

RESEARCH

Split intransitivity in Japanese is syntactic: Evidence for the Unaccusative Hypothesis from sentence acceptability and truth value judgment experiments

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Split intransitivity (SI) is the generalization that intransitive verbs form two subclasses: the subjects of some intransitives behave like direct objects of transitive verbs, whereas the subjects of other intransitives behave like transitive subjects. The Unaccusative Hypothesis (UH) accounts for SI syntactically, arguing that the subjects of some intransitives (*unaccusatives*) are initially internal arguments, just like transitive objects, while the subjects of other intransitives (*unergatives*) are true subjects, just like transitive subjects. The UH has been enormously influential and inspired a rich and diverse literature on SI, including many recent experimental studies. Yet, no conclusive evidence for or against the UH has been put forward, largely because SI diagnostics (SIDs) – phenomena that motivate SI – are often amenable to both syntactic and non-syntactic analyses. In order to present unequivocal evidence for the UH, therefore, SIDs that make crucial reference to the UH must be carefully identified and studied. This study argues that two Japanese SIDs, *quantifier scope* and *floating numeral quantifier licensing* (FNQ-licensing), are such SIDs, as (i) they make crucial reference to the UH and the putative syntactic difference between unaccusative and unergative subjects, and (ii) they reliably classify Japanese intransitive verbs into two subclasses because of a syntactic difference. The evidence for this claim comes from the results of truth value judgment and sentence acceptability judgment experiments. The study argues that the results of these experiments show that Japanese intransitive verbs form two subclasses because of a syntactic difference, supporting the UH.

Keywords: split intransitivity; Unaccusative Hypothesis; floating quantifiers; quantifier scope; Japanese; experimental syntax

1 Introduction

Split intransitivity refers to the generalization that intransitive verbs form two subclasses. While the core arguments of some intransitive verbs share common properties with transitive direct objects, the core arguments of other intransitive verbs do so with transitive subjects. The Unaccusative Hypothesis (UH; Perlmutter 1978; Burzio 1981, 1986) accounts for this generalization by proposing a different structure for each type of intransitive verb: *unergatives* have an external argument subject base-generated outside of VP (1a) while *unaccusatives* have an internal argument subject base-generated inside VP (1b).

- (1) a. $[_{XP} DP \ [_{VP} V \]]$ (UNERGATIVES)
b. $[_{XP} \ [_{VP} V DP \]]$ (UNACCUSATIVES)

Split intransitivity has also been characterized semantically. Unaccusatives often denote states or telic events, and their core arguments are undergoers of events or holders of states. In contrast, unergatives typically denote atelic events, and their core arguments

are usually volitional agents. While Perlmutter (1978) and many subsequent studies argue that split intransitivity is semantically determined and syntactically encoded (Levin & Rappaport-Hovav 1989, 1995; Sorace 2000), others argue that the distinction is purely syntactic (Rosen 1984; Perlmutter 1989) or semantic (Van Valin 1990; Dowty 1991; Kishimoto 1996). A major factor in this disagreement is that *split intransitivity diagnostics* (SIDs), phenomena by which unaccusativity or unergativity can be determined, are often amenable to both syntactic and non-syntactic analyses. Thus, in order to present unequivocal evidence for the UH, one must identify SIDs that make direct reference to the purported base-generated positions of unaccusative and unergative subjects. Only then can one show whether such diagnostics reliably classify intransitive verbs into the two subclasses because of the putative syntactic difference, not because of non-syntactic factors. While there are studies that identify SIDs that make crucial reference to the hypothesized difference between unaccusative and unergative verbs, and studies that systematically examine how particular SIDs classify intransitive verbs, very few studies have done both: identify SIDs that make crucial reference to the UH and systematically test the predictions of the UH with such SIDs and a group of intransitive verbs.¹

The aim of this study is to address the aforementioned issues in the existing literature on split intransitivity and SIDs by taking a step toward identifying unequivocal evidence for the UH. We argue that Japanese has at least two SIDs that make crucial reference to the claimed syntactic difference between unaccusative and unergative subjects according to the UH: *quantifier scope* (Nakayama & Koizumi 1991; Yatsushiro 1999) and *floating numeral quantifier licensing* (FNQ-licensing; Miyagawa 1989). We show that these diagnostics reliably classify Japanese intransitive verbs into two subclasses based on the results of truth value judgment and sentence acceptability judgment experiments, and argue that these findings are best accounted for by the UH. That is, subjects of some Japanese intransitive verbs are base-generated as internal arguments, while subjects of other Japanese intransitive verbs are base-generated as external arguments, and this difference is reflected in the judgments of Japanese native speakers.

The rest of this study is structured as follows. Section 2 reviews recent experimental studies on split intransitivity with auxiliary selection, and argues that data from auxiliary selection do not provide direct evidence for or against the UH, because auxiliary selection is not directly linked to the putative syntactic difference between unaccusative and unergative subjects. In order to investigate predictions of the UH, one must identify and examine SIDs that make direct reference to the putative syntactic difference between unaccusative and unergative subjects. Section 3 introduces quantifier scope in doubly-quantified sentences as such an SID in Japanese. Given that Japanese is a “scopally rigid” language (Kuroda 1970; Kuno 1973; Hoji 1985), the UH predicts that, in Japanese, a quantifier subject may scopally interact with a VP-internal quantifier only in unaccusative sentences (Nakayama & Koizumi 1991; Yatsushiro 1999). Section 4 tests this prediction with eight intransitive and four transitive verbs with a truth value judgment experiment that examined the availability of surface and inverse scope interpretations in doubly-quantified Japanese intransitive and transitive sentences in the canonical subject-initial order (Experiment 1). The results show that inverse scope is readily available with doubly-quantified unaccusative sentences but not with similar unergative and transitive sentences. Section 5 introduces FNQ-licensing and a “stranding” analysis of FNQs by Miyagawa (1989), according to which FNQ-licensing in Japanese is another

¹ An important exception to this generalization is Sorace & Shomura (2001), which will be discussed in detail in Section 5.2.

SID that makes crucial reference to the UH. Section 6 presents the results of a sentence acceptability judgment experiment with FNQ-licensing (Experiment 2). They show that FNQ-licensing divides ten Japanese intransitive verbs from five lexical semantic classes (change of location, change of state, stative, controlled motional process, and controlled non-motional process) into two larger groups: the controlled motional process and controlled non-motional process verbs, whose sentences' acceptability is significantly affected by FNQs, and the change of location, change of state, and stative verbs, whose sentences' acceptability is not significantly affected by FNQs. We argue that this dichotomy provides novel evidence for the UH. Section 7 addresses two empirical questions that previous studies raise about FNQ-licensing as an SID: (i) whether and to what extent the telicity of events denoted by intransitive sentences affects FNQ-licensing and (ii) whether and to what extent the animacy (and therefore potential agentivity) of intransitive subjects affects FNQ-licensing. Section 8 presents the results of another sentence acceptability judgment experiment that addresses these questions (Experiment 3). The results suggest that the telicity of an intransitive event does affect FNQ-licensing, but do not support the hypothesized effect of the animacy of intransitive subjects on FNQ-licensing. Section 9 concludes the study with a discussion of the implications of our findings for split intransitivity in Japanese and the possibility of extending these findings to other languages with similar SIDs.

2 Previous experimental studies on split intransitivity

Split intransitivity and its diagnostics have been the topic of many recent experimental studies, especially with Romance and Germanic languages (Italian: de Vincenzi 1991; Sorace 1993, 1995; German: Keller 2000; Keller & Sorace 2003; Randall et al. 2004; Dutch: Randall et al. 2004; Spanish: Montrul 2005; and English: Friedmann et al. 2008) and East Asian languages (Japanese: Hirakawa 1999, 2001; Sorace & Shomura 2001; Mandarin Chinese: Yuan 1999; Laws & Yuan 2010; and Korean: Ko & Oh 2010, 2012; Lee 2011). By far, the best studied SID in the experimental literature is auxiliary selection (Sorace 1993, 1995, 2000; Keller 2000; Keller & Sorace 2003; Randall et al. 2004; Laws & Yuan 2010). Auxiliary selection refers to a phenomenon where verbs select for either BE (2) or HAVE auxiliaries (3) in perfective sentences.

- (2) a. *Italian* (Sorace 2000: 863; (1a))
 Maria **e** venuta alla festa.
 Maria **is** come to_the party
 'Maria came to the party.'
- b. *Dutch* (Sorace 2000: 863; (1c))
 De brief **is** met de tweede post gekomen.
 the letter **is** with the second post arrived
 'The letter arrived with the second post.'
- (3) a. *Italian* (Sorace 2000: 874; (33a))
 I colleghi **hanno** chiaccherato tutto il pomeriggio.
 the colleagues **have** chatted whole the afternoon
 'My colleagues chatted the whole afternoon.'
- b. *Dutch* (Sorace 2000: 874; (33c))
 De trompettist **heeft** met bolle wangen geblazen.
 the trumpeter **has** with puffed-out cheeks blown
 'The trumpeter blew with puffed-out cheeks.'

Based primarily on experimental data on auxiliary selection from Romance and Germanic languages, Sorace (1993, 1995, 2000) proposes that the mapping of intransitive verbs onto unaccusative/unergative syntax is mediated by a hierarchical organization of intransitive verbs based on their lexical semantic features, called the Auxiliary Selection Hierarchy (ASH). Intransitive verbs that denote inherently dynamic and telic events, such as change of location verbs like ‘arrive’, are ranked at the top of the hierarchy as core unaccusatives, while intransitive verbs that denote inherently static and atelic events, such as non-motional controlled process verbs like ‘play’, are ranked at the bottom of the hierarchy as core unergatives.

- (4) The ASH (Sorace 2000)
- | | |
|--|----------------------|
| CHANGE OF LOCATION (‘come’, ‘fall’, ‘drop’, etc.) | (CORE UNACCUSATIVES) |
| CHANGE OF STATE (‘die’, ‘be born’, ‘appear’, etc.) | |
| CONTINUATION OF A PRE-EXISTING STATE (‘remain’, ‘stay’, ‘survive’, etc.) | |
| EXISTENCE OF STATE (‘be’, ‘exist’, ‘belong’, etc.) | |
| UNCONTROLLED PROCESS (‘tremble’, ‘sweat’, ‘shiver’, etc.) | |
| CONTROLLED MOTIONAL PROCESS (‘walk’, ‘swim’, ‘dance’, etc.) | |
| CONTROLLED NON-MOTIONAL PROCESS (‘talk’, ‘work’,
‘play’, etc.) | (CORE UNERGATIVES) |

According to the ASH, core unaccusatives exhibit clear and stable unaccusative behavior (e.g., categorically selecting BE) while core unergatives show clear and stable unergative behavior (e.g., categorically selecting HAVE), both cross-linguistically and language-internally. In contrast, verbs in the midrange of the ASH show indeterminate behaviors and more cross-linguistic and language-internal variability (e.g., alternating between BE and HAVE).

Despite the wealth of data accumulated by the experimental studies on auxiliary selection, which highlight the importance of the lexical semantics of verbs in accounting for the phenomenon (Sorace 1993, 1995, 2000; Keller 2000; Keller & Sorace 2003; Randall et al. 2004; Laws & Yuan 2010), we argue that auxiliary selection is not an ideal SID with which to investigate predictions of the UH, because auxiliary selection is not linked to the core claim of the UH, that subjects of intransitive verbs are either external or internal arguments.

First, there is considerable cross-linguistic variation in how auxiliary selection is manifested, and there are languages in which auxiliary selection simply has no correlation with split intransitivity. While the generalization that HAVE co-occurs with active transitives and unergatives while BE co-occurs with passive transitives and unaccusatives is robust in Italian and strongly suggestive of the correlation between auxiliary selection and split intransitivity, this correlation is an exception rather than the norm. And although auxiliary selection in Dutch splits intransitive verbs into two subclasses, Dutch also has transitive verbs that select for BE (Lieber & Baayen 1997). There are also languages in which all intransitive verbs take the same auxiliary, e.g., Spanish with HAVE and Bulgarian with BE (Kayne 1993; Legendre 2007). These observations make it clear that the selection of auxiliaries is not intrinsically linked to split intransitivity or the base-generated position of intransitive subjects. In fact, the wide range of variation in auxiliary selection across languages has led studies to argue that it is determined not by the argument structure of verbs but by other lexical semantic factors (e.g., Zaenen 1988; Van Valin 1990; Dowty 1991; Lieber & Baayen 1997;

Legendre 2007) or other factors such as phi-features and tense (e.g., Kayne 1993; Hoekstra 1994).

Second, recent experimental studies suggest that telicity of events plays a determining role in auxiliary selection. Keller (2000) and Keller & Sorace (2003) investigated the behavior of German intransitive verbs with auxiliary selection and impersonal passives to test predictions of the ASH. One of their experiments examined possible effects of manipulating telicity of events and animacy of subjects on these two SIDs. Telicity was manipulated with prefixes that induce telic interpretations with change of state verbs, and animacy with inanimate and animate subjects with stative verbs. The results confirmed the effects of telicity on auxiliary selection, as BE was clearly preferred with change of state verbs with the telic-inducing prefixes, while preferences were less clear for the same verbs without the prefixes. Animacy of subjects turned out to have no effect on auxiliary selection with stative verbs; a clear preference for HAVE was found with stative verbs regardless of the animacy of their subjects. Randall et al. (2004) also investigated the effects of agentivity and telicity on auxiliary selection with nonce intransitive verbs with Dutch and German adults and children. Their results with Dutch adults showed that HAVE was overwhelmingly preferred in all the atelic descriptions, whether the verb is agentive (e.g., *laugh* and *dance*) or non-agentive (e.g., *sparkle* and *roll*), and whether atelicity is inherent to the verb (e.g., *laugh* and *sparkle*) or due to the presence of a PP (e.g., *dance in the room* and *roll in the room*). On the other hand, BE was selected most frequently with the telic descriptions, in 100% of non-agentive telic cases (e.g., *roll into the room*) and 88% of agentive telic cases (e.g., *dance into the room*). Based on these findings, the study concluded that telicity is the primary semantic factor that determines auxiliary selection in Dutch (and German).

In sum, the findings from previous studies on auxiliary selection make it clear that auxiliary selection is not directly linked to the UH, and recent experimental studies have shown that it is strongly influenced by telicity of events. If auxiliary selection is primarily a semantic phenomenon, as some studies argue, then the fact that it motivates a lexical-semantic hierarchical organization of intransitive verbs such as the ASH is not surprising. Crucially, what is missing in previous studies on auxiliary selection is a link between the phenomenon and the UH and its core claim: that intransitive subjects are either internal or external arguments. In order to provide direct evidence for the UH, we must identify SIDs that make direct reference to the hypothesis and the putative syntactic difference among intransitive subjects. We can then show that such SIDs reliably classify intransitive verbs into two groups because of a syntactic difference. In what follows, we first present quantifier scope in doubly-quantified sentences as such a diagnostic.

3 Quantifier scope

3.1 Quantifier scope in doubly-quantified sentences

Japanese is considered a “scopally rigid” language, in which the scope relations of quantifiers are determined only by their surface positions (Kuroda 1970; Kuno 1973; Hoji 1985). This means that a Japanese sentence with two quantifiers is unambiguous. The only available interpretation of such doubly-quantified sentences is one in which the quantifier that linearly precedes (and therefore presumably c-commands) the other quantifier takes the wide scope, or the surface scope. In example (5), the only interpretation available is the one in which the existential quantifier *dareka* ‘someone’ takes scope over the universal quantifier *subete* ‘all’.

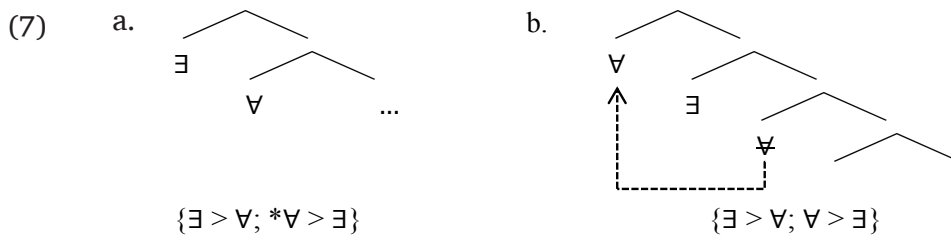
- (5) **Dareka-ga** kono heya-no **subete-no** hon-o yon-da.
 someone-NOM this room-GEN all-GEN book-ACC read-PST
 ‘Someone read all the books in this room.’ $\{\exists > \forall; * \forall > \exists\}$

This is in contrast with doubly-quantified sentences in English, which allow two interpretations (e.g., May 1977).

However, once one of the quantifiers is displaced, scope ambiguity can be observed. In example (6), the internal argument with the universal quantifier is scrambled to the sentence initial position, where it precedes and presumably c-commands the subject. This sentence is ambiguous, showing both the surface scope of the two quantifiers, where the scrambled universal quantifier takes scope over the existential quantifier, and the inverse scope, where the existential quantifier takes scope over the universal quantifier.

- (6) [Kono heya-no hon-no **dore-mo**]_i **dareka-ga** t_i yon-da.
 [this room-GEN book-GEN which-also]_i someone-NOM t_i read-PST
 ‘Someone read every book in this room.’ $\{\exists > \forall, \forall > \exists\}$

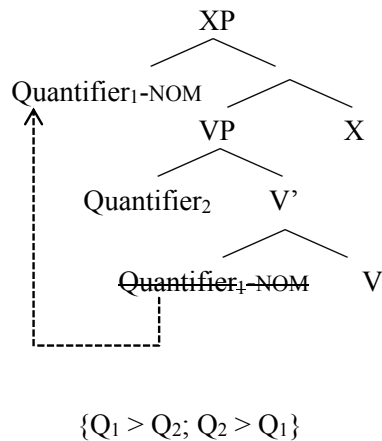
Under the assumption that the scope of a quantifier is its c-command domain (e.g., May 1977; Huang 1982; Hoji 1985; Aoun & Li 1989, 1993), the structurally higher quantifier takes wide scope over the structurally lower quantifier (7a). Thus, only the surface scope obtains in doubly-quantified sentences like (5). When one of the quantifiers undergoes syntactic movement, as in (6), the scope of the two quantifiers becomes ambiguous because the scrambled quantifier phrase c-commands the other quantifier (the surface scope) but its trace is c-commanded by the other quantifier (the inverse scope) (7b) (see Aoun & Li 1993 for a comprehensive treatment of quantifier scope based on quantifier raising at LF, according to which the scope ambiguity in (7b) is due to the moved quantifier being in a non-thematic position).



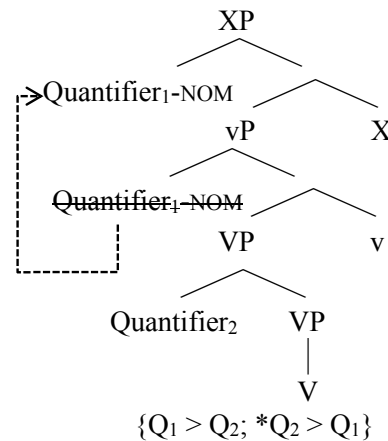
3.2 Quantifier scope as a split intransitivity diagnostic

Scope rigidity and the UH together lead to the following predictions about quantifier scope in doubly-quantified intransitive sentences in Japanese. First, a doubly-quantified intransitive sentence with an unaccusative verb with a quantifier subject and another quantifier below the subject position, e.g., inside VP, is predicted to allow both surface and inverse scope of the two quantifiers. This is because the unaccusative subject is base-generated as an internal argument inside VP, where it is c-commanded by the VP-internal quantifier, but this hierarchical relationship is reversed when the quantifier subject moves to the sentence initial position (8a). Second, a similar doubly-quantified intransitive sentence, but with an unergative verb, is predicted to allow only the surface scope of the two quantifiers because the quantifier subject is never c-commanded by the other quantifier inside VP (8b).

(8) a. Unaccusative



b. Unergative



In fact, Nakayama & Koizumi (1991) observe that in doubly-quantified unaccusative sentences in subject-initial order such as (9a), the two quantifiers – the universal quantifier subject *daremo-ga* ‘everyone-NOM’ and the temporal adjunct that contains the disjunction *-ka* – can have both surface and inverse scope while the quantifiers in similar doubly-quantified unergative sentences only have the surface scope (9b). Yatsushiro (1999) independently observes that doubly-quantified unaccusative sentences such as (10) are ambiguous.

(9) From Nakayama & Koizumi (1991: 313; (24b), (24a))

- a. *Daremo-ga ni-ji-ka san-ji-ni shin-da.*
 everyone-NOM 2-o'clock or 3-o'clock-at die-PST
 ‘Everyone died at 2 or 3 o'clock.’ { $\forall > \text{or}$, $\text{or} > \forall$ }
- b. *Daremo-ga ni-ji ka san-ji-ni warat-ta.*
 everyone-NOM 2-o'clock or 3-o'clock-at laugh-PST
 ‘Everyone laughed at 2 or 3 o'clock.’ { $\forall > \text{or}$, * $\text{or} > \forall$ }

(10) From Yatsushiro (1999: 35; (33b))

- Dareka-ga doko-ni-mo i-ta.*
 someone-NOM where-LOC-also be-PST
 ‘Someone was everywhere.’ { $\exists > \forall$, $\forall > \exists$ }

There are several advantages to using quantifier scope as an SID. First, quantifier scope in doubly-quantified sentences has been experimentally studied in different languages, including English (Kurtzman & MacDonald 1993; Musolino et al. 2000; Anderson 2004; Musolino & Lidz 2006; Lee 2009; Syrett & Lidz 2011), Korean (Han et al. 2007; Lee 2009; O’Grady et al. 2009), Chinese (Scontras et al. 2013), and Japanese (Han et al. 2009), with results that support the observations in the theoretical literature. Second, quantifier scope as an SID requires no extra linguistic materials beyond the intransitive verb and two quantifiers. Finally, there is no a priori reason to suspect that non-syntactic differences between unaccusatives and unergatives should determine the scope of the quantifiers. While several non-structural/semantic proposals attempt to explain quantifier scope ambiguity, such as the storage approach (Cooper 1983), the type-flexibility approach (Hendriks 1993) and the continuation approach (Barker 2002), they all claim that there is a general semantic mechanism responsible for scope ambiguity with doubly-quantified sentences. Thus, none of them predicts that interpretations of doubly-quantified intransi-

tive sentences with unaccusatives and unergatives will be different, e.g., because of lexical semantic differences between unaccusatives and unergatives. The structural account for scope ambiguity outlined above appears to be the only proposal for quantifier scope that predicts the observed difference in the interpretation of doubly-quantified intransitive sentences with unaccusatives and unergatives.

3.3 Section summary

Given that Japanese is a “scopally rigid” language (Kuroda 1970; Kuno 1973; Hoji 1985), the Unaccusative Hypothesis predicts that doubly-quantified sentences in Japanese with a quantifier subject and a VP-internal quantifier will allow for the inverse scope reading of the two quantifiers only if the predicate is an unaccusative verb. Observations in the theoretical literature support this prediction (Nakayama & Koizumi 1991; Yatsushiro 1999). In Section 4, we report the result of an experiment that examined this prediction.

4 Experiment 1: Quantifier scope

In order to test our predictions, a truth value judgment task (TVJT: Crain & Thornton 1998) was used to elicit speakers’ intuitions about the availability of surface and inverse scope with doubly-quantified intransitive and transitive sentences. In a TVJT, participants are presented with descriptions of situations (as act-outs with stuffed animals, animations, written descriptions, etc.), followed by sentences that are intended to describe the situations (*target sentences*). Participants judge whether the target sentences can be true statements of the described situations. For our experiment, we created target sentences with putative unaccusative and unergative verbs as well as transitive verbs and two quantifiers: existential quantifier subjects and VP-internal universal quantifiers. Each target sentence was paired with one of two types of description: (i) *surface scope descriptions*, with which target sentences can be true with the surface scope of the two quantifiers, the existential quantifier taking scope over the universal quantifier ($\exists > \forall$), and (ii) *inverse scope descriptions*, with which target sentences can only be true with the inverse scope of the two quantifiers, the universal quantifier taking scope over the existential quantifier ($\forall > \exists$).

4.1 Predictions

We expected all three types of sentences, unaccusative, unergative, and transitive to be judged as true with surface scope descriptions; thus we predicted no difference in distribution of judgments between the three types of sentences. However, we expected only unaccusative sentences to be judged as true with inverse scope descriptions, because their quantifier subjects are by hypothesis base-generated as internal arguments where they are c-commanded by the other quantifiers. Unergative and transitive sentences with inverse scope descriptions were expected to be judged as false because their subjects are never c-commanded by the other quantifiers. Having said this, the findings from previous experimental studies suggest that the surface scope interpretation is strongly preferred over the inverse scope interpretation even when the latter should be available (Anderson 2004; Lee 2009). Thus, we predicted that true judgments with inverse scope descriptions would be significantly more frequent with doubly-quantified unaccusative sentences than with doubly-quantified unergative and transitive sentences, as the inverse scope interpretation of doubly-quantified unaccusative sentences might not always be accessible to speakers.

4.2 Methods

4.2.1 Materials

As discussed above, the target sentences were constructed so that the existential quantifier always appeared in the subject position while the universal quantifier appeared VP-internally, as an oblique complement with unaccusatives and as a VP-adjunct with

unergatives. This is because (i) the surface scope with a universal quantifier c-commanding an existential quantifier logically entails surface scope and (ii) existential quantifiers are known to take wide scope over a quantifier that c-commands them without undergoing syntactic movement (Reinhart 1997). Four putative unaccusative verbs (*araware-ru* ‘appear’, *nakunar-u* ‘disappear’, *ku-ru* ‘come’, and *todok-u* ‘reach’), four putative unergative verbs (*asob-u* ‘play’, *hashir-u* ‘run’, *hanas-u* ‘talk’, and *hatarak-u* ‘work’), and four transitive verbs (*tabe-ru* ‘eat’, *mi-ru* ‘watch’, *hanas-u* ‘speak’, and *nom-u* ‘drink’) were used to construct target sentences.² All unergative and transitive target sentences had *dareka* ‘someone’, the existential quantifier that refers to a human, as their subjects. With unaccusative target sentences, two of the putative unaccusatives, *araware-ru* ‘appear’ and *ku-ru* ‘come’, also had *dareka* ‘someone’ as their subjects, whereas the other two, *nakunar-u* ‘disappear’ and *todok-u* ‘reach’, had *nanika* ‘something’, the existential quantifier that refers to an inanimate object, as their subjects. This was done to see if the animacy of the existential quantified subject affects the availability of inverse scope interpretations. Examples of target sentences are given in (11), and surface and inverse scope descriptions for (11a) are given in (12).³

- (11) a. *ku-ru* ‘come’ (unaccusative)
 Kongetsu-wa kyooju-no **dareka-ga** **dono** **ivento-ni-mo**
 this_month-TOP professor-GEN **someone-NOM** **which** **event-LOC-also**
 ki-ta.
 come-PST
 ‘This month, some professor came to every event.’
- b. *hashir-u* ‘run’ (unergative)
 Taikai shonichi-ni membaa-no **dareka-ga** **dono**
 competition first-day-in member-GEN **someone-NOM** **which**
shumoku-de-mo hashit-ta.
race-LOC-also run-PST
 ‘On the first day of the competition, someone from the team ran in every race.’
- (12) a. SURFACE SCOPE DESCRIPTION: The department of linguistics at A University has three professors: Professors Maeda, Murai, and Aota. This month, there were three department sponsored events. At the event that took place during the first week, Professors Maeda and Aota showed up. To the event in the second week, Professors Murai and Aota came. Finally, Professors Maeda, Murai, and Aota attended the event that took place yesterday.
- b. INVERSE SCOPE DESCRIPTION: The department of linguistics at A University has three professors: Professors Maeda, Murai, and Aota. This month, there were three department sponsored events. At the event that took place during the first week, Professors Maeda and Aota showed up. To the event in the second week, Professors Murai and Aota came. Finally, Professors Maeda and Murai attended the event that took place yesterday.

² All the intransitive verbs except for *nakunar-u* ‘disappear’ have been classified as unaccusatives or unergatives in previous studies based on various different SIDs: *ku-ru* ‘come’ (Fujita 1988; Miyagawa 1989), *araware-ru* ‘appear’ (Kageyama 1993), *todok-u* ‘reach’ (Mihara 1998), *asob-u* ‘play’, *hashir-u* ‘run’ (Kageyama 1993, 1996; Kishimoto 1996), *hanas-u* ‘talk’, *hatarak-u* ‘work’ (Kageyama 1996; Kishimoto 1996). *Nakunar-u* ‘disappear’ was classified as unaccusative based on our own intuitions with respect to FNQ-licensing.

³ An anonymous reviewer points out that the non-subject quantifier in (11a) is inside an argument of the verb *ki-ta* ‘come-PST’ while the non-subject quantifier in (11b) is an adjunct and argues that this is problematic as scope ambiguity obtains more readily between co-arguments. However, this claim is untenable with quantifier scope in Japanese, as doubly-quantified transitive sentences in Japanese are generally regarded as unambiguous, as discussed in Section 3.1. This is also confirmed by our findings from Experiment 1 discussed below.

In (12a), one professor, Aota, came to all three events, making it compatible with the surface scope interpretation of (11a), in which the existential quantifier subject takes scope over the oblique universal quantifier (i.e., there was a professor in the department who came to all three events). In (12b), none of the professors attended all three events; thus, it is incompatible with the surface scope interpretation of (11a). Therefore, in order for (11a) to be judged as true in the context in (12b), the inverse scope interpretation must be accessed, in which the oblique universal quantifier takes scope over the existential quantifier subject (i.e., for each of the three events, there was a professor in the department who came to it).

Each of the twelve critical target sentences was combined with a surface scope description and an inverse scope description, resulting in twenty-four target sentence–description pairs. These twenty-four target sentence–description pairs were divided into two lists. Each list had only one of the two descriptions of each target sentence, and an equal number of surface and inverse descriptions (six surface and inverse descriptions in each). A total of twenty-four filler sentence–description pairs were created with six two-place verbs (*nobor-u* ‘ascend’, *kudar-u* ‘descend’, *sawar-u* ‘touch’, *de-ru* ‘leave’, *hanare-ru* ‘separate’, *nuke-ru* ‘come off’) and were distributed in four lists using a Latin Square design, so that every list had all six filler verbs with three surface scope and three inverse scope descriptions. Each of the four filler-pair lists was combined with one of the two critical target-pair lists, creating four lists of eighteen sentence–description pairs. The order of each list was pseudo-randomized.

4.2.2 Procedure

The experiment was presented using an online website designed to host psycholinguistic experiments (<http://spellout.net/ibexfarm/>). One hundred university students from Gifu and Tokyo, Japan participated. Participants went through three sets of practice sentence–description pairs before starting the experiment. They first read a description, which was followed by a question that asked: “Does the sentence below correctly describe the situation described above?” in Japanese. They then read the target sentence and indicated whether it was true or false given the description, by clicking a key that corresponds to “true” or “false.”

The obtained judgments were divided into the surface and inverse descriptions and analyzed with logistic mixed-effects models with verb types as the fixed factor and subjects and items as random factors. The analyses were performed using the *lmerTest* package (Kuznetsova et al. 2016) in the statistical software R (R Core Team 2015).

4.3 Results

4.3.1 The distribution of judgments with three verb types

Figure 1 shows the distributions of judgments with the three verb types with surface scope descriptions in terms of their frequency. Table 1 summarizes the results of the statistical analysis.

The frequency of true judgments is overwhelmingly higher than the frequency of false judgments with all three verb types, although the frequency of false judgments is higher with unergative sentences (21/200, or 10.5%) than with transitive (9/200, or 4.5%) and unaccusative sentences (8/200, or 4%). The distribution of judgments was nearly significantly different between the transitive and unergative sentences ($\beta = -1.09$, $SE = 0.59$, $p = .06$), while the distribution of judgments between the transitive and unaccusative sentences was not significantly different ($\beta = 0.04$, $SE = 0.64$, $p = .95$).

Figure 2 shows the distributions of judgments with the three verb types with inverse scope descriptions. Table 2 summarizes the result of the statistical analysis.

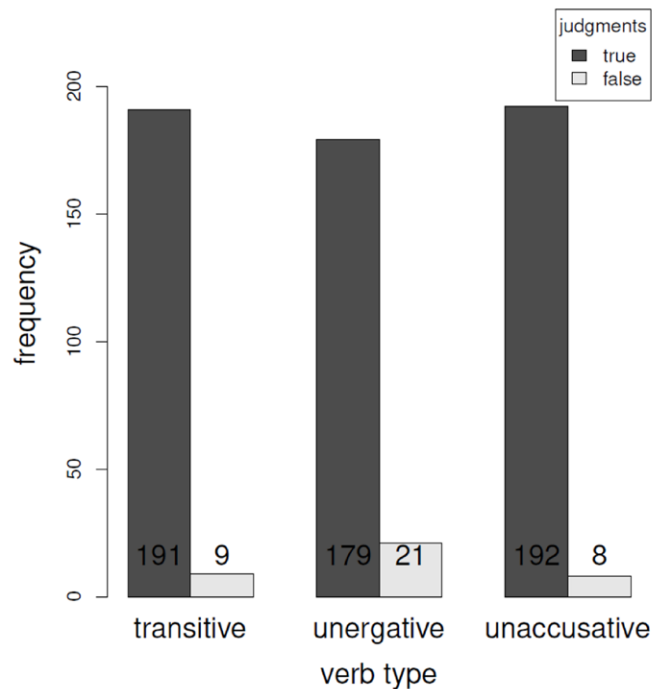


Figure 1: Distribution of judgments with the three verb types with surface scope descriptions.

Table 1: Summary of the statistical analysis of the judgments for the surface scope descriptions.

measure	estimate	z-value
(Intercept)	3.86(0.61)	6.36***
unaccusative	0.04(0.64)	0.07
unergative	-1.09(0.59)	-1.86

*** = $p \leq 0.001$.

While over 90% of the transitive and unergative sentences were judged as false (190/200 or 95.5% and 185/200 or 92.5%, respectively), only 32.5% (65/200) of the unaccusative sentences were judged as false; 67.5% (135/200) were judged as true. The distribution of judgments is not significantly different between the transitive and unergative sentences ($\beta = 0.43$, $SE = 0.67$, $p = .65$), while the difference is significant between the unaccusative and transitive sentences ($\beta = 4.93$, $SE = 0.72$, $p < .001$).

4.3.2 The distribution of judgments with individual verbs

Because the results with the unergative and transitive verbs patterned alike, only the results with the intransitive verbs will be discussed in this section. Figure 3 and 4 summarize the distributions of judgments with the eight intransitive verbs with surface and inverse descriptions, respectively, in terms of their percentages.

Figure 3 shows that the percentages of true judgments are above 80% with all intransitive verbs with surface scope descriptions. Figure 4 shows, first, that the distribution of judgments with the putative unergatives with inverse scope descriptions is mirror images of their distribution with surface scope descriptions in Figure 3, with the percentages of false judgments being overwhelmingly high. Figure 4 also shows that the distribution of judgments with the putative unaccusatives with inverse scope descriptions splits into two groups. The percentages of true judgments are overwhelmingly high with two of the putative unaccusatives, *araware-ru* 'appear' (88%) and *todok-u* 'reach' (88%), whereas they

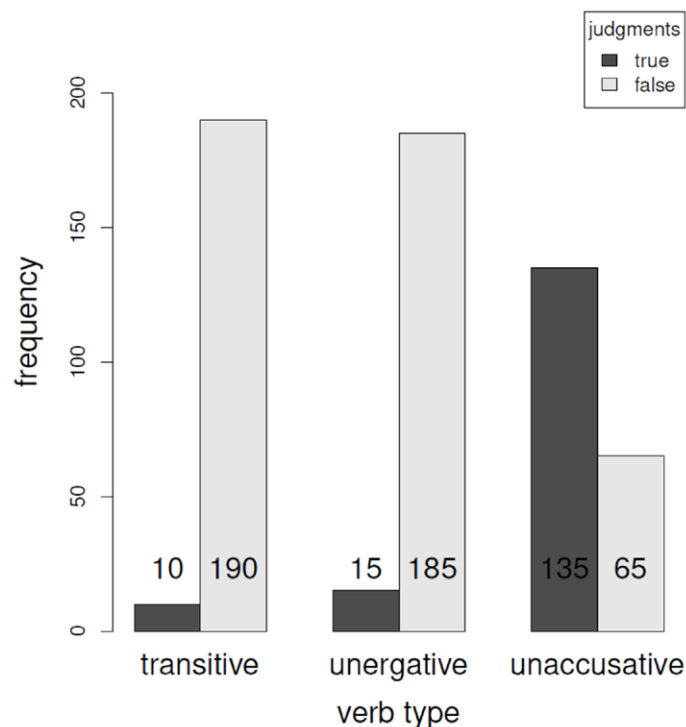


Figure 2: Distribution of judgments with the three verb types with inverse scope descriptions.

Table 2: Summary of the statistical analysis of the judgments for the inverse scope descriptions.

measure	estimate	z-value
(Intercept)	-3.82(0.57)	-6.69***
unaccusative	4.93(0.72)	6.87***
unergative	0.43(0.67)	0.65

*** = $p \leq 0.001$.

are slightly lower than the percentages of false judgments with the two others, *nakunar-u* ‘disappear’ (48%) and *ku-ru* ‘come’ (46%).

4.4 Discussion

The results of Experiment 1 are consistent with our predictions, as they divided the intransitive verbs into two groups, the putative unaccusatives and the putative unergatives, with the former allowing inverse scope significantly more frequently than the latter (46–88% for unaccusative sentences vs. 0–16% for unergative sentences). One unexpected finding from Experiment 1 was the split among the four putative unaccusatives in terms of the percentages of true judgments with inverse descriptions (88% for both *araware-ru* ‘appear’ and *todok-u* ‘reach’ vs. 48% for *nakunar-u* ‘disappear’ and 46% for *ku-ru* ‘come’). This suggests that the inverse scope descriptions paired with *araware-ru* ‘appear’ and *todok-u* ‘reach’ were more effective in eliciting the inverse scope than the inverse descriptions paired with *nakunar-u* ‘disappear’ and *ku-ru* ‘come’. However, it remains the case that the target sentences with all four putative unaccusatives allowed inverse scope interpretations significantly more frequently than the target sentences with the putative unergatives and the transitives did. It should be recalled that two of the four putative unaccusatives

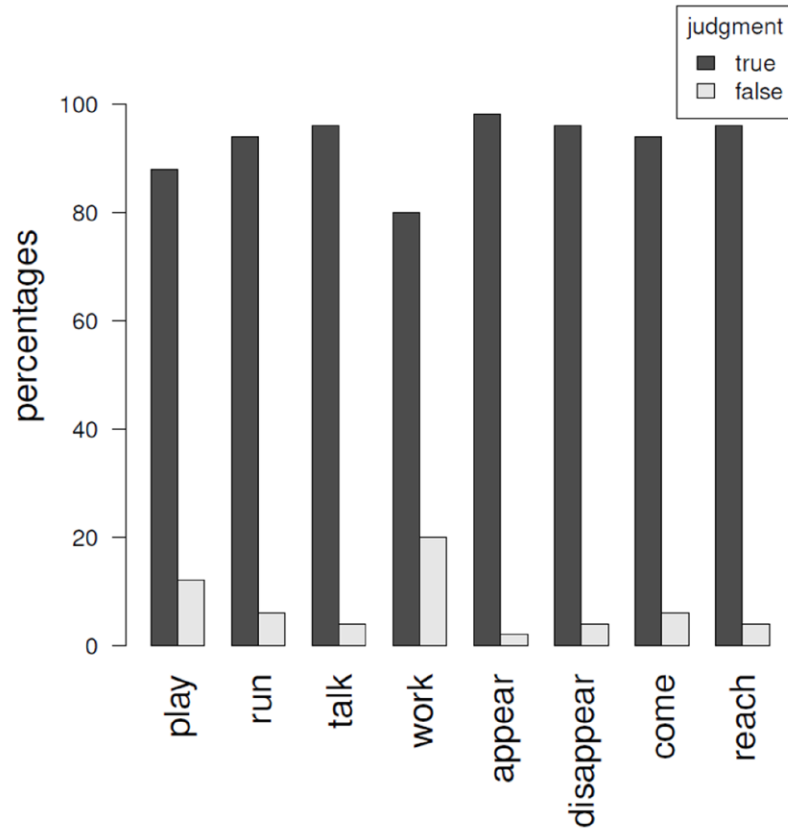


Figure 3: Distribution of judgments with the intransitive verbs with surface descriptions.

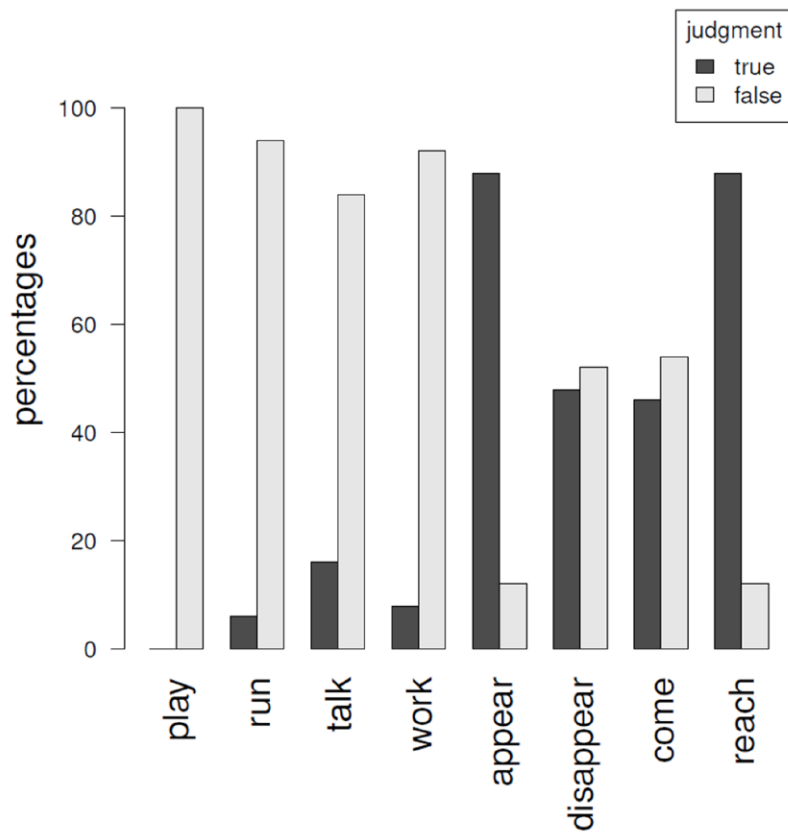


Figure 4: Distribution of judgments with the intransitive verbs with inverse descriptions.

were presented with *dareka* ‘someone’, the existential quantifier that refers to a human, as their subject, while the other two were presented with *nanika* ‘something’, the existential quantifier that refers to an object, as their subject. The fact that the two of the putative unaccusatives whose judgments were overwhelmingly high, *araware-ru* ‘appear’ (88%) and *todok-u* ‘reach’ (88%), were presented with *dareka* ‘someone’ and *nanika* ‘something’, respectively, suggests that the animacy of the quantifier subjects does not affect the availability of inverse scope.

In sum, under the assumption that the scope of quantifiers is determined structurally (e.g., May 1977), the findings from Experiment 1 provide support for the UH, as the putative syntactic difference among intransitive subjects provides a straightforward account for them: unaccusative subjects are base-generated internal arguments (8a) while unergative subjects are base-generated external arguments (8b).

5 FNQ-licensing

5.1 FNQ-licensing and the “stranding” analysis

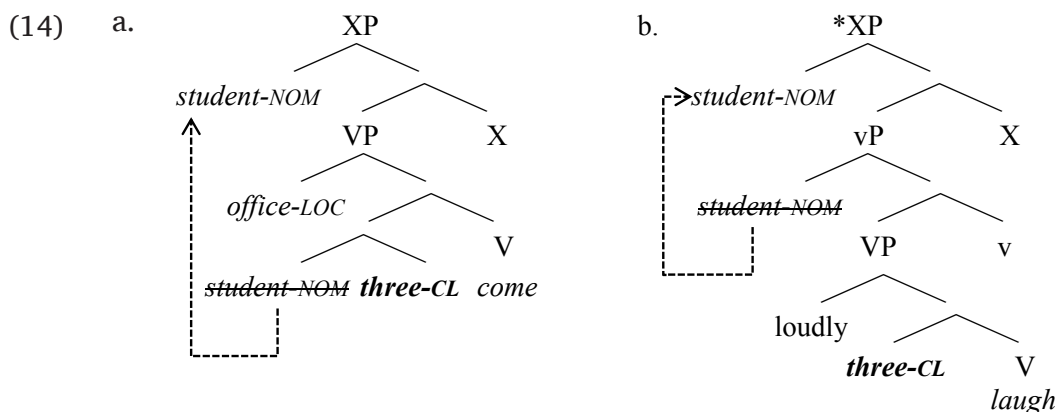
Consider the following contrast with the licensing of FNQs in Japanese.

- (13) a. **Gakusee-ga** (✓**san-nin**) ofisu-ni (✓**san-nin**) ki-ta.
 student-NOM (three-CL) office-LOC (three-CL) come-PST
 ‘Three students came to the office.’
- b. **Gakusee-ga** (✓**san-nin**) geragera-to (#**san-nin**) warat-ta.
 student-NOM (three-CL) loudly (three-CL) laugh-PST
 ‘Three students laughed loudly.’

NQs consist of a numeral such as *san* ‘three’ and a classifier such as *-nin*, which agrees with a semantic feature of the modified NP (its *associate*), e.g., [+human] with *-nin*.

Miyagawa (1989) argues that the ability of Japanese intransitive subjects to license NQs that are “floating” inside VP, i.e., the second NQ in each of the examples, is sensitive to split intransitivity. While subjects of intransitive verbs like *ku-ru* ‘come’ readily license floating NQs (FNQs) (13a), subjects of other intransitive verbs such as *wara-u* ‘laugh’ do not (13b).⁴ Miyagawa (1989) proposes a syntactic account for the contrast in (13) based on two assumptions. First, he adopts the UH. Second, he assumes that an FNQ and its associate must be in a syntactically local configuration in their base-generated positions, but the associate can “strand” the FNQ by undergoing syntactic movement. Under these assumptions, the FNQ in (13a) is licensed despite the presence of the intervening PP because *ku-ru* ‘come’ is unaccusative and its subject is base-generated as an internal argument inside VP, where it was in the required local configuration with the FNQ (14a). In contrast, (13b) is degraded because *wara-u* ‘laugh’ is an unergative and its subject is an external argument base-generated outside VP, e.g., as a specifier of a v. Thus, it was never in the required local configuration with the FNQ (14b).

⁴ A similar contrast has also been attested in Korean (e.g., Gerds 1987; Lee 1989; Ahn 1990; O’Grady 1991; Kang 2002; Ko 2005, 2007; Miyagawa 2006). One important difference between Japanese and Korean FNQs is that Korean FNQs can be case-marked. The contrast in FNQ-licensing among intransitive verbs is observed in Korean only with case-less FNQs (e.g., Ahn 1990; Ko & Oh 2010, 2012).



What is important for our purposes is that FNQ-licensing under the stranding analysis makes direct reference to the UH. It is the base-generated position of intransitive subjects that determines the acceptability of the FNQs associated with them.

5.2 Previous studies

To our best knowledge, Sorace & Shomura (2001) was the first study experimentally examining FNQ-licensing as an SID. The study examined whether acceptability judgments by Japanese native and L2 speakers concerning two SIDs, one of which was FNQ-licensing, showed speakers’ sensitivity to the ASH. The ASH is repeated below as (15).⁵

- (15) The ASH (Sorace 2000)
- CHANGE OF LOCATION (‘come’, ‘fall’, ‘drop’, etc.) (CORE UNACCUSATIVES)
 - CHANGE OF STATE (‘die’, ‘be born’, ‘appear’, etc.)
 - CONTINUATION OF A PRE-EXISTING STATE (‘remain’, ‘stay’, ‘survive’, etc.)
 - EXISTENCE OF STATE (‘be’, ‘exist’, ‘belong’, etc.)
 - UNCONTROLLED PROCESS (‘tremble’, ‘sweat’, ‘shiver’, etc.)
 - CONTROLLED MOTIONAL PROCESS (‘walk’, ‘swim’, ‘dance’, etc.)
 - CONTROLLED NON-MOTIONAL PROCESS (‘talk’, ‘work’, ‘play’, etc.) (CORE UNERGATIVES)

The ASH predicts a clear contrast between sentences with core unergatives with the NQ adjacent to its associate ([–FNQ]) and similar sentences with an FNQ ([+FNQ]), with the former judged as significantly better than the latter, and no such contrast with core unaccusatives. With intransitive verbs in the middle of the hierarchy, such as stative verbs, the ASH predicts contrasts that are weaker than those with core unergatives but stronger than those with core unaccusatives. In order to test these predictions, Sorace & Shomura selected thirty-nine verbs, three from each of thirteen classes of intransitive verbs, ranging from the core unergative class (i.e., controlled non-motional process verbs) to the core unaccusative class (i.e., change of location verbs). Sentences with these verbs were presented in [–FNQ] and [+FNQ] conditions.

Their predictions were borne out with the native speakers’ judgments on the unergatives. The core unergatives such as controlled non-motional process verbs (e.g., *asob-u* ‘play’) and relatively highly ranked peripheral unergatives such as controlled motional process verbs (e.g., *oyog-u* ‘swim’) showed clearer contrasts between the [–FNQ] and [+FNQ]

⁵ The other was Case drop (Kageyama 1993, 1996), which, however, the native speakers did not accept regardless of verb type or NP argument status.

conditions, while relatively lower-ranked peripheral unergatives such as uncontrolled process verbs (e.g., *hikar-u* ‘flash’) showed less pronounced contrasts. However, the results with unaccusatives were less clear. Notably, the native speakers judged sentences with change of location verbs (e.g., *tsuk-u* ‘arrive’), the core unaccusative class, as if they were unergatives, with a significant difference between the [-FNQ] and the [+FNQ] conditions. The authors speculate that this unexpected result might have been due to the effects of the animacy (and therefore potential agentivity) of subjects, which their experiment did not control for:

“One may speculate that the pattern arises because Japanese ranks agentivity higher than telicity across the board, as Kishimoto (1996) suggested. If it is the case that [\pm] agentivity is a crucial determinant of split intransitivity, one consequence might be that syntactic diagnostics such as QF (quantifier float) are particularly sensitive to agentivity.” (Sorace & Shomura 2001: 271)

While the results reported by Sorace & Shomura (2001) suggest that FNQ-licensing is a promising diagnostic to use in experimental settings, they also indicate potential issues in experimentally testing intransitive verbs with this diagnostic. One potential issue concerns verb selection. We agree that what the study did – testing a large number of intransitive verbs selected from different lexical semantic groups – is exactly what needs to be done to obtain data that allow for generalization across different intransitive verbs while taking into consideration possible effects of lexical semantic differences. However, the thirty-nine verbs the study tested include some whose unaccusative/unergative status is questionable. First, some of the putative unaccusatives can co-occur with an accusative-marked phrase, such as *sar-u* ‘leave’ (change of location), *nobor-u* ‘ascend’, *susum-u* ‘advance’, *agar-u* ‘rise’ (change of condition), and *yorokob-u* ‘rejoice’ (existence of a condition). Naturally occurring examples are given in (16).

- (16) a. **gurando-o** sar-u Chiben Wakayama-no senshu-tachi
field-ACC leave-NPST Chiben Wakayama-GEN player-PL
 ‘the players of the Chiben Wakayama high school team who leave the baseball field’⁶
- b. saijookai-made hitasura **too-o** nobor-u akushon geemu
 top_floor-till solely **tower-ACC** ascend-NPST action game
 ‘an action game in which (you) solely go up a tower to its top floor’⁷
- c. **suroopu-o** agar-u-to mie-ru shiisaa
 slope-ACC rise-NPST-CONJ be_visible-NPST guardian_dog
 ‘the guardian dogs that become visible once you go up the slope’⁸
- d. **Benteke-no hatsu gooru-o** yorokob-u Rojaasu
B-GEN first goal-ACC rejoice-NPST R
 ‘Rogers, who rejoices over Benteke’s first goal’⁹

While it is cross-linguistically common for unergatives to optionally co-occur with an accusative-marked phrase, unaccusatives never do so. Thus, the fact that these putative unaccusatives can co-occur with an accusative-marked phrase casts doubt on their classification. Second, some of the verbs classified as unergatives in the study, such as *hak-u* ‘vomit’ (bodily function), *uta-u* ‘sing’, and *mats-u* ‘wait’ (non-motional controlled process)

⁶ <http://www.asahi.com/>.

⁷ <http://blog.livedoor.jp/>.

⁸ <http://www.tripadvisor.jp/>.

⁹ <http://www.goal.com/jp/>.

are better characterized as transitive, as they require a direct object (which can be null in Japanese). In fact, two major monolingual Japanese dictionaries, *Koojien* and *Nihongo Daijiten*, list these three verbs as transitive. Thus, the use of verbs that have not been previously identified as unaccusative/unergative runs the risk of introducing confounding factors. A more conservative and better informed approach is to use verbs that have been identified as unaccusative/unergative in previous studies, at least for expository studies such as this one.

5.3 Section summary

Miyagawa's (1989) claim that FNQ-licensing is sensitive to the unaccusative-unergative distinction along with his proposed stranding analysis of FNQs has made FNQ-licensing one of the best known SIDs in Japanese. It is particularly attractive for our purposes, as FNQ-licensing under the stranding analysis makes direct reference to the UH. Another reason FNQ-licensing is of interest for us is that it is experimentally examined in Sorace & Shomura's (2001) seminal study, and the results of the experiment reported in that study raise several questions that should be addressed in order to achieve a better understanding of FNQ-licensing as an SID.

6 Experiment 2: FNQ-licensing as an unaccusative diagnostic

Experiment 2 examined if the previously reported contrast in the ability of Japanese intransitive subjects to license FNQs can be established in an acceptability judgment experiment once some potential issues raised by the study discussed in Sorace & Shomura (2001) are addressed.

6.1 Predictions

If the UH holds with Japanese intransitive verbs and FNQ-licensing is a valid diagnostic for the unaccusative-unergative distinction, FNQ-licensing should divide Japanese intransitive verbs into two subgroups. Therefore, we predict no significant difference between mean acceptability judgments for putative unaccusative sentences with and without FNQs, and a significant difference between the mean acceptability judgments of putative unergative sentences with and without FNQs, with the former being judged significantly less acceptable than the latter. On the other hand, if FNQ-licensing is sensitive to different lexical semantic features of intransitive verbs, e.g., as hypothesized by the ASH, then speakers' intuitions about FNQ-licensing by intransitive subjects should reflect the lexical semantic classes to which the intransitive verbs belong.

6.2 Methods

6.2.1 Materials

Following the basic design of Sorace & Shomura's (2001) study, Experiment 2 examined ten Japanese intransitive verbs from five different lexical semantic classes in terms of their subjects' ability to license FNQs.

- (17)
- a. Class 1 (change of location verbs): *hair-u* 'enter', *ochi-ru* 'fall'
 - b. Class 2 (change of state verbs): *araware-ru* 'appear', *kie-ru* 'disappear'
 - c. Class 3 (stative verbs): *i-ru* 'be', *nokor-u* 'remain'¹⁰
 - d. Class 4 (controlled motional process verbs): *odor-u* 'dance', *oyog-u* 'swim'
 - e. Class 5 (controlled non-motional process verbs): *asob-u* 'play', *hatarak-u* 'work'

¹⁰ The two classes of stative verbs, continuation of a pre-existing state and existence of state, are treated as a single class, stative verbs, because (i) the number of stative verbs is small in Japanese and (ii) the results from the study reported in Sorace & Shomura (2001) showed no difference between these two classes, as far as their sensitivity to FNQ-licensing is concerned.

Nine of these ten intransitive verbs (i.e., all except *nokor-u* ‘remain’ in Class 3) have been identified as unaccusatives or unergatives in previous studies.¹¹ The verb *nokor-u* was added as the second stative verb, as the only stative verb that has been discussed in the relevant literature appears to be *i-ru* ‘be’. As (18) shows, all the verbs in Classes 1, 2 and 3, as the putative unaccusatives, are incompatible with an accusative-marked NP.

- (18) a. Taro-ga heya-ni/*o hait-ta.
T-NOM room-LOC/ACC enter-PST
‘Taro entered the room.’ (*hair-u* ‘enter’)¹²
- b. Neko-ga ana-ni/*o ochi-ta.
cat-NOM hole-LOC/ACC fall-PST
‘The cat fell in the hole.’ (*ochi-ru* ‘fall’)
- c. Yakusha-ga suteeji-ni/*o araware-ta.
actor-NOM state-LOC/ACC appear-PST
‘The actor appeared on the stage.’ (*araware-ru* ‘appear’)
- d. Otoko-ga kurayami-ni/*o kie-ta.
man-NOM darkness-LOC/ACC disappear-PST
‘The man disappeared into the darkness.’ (*kie-ru* ‘disappear’)
- e. Taro-ga heya-ni/*o i-ta.
T-NOM room-LOC/ACC be-PST
‘Taro was in the room.’ (*i-ru* ‘be’)
- f. Hanako-ga heya-ni/*o nokot-ta.
H-NOM room-LOC/ACC remain-PST
‘Hanako remained in the room.’ (*nokor-u* ‘remain’)

The verbs in Classes 4 and 5, the putative unergatives, are compatible with an accusative-marked NP, as unergatives cross-linguistically often are (e.g., Hale and Keyser 1993, 2002).¹³

Thus, Experiment 2 had a 2 x 5 design crossing FNQ ([–FNQ] vs. [+FNQ]) and verb classes (Classes 1, 2, 3, 4 and 5). All experimental sentences had animate subjects and non-NP arguments and adjuncts that were natural with the verbs. The target sentences with the ten verbs were embedded inside complex sentences. Four lexicalizations of each verb were constructed for each of the two conditions, and distributed among four lists in a Latin Square design, so that every participant rated the same verb twice in two different lexicalizations,

¹¹ *hair-u* ‘enter’ (Miyagawa 1989), *ochi-ru* ‘fall’ (Kageyama 1993, 1996), *araware-ru* ‘appear’ (Kageyama 1993, 1996), *kie-ru* ‘disappear’ (Tsujimura 1991), *a/i-ru* ‘be’ (Kageyama 1993), *odor-u* ‘dance’ (Fujita 1988; Miyagawa 1989; Kageyama 1993; Kishimoto 1996), *oyog-u* ‘swim’ (Kageyama 1996; Kishimoto 1996), *asob-u* ‘play’, *hatarak-u* ‘work’ (Kageyama 1993, 1996; Kishimoto 1996).

¹² An anonymous reviewer points out that the verb *hair-u* ‘enter’ is compatible with an accusative-marked phrase in examples like (i) below.

- (i) Roji-o hair-u-to chiisana shoppingumooru ga ...
alley-ACC enter-NPST-CONJ small shopping.mall-NOM ...
‘Turning into an alley, (there was) a small shopping mall ... (<https://www.tripadvisor.jp/>)

It appears that the verb licenses an accusative-marked phrase when (i) the accusative-marked phrase refers to a path (rather than a location) and (ii) the verb appears in a non-root environment. An accusative-marked phrase that refers to a path fails to be licensed in a root environment, as shown in (ii) (the judgment is my own).

- (ii) *Taro-ga roji-o hait-ta.
T-NOM alley-ACC enter-PST
‘Taro turned into the alley.’

¹³ Anticipating Experiment 3, in which animacy of intransitive subjects and telicity of intransitive events were manipulated, all the verbs in Classes 1, 2 and 3 are compatible with both animate and inanimate subjects, and all the verbs in Classes 4 and 5 are compatible with adjuncts that induce telic interpretations of events.

once in the [-FNQ] condition and another time in the [+FNQ] condition. This resulted in four lists of twenty sentences. Each list was combined with the same forty filler sentences, resulting in sixty sentences per list. The order of each list was then pseudo-randomized such that related conditions were never presented in succession. (19) provides examples of the two conditions with *ochi-ru* ‘fall’, a Class 1 verb, and *hatarak-u* ‘work’, a Class 5 verb. The embedded sentences with the target verbs are indicated with square brackets.

- (19) a. *ochi-ru* ‘fall’: [-FNQ]
 Yuuenchi-no keebiin-wa
 amusement.park-GEN security.guard-TOP
 [fuzaketa shoogakusee-ga yo-nin
 [frolicking elementary.school.children-NOM four-CL
 kooen-no ookina ike-ni ochi-ta] koto-o hookokushi-ta.
 park-GEN large pond-LOC fall-PST] fact-ACC report-PST
 ‘The security guard for the amusement park reported that four frolicking elementary school children fell into the large pond in the park.’
- b. *ochi-ru* ‘fall’: [+FNQ]
 Yuuenchi-no keebiin-wa [fuzaketa
 amusement.park-GEN security.guard-TOP [frolicking
 shoogakusee-ga kooen-no ookina ike-ni
 elementary.school.children-NOM park-GEN large pond-LOC
 yo-nin ochi-ta] koto-o hookokushi-ta.
 four-CL fall-PST] fact-ACC report-PST
 ‘The security guard for the amusement park reported that four frolicking elementary school children fell into the large pond in the park.’
- c. *hatarak-u* ‘work’: [-FNQ]
 Konbini-no tenchoo-wa [ryuugakusee-no
 convenience.store-GEN manager-TOP [foreign.student-GEN
 arubaito-ga san-nin totemo majime-ni hatarai-ta]
 part-time.workder-NOM three-CL very diligently work-PST]
 no-o yorokon-da.
 thing-ACC rejoice-PST
 ‘The manager of the convenience store was happy that three foreign student part-time workers worked very diligently.’
- d. *hatarak-u* ‘work’: [+FNQ]
 Konbini-no tenchoo-wa [ryuugakusee-no
 convenience.store-GEN manager-TOP [foreign.student-GEN
 arubaito-ga totemo majime-ni san-nin hatarai-ta]
 part-time.workder-NOM very diligently three-CL work-PST]
 no-o yorokon-da.
 thing-ACC rejoice-PST
 ‘The manager of the convenience store was happy that three foreign student part-time workers worked very diligently.’

6.2.2 Procedure

The experiment was presented on the same host website for psycholinguistic experiments used for Experiment 1 (<http://spellout.net/ibexfarm>). Thirty-two students at a university in Tokyo, Japan participated. The participants were instructed to use a 7-point scale to provide their judgments, with 7 being “completely natural” and 1 being “completely unnatural.” The participants first read instructions that explained

the general purpose of acceptability judgment experiments, with examples, and encouraged them to use the full range of the scale to judge the sentences. The judgments provided by the participants were standardized (z -score transformed) prior to analysis, in order to correct for potential scale biases among participants (Schütze & Sprouse 2013). The standardized judgments were analyzed with linear mixed-effects models with verb classes and FNQ as fixed factors and subjects and items as random factors. The mean z -scores for the individual verbs were also examined to check individual differences among the ten intransitive verbs. These analyses were performed using the `lmerTest` package (Kuznetsova et al. 2016) in the statistical software R (R Core Team 2015).

6.3 Results

Figure 5 summarizes the mean z -scores for the acceptability judgments for the five verb classes in the two different FNQ conditions, [-FNQ] and [+FNQ]. The error bars in Figure 5 and all the following figures represent 95% confidence intervals. Table 3 presents a summary of the statistical analysis.

A visual inspection of Figure 5 suggests that the five verb classes fall into two groups. With the verbs in Classes 1, 2 and 3, i.e., the putative unaccusatives, the mean acceptability judgments for the [-FNQ] and the [+FNQ] conditions do not appear to be significantly different. In contrast, with the verbs in Classes 4 and 5, the putative unergatives, the mean acceptability judgments for the two FNQ conditions do appear to be significantly different. This observation is confirmed by the statistical analysis. The interaction between FNQ and verb classes is significant only with Classes 4 ($\beta = -0.68$, $SE = 0.26$, $p = .01$) and 5 ($\beta = -0.54$, $SE = 0.26$, $p = .04$).

Figure 6 shows the mean z -scores for the ten intransitive verbs. The mean z -scores for the individual verbs further solidify the observation that FNQ-licensing splits these ten intransitive verbs into two groups. While the mean z -scores for the [-FNQ] and [+FNQ] conditions do not appear to be significantly different from each other for *hair-u* ‘enter’ and *ochi-ru* ‘fall’ (Class 1), *araware-ru* ‘appear’ and *kie-ru* ‘disappear’ (Class 2), and *i-ru* ‘be’ and *nokor-u* ‘remain’ (Class 3), with the means for both [-FNQ] and [+FNQ] conditions being positive (above the zero point), they do appear to be significantly different from each other with *odor-u* ‘dance’ and *oyog-u* ‘swim’ (Class 4) and *asob-u* ‘play’ and *hatarak-u* ‘work’ (Class 5), with the means for the [+FNQ] conditions being negative (below the zero point). The results of post-hoc analyses for the effect of FNQ within the individual verbs largely confirm these observations.

Table 4 summarizes the results of the post-hoc analyses. The effect of FNQ is not significant with all the verbs in Class 1 (*hair-u* ‘enter’ and *ochi-ru* ‘fall’), Class 2 (*araware-ru* ‘appear’ and *kie-ru* ‘disappear’), and Class 3 (*i-ru* ‘be’ and *nokor-u* ‘remain’). In contrast, the effect of FNQ is significant with both of the verbs in Class 4 (*odor-u* ‘dance’ and *oyog-u* ‘swim’) and one of the verbs in Class 5, *asob-u* ‘play’, while it was not quite significant with the other Class 5 verb, *hatarak-u* ‘work’.

6.4 Discussion

The results of Experiment 2 show that FNQ-licensing divides the ten Japanese intransitive verbs from the five different lexical semantic classes into two subgroups, just like quantifier scope in doubly-quantified sentences in Experiment 1 has been shown to do (albeit with a different set of Japanese intransitive verbs). Together, the results of Experiment 1 and 2 support the claim that the UH holds with Japanese intransitive verbs.

At the same time, the findings from Experiment 2 fail to support the ASH as a hypothesis for Japanese intransitive verbs and FNQ-licensing. If the ASH applies to FNQ-licensing,

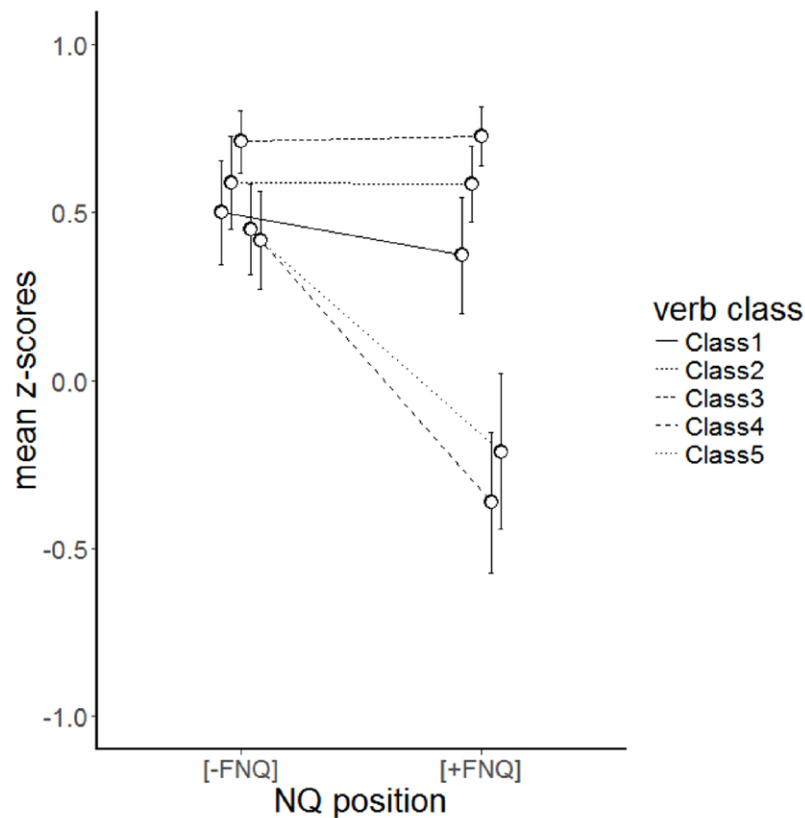


Figure 5: Mean z-scores from Experiment 2.

Table 3: Summary of the statistical analysis for Experiment 2.

measure	estimate	t-value
(Intercept)	0.5(0.13)	3.8***
FNQ	-0.16(0.18)	-0.86
Class 2	0.09(0.18)	0.52
Class 3	0.21(0.18)	1.17
Class 4	-0.04(0.18)	-0.22
Class 5	-0.07(0.18)	-0.4
FNQ × Class 2	0.14(0.26)	0.55
FNQ × Class 3	0.17(0.26)	0.66
FNQ × Class 4	-0.68(0.26)	-2.635*
FNQ × Class 5	-0.54(0.26)	-2.09*

*** = $p \leq 0.001$, * = $p \leq 0.05$.

it predicts fine-grained differences in the mean acceptability judgments for the [-FNQ] and the [+FNQ] conditions across the five verb classes. Specifically, it would predict that the difference in the mean acceptability judgments between these two conditions would be smallest with Class 1 (change of location) and largest with Class 5 (controlled non-motional process), with Class 3 (stative) showing a difference somewhere between those of Class 1 and Class 5. Instead, our results show that the differences between the [-FNQ] and the [+FNQ] conditions are smallest with Classes 2 and 3, only slightly larger with Class 1, and largest with Classes 4 and 5. These observations fail to support the ASH's claims that (i) change of location verbs (Class 1) are the core unaccusatives, (ii) stative

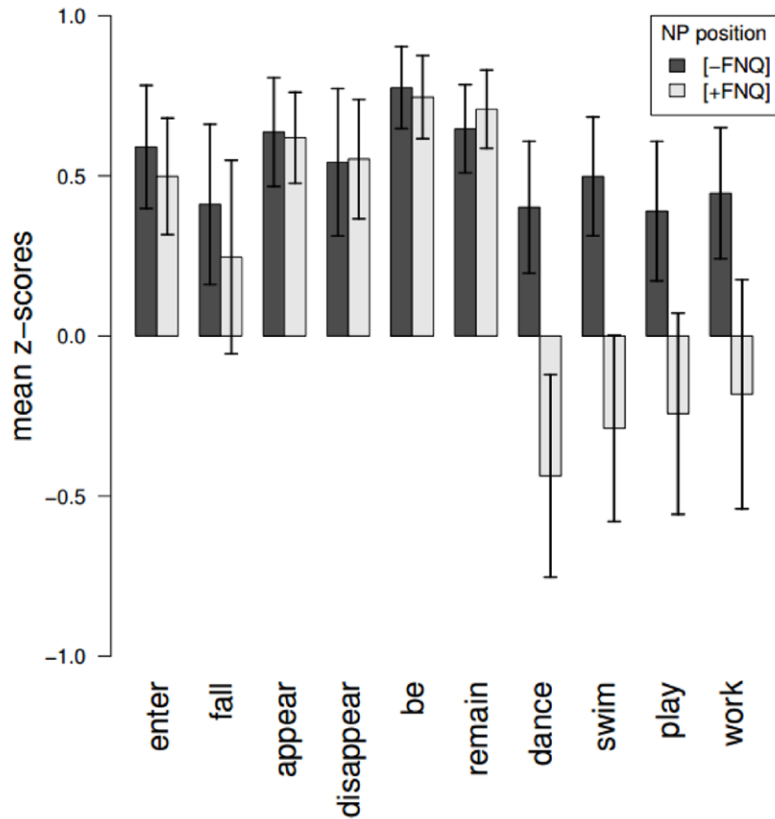


Figure 6: Mean z-scores for the individual intransitive verbs.

Table 4: Summary of the post-hoc analyses for the individual verbs in Experiment 2.

verb	β	SE	p-value
<i>hair-u</i> 'enter'	-0.1	0.16	0.56
<i>ochi-ru</i> 'fall'	-0.22	0.41	0.62
<i>araware-ru</i> 'appear'	-0.02	0.11	0.87
<i>hie-ru</i> 'disappear'	0.01	0.18	0.98
<i>i-ru</i> 'be'	-0.03	0.07	0.67
<i>nokor-u</i> 'remain'	0.06	0.09	0.5
<i>odor-u</i> 'dance'	-0.83	0.36	0.05*
<i>oyog-u</i> 'swim'	-0.85	0.3	0.02*
<i>asob-u</i> 'play'	-0.69	0.26	0.03*
<i>hatarak-u</i> 'work'	-0.71	0.35	0.08

* = $p \leq 0.05$.

verbs (Class 3) are peripheral unaccusatives, (iii) controlled non-motional process verbs (Class 5) are the core unergatives, and (iv) controlled motional process verbs are peripheral unergatives (Class 4).

7 Potential effects of agentivity and telicity on FNQ-licensing

One recurring issue in SIDs across languages is that they are often sensitive to certain lexical semantic features of intransitive verbs. As discussed in Section 2, the auxiliary selection in western European languages has been shown to be sensitive to the telicity

of intransitive events. Another well-known SID, impersonal passives, has been argued to be sensitive to potential agentivity of intransitive subjects (e.g., Perlmutter 1978; Zaenen 1988). While there is no a priori reason to suspect that lexical semantic features of the intransitive verbs affected quantifier scope interpretations in Experiment 1, previous studies on FNQ-licensing give us good reasons to worry that potential agentivity of intransitive subject and telicity of intransitive events may affect FNQ-licensing.

7.1 Potential effects of agentivity of intransitive subjects on FNQ-licensing

In Section 5.2, we reviewed a study by Sorace & Shomura (2001) that found a significant difference in the mean acceptability judgments between the [-FNQ] and the [+FNQ] conditions with change of location verbs, core unaccusatives according to the ASH. The authors speculate that this unexpected finding may have been due to the fact that these verbs were presented with animate subjects, and this led them to hypothesize that FNQ-licensing may be sensitive to the animacy (and therefore potential agentivity) of intransitive subjects.

7.2 Potential effects of telicity of intransitive events on FNQ-licensing

It has also been noted that the acceptability of unergative sentences with an FNQ, such as (20a) and (21a), improves with an adjunct that facilitates a telic interpretation of the events, as in (20b) and (21b) (Tsujimura 1994, 1996; Mihara 1998; Miyagawa 2012).

- (20) From Tsujimura (1994: 342; (16a–b))
- a. ?*Kodomo-ga inu-to awatete san-nin hashit-ta.
 child-NOM dog-with hurriedly three-CL run-PST
 ('Three children ran hurriedly with a dog.')
- b. Kodomo-ga inu-to awatete **kooen-made** san-nin hashit-ta.
 child-NOM dog-with hurriedly **park-till** three-CL run-PST
 'Three children ran hurriedly to the park with a dog.'
- (21) From Miyagawa (2012: 88; (9a–b))
- a. *Tomodachi-ga jup-pun futa-ri odot-ta.
 friend-NOM ten-minutes two-CL dance-PST
 ('Two friends danced for ten minutes.')
- b. Tomodachi-ga **jup-pun-no** **uchini** futa-ri odot-ta.
 friend-NOM **ten-minutes-GEN** **within** two-CL dance-PST
 'Two friends danced in ten minutes.'

There are competing accounts for the contrast in (20) and (21). Ishii (1999) argues that instances of FNQs like (20b) and (21b) should be analyzed as VP-modifying adverbs, unlike the cases of FNQs that result from syntactic movement of their associates, which are adnominals. The main motivation for Ishii's proposal comes from the observation that instances of FNQs like (20b) and (21b) obligatorily have a distributive (or multiple-event) reading, in which the event that the verb denotes is interpreted as occurring multiple times with different subjects. For instance, the most natural interpretation of (21b) is that there were two separate events of dancing with two different subjects. In contrast, a collective reading is available with FNQs that are compatible with the stranding analysis, such as (22).¹⁴

¹⁴ Examples like (22) are acceptable presumably because the adverbial *sakki* 'a moment ago' is vP-external.

- (22) Tomodachi-ga sakki futa-ri odot-ta.
 friend-NOM a moment_ago two-CL dance-PST
 ‘Two friends danced a moment ago.’

Unlike (21b), (22) can be interpreted as denoting a single event of dancing with two friends as the subject. Under Ishii’s analysis, (21a) is unacceptable because the FNQ is compatible with neither the stranding analysis nor the VP-modifying adverb analysis. However, Nakanishi (2008) questions the alleged correlation between the distributive reading and the “adverbial” FNQs with examples in which the FNQs are amenable to the stranding analysis but still require a distributive interpretation, such as (23).

- (23) Nakanishi (2008: 300; 31b)
 Tomodachi-ga kinoo futa-ri kekkon shi-ta.
 friend-NOM yesterday two-CL marriage do-PST
 ‘Two friends (independently) got married yesterday.’

In addition, examples like (20b) from Tsujimura (1994) are also problematic for Ishii’s generalization, as the FNQ in the example is compatible with a collective reading, unlike (21b).

Mihara (1998) argues that FNQs are licensed at different levels of grammar. According to the study, FNQs quantify result-states of internal arguments in the Lexical Conceptual Structure (LCS). Thus, FNQs are readily licensed by direct objects in telic transitive sentences (24) and subjects of telic unaccusative sentences (25).

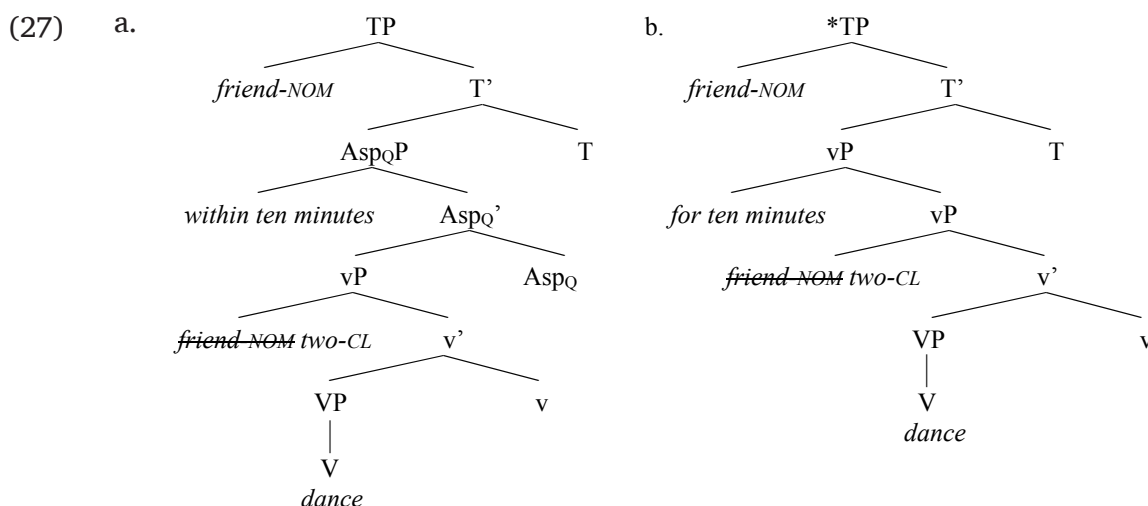
- (24) a. Kare-wa sono sakka-no hon-o ni-satsu yon-da.
 he-TOP that author-GEN book-ACC two-CL read-PST
 ‘He read two books by that author.’
 b. LCS: [[*he* ACT ON *books* by *that author*] CONTROL [*books* by *the author* BECOME [*books* by *the author* BE AT [state *read*]] & [_{AMOUNT} *two*]]
- (25) a. Kozutsumi-ga ofisu-ni futa-tsu todoi-ta.
 package-NOM office-LOC two-CL arrive-PST
 ‘Two packages arrived at the office.’
 b. LCS: [*package* BECOME [*package* BE AT [state *arrived*]] & [_{AMOUNT} *two*]]

In contrast, unergative sentences often fail to license FNQs because they usually denote atelic events and lack an internal argument. However, unergative subjects may license FNQs when the denoted events are interpreted as “temporally delimited.” Such an interpretation can arise due to a number of reasons, including the presence of certain adjuncts, discourse contexts, and the speaker’s knowledge about the world. Mihara (1998: 108) calls this type of delimited interpretation “discourse-driven aspect delimitation” and distinguishes it from delimitation of events in LCS as in (24) and (25).

Finally, Miyagawa (2012) proposes a syntactic account for FNQ-licensing in unergative sentences such as (20) and (21), based on the following assumption.

- (26) Telicity and the External Argument (TEA): Once the external argument moves to [Spec, TP], its lower copy in the predicate-internal subject position is visible under the telic interpretation.

Following Borer (2005), Miyagawa adopts the hypothesis that telic sentences involve a functional projection of Asp(ect)_Q, where the subscript “Q” stands for “quantity.” Miyagawa argues that subjects of telic unergative sentences can license FNQs because these sentences involve a projection of Asp_Q, whose specifier position is occupied by a telic-inducing adjunct. The presence of the Asp_QP makes the lower copy of the unergative subject in [Spec, vP] visible in syntax by TEA (26), licensing the FNQ (27a). In contrast, atelic unergative sentences lack a projection of Asp_Q, so the lower copy of the unergative subject is invisible in syntax. Thus, the FNQ is not licensed, making the sentence unacceptable (27b).



Under the aspect phrase analysis, telicity of events plays the determining role in FNQ-licensing only when external argument subjects are involved. Thus, Miyagawa maintains that copies of A-movement inside the VP are visible regardless of the telicity of the events. Therefore, FNQs in unaccusative sentences with an atelic interpretation, such as (28), are acceptable.

- (28) Kyaku-ga mise-ni san-nin i-ta.
 customer-NOM shop-LOC three-CL be-PST
 ‘There were three customers in the shop.’

The LCS/discourse-driven delimitation analysis wrongly rules out sentences like (28), as they do not denote telic events where FNQs may quantify result-states of subjects. Here, it should be noted that the results of Experiment 2 also showed no significant difference in the mean acceptability judgments between the [-FNQ] and the [+FNQ] conditions with the stative verbs (Class 3 verbs: *i-ru* ‘be’ and *nokor-u* ‘remain’; Section 6.3). Because FNQs appear to be licensed with atelic stative verbs, it is clear that telicity is not the determining factor of FNQ-licensing.¹⁵ However, what the observations in the previous studies that we reviewed suggest is that telicity may affect FNQ-licensing with subjects of agentive atelic intransitive verbs, such as Class 4 verbs (*odor-u* ‘dance’ and *oyog-u* ‘swim’) and Class 5 verbs (*asob-u* ‘play’ and *hatarak-u* ‘work’).

¹⁵ An anonymous reviewer suggests that Mihara’s (1998) proposal is not necessarily incompatible with the observation that stative verbs license FNQs, as LCS representations such as (24b) and (25b) contain a *state* component, and not a *result-state* component. According to Mihara (1998), however, FNQs function as *aspectual delimiters* and *quantifiers* of result-states (Mihara 1998: 98). As such, FNQs must co-occur with a delimited event with a *state* component that is quantifiable, i.e., individuated, such as a result-state. Since intransitive sentences with stative verbs such as (28) and the experimental sentences with Class 3 verbs in Experiment 2 are incompatible with result-state/delimited interpretations, we maintain that Mihara’s (1998) proposal wrongly predicts that FNQs should not be licensed in these sentences.

8. Experiment 3

Experiment 3 examined the effects of telicity of intransitive events on FNQ-licensing with verbs in Classes 4 (controlled motional process) and 5 (controlled non-motional process) and the effects of animacy of intransitive subjects on FNQ-licensing with the verbs in Classes 1 (change of location), 2 (change of state) and 3 (stative). We manipulated telicity only with the verbs in Classes 4 and 5 because (i) only these verbs showed significant differences in acceptability judgments between the [-FNQ] and the [+FNQ] conditions in Experiment 2, and (ii) verbs in Classes 1 (change of location) and 2 (change of state) are inherently telic while verbs in Class 3 (stative) are stative, and therefore, it is difficult, if not impossible, to manipulate their telicity. On the other hands, the verbs in Classes 4 and 5 are all compatible with telicity-inducing adjuncts. The animacy of intransitive subjects was manipulated only with verbs in Classes 1, 2 and 3 (stative) because the verbs in Classes 4 (controlled motion process) and 5 (controlled non-motional process) require animate subjects.

8.1 Predictions

If the telicity of intransitive events has significant effects on FNQ-licensing with atelic agentive intransitive verbs, i.e., putative unergatives, as has been argued, then we would expect a significant interaction between telicity and FNQ, with relatively larger differences between mean acceptability judgments for intransitive sentences with Class 4 and 5 verbs in the [-FNQ] and the [+FNQ] conditions within the atelic ([-telic]) condition than for similar sentences within the telic ([+telic]) condition. If the potential agentivity of intransitive subjects affects FNQ-licensing with putative unaccusative verbs, as Sorace & Shomura (2001) speculate, then we would expect a significant interaction between animacy and FNQ, with larger differences in mean acceptability judgments for intransitive sentences with Class 1, 2, and 3 verbs in the animate ([+animate]) condition than for similar sentences in the inanimate ([-animate]) condition.

8.2 Methods

8.2.1 Materials

The same ten intransitive verbs that were used in Experiment 2, *hair-u* ‘enter’, *ochi-ru* ‘fall’, *araware-ru* ‘appear’, *kie-ru* ‘disappear’, *a/i-ru* ‘be’ and *nokor-u* ‘remain’, *odor-u* ‘dance’, *oyog-u* ‘swim’, *asob-u* ‘play’, and *hatarak-u* ‘work’, were also used in Experiment 3.¹⁶ The telicity of the events was manipulated with the verbs in Classes 4 and 5 by using two types of adjuncts to indicate that the events took place in a particular time interval (e.g., *x-no aida-ni* ‘within x time’) or had a clear end point (*x-made* ‘until x-time’) for the telic condition ([+telic]), and adjuncts that do not so indicate such as locatives (e.g., *kyooshitsu-no naka-de* ‘inside the class room’) and manner adverbs (*totemo nakayoku* ‘very amicably’) for the atelic condition ([-telic]). Four lexicalizations of each verb were constructed for each of the four conditions and distributed among four lists using a Latin Square design. Every list included the four conditions for each of the five classes; two of the conditions had the same verb in two different lexicalizations and the other two conditions had a different verb (from the same class) also in two different lexicalizations. Thus, every participant judged all four conditions for each of the five verb classes without having to judge the same verb four times. This resulted in twenty critical items. Each of these four lists was mixed with the same twenty-eight fillers, and their order was pseudo-randomized. (29) and (30) provide examples of the experimental sentences, showing the manipulation of

¹⁶ The verb of existence has two forms depending on animacy of subjects: *i-ru* with an animate subject and *a-ru* with an inanimate subject.

event telicity with *asob-u* ‘play’ (29) and the manipulation of subject animacy with *hair-u* ‘enter’ (30).

- (29) a. *asob-u* ‘play’: [–FNQ] & [–telic]
 Gakudoohoiku-no shidooin-wa sekininsha-no kyooshi-ni
 after.school.program-GEN worker-TOP in.charge-GEN teacher-DAT
[kazegimi-no kodomo-tachi-ga yo-nin
[under.the.weather child-PL-NOM four-CL
 kyooshitsu-no naka-de ason-da]-to hookokushi-ta.
 classroom-GEN inside-LOC play-PST]-COMP report-PST
 ‘The worker of the afterschool program reported to the teacher in charge
 that four children under the weather played in the classroom.’
- b. *asob-u* ‘play’: [+FNQ] & [–telic]
 Gakudoohoiku-no shidooin-wa sekininsha-no kyooshi-ni
 after.school.program-GEN worker-TOP in.charge-GEN teacher-DAT
[kazegimi-no kodomo-tachi-ga kyooshitsu-no naka-de
[under.the.weather child-PL-NOM classroom-GEN inside-LOC
yo-nin ason-da]-to hookokushi-ta.
four-CL play-PST]-COMP report-PST
 ‘The worker of the afterschool program reported to the teacher in charge
 that four children under the weather played in the classroom.’
- c. *asob-u* ‘play’: [–FNQ] & [+telic]
 Shiminpuuru-no kanshi’in-wa senpai-no kanshi’in-ni
 public.pool-GEN lifeguard-TOP senior-GEN lifeguard-DAT
[yoojipuuru-de kinjo-no yoochiensei-ga juu-nin
[toddler.pool-LOC local-GEN kindergartener-NOM ten-CL
 ni-jikan-no aida-ni ason-da]-to hookokushi-ta.
 two-hour-GEN duration-LOC play-PST]-COMP report-PST
 ‘The lifeguard at the public pool reported to a senior lifeguard that
 ten kindergarteners played in the toddler pool in two hours.’
- d. *asob-u* ‘play’: [+FNQ] & [+telic]
 Shiminpuuru-no kanshi’in-wa senpai-no kanshi’in-ni
 public.pool-GEN lifeguard-TOP senior-GEN lifeguard-DAT
[yoojipuuru-de kinjo-no yoochiensei-ga ni-jikan-no
[toddler.pool-LOC local-GEN kindergartener-NOM two-hour-GEN
 aida-ni **juu-nin** ason-da]-to hookokushi-ta.
 duration-LOC **ten-CL** play-PST]-COMP report-PST
 ‘The lifeguard at the public pool reported to a senior lifeguard that ten
 kindergarteners played in the toddler pool in two hours.’
- (30) a. *hair-u* ‘enter’: [–FNQ] & [+animate]
 Harikomi-chuu-no keeji-wa soosaikka-no
 stakeout-during-GEN detective-TOP criminal.investigation.division-GEN
kachoo-ni [chuunen.danee-ga futa-ri yoogisha-no mise-ni
 chief-DAT **[middle.aged.man-NOM two-CL suspect-GEN shop-LOC**
 hait-ta]-to hookokushi-ta.
 enter-PST]-COMP report-PST
 ‘The detective on a stakeout reported to the chief of the criminal
 investigation division that two middle-aged men entered the shop
 owned by the suspect.’

- b. *hair-u* ‘enter’: [+FNQ] & [+animate]
 Harikomi-chuu-no keeji-wa **soosaikka-no**
 stakeout-during-GEN detective-TOP criminal.investigation.division-GEN
kachoo-ni [**chuunen.dansee-ga** yoogisha-no mise-ni
 chief-DAT [**middle.aged.man-NOM** suspect-GEN shop-LOC
futa-ri hait-ta]-to hookokushi-ta.
two-CL enter-PST]-COMP report-PST
 ‘The detective on a stakeout reported to the chief of the criminal investigation division that two middle-aged men entered the shop owned by the suspect.’
- c. *hair-u* ‘enter’: [-FNQ] & [-animate]
 Hikkoshiya-no juugyoo-in-wa kyaku-no chuunenfuufu-ni
 moving.company-GEN worker-TOP customer-GEN middle.aged.couple-DAT
[atarashii yoofukudansu-ga futa-tsu nikai-no shinsitsu-ni
[new wardrobe-NOM two-CL second.floor-GEN bedroom-LOC
 hait-ta]-to it-ta.
 enter-PST]-COMP say-PST
 ‘The worker of the moving company said to the middle-aged couple who were the customers that two brand-new wardrobes were placed in the bedroom on the second floor.’
- d. *hair-u* ‘enter’: [+FNQ] & [-animate]
 Hikkoshiya-no juugyoo-in-wa kyaku-no chuunenfuufu-ni
 moving.company-GEN worker-TOP customer-GEN middle.aged.couple-DAT
[atarashii yoofukudansu-ga nikai-no shinsitsu-ni
[new wardrobe-NOM second.floor-GEN bedroom-LOC
futa-tsu hait-ta]-to it-ta.
two-CL enter-PST]-COMP say-PST
 ‘The worker of the moving company said to the middle-aged couple who were the customers that two brand-new wardrobes were placed in the bedroom on the second floor.’

8.2.2 Procedure

The procedures for Experiment 3 were the same as those for Experiment 2. Thirty university students in Tokyo, Japan participated. The obtained judgments were standardized (*z*-score transformed) before they were analyzed with linear mixed effects model analysis with FNQ and animacy as the fixed factors for the sentences with Class 1, 2, and 3 verbs, and FNQ and telicity as the fixed factors for the sentences with Class 4 and 5 verbs, with subjects and items as random factors for both. Planned pairwise comparisons were conducted to isolate the effects of FNQ and telicity within the sentences with the verbs in Classes 4 and 5, and FNQ and FNQ and animacy within the sentences with the verbs in Classes 1, 2, and 3. These analyses were performed using the *lmerTest* package (Kuznetsova et al. 2016) in the statistical software R (R Core Team 2015).

8.3 Results

8.3.1 Effects of telicity within the verbs in Classes 4 and 5

Figure 7 shows the mean *z*-scores for the sentences with the verbs in Classes 4 and 5. Table 5 presents a summary of the statistical analysis.

The results show that FNQ is a significant predictor of the acceptability of sentences with Class 4 and 5 verbs ($\beta = -0.14$, $SE = 0.06$, $p = .02$), but telicity is not ($\beta = -0.03$, $SE = 0.06$, $p = .64$). The interaction between these two factors is also not significant

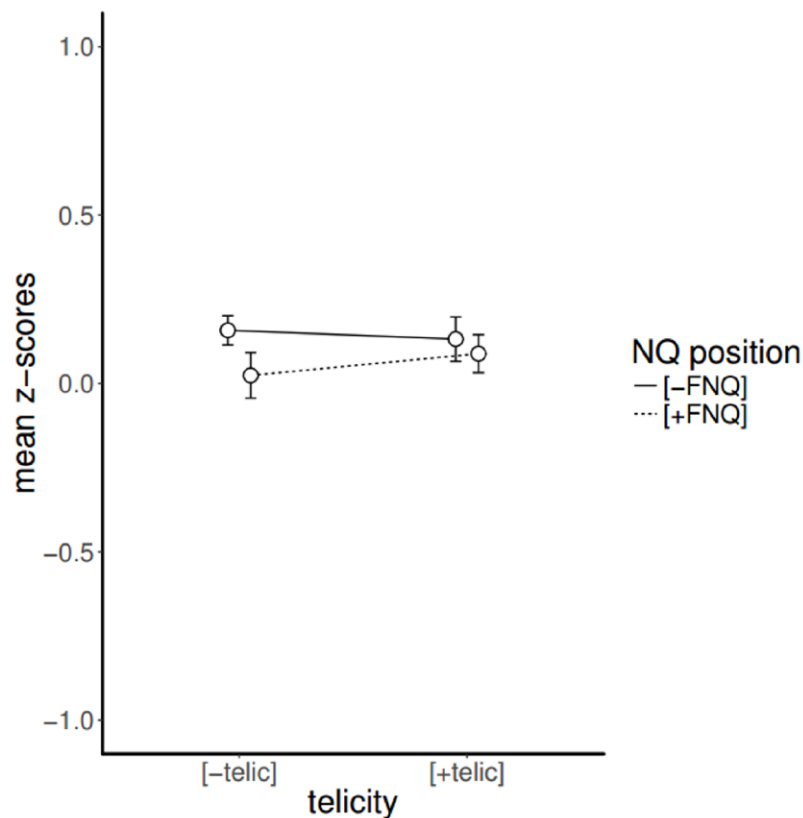


Figure 7: Mean z-scores for the sentences with Classes 4 and 5 verbs.

Table 5: Summary of the statistical analysis for the sentences with Class 4 and 5 verbs.

measure	estimate	t-value
(Intercept)	0.16(0.04)	3.46***
FNQ	-0.14(0.06)	-2.4*
telicity	-0.03(0.06)	-0.48
FNQ × telicity	0.09(0.08)	1.19

*** = $p \leq 0.001$, * = $p \leq 0.05$.

($\beta = 0.09$, $SE = 0.08$, $p = .24$). The results of the planned pairwise comparisons reveal that FNQ is significant within the [-telic] condition ($\beta = -0.14$, $SE = 0.05$, $p = .03$) but not within the [+telic] condition ($\beta = -0.04$, $SE = 0.06$, $p = .49$). The effect of telicity is not significant within the [-FNQ] condition ($\beta = -0.02$, $SE = 0.05$, $p = .58$) or within the [+FNQ] condition ($\beta = 0.07$, $SE = 0.07$, $p = .31$).

A post-hoc analysis of the effects of telicity within each of the two verb classes, Class 4 and Class 5, reveals that the effect of telicity was observed only with the verbs in Class 5 (controlled non-motional process verbs). Figure 8 presents the mean z-scores for the sentences with the verbs in Class 4 and Table 6 summarizes the statistical analysis for them. Neither FNQ ($\beta = 0.19$, $SE = 0.04$, $p = .37$), telicity ($\beta = 0.07$, $SE = 0.06$, $p = .18$), nor their interaction ($\beta = -0.03$, $SE = 0.08$, $p = .71$) is a significant predictor for the acceptability of the sentences with the verbs in Class 4. Figure 9 presents the mean z-scores for the sentences with the verbs in Class 5 and Table 7 summarizes the statistical analysis for them.

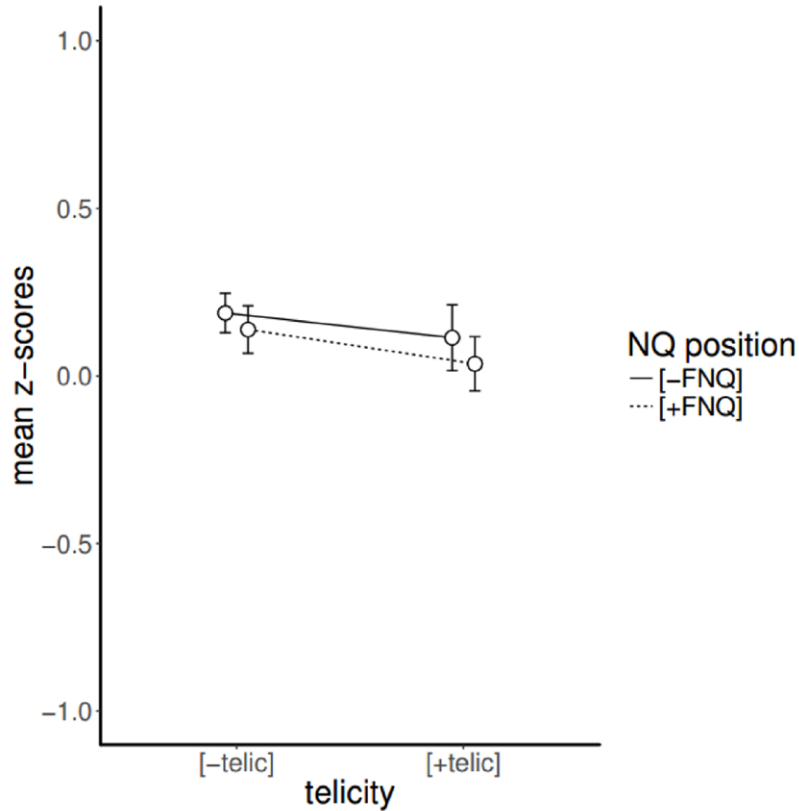


Figure 8: Mean z-scores for the sentences with Class 4 verbs.

Table 6: Summary of the statistical analysis for sentences with Class 4 verbs.

measure	estimate	t-value
(Intercept)	0.19(0.04)	4.78***
FNQ	-0.05(0.05)	-0.9
telicity	-0.07(0.06)	-1.35
FNQ × telicity	-0.03(0.08)	-0.37

*** = $p < 0.001$.

While telicity ($\beta = 0.02$, $SE = 0.07$, $p = .78$) is not a significant predictor, both FNQ ($\beta = -0.22$, $SE = 0.07$, $p = .01$) and the interaction between FNQ and telicity ($\beta = 0.21$, $SE = 0.09$, $p = .04$) are significant predictors of acceptability for the sentences with Class 5 verbs.

8.3.2 Effect of animacy of subjects with the verbs in Classes 1, 2 and 3

Figure 10 shows the mean z-scores for the sentences with the verbs in Classes 1, 2, and 3. Table 8 presents a summary of the statistical analysis.

While FNQ is not a significant predictor of the acceptability of these sentences ($\beta = 0.13$, $SE = 0.04$, $p = .97$), animacy is ($\beta = 0.11$, $SE = 0.05$, $p = .03$). Their interaction is not significant ($\beta = -0.03$, $SE = 0.07$, $p = .63$). A visual inspection of Figure 8 suggests that the significant effect of animacy comes from the overall higher acceptability means of the sentences in the [+animate] condition. The results of the planned pairwise comparisons confirm this observation. Animacy approaches significance within

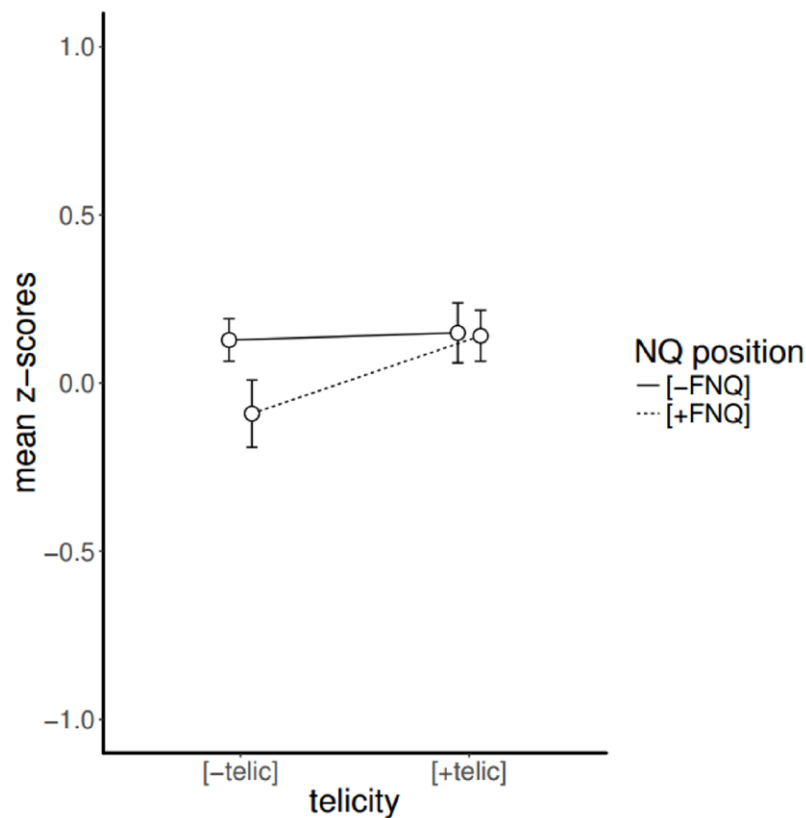


Figure 9: Mean z-scores for the sentences with Class 5 verbs.

Table 7: Summary of the statistical analysis for sentences with the Classes 5 verbs.

measure	estimate	t-value
(Intercept)	0.13(0.05)	2.627*
FNQ	-0.22(0.07)	-3.3**
telicity	0.02(0.07)	0.29
FNQ × telicity	0.21(0.09)	2.27*

** = $p \leq 0.01$, * = $p \leq 0.05$.

both the [-FNQ] condition ($\beta = 0.11$, $SE = 0.06$, $p = .06$) and the [+FNQ] condition ($\beta = 0.08$, $SE = 0.04$, $p = .08$). The effect of FNQ is not significant within the [-animate] condition ($\beta = -0.00$, $SE = 0.06$, $p = .98$) or within the [+animate] condition ($\beta = -0.04$, $SE = 0.03$, $p = .26$).

8.4 Discussion

The results of Experiment 3 provide no evidence for Sorace & Shomura's (2001) hypothesis that FNQ-licensing is sensitive to animacy (and therefore potential agentivity) of intransitive subjects. However, the results of Experiment 3 confirm that the telicity of the events that intransitive verbs denote affects FNQ-licensing with some agentive atelic intransitive verbs, as a significant interaction between FNQ and telicity was found with the sentences with the verbs in Class 5. No effect of telicity was found with the verbs in Class 4, which were judged like unaccusatives, with no significant difference in the mean z-scores between the [-FNQ] and the [+FNQ] conditions within the [-telic] condition.

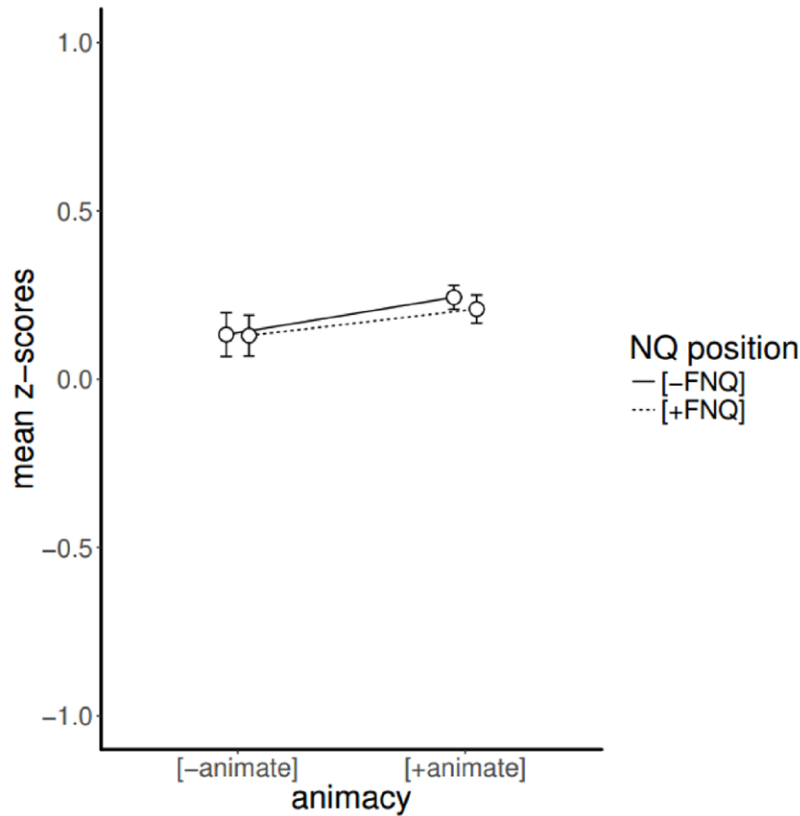


Figure 10: Mean z-scores for the sentences with Class 1, 2 and 3 verbs.

Table 8: Summary of the statistical analysis for sentences with Class 1, 2 and 3 verbs.

measure	estimate	t-value
(Intercept)	0.13(0.04)	3.46**
FNQ	-0.0(0.05)	-0.03
animacy	0.11(0.05)	2.27*
FNQ × animacy	-0.03(0.07)	-0.49

** = $p \leq 0.01$, * = $p \leq 0.05$.

Thus, the results of Experiments 2 and 3 together lead us to conclude the following about the role of telicity of events in FNQ-licensing. First, the results of Experiment 2 show that telicity is not a necessary factor for FNQ-licensing. As discussed in Sections 6.3 and 7.2, the intransitive sentences with atelic stative verbs in Class 3 received two of the highest means for the [+FNQ] condition among the ten intransitive verbs tested, indicating that FNQs are highly acceptable with atelic stative verbs. Second, the results of Experiment 3 show that the telicity of intransitive events can influence FNQ-licensing with agentive atelic verbs, i.e., putative unergative verbs. In other words, the telicity of events exhibits its effects on FNQ-licensing only when external argument subjects are involved, as Miyagawa (2012) points out. These observations make FNQ-licensing different from auxiliary selection, as telicity does appear to be the determining factor for the latter, whether it is inherent to the verbs’ meaning, or compositionally induced by adjuncts, as discussed in Section 2. Another important difference between FNQ-licensing and auxiliary selection is that FNQ-licensing under the stranding analysis provides a direct link between this SID and the UH, while there is no direct link between auxiliary selection and the UH, as argued in

Section 2. Thus, we contend that the stranding analysis of FNQ-licensing and our findings from Experiment 2 together provide compelling theoretical and empirical arguments for the UH in Japanese, and the finding that telicity affects FNQ-licensing with agentive atelic intransitive verbs does not necessarily undermine these arguments. We must leave for a future study an account of what causes telicity compositionally induced with adjuncts to influence FNQ-licensing with agentive atelic verbs. Nevertheless, the mechanism through which telicity influences FNQ-licensing with agentive atelic verbs could be independent of how FNQ-licensing works with intransitive verbs under normal circumstances, i.e., without the manipulation of telicity, as proposed by Miyagawa (2012). This is because telicity only contributes to, and does not determine, the acceptability of FNQ-licensing.

9 Concluding remarks and some implications

In this study, we first argued that, in order to properly test predictions of the UH, SIDs that make direct reference to the hypothesis need to be investigated and that auxiliary selection is not ideal for this purpose, because it does not make direct reference to the UH. We then argued that two SIDs in Japanese, quantifier scope and FNQ-licensing, are ideal to investigate predictions of the UH, as they do make direct reference to the putative syntactic difference among intransitive subjects. We presented experimental evidence for the effectiveness of these two SIDs from the results of the first two experiments (Experiments 1 and 2). The results of Experiment 1 revealed a disproportionately higher availability of inverse scope interpretations of doubly-quantified sentences with putative unaccusatives than with putative unergatives (and transitives). The results of Experiment 2 showed that FNQ-licensing classifies ten Japanese intransitive verbs from five different lexical semantic classes into two subclasses: the controlled motional process and controlled non-motional process verbs, whose sentences' acceptability is significantly affected by FNQs, and the change of location, change of state, and stative verbs, whose sentences' acceptability is not significantly affected by FNQs. The UH, which divides intransitive verbs into two subclasses, unaccusatives and unergatives, provides a straightforward accounts for these findings from Experiments 1 and 2. Finally, Experiment 3 examined the effects of telicity of intransitive events and animacy of intransitive subjects on FNQ-licensing. While the results of Experiment 3 provide no evidence for effects of animacy of intransitive subjects on FNQ-licensing, they confirm the effects of telicity of events on FNQ-licensing with agentive atelic intransitive verbs such as the verbs in Class 5. We argued that this finding does not undermine our claim that FNQ-licensing provides support for the UH. Rather, it highlights the necessity of providing an account for how telicity compositionally induced with adjuncts influences FNQ-licensing on agentive atelic verbs, which could be independent of how FNQ-licensing normally divides intransitive verbs into unaccusatives and unergatives. We will briefly discuss some implications of our findings below to conclude this study.

9.1 *The nature of the movement of unaccusative subjects*

The results of Experiments 1 and 2 provide novel experimental evidence for the syntactic movement of unaccusative subjects in Japanese. But they also raise several questions that future studies need to address concerning the syntax of unaccusatives in Japanese. First, our findings and the observations in previous studies together lead us to conclude that the syntactic movement of an unaccusative subject must be optional. Previous studies provide evidence that unaccusative subjects in Japanese may remain in-situ (Nakayama & Koizumi 1991; Yatsushiro 1999; Miyagawa & Babyonyshev 2004; Takano 2011). Nakayama & Koizumi (1991) and Yatsushiro (1999) independently argue that when a quantifier unaccusative subject follows a quantifier locative phrase, the only available

interpretation is the surface scope, where the quantifier locative phrase takes scope over the quantifier subject.

- (31) a. From Nakayama & Koizumi (1991: 351; (ii))
Tokyo-ka Kanda-ni subete-no gakusee-ga tsui-ta.
Tokyo-or Kanda-LOC all-GEN students-NOM arrive-PST
‘All students arrived at Tokyo or Kanda.’ {or > \forall , $*\forall$ > or}
- b. From Yatsushiro (1999: 34; (32a))
Dokoka-ni daremo-ga i-ta.
somewhere-LOC everyone-NOM be-PST
‘Everyone was somewhere.’ { \exists > \forall , $*\forall$ > \exists }

Takano (2011) argues that, with two-place unaccusative verbs with a theme argument and a locative argument such as *tsuk-u* ‘arrive’ and *i-ru* ‘be’, either the theme or the locative argument may occupy the subject position, which he assumes to be [Spec, vP], following Saito (2009).

- (32) a. [_{vP} Locative_i [_{vP} t_i Theme V_{UNACC}]_v]
b. [_{vP} Theme_i [_{vP} Locative t_i V_{UNACC}]_v]

According to Takano, the locative and theme arguments are in the subject position in (32), i.e., their movement to [Spec, vP] is an instance of A-movement, because either the clause-initial locative argument (33a) or the clause-initial theme argument (33b) can serve as the antecedent of the subject-oriented anaphor *jibun* ‘self’.

- (33) From Takano (2011: 234; (14a), (15a))
- a. [Ken_i-ni] [jibun_i-no saifu-ga] modot-ta.
Ken-LOC self-GEN wallet-NOM return-PST
‘His_i wallet returned to Ken_i.’
- b. [Ken_i-ga] [jibun_i-no heya-ni] modot-ta.
Ken-NOM self-GEN room-LOC return-PST
‘Ken_i returned to his_i room.’

Under this analysis, the examples in (31) do not have the inverse scope interpretation because they have (32a) as their underlying structure, where the quantified theme argument stays in-situ and never c-commands the quantifier locative argument. In contrast, similar sentences with the theme-initial order (e.g., the experimental sentences in Experiment 1), are ambiguous because the quantifier theme argument, which is originally c-commanded by the quantifier locative argument, moves to [Spec, vP] and ends up c-commanding the quantifier locative argument. These observations suggest that in Japanese, (i) unaccusative subjects may remain in-situ, (ii) the syntactic movement that unaccusative subjects undergo in doubly-quantified unaccusative sentences is A-movement, and (iii) unaccusative subjects that undergo A-movement reconstruct. However, as an anonymous reviewer points out, subjects of Japanese transitive sentences are known to not undergo reconstruction. Thus, a quantified transitive subject in transitive sentences like (34) must take wide scope with respect to negation (Miyagawa 2001, 2003; Han et al. 2008).

- (34) Miyagawa (2001; 298: (8))
Zen’in-ga sono tesuto-o uke-na-katta (koto).
all-NOM that test-ACC take-NEG-PAST
‘All did not take that test.’ { \forall > \neg , $*\neg$ > \forall }

In contrast, a quantifier unaccusative subject in unaccusative sentences such as (35) can take narrow scope with respect to negation (Miyagawa & Babyonyshev 2004).

- (35) Modified from Miyagawa & Babyonyshev (2004: (27))
 Zen'in-no hon-ga ofisu-ni ari-mas-en.
 all-GEN book office-LOC be-POL-NEG
 'There aren't everyone's books in the office.' $\{\forall > \neg, \neg > \forall\}$

Thus, under the assumption that both transitive and unaccusative subjects undergo A-movement, the contrast in reconstructability of unaccusative and transitive subjects in (34) and (35) requires an explanation (see Miyagawa & Babyonyshev 2004 for a relevant discussion).

Another layer of complication is added by the question of the syntactic movement of unaccusative subjects in FNQ sentences. The observations in previous studies suggest that unaccusative subjects undergo A'-movement in FNQ sentences. Evidence for this conclusion also comes from the binding of *jibun* 'self'. When the theme argument of a two-place unaccusative verb and an associated NQ are adjacent and precede the locative phrase, the theme argument can be an antecedent of *jibun* 'self', suggesting that it is the subject (36a). However, if only the theme argument precedes the locative argument, leaving an FNQ behind, the theme argument cannot be interpreted as the antecedent of *jibun* 'self', suggesting that it is in a non-argument position (36b) (Bošković & Takahashi 1998; Yamashita 2001, 2002, 2006; Fitzpatrick 2006; Miyagawa 2006).

- (36) a. [Kyooju_i-ga san-nin] jibun_i-no gakusee-no tooku-ni ki-ta.
 professor- NOM three-CL self-GEN student-GEN talk-LOC come-PST
 b. *[Kyooju_i-ga] jibun_i-no gakusee-no tooku-ni [san-nin] ki-ta.
 professor- NOM self-GEN student-GEN talk-LOC three-CL come-PST
 'Three professors came to their students' talks.'

Under Takano's (2011) analysis, discussed above, the theme argument and the associated NQ together move to [Spec, vP] in (36a), i.e., they are the subject. In (36b), however, the locative argument occupies [Spec, vP]; thus, the landing site of the fronted theme argument can only be an A'-position.

- (37) a. [_{VP} Theme NQ_i [_{VP} Locative t_i V_{UNACC}]_v]
 b. [_{XP} Theme_k [_{VP} Locative_i [_{VP} t_i t_k NQ V_{UNACC}]_v]]

Thus, unaccusative subjects in Japanese do not always move out of VP, and when they do, the nature of their movement appears to be (i) different from that of transitive subjects and (ii) determined by their interactions with their co-arguments. Future studies should address these properties of Japanese unaccusative subjects to achieve a better understanding of the syntax of unaccusatives in Japanese.

9.2 Beyond Japanese

One of the main goals of this study was to argue that experimental research that examines the predictions of the UH must focus on SIDs that can be directly linked to the hypothesis. While we hope to have achieved this goal by presenting the results of our three experiments with quantifier scope and FNQ-licensing, the conclusions we reached could be further strengthened by examining similar SIDs in other languages. In particular, FNQ-licensing and quantifier scope are potential SIDs in at least two other languages, Korean

and Chinese. Both are considered scopally rigid languages like Japanese (Korean: Ahn 1990; Sohn 1995; Han et al. 2007; Chinese: Huang 1982; Lee 1986; Aoun & Li 1993), a status that has been confirmed in recent experimental studies (Korean: Han et al. 2008; Lee 2009; O'Grady et al. 2009; Chinese: Scontras et al. 2013). Korean FNQ-licensing is a frequently discussed SID (e.g., Gerdts 1987; O'Grady 1991; Yang 1991; Kang 2002; Miyagawa 2006; Ko 2005, 2007) that has been experimentally studied (Ko & Oh 2010, 2012; Lee 2011). While whether Chinese has FNQs is controversial (e.g., Kobuchi-Philip 2007), several native Mandarin speakers report contrasts in licensing of post-verbal NQs by preverbal subjects among different intransitive verbs. Thus, quantifier scope and FNQ-licensing in Korean and Chinese potentially provide a cross-linguistic testing ground for examining how similar SIDs in different languages classify intransitive verbs.

Finally, beyond quantifier scope and FNQ-licensing, future studies should identify other SIDs that make direct reference to the Unaccusative Hypothesis across different languages, so that more concrete evidence for the hypothesis might be brought to light to strengthen its empirical validity.

Abbreviations

ACC = accusative, CL = classifier, COMP = complementizer, CONJ = conjunction, DAT = dative, GEN = genitive, LOC = locative, NEG = negative, NOM = nominative, NPST = non-past, PL = plural, PST = past, TOP = topic

Additional Files

The additional files for this article can be found as follows:

- **Appendix 1.** Statistics. DOI: <https://doi.org/10.5334/gjgl.268.s1>
- **Appendix 2.** Materials. DOI: <https://doi.org/10.5334/gjgl.268.s2>

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Competing Interests

The author has no competing interests to declare.

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