



Kaku-Macdonald, K., Liceras, J. M., & Kazanina, N. (2020). Acquisition of aspect in L2: The computation of event completion by Japanese learners of English. *Applied Psycholinguistics*, 41(1), 185-214. <https://doi.org/10.1017/S014271641900047X>

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Link to published version (if available):
[10.1017/S014271641900047X](https://doi.org/10.1017/S014271641900047X)

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Introduction

People are interested in and affected by events that happen around them. Quite often we not only care whether an event took place, but also whether it was performed completely. A clear illustration of this comes from sports: if one leads a Marathon race right from the start for the next 42 km but falls of exhaustion just before the finish line, their effort is wasted and the sportsman is not crowned as the Marathon winner. In a less dramatic example, a client is likely to be angry with a painter who did an impeccable job painting the walls everywhere in the living room but for a spot above the fireplace. As these and many other examples suggest, people are quite tuned to event completion and, unsurprisingly, so is their language. In language, event completion can be encoded using lexical (e.g., using words *completely, fully*) or grammatical (e.g., via lexical or grammatical aspect) means.

The main objective of our research is to examine Japanese learners of English's understanding of completion entailments of L2 predicates in situations where the entailment pattern differs from that of the L1. We will focus on accomplishment predicates with count objects such as *eat an apple* or *erase a star*. Of special interest to us is the fact that such predicates have - the so-called 'event cancellation' (Tsujimura, 2003), or 'neutral perfective' reading (Singh, 1998) - in Japanese but not in English (Fromkin et al., 2000; Ikegami, 1985; Kageyama, 1996; Tsujimura, 2003; Yoshida, 2005, 2008). The term 'event cancellation' refers to the fact that in Japanese and some other languages, a simple past accomplishment predicate with a concrete countable object may indicate an incomplete event (i.e., an event that did not reach its culmination point). This is illustrated by sentences in (1) and (2), which exemplify the availability of the event cancellation reading in Japanese but not in English; these judgements

will be carefully explored in our study using a sample of monolingual Japanese and English speakers.

- (1) a. Lisa erased the star. [complete event]
 b. # Lisa erased the star but some of it still remains.
- (2) a. Risa-wa hoshi-o keshita [complete/incomplete event]
 Lisa-Top star-Acc erased
 ‘Lisa erased (a/the) star(s).’
 b. Risa-wa hoshi-o keshita keredo mada nokotte-iru [event cancellation reading]
 Lisa-Top star-Acc erased but still remains
 ‘Lisa erased (a/the) star(s) but it still remains.’

In (1)a, the English simple past sentence *Lisa erased the star* entails completion (i.e., it describes a star-erasing event as a result of which the star has been removed completely). Accordingly, the sentence becomes semantically infelicitous when it is followed by a clause suggesting that the event is incomplete, such as *but some of it still remains* as in (1)b. By contrast, a Japanese simple past predicate such as *hoshi-o keshita* ‘star-Acc erased’ in (2)a can refer to both a complete and an incomplete event, as confirmed by the fact that the sentence (2)b is semantically felicitous. The event cancellation phenomenon has also been observed in Chinese (Smith, 1991, 1994, Soh & Kuo, 2005; Tai, 1984, Yin & Kaiser, 2011), Hindi (Arunachalam & Kothari, 2011; Singh, 1998), Malagasy (Travis, 2000) and Thai (Koenig & Muansuwan, 2000).

For a Japanese learner of English to know that the English sentence in (1)a entails completion is not trivial. In fact, in order to arrive at a target-like understanding of aspectual entailments of simple past accomplishment predicates in English the L1 Japanese learner needs

to invalidate the event cancellation reading. That is, she needs to infer that English simple past predicates only possess the subset of readings, i.e., they refer to complete events only.

In the current study, we will show that, in line with Full Transfer/Full Access hypothesis (Schwartz & Sprouse, 1996), Japanese learners of English start out by exhibiting an L1-like pattern in the domain of aspectual entailments in L2 and gradually move toward the L2-like pattern of aspectual entailments. Moving towards the target-like representation in L2 implies the ability to eliminate the event cancellation reading which is only available in Japanese. There are (at least) two logically possible ways in which a Japanese learner of English could progress towards a target-like representation of completion entailments in English: via explicit instruction or via internalization of the English determiner phrases that render the event cancellation reading unavailable. With regards to the first option, explicit instruction does not seem to be a substantive factor because, to the best of our knowledge, it is quite rare that completion entailments are discussed in the classroom. With regards to the second option, however, the properties of Determiner Phrases in English that are discussed in the classroom may indirectly help learners to internalize the compositional rules that are important for the derivation of aspect and completion entailments in English (see next section). Furthermore, although spontaneous real-life observation available to L2 learners is compatible with their original L1 ‘superset’ setting whereby a simple past accomplishment predicate can refer to either complete or incomplete events, the L2 learners’ sensitivity to the missing data in the L1 input, namely, the fact that L1 English speech sentences like (1)a are (almost) never used to refer to incomplete events, may provide further evidence needed for abandoning the Japanese superset option and maintaining the subset option as the only option available in English past tense sentences.

In the following sections we outline how aspect is calculated for past accomplishment predicates in English and Japanese, review previous studies on the event cancellation phenomena and outline the current study.

Event cancellation: linguistic analysis

Aspect reflects internal properties of an eventuality denoted by the verb in relation to the event's temporal continuity, such as whether it is complete or incomplete (which is what the current paper focuses on), has an inherent start point or endpoint, as well as whether it is habitual, durative, iterative, and so on. Such aspectual distinctions can be encoded via grammatical or lexical aspect. 'Grammatical aspect' is governed by inflectional categories such as Tense and Aspect that operate above the VP level.¹ For example, in English, the simple past form of the predicate *build a house* (as in *John built a house*) is considered to entail that the house was built completely, but its past progressive form (as in *John was building a house*) does not. 'Lexical aspect' is calculated compositionally at the VP level as a function of the properties of the verb and its arguments (Dowty, 1979; Tenny, 1994; Verkuyl, 1972). For example, the predicate class from the so-called Vendler-Dowty classification (Dowty, 1979; Vendler, 1967) interacts with lexical aspect. In this classification, four types of predicates are distinguished on the basis of the properties of an eventuality denoted by predicate: statives (e.g., *know*), activities (e.g., *run*), accomplishments (e.g., *run a mile*) and achievements (e.g., *recognize*). In addition, as shown below, the properties of the object DP (= Determiner Phrase) can influence lexical aspect in general, and whether the predicate refers to a complete and incomplete event in particular.^{2,3}

Research on the event cancellation phenomena across languages reports availability of the reading in languages such as Chinese, Hindi, Japanese or Thai but not in a language such as English. However, the details of theoretical analyses as to why the reading is available in some

languages but not others differ.⁴ One prominent approach to event cancellation examines crosslinguistic differences in the nominal system. Singh (1998) attributes the difference in the availability of these readings in Hindi vs. English to the lack of determiners in Hindi. According to Singh, bare NPs (= Noun Phrase) in Hindi create at least two ambiguities which have repercussions for whether a simple past sentence entails event completion. One ambiguity can be found in a mass noun such as ‘milk’ that can be interpreted as ‘milk’ or ‘the milk’. Whereas *Mike drank the milk* typically entails event completion, *Mike drank milk* does not. Another ambiguity occurs when using a count noun such as ‘apple’, which does not only mean ‘an apple’ or ‘the apple’ but also ‘apples’ or ‘any part of an apple’ and thus interacts with the completion entailment of a sentence (e.g., *Ken ate the apple* entails event completion whereas *Ken ate apples* does not). Similar observations on bare NPs in accomplishment predicates and their availability for event cancellation readings are reported for Japanese (Fromkin et al., 2000) and for Chinese (Soh & Kuo, 2005). Fromkin et al. (2000) claim that Japanese allows bare NPs in sentences and that accomplishment verb predicates with bare NPs are compatible with both complete and incomplete readings. Similarly, in Chinese, Soh and Kuo (2005) argue that the availability of the event cancellation readings is due to the Chinese nominal system⁵ (i.e., lack of articles).

An adaptation of Soh and Kuo’s (2005) analysis to the case of Japanese provides us with an appropriate framework to offer a detailed account of our learnability assumptions. Therefore, we assume that the differences in availability of the event cancellation readings in Japanese vs. English are due to the differences in their DPs. That is, properties of the object DP are taken to modulate the aspectual value of a simple past accomplishment predicate (i.e., its completion entailments). To illustrate this one could picture a scenario in which Ken was to build three houses but could only finish two of them while leaving the third one built halfway. In English,

this event can be described as ‘Ken built houses’ but not as ‘Ken built the houses’ or ‘Ken built three houses’, thus indicating that the object DP (*houses* vs. *the/three houses*) critically interacts with the completion entailments of the sentence. A similar observation holds in Japanese: when the object of the past verb *tatemashita* ‘built’ is a bare noun as in (3a) *Ken-wa ie-o tatemashita* (literally ‘Ken house built’) it is compatible with the incomplete house-building scenario described above. However, when the object is changed to ‘three houses’ as in (3b), the resulting predicate can only refer to a completed event in which all three houses were finished.

- (3) a. Ken-wa ie-o tatemashita.
 Ken -Top house-Acc built
 ‘Ken built a/the house(s).’
- b. Ken-wa san-gen-no ie-o tatemashita.
 Ken-Top three-Cl-Gen house-Acc built
 ‘Ken built three houses.’

The above demonstrates that the aspectual value of the predicate is conditioned, at least partially, by the object DP. The difference in the completion entailment pattern in English vs. Japanese accomplishments is then attributed to the representation of bare nominals in these languages and to whether or how bare nominals combine with functional categories such as Det(eterminer) and Num(ber) (Kaku & Kazanina, 2007, Kaku, Licerias & Kazanina, 2008a, 2008b). In particular, Soh and Kuo (2005) adopt Chierchia’s (1998b) idea that bare nominals may differ across languages: bare nouns in English may be either count or mass, whereas all nouns in Chinese (and Japanese) are mass.⁶ In addition, they employ Jackendoff’s (1991) classification of nominal features in terms of the binary conceptual feature *boundedness* ([+/-b]) which indicates whether boundaries of an entity are discernable. Under this classification singular count nouns in English

(*star*) are bounded, whereas plural count nouns (*stars*) and mass nouns (*milk*) are unbounded because entities denoted by them lack precise boundaries. Various functional heads that project within a DP, such as determiners or number morphology, are considered as functions that modulate the value of the boundedness feature of their complement NP. In our analysis ([removed for review]) we propose that in English the determiners *a* and *the* set the value of the boundedness feature of its complement to [+b], whereas the plural marker *-s* sets the boundedness value of its complement to [-b].

We assume that Japanese learners of English know, at least at the conceptual level, that English has a mass/count distinction which comes with Det and Num morphology. This assumption is based on two facts. First, the fact that explicit instruction in formal classroom settings is available for most Japanese learners of English (at least it was in the case of the L2 learners who participated in this study). Second, the assumption that, as proposed by the Rich Agreement Hypothesis (Koenenman & Zeijlstra, 2014), there is a tight connection between syntax and morphology, which is also realized as a tight connection between a morphosyntactic form and its abstract features, which leads us to propose that the abstract features associated with Det and Num morphology are available to the learners.

Let us illustrate the described approach using an English predicate *erased a/the star* (Figure 1a) where the bare count noun *star* enters the derivation as bounded (i.e., [+b]).

[Figure 1 about here]

Figure 1 shows that in English, and other languages with overt determiner and number morphology, NumP and DetP are obligatorily projected (Déprez, 2005; Gabriele, 2007). In the

present example, projection of these categories does not change the boundedness value and the resulting DP *a/the star* is [+b] at the uppermost level. When the [+b] DP merges with the verb (*erased*), the entire VP refers to a complete event. The derivation for the predicate *erase the stars* with a plural object (Figure 1b) is different, but it yields an identical overall outcome in terms of the predicate aspect. The bare nominal *star* starts as [+b], but the boundedness feature is reset to [-b] once it merges with the plural marker *-s* when NumP is projected. The value [-b] is then changed back to [+b] as a result of merging with the determiner *the*. The resulting DP is bounded and the entire VP entails event completion. When the predicate is used in the simple past tense, heads merging above the VP level (e.g., Tense or Aspect) do not change the aspectual value, hence the aspectual value of the sentence coincides with that at the VP level.

Figure 2 shows the derivation of the Japanese VP *hoshi-o keshimashita* ‘gloss: star-Acc erased.’ The bare noun *hoshi* is unbounded and enters the derivation as [-b]. NumP and DetP are not obligatorily projected in Japanese and the boundedness value [-b] remains unchanged. The verb *keshimashita* merges with an unbounded object and the resulting predicate can refer either to a complete event or an incomplete event. This accounts for the availability of the event cancellation reading in Japanese but not in English.

[Figure 2 about here]

In sum, the account above argues that, in order to correctly derive the aspectual value of the English predicate, learners need to have an understanding of object boundedness, how it is computed and how it interacts with the projection of NumP or DP in English. Applying this to the case of Japanese learners of English, as learners (with increasing L2 proficiency) gain better awareness of English determiner and number morphology, this will lead them to incorporate the

projection of NumP and DP in the L2 grammar which in turn will contribute to their progress towards a target-like representation of the predicate aspect.

Previous studies on L2 acquisition of aspect

The acquisition of semantics in the aspectual domain in L2 learners has received considerable attention in the literature (Gabriele, 2005, 2007, 2009, 2010; Slabakova, 2000, 2001, 2005; Montrul & Slabakova, 2002, 2003; Yin & Kaiser, 2011, 2013). Below we briefly discuss several studies that focus on L2 learners' understanding of aspectual semantics in the target language.

As is true for many phenomena in L2 acquisition, one of the factors that influences whether L2 learners achieve a target-like representation concerns the relationship between the relevant representations in L1 and L2. Speaking of predicate aspect, L1 and L2 may use essentially the same encoding of aspect, as for example English and Spanish do for lexical aspect (i.e., object boundedness influences the aspectual value of the predicate, Nishida, 1994). Alternatively, L1 and L2 may use different encoding mechanisms, as in the case of English vs. Bulgarian or Russian (in Bulgarian and Russian, object boundedness does not influence aspect but affixes on verbs do). If at the beginning stage of the second language learning process the learners use algorithms from their native language, i.e., 'L1 transfer' (Gass & Selinker, 1994; Schwartz & Sprouse, 1996), a more target-like performance should be expected in L2 when the learners use a similar encoding of aspect in their L1. Slabakova's (2000, 2001) studies on acquisition of English telicity by native speakers of Spanish and Bulgarian and Slabakova's (2005) study of English learners of Russian provide support for this view.

Most relevant to us are two studies by Gabriele (2009, 2010) on aspectual entailments that involve Japanese and English. Gabriele (2010) investigated completion entailment of

accomplishment predicates with plural objects in Japanese and demonstrated L1 transfer effects of the boundedness of count nouns in the interpretation of telicity by English learners of Japanese. As mentioned, Japanese accomplishment predicates with bare count nouns (i.e., -boundedness) are compatible with both complete and incomplete events. The results from interpretation tasks indicate that both intermediate and advanced English learners of Japanese have difficulty in calculating the correct aspectual value of predicates with bare count nouns in Japanese (e.g., *kaado-o kakimashita* ‘wrote card’), i.e., they interpret them as referring to complete events only. Gabriele argues that this pattern stems from the boundedness of count nouns in L1 English and that overcoming this L1 transfer effect is difficult especially when the learners cannot rely on a morphosyntactic cue to interpret predicate aspect.

In her bidirectional study on English and Japanese L2 learners, Gabriele (2009) investigated preemption in the aspectual domain (i.e., cases where certain aspects of L1 need to be ‘unlearned’ to achieve the L2 pattern). Of critical interest were achievement predicates such as *arrive*, which yield a progressive reading when they are combined with a progressive morpheme *be -ing* in English (as in *The plane is arriving*), but a resultative reading when they combine with the imperfective marker *te-iru* in Japanese (*Hikooki-ga kuuko-ni tsuite-iru* ‘The plane (arrived and) is at the airport’). Gabriele found that preemption was difficult for both groups of learners, but especially for Japanese learners of English, of whom even the most advanced ones incorrectly accepted the resultative reading with achievements in English at a rather high rate. The phenomenon examined in our experiments – completion entailments of simple past accomplishments by Japanese learners of English – represents, arguably, an even more challenging case of preemption. The interpretations available for a simple past accomplishment in L1 Japanese (complete or incomplete events) represent a superset of the

interpretations available in the L2. Hence, positive evidence from English whereby accomplishments refer to a complete event (representing L1 English, i.e., subset setting) may be misinterpreted by Japanese learners of English as supporting evidence for their L1 (superset) setting, and thus incorrectly reinforce such superset representation as adequate for L2. In Gabriele's study such reinforcement via positive evidence is unavailable as the progressive and resultative readings are mutually exclusive.

Research questions and predictions

Our study investigates two research questions. First, we examine whether adult Japanese learners of English learn to invalidate the event cancellation reading of simple past predicates such as in (1)a. Second, if the L2 learners successfully derive completion entailments of L2 predicates, how such understanding develops and interacts with increasing L2 proficiency.

We predict that, with increasing L2 proficiency, Japanese learners of English will progress towards a target-like representation of aspectual entailment. We further hypothesize that such progress results from two parallel routes: a grammatical route rooted in the learners' growing awareness of the English determiner and number morphology, which will lead them to incorporate the projection of NumP and DP in the L2 grammar, combined with a statistical route rooted in the learners' inferences based on missing data. The statistical route is rooted in the assumption that, as proposed for L1 learners, L2 learners may be able to make inferences about the aspectual entailments of English simple past predicates on the basis of missing evidence (see Discussion & Conclusions).

Finally, an important point that has been noted in the theoretical literature concerns the existence of predicate-level variability and contextual and pragmatic influences with respect to the availability of the event cancellation reading (Soh & Kuo, 2005; Tsujimura, 2003; Hay,

Kennedy & Levin, 1999; Koeing & Muansuwan, 2000). Our experimental study aimed to approach this issue with rigour by including two sizeable monolingual groups (L1 English and L2 Japanese) and 16 different predicates that could be screened to yield a (smaller) set of predicates that clearly differ between English and Japanese in terms of the availability of event cancellation reading. The native speaker data, apart from serving as baseline for L2 speakers, are a valuable addition to the existing literature, in which predicate-level variability has received limited empirical examination.⁷

Experiment

Participants

One group of one hundred ninety-six Japanese learners of English (L2 English group) as well as one control group of English monolinguals (L1 English, n=20) and one control group of Japanese monolinguals (L1 Japanese, n=20) participated in the experiment.

Sixty of the 196 participants in the L2 group were 2nd year junior high school students in Japan and were classified as beginner L2 learners. These students had been taking formal English lessons an average of 1.8 years (ranging from 1.7 to 1.9 years) at the time of the experiment. No additional placement test was administered for this group. Because the test items were challenging for beginner participants and in order to ensure that the participants were able to perform the task adequately, they were trained on the same lexical items as those included in the experiment a week prior to the task (i.e., the verbs in the target sentences in the experiment) and no special morphology or syntax training was provided.⁸ Including results of the substantial numbers of beginners is important for the study since it provides us with information as to whether or not L1 transfer effect is present in the acquisition of the semantics of predicate aspect. Such a confirmation is needed because, for example, there is a logical alternative whereby all L2

English learners interpret simple past sentences as entailing event completion as being the default option regardless of the type of DP that their L1 possesses. This would parallel Koenig and Muansuwan's view (2000) for the suggestion that in L1 acquisition by default simple past refers to a completed event. If this were the case, the results would show that the L2 beginners interpret an English simple past sentence's in incomplete event as a complete event. As seen in the results section, our findings rule out this option.

The remaining 136 out of 196 participants were categorized into an intermediate group (n=96, the mean years of formal English study was 9.2 years, range 6-20 years) or an advanced group (n=40, mean years of study was 13.5 years, range 6-30 years). The intermediate group were university students in Japan and workers in Canada. The advanced group comprised speakers who were university students in Japan, Japanese English teachers in Japan and workers in Canada. The classification into intermediate vs. advanced group was done on the basis of the Quick Placement Test (published by Oxford University Press and the University of Cambridge Local Examinations Syndicate, 2001) that evaluates the learners' vocabulary, grammar and reading skills. Following Rezai (2006), participants with scores of 70% and above were classified as advanced (n = 40, mean score 74.5%, range 70-96.6%) and those who fell into the range of 40-69% were classified as intermediate (n = 96, mean score 57.5%, range 42-68%). L1 English speakers (mean age 30.1 years, range 20-45) were recruited in [removed for review] and the participants in the L1 Japanese control group (mean age 26.9 years, range 20-40) were recruited in either [removed for review].

The L2 English groups and the L1 English group performed a truth-value judgment task in English and the L1 Japanese group performed a Japanese version of the truth-value judgment

task. The L2 English groups also completed a language background questionnaire (see [removed for review]).

Method

The experiment was modeled after Kaku and Kazanina's (2007) experiment and followed the basic features of a truth-value judgment task (Crain & Thornton, 1998; Gordon, 1996). Participants watched a short animated PowerPoint presentation. In each animation, the objects appeared on the screen and then moved and changed their location and/or appearance as part of an event that they participated in. The effects were implemented using animation effects options in PowerPoint (e.g., Appear, Disappear, and their motion paths which enable specifying object movement trajectories). Each event was performed either completely or incompletely; the performance of the event was accompanied by a verbal description narrated by a male speaker (also duplicated by written text appearing on the screen). The participant's task was to judge the truth-value of a target sentence that appeared at the end of each story.

To illustrate this procedure, we provide a depiction of the complete singular version of the *star-erasing* scenario (Figure 3). First, the voice announces (and was also duplicated by written text on the screen) that a girl named Lisa has a drawing of a star on a piece of paper (the star drawing appears on the screen, Figure 3A). Then the voice says that Lisa wanted to get rid of the star.⁹ At this point the eraser appears and starts moving back and forth which results in gradual disappearance of the star (Figure 3B) until the star is completely erased. The voice says 'This is what she did' and the star disappears completely (Figure 3C). The target sentence *Lisa erased the star* then appears on the screen and the participant has to judge if the sentence is a true description of what happened in the story. Participants were instructed to choose an answer from one of three choices: *Yes*, *No* and *I did not understand the sentence*. When choosing *No*,

participants were asked to elaborate on their rationale in any language. The incomplete singular version of the star-erasing scenario is shown in Figure 3D-E-F. The incomplete version is identical to its complete counterpart including the target sentence, except for the fact that in the animation the star is erased incompletely (Figure 3F).

[Figure 3 about here]

The experiment followed a 2×2 design with factors *event type* (complete/incomplete) and *number of affected objects* (Singular/Plural) (Figure 4). Conditions A and B both involved a singular object and differed in whether the critical event was performed completely (condition A) or incompletely (condition B). Accordingly, the target sentence contained a predicate with a singular bounded object DP (e.g., *Lisa erased the star*). Conditions C and D followed the same pattern with the difference that multiple objects (2 or 3, see Appendix A) were involved in the event; the target sentence contained a plural bounded object DP (e.g., *Lisa erased the stars*).

[Figure 4 about here]

Designing stimuli for the experiment presented the following challenge: to find English predicates that are definitively perceived as an accomplishment (i.e., denoting an event that unfolds incrementally towards a clearly defined and unambiguous endpoint). This is a non-trivial task as even the same predicate with a bounded object may be ambiguous between an accomplishment and an activity reading.¹⁰ Furthermore, the status of each predicate (more precisely, its translation equivalent) with respect to the event cancellation reading in Japanese needed to be verified. Indeed, we aimed to track the L2 learners' performance in a situation in

which their native (L1 Japanese) and L2 target (corresponding to L1 English) entailment judgments are diametrically opposite. That is, the predicate can denote an incomplete event in L1 Japanese but not in L1 English. In light of these facts, our strategy was to include a wide range of predicates in our experimental materials to make it possible to compile a large enough subset of predicates for the L2 groups' analyses that includes only those predicates that showed a clearly distinct pattern in L1 English and L1 Japanese (i.e., they were unambiguously rejected by L1 English speakers and clearly allowed an event cancellation reading by L1 Japanese speakers). Hence, sixteen sets of four conditions were created using 16 different accomplishment predicates: *paint the door(s)*, *build the house(s)*, *erase the star(s)*, *draw the picture(s)*, *eat the orange(s)*, *fill the glass(es)*, *assemble the chair(s)*, *untie the bow(s)*, *empty the bottle(s)*, *remove the cork(s)*, *circle the star(s)*, *shred the document(s)*, *melt the candle(s)*, *disassemble the table(s)*, *unwrap the present(s)*, *type the name(s)*. In each scenario we attempted to highlight the desired endpoint/goal for the event by explicitly stating it at the beginning of the story (e.g., in the 'erase the star' scenario the goal was stated as 'Lisa wanted to get rid of the star').

Four presentation lists were created using a Latin Square Design and 16 filler animations were added to each list (See Appendix B for a list of experimental materials). The order of items within each list was randomized. Participants were tested individually, in small groups and in the case of beginners, in a classroom setting.

An animated PowerPoint presentation was presented to them by the experimenter on a laptop screen (when tested individually) or on a projector screen (when tested collectively in small groups or in the classroom setting) and the audio stimuli were played via loudspeakers. The participants wrote their answer at the end of each trial into a response sheet. They were

given 25 seconds to respond to each question.¹¹ The experimental session lasted approximately 40 minutes including a 5-7 minutes break halfway through the task.

Results

Analysis

The dependent variable was binary (the Yes/No response from each participant for each trial in each condition A-D), hence **mixed-effects logistic regression model** was applied to raw, trial-level data (Jaeger, 2008) in R (Version 3.4.3; CRAN project; R Core Team, 2017). The R function *glmer* (package ‘lme4’, Bates, Maechler, Bolker & Walker, 2015) with a binomial family and a logit link function was used. Two models were constructed: one model was fitted to the data from the L1 English and L1 Japanese groups, and the other to the data from the L2 groups. We included three predictors into the model: *language group* (for the analysis of L1 group data) or *L2 proficiency* (for the analysis of L2 group data), *number of objects* and *event type*, as well as their interactions. **All fixed factors were coded using sum-to-zero contrast coding** (see Tables 1 & 2 below for further details).

Participants and items were used as random factors. Model parameters were estimated using a maximum likelihood method (the Laplace approximation). A maximal random-effect structure justified by the design was used to fit a model (Barr, Levy, Scheepers, & Tily, 2013) whereby random intercepts and slopes were included for every fixed effect. If the maximal model did not converge, the effect structure was simplified step-wise until convergence was obtained using the recommendations in Barr et al. (2013).

The data from the L1 Japanese and L1 English groups will be reported first and will serve to identify a subset of predicates that clearly differ in terms of the availability of the event

cancellation reading in Japanese vs. English. This subset of predicates will then be used in the analysis of the L2 learners' data.

L1 English and L1 Japanese speakers' performance

Results from the L1 English participants and L1 Japanese participants, who performed a Japanese version of the task, are shown in Figure 5.

[Figure 5 about here]

Both the L1 English and the L1 Japanese speakers overwhelmingly accepted sentences with complete events: the averaged % Yes responses on conditions A (Sg/complete) and C (Pl/complete) was 100% for the L1 English and 98.1% for the L1 Japanese groups. On the contrary, the performance on the incomplete-event conditions differed across languages, with the L1 Japanese speakers accepting the target simple past sentence at a higher rate than the L1 English speakers: 63.1% vs. 20.6% of Yes responses respectively on conditions B (Sg/incomplete) and D (Pl/incomplete). These observations were confirmed statistically (Table 1).¹²

[Table 1 about here]

The maximal convergent model included the factors *language group*, *event type* and *number of objects* and their 2- and 3-way interactions as fixed factors, as well as a random intercept by subject and random intercept and slopes for *event type* and *group* by predicate. [Abridged R formula: $\text{model} = \text{glmer}(\text{yesrate} \sim \text{group} * \text{event} * \text{numobj} + (1|\text{subj}) + (1 + \text{event} + \text{group} | \text{pred}), \text{family} = \text{binomial})$] In the model the significant factors were *event type*

(estimate = 6.5, SE = 1.2, $z = 5.5$, $p < .001$), reflecting higher Yes-rate for complete vs. incomplete events, and the interaction *group x event type* (estimate = 5.0, SE = 1.8, $z = 2.8$, $p = .005$) reflecting that Yes-rate for complete vs. incomplete events differed for English vs Japanese L1 speakers. As no factors containing *number of objects* were significant, for the remainder of this section singular and plural objects will not be considered separately.

Ceiling-like acceptance of target sentences with complete events in the complete-event conditions A (Sg/complete) and C (Pl/complete) by both groups is in full alignment with our expectations. The overall trend in the incomplete-event conditions B (Sg/incomplete) and D (Pl/incomplete) is as expected (i.e., Japanese speakers accepted target sentences as descriptions of an incomplete event significantly more than English speakers). A relatively low acceptance rate in the incomplete-event conditions B and D by English speakers suggests that simple past accomplishments entail completion in English. A significantly higher acceptance rate in the same conditions (B and D) by the Japanese group reflects the availability of the event cancellation reading in L1 Japanese. However, the fact that the English speakers accepted target sentences with incomplete events in conditions B (Sg/incomplete) and D (Pl/incomplete) roughly in a fifth of cases and the Japanese speakers rejected them with incomplete events in roughly a third of cases requires a closer examination and points to a possibility of lexical variability among different predicates, as mentioned in the Method section. We therefore examine (Figure 6) the individual predicate data from the L1 Japanese and the L1 English groups with the aim of establishing potential differences among predicates. Such differences, if found, would have implications for theories of aspectual entailments in English and Japanese (see Discussion & Conclusions). With respect to the key focus of this research, this analysis is needed to establish a

subset of predicates that clearly have a completion entailment in English but not in Japanese and thus are likely to present a challenge for Japanese learners of English.

[Figure 6 about here]

Various types of predicates can be identified on the basis of Figure 6. The first 6 predicates (*eat the orange, untie the bow, erase the star, disassemble the table, paint the door, shred the document*) showed an expected pattern of judgments in both L1 English and L1 Japanese. That is, they are rejected with an incomplete event in L1 English and accepted in L1 Japanese. These predicates that yielded diametrically opposite response patterns from the L1 English and the L1 Japanese speakers align perfectly with the predictions of Soh and Kuo's extended account that links the predicate aspectual value to the object boundedness in Japanese (see section of *Event cancellation: linguistic analysis*). We also added to this group the predicates *type the name* and *assemble the chair* on the grounds that they similarly show a strong contrast between the L1 English and L1 Japanese readings (at least 50% difference). This was done to maintain a larger set of predicates for the analyses of L2 data. We will use this subset of 8 'clear' predicates to examine whether L2 learners can progress from the L1 Japanese representation of aspect to an L1 English representation of aspect.

Among the remaining 8 predicates, 3 predicates (*draw the picture, melt the candle and unwrap the present*) were largely accepted by both L1 Japanese and L1 English speakers with incomplete events, and 5 other predicates (*fill the glass, build the house, circle the star, empty the bottle, remove the cork*) were rejected by both L1 Japanese and L1 English speakers with incomplete events. Because in all these cases the L1 English and L1 Japanese judgments are similar, they do not provide information for exploring progression of completion entailments in

Japanese learners of English. Although they will not be included in the main L2 data analysis that we discuss next, they provide valuable information on which factors affect completion entailments in English and Japanese. We will return to this in the Discussion & Conclusions section.

L2 English learners' performance

All analyses of the data from L2 English speakers are performed using the 8 'clear' predicates identified on the basis of the L1 data above. These predicates are the 8 accomplishment predicates that showed a contrast in the presence of an event cancellation reading in L1 Japanese vs. L1 English: *eat the orange, untie the bow, erase the star, disassemble the table, paint the door, shred the document, type the name* and *assemble the chair*. Each participant thus provided 2 data points for each of 4 conditions.

'I don't understand responses' (59 out of a total of 1568 responses corresponding to 3.8%) from L2 Japanese learners' of English were excluded from further analyses. All analyses were performed on the remaining 1509 responses to 'clear' predicates. Figure 7 shows the rate of Yes-responses for the beginner, intermediate and advanced L2 groups on conditions A-D for the 8 'clear' predicates. The figure also includes the data from L1 Japanese and L1 English which respectively provide a starting and a target performance level for L2 learners.

[Figure 7 about here]

Figure 7 demonstrates that all three L2 groups showed a ceiling-like performance in conditions A (Sg/complete) and C (Pl/complete). It also shows that in the critical conditions B (Sg/incomplete) and D (Pl/incomplete) L2 learners show a clear progression towards target-like (i.e., L1 English-like) performance with growing English proficiency level. Indeed, a rather high

acceptance of past predicates with incomplete events by beginners (72% in conditions B and D combined) lowers to 61% in the intermediate group and further to 39% in the advanced group.

The maximal model that converged included the factors *L2 proficiency*, *number of objects* and *event type* and their 2- and 3-way interactions, as well as random intercept by subject and random intercept and slopes for *L2 proficiency* and *event type* by predicate (abridged R formula: $\text{yesrate} \sim \text{L2prof} * \text{event} * \text{numobj} + (1 | \text{subj}) + (1 + \text{L2prof} + \text{event} | \text{pred})$). The model output is reported in Table 2, alongside effect sizes and confidence intervals for each simple effect or interaction.

[Table 2 about here]

The model showed a significant main effect of *event type* (estimate = 3.1, SE = 0.5, $z = 6.7$, $p < .001$) reflecting a higher rate of Yes-responses for complete vs. incomplete events. Two-way interactions *event type* \times *number of objects* was significant (estimate = -1.5, SE = 0.5, $z = -3.0$, $p = .002$) reflecting the L2 learners' higher rate of Yes-responses for plural objects with incomplete events. *L2 proficiency* \times *event type* interaction was significant for both contrasts, reflecting higher acceptance rates for simple past sentences for beginners vs. intermediate and advanced learners (estimate = -2.1, SE = 0.5, $z = -4.6$, $p < .001$) and also for intermediate vs. advanced learners (estimate = -1.4, SE = 0.7, $z = -2.1$, $p = .039$) but only in the case of incomplete events. Finally, the interaction *L2 proficiency* \times *event type* \times *number of objects* was significant (estimate = 2.2, SE = 0.9, $z = 2.5$, $p = .012$) confirming higher acceptance rates for simple past sentences with complete vs. incomplete events for beginners than for intermediate and advanced learners, especially with singular objects.¹³ Indeed, focusing on incomplete events,

the drop in acceptance rates of English simple past accomplishments was especially pronounced with Singular incomplete events (beginner 64%, intermediate 46%, advanced 34%), and was also present with Plural events (beginner 69%, intermediate 61%, advanced 46%). This significant decrease in acceptance of simple past sentences with incomplete events with increasing L2 proficiency demonstrates that L2 learners progress from an L1 Japanese-like interpretation of English simple past predicates that allows event cancellation towards an L1 English-like one that precludes event cancellation.

[Figure 8 about here]

Finally, we examined the L2 learners' data from the incomplete-event conditions B and D predicate-by-predicate. Figure 8 shows L2 learners' performance alongside the performance from L1 Japanese and L1 English speakers for individual predicates. Despite some differences in an exact curve shape for the individual predicates, the majority of individual predicate curves show a stable descending trend found in the averaged data for the incomplete-event conditions. As discussed above and as demonstrated in Figure 8 by the dotted average line, the acceptance rate of simple past predicates with incomplete events (i.e., event cancellation reading rate) is highest in the L1 Japanese and the L2 English beginner groups, then drops in the L2 English intermediate group, and drops even more in the L2 English advanced and L1 English groups.

Discussion and Conclusions

Our study investigated whether Japanese learners of English can learn to invalidate the event cancellation reading in English and how such understanding develops with increasing English proficiency. We addressed this question by examining how beginner, intermediate and

advanced Japanese learners of English interpret accomplishment predicates that allow an event cancellation reading in Japanese but not in English. Eight ‘clear’ accomplishment predicates which show a distinct pattern in L1 Japanese and L1 English with respect to the availability of the event cancellation reading (84% of acceptance in conditions B (Sg/incomplete) and D (Pl/incomplete) by Japanese L1 speakers vs. 6% of acceptance by English L1 speakers) were chosen. We found that whereas the beginner learners directly transferred their L1 Japanese representation of predicate aspect onto their L2, the intermediate and especially the advanced learners of English clearly progressed towards the target-like representation of aspectual entailments in the L2 (73% vs. 65% vs. 39% in incomplete conditions B (Sg/incomplete) and D (Pl/incomplete) by the beginner, intermediate and advanced Japanese learners of English respectively). These results demonstrate that L2 learners can gradually overcome the effects of L1 transfer and learn to invalidate the event cancellation reading in English.

The results from the beginner L2 learners reveal L1 transfer effects as predicted by the Full Transfer/Full Access hypothesis (Schwartz & Sprouse, 1996). If beginner learners misrepresent the English bare nominal star as [-b] (see Figure 9a) and, following their native language principles, do not project NumP and DP, the English predicate *erased a/the star* will be marked as [-b] at the VP level. Hence, their representation will be consistent with the event cancellation reading. (Figure 9b demonstrates a similar derivation for the plural *erased the stars*.)

[Figure 9 about here]

Furthermore, the L1 transfer effect of the object boundedness observed in our study is in line with Gabriele (2010) who demonstrated that English learners of Japanese use their L1

setting of count noun boundedness and NumP and DP projection¹⁴ to compute predicate aspect in the L2. Recall that Gabriele's (2010) study found that English learners of Japanese interpret a simple past sentence with a bare count noun (e.g., *kaado-o kakimashita* 'wrote card') to mean that all of the cards mentioned in the story are affected (i.e., *the cards*) and to entail completion. Gabriele argued that the challenge for the learners lies in the absence of morphosyntactic cues (i.e., plural morphology and determiners) for interpreting completion entailment of simple past accomplishment sentences in Japanese. L1 transfer effects of boundedness of count nouns and the projection of NumP and DP were prominent in both the intermediate and the advanced learners in Gabriele (2010). In our study, in comparison, L1 transfer effects of both the boundedness of count nouns and the lack of the projection of NumP and DP weaken with growing proficiency, i.e., they show progress towards the target-like interpretation of English predicate aspect. Given this, our results could indicate that it is less complex for the learners to move away from their L1 settings towards the target-like representation of aspect when there are overt morphosyntactic cues that can aid in the computation of predicate aspect. Most generally, we consider our findings to align with the proposal (Gabriele's 2010; Gabriele & McClure's 2011; Gabriele & Sugita Hugh's 2015) that morphological encoding of a semantic concept influences L2 learners' acquisition trajectory of the target like form-meaning mapping (see also Slabakova, 2008).

In the introduction we discussed two options that may enable Japanese learners of English to move away from their L1-like superset interpretation of aspectual entailments in simple past predicates ('a simple past accomplishment predicate need not entail completion') to a subset interpretation ('a simple past accomplishment entails completion'). First, the learners may benefit from their growing awareness of English determiner and number categories which

contribute to calculation of DP boundedness which in turn is important for aspectual entailments. Note however that our study did not manipulate object boundedness (only predicates with bounded objects were used). Therefore, while our results are compatible with the interpretation that the L2 learners' progress is aided by their growing understanding of object boundedness in English, a more definitive answer will require further research that includes object boundedness manipulation.

Second, L2 learners may be able to make inferences about the aspectual entailments of English simple past predicates on the basis of missing evidence. The role of missing evidence has been discussed in L1 acquisition in terms of whether learners use this type of information in language learning and if so, how they use it (Pinker, 1989). The idea is that learners can infer ungrammaticality of certain types of sentences based on the observation of non-occurrence of them in the input. Some researchers argue that missing evidence does not explain children's successful language learning because it is too vague to measure if and how children use it in the language learning environment (Pinker, 1989). Similarly, in L2 acquisition, missing evidence is generally not considered as playing a facilitating role for L2 learners to acquire the target language (White, 1989:15; White 2003:165). However, a growing amount of research indicates that children do use missing evidence in language acquisition (MacWhinney, 2004; Tenenbaum & Griffiths, 2001; Perfors, Tenenbaum & Regier, 2006, among others). Following the research demonstrating the role of missing data in L1 acquisition, we would like to argue that L2 Japanese learners of English may benefit from missing evidence. In a nutshell, if L2 learners observe that sentences such as *John erased a star* are uttered by English speakers (almost) exclusively to describe a completed star-erasing event, the lack of situations in which the sentence refers to an incomplete star-erasing event functions will be interpreted as 'missing evidence'.

Let us provide more details about the hypothesis presented above. Starting generally, an important role of missing evidence for learning and generalization has been formalized by Tenenbaum and Griffiths (2001). These authors laid out a framework which rationalizes these processes in many cognitive domains, including language, in terms of Bayesian statistical principles. The central idea is that the learner entertains a limited number of hypotheses in relation to the data; a hypothesis gains more weight as the learner encounters data instances that fully support the hypothesis. Hence, if a hypothesis is supported by a data pattern that is missing from the input, it will eventually lose to a competitor hypothesis that is reinforced by the input. In our case, imagine that an L2 learner considers a superset hypothesis ('simple past predicates need not entail completion') and a subset hypothesis ('simple past predicates entail completion') regarding the aspectual entailments of English simple past accomplishments. During his or her exposure to English, the learner will encounter instances of simple past predicates referring to a past complete event much more often than those in which they refer to a past incomplete event. Thus, the subset hypothesis whereby the English simple past entails completion will be reinforced as the one that is better correlated with the input. Note that this acquisition scenario makes two assumptions which await independent verification: that an appropriate hypothesis space consisting of the subset and the superset hypotheses can be outlined by the learner, and that the learner has an opportunity to both observe events in the real world and hear how they are described by native English speakers.

Completion entailments in English and event cancellation in Japanese: individual predicate variability

Although the main goal of the study was to investigate whether L2 learners can develop a completion entailment pattern in L2 that is different from their L1 pattern, our well-controlled

empirical data from monolingual English and Japanese speakers are valuable for the discussion of completion entailments for the simple past in these languages. The results from a total set of 16 predicates reported in Figure 6 clearly demonstrate significant inter-predicate variation in both languages.

In L1 English there is a bimodal distribution pattern among predicates. Namely, for 13 out of 16 predicates, the L1 English speakers either did not accept the event cancellation reading at all (*eat the orange, erase the star, disassemble the table, paint the door, untie the bow, type the name, assemble the chair, circle the star, empty the bottle, and build the house*) or accepted it at most 20% of the time (*shred the document, fill the glass, and remove the cork*). However, with the remaining three predicates (*melt the candle, draw the picture and unwrap the present*) they accepted the event cancellation reading in 80% of cases. The L1 Japanese speakers' judgments of the equivalent 16 Japanese predicates are non-uniform as well. In particular, there were 8 predicates for which the event cancellation reading is readily available (acceptance rates of 80% or higher): *eat the orange, erase the star, disassemble the table, paint the door, shred the document, untie the bow, melt the candle, and draw the picture*). L1 Japanese speakers consistently rejected 4 out of 16 predicates (acceptance rate $\leq 20\%$): *circle the star, remove the cork, empty the bottle*¹⁵ and *build the house*). We discuss why this could be the case below. The remaining four predicates (*assemble the chair, type the name, fill the glass, and unwrap the present*) yielded an intermediate score between 40% and 60%.¹⁶ The variation above suggests that the event cancellation reading is not always available in Japanese and unavailable in English with accomplishment predicates. Hence, the object DP boundedness is not the only factor for deriving completion entailment in single past accomplishment sentences. Instead, as discussed

below, the availability of either reading is also influenced by the lexical properties of the verb and potentially by other factors.

L1 variability in the acceptance of the event cancellation reading has been previously reported in various languages, including Japanese and English (Arunachalam & Kothari, 2011; Gabriele, 2010; Soh & Kuo, 2005; Sugita, 2009; Tsujimura, 2003; Yoshida, 2005, 2008). Our L1 findings are similar to the findings by Arunachalam and Kothari (2011) who examined completion entailments in English and Hindi simple past accomplishments and achievement predicates. Focusing on their findings on English accomplishments, the accomplishments that they tested were all accepted with incomplete events to at least a considerable degree (*cover a pot*: 54%, *draw a flower*: 64%, *eat a cookie*: 67%, *fill a glass*: 95%). When these simple past accomplishments were tested in another experiment alongside the same predicates used with the particle ‘up’ (e.g., *cover up a pot*), English speakers’ acceptance rate of the simple accomplishments with incomplete events was even higher (*cover a pot*: 83%, *eat a cookie*: 83%, *fill a glass*: 100%, *draw a flower*: not tested). In explaining their results, the authors argue that whether an event is considered as (in)complete varies with context, which can differ by the type of object (e.g., a full wine glass typically has more empty space than a full water glass) and the intended use (e.g., filling a water glass for drinking does not require that the water reaches the rim, but such a requirement may be present when one fills up a water glass to measure out a quantity of water).

Similar considerations may apply to our case. The fact that the object type can affect the aspectual entailments of the predicate may explain some of the predicate variability in L1 English. For example, L1 English speakers often accepted the predicate *drew a picture* in an incomplete scenario which could be due to the fact that incomplete objects may be considered as

acceptable example of the category denoted by the object NP (the notion of ‘extended-objects’ in Parsons (1990) or ‘allowed partial objects’ in Soh & Kuo (2005) whereby an incomplete picture may be included in the set of denotations for the relevant nominal). In addition, our L1 Japanese data *ie-o tatemashita* ‘house-Acc built’ that showed the low acceptance in the incomplete scenario may be explained by this notion of the object type. For example, when someone said *Bill-wa ie-o tatemashita* ‘Bill-Top house-Acc built’, there should have been at least one completely built house where a person can live in. In other words, for the Japanese accomplishment predicate ‘built a house’, incomplete objects (i.e., unfinished house) is not considered as acceptable denotation of the event of *built a house* (i.e., the notion of ‘No Partial Object’ in Soh & Kuo, 2005 whereby only a complete house is included in the set of denotations for the relevant nominal).¹⁷

Furthermore, there may be variability due to the intended use. Despite our effort for experimental situations to set an unambiguous intended event endpoint for each experimental scenario (e.g., in the ‘erase the star’ scenario the agent stated the intention to get rid of the star completely), it could be that some scenarios failed to clearly establish what a targeted complete event was, as a result of which the participant may have concluded that the event goal was reached even when the event was acted out incompletely. For example, in a story with the predicate *melt a candle*, we used the lead-in sentence *Grace wanted to make two small candles out of one big candle* to make it clear that the original big candle had to be melted completely. However, both L1 English and L1 Japanese speakers almost always accepted the target sentence *Grace melted the candle* even in an incomplete scenario in which the candle started melting and stopped when it melted halfway. If participants thought that the wax from a half-melted candle

was sufficient to make a second candle they could conclude that the event had reached its endpoint and accept the target sentence.

Theoretical accounts discussed so far all highlight the relevance of the object DP – its boundedness or meta-linguistic properties of its referent – in computing the aspectual entailments of accomplishment predicates. It has also been proposed that some of the information that is relevant for computation of the predicate aspect is lexicalized in the verbal root (Rappaport Hovav & Levin, 2010). Rappaport Hovav and Levin distinguish two main types of verbal roots in accordance with the associated event structure: *result* roots and *manner* roots. The idea is that a *result* root (e.g., *empty*) focuses on a state that results from some activity, whereas a *manner* root (e.g., *wipe*) indicates an activity, which is carried out to achieve a change defined by the predicate. Because a verb such as *empty* describes a result state that is brought about by removing substance from a place, it is incompatible with an incomplete situation in which that result state is not achieved (regardless of whether the object is bounded, as in ‘John emptied the bottle’, or unbounded, as in ‘John emptied bottles’). Relating to our L1 Japanese findings, *fill* and *remove* which yielded unexpectedly high rejection rates in the incomplete scenario all carry the main characteristic of result roots (i.e., they denote a change of state reached by an externally caused activity).

On the other hand, a manner root such as *draw* describes an activity that is associated with means (e.g., inscribing lines with pens or other marking instruments). Such verbs indicate an activity targeted towards achieving the result state indicated by the predicate. However, they may not require the result state to be achieved even with bounded object DPs. Accordingly, three predicates that were often accepted in an incomplete event by L1 English speakers: *draw*, *melt*

and *unwrap* all have a manner root. Hence, the type of verbal root may need to be considered among factors influencing the aspectual value of the predicate.¹⁸

Most generally, our findings support the claim that lexical properties of the verb or meta-linguistic knowledge about objects, alongside the boundedness of the object DP, influence the predicate aspectual value.

In conclusion, we have demonstrated that Japanese learners of English progress towards an English-like representation of aspectual distinctions (and preempt their L1 option). We have proposed that such a progress was possible due to a combination of grammatical knowledge and observational inference. Further tests for this proposal might be provided by other linguistic phenomena and/or different combinations of L1 and L2, which we leave for future research.