or weak – on cognition, including memory. The results of the experiments conducted for this thesis show that event descriptions do not affect speakers’ memory to a degree that is significant enough to enable them to accurately remember event nature. It is optional for both language speakers to mark event contingency in descriptions, although Japanese speakers have various ways of marking it and prefer to mark it. If experiments were conducted using the same method to compare English speakers and speakers of another language that obligatorily marks event intentionality and contingency, significant differences in memory might be identified.

The discussion about the relationship between language and cognition is sure to continue and thrive in the future. As previous studies have already pointed out, more

collaborative studies between linguists and psychologists or cognitive scientists are needed. When discussing the relationship between language and cognition, researchers should formulate hypotheses only after performing an in-depth analysis of target languages. Without such an exhaustive analysis of the languages in question, researchers rely on ill-formed assumptions. The topic that I discussed in 4.2.2 – how to analyze linguistic descriptions – has routinely been omitted or disregarded in previous studies. However, it is also important that researchers have the knowledge required to analyze languages involved.

In addition to performing more in-depth linguistic analysis, the methodology of the experiment should also be refined. Obviously, the methodology used in the experiments for this study is not the only way to investigate language effects on memory. For example, I could measure reaction time (the time it takes for participants to offer answers), and not simply ask if participants remembered events or not. If participants offer answers long after the presentation of the instruction, I could assume that the answers are given randomly or without confidence. To successfully conduct psycholinguistic research with improved methods and after a thorough analysis of the target languages, collaboration between psychologists and linguists is essential. Psychologists, who are familiar with quantitative studies, should collaborate with linguists who have abundant knowledge of the target languages, and vice versa.

Furthermore, overly simplistic conclusions should be avoided. A number of previous studies considered results derived from the comparison of only a few languages as evidence of what holds for other languages. Moreover, certain studies that compared a few languages and did not support relativistic accounts suggested that language, in general, has

little, if any, power on cognition. Broadly speaking, data acquired from comparisons of a few specific languages do not always hold for other languages. When it comes to drawing conclusions, researchers should be more cautious in cases where language effects are both confirmed and denied.

List of Abbreviations

Abbreviations used in this thesis are listed below:

ACC accusative

CONJ conjunction

GEN genitive

INS instrumental

INTR intransitive

LOC locative

NOM nominative

PROG progressive

PST past

TR transitive

In this thesis, the asterisk (*) indicates that the sentence is not acceptable at all, and the double question marks (??) indicate that the sentence is not very acceptable.

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