Effects of Telicity and Agentivity on Floating Numeral Quantifiers as an Unaccusative Diagnostic

Shin Fukuda

1. Introduction

Unaccusativity, or *split intransitivity*, refers to the generalization that intransitive verbs divide into two subclasses, *unaccusatives* and *unergatives*. While the core arguments of unaccusatives share common properties with direct objects of transitive verbs, the core arguments of unergatives do so with transitive subjects. The Unaccusative Hypothesis (Perlmutter 1978; Burzio 1986) accounts for the generalization by proposing two underlying structures for intransitive verbs. The unergative structure involves an external argument base-generated outside of VP (1a) while the unaccusative structure involves an internal argument base-generated inside VP (1b).

(1) a. $[_{XP}$ D/NP $[_{VP}$ V $]]$ b. $[_{XP}$ $[_{VP}$ V D/NP $]]$

Unaccusativity 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.

There are three major approaches to unaccusativity. The syntactic approach argues that unaccusativity is a purely syntactic distinction and that the lexical semantics of verbs does not play a deterministic role in the classification of intransitive verbs (Rosen 1984; Perlmutter 1989). The semantic approach argues that the distinction is a lexical semantic one and denies the Unaccusative Hypothesis in (1) (Van Valin 1990; Dowty 1991; Kishimoto 1996). The syntax-semantics interface approach argues that unaccusativity is semantically determined and syntactically encoded (e.g., Perlmutter 1978; Levin and Rappaport-Hovav 1989, 1995; Sorace 2000). The disagreements on the nature of unaccusativity have arisen primarily because the empirical data that have been used to motivate unaccusativity across languages are often amenable to both syntactic and semantic accounts. Consider the following contrast in the licensing of numeral quantifiers (NQs) in Japanese.

(2)	a.	**Gakusee-ga**	(✓**san-nin)**	ofisu-ni	(✓**san-nin)**	ki-ta[1]
		student-NOM	(three-CL)	office-LOC	(three-CL)	come-PST
		'Three students came to the office.' [UNACCUSATIVE]				
	b.	**Gakusee-ga**	(✓**san-nin)**	geragera-to	(#**san-nin)**	warat-ta
		student-NOM	(three-CL)	loudly	(three-CL)	laugh-PST
		'Three students laughed loudly.' [UNERGATIVE]				

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*. It has been observed that Japanese intransitive subjects' ability to license NQs that are "floating" inside VP, i.e., the second NQ in each of the examples, is sensitive to unaccusativity. While subjects of typical unaccusatives such as *ku-ru* 'come' readily license floating NQs (FNQs) (2a), subjects of typical unergatives such as *wara-u* 'laugh' do not (2b). Miyagawa (1989) proposes a syntactic account for the contrast in (2) based on two

[*]Shin Fukuda, University of Hawai'i at Mānoa, fukudash@hawaii.edu. I wish to thank the audience at WCCFL 34 for their helpful feedback. All errors remain my own.

[1]Abbreviations: ACC = accusative, CL = classifier, GEN = genitive, LOC = locative, NOM = nominative, PST = past, TOP = topic.

 Proceedings of the 34th West Coast Conference on Formal Linguistics, ed. Aaron Kaplan et al., 222-231. Somerville, MA: Cascadilla Proceedings Project.

assumptions. First, he adopts the Unaccusative Hypothesis in (1). 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 (2a) is licensed despite the presence of the intervening PP because *ku-ru* 'come' is an unaccusative and its subject is base-generated as an internal argument inside VP, where it was in the required local configuration with the FNQ. In contrast, (2b) is degraded because *wara-u* 'laugh' is an unergative and its subject was base-generated outside VP as an external argument. Thus, it was never in the required local configuration with the FNQ. As such, FNQ-licensing emerges as an unaccusative diagnostic that makes direct reference to the Unaccusative Hypothesis in (1).

More recently, however, the syntactic analysis of FNQs has been challenged by the claim that the acceptability of unergative sentences with a subject-oriented FNQ, such as (3a) and (4a), improves with an adjunct that facilitates a telic interpretation of the events (*telic adjuncts*), as in (3b) and (4b) below (Tsujimura 1994, 1996; Mihara 1998; Nakanishi 2008; Miyagawa 2012).

(3) 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.' (Tsujimura 1994, 342; 16a-b)

(4) 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.' (Miyagawa 2012, 88; 9a-b)

This observation led some studies to argue that telicity of events determines FNQ-licensing in unergative sentences, at the level of either discourse pragmatics (Mihara 1998) or syntax (Miyagawa 2012). According to these "telicity-driven" approaches, the contrast in FNQ-licensing in (3) and (4) is a *grammatical contrast* that requires a *grammatical account*, and telicity of events is responsible for it. Importantly, this means that FNQ-licensing is no longer a reliable unaccusative diagnostic in Japanese, as manipulation of telicity effectively nullifies FNQs' sensitivity to unaccusativity.

This study challenges the core assumption of the telicity-driven accounts for FNQ-licensing with novel experimental evidence. The evidence comes from an acceptability judgment study that examined effects of telicity of unergative events and agentivity of unaccusative subjects on FNQ-licensing. The results show (i) noticeable effects of manipulation of telicity of unergative events on acceptability of FNQs that are nonetheless best characterized as changes in degree of acceptability, rather than a categorical grammaticality change, and (ii) weaker effects of manipulation of animacy (and therefore potential agentivity) of unaccusative subjects on FNQ-licensing, which the telicity-driven approaches to FNQ-licensing fail to predict. Based on these findings, this study argues that the effects of telicity and agentivity on FNQ-licensing are *extra-grammatical* and proposes a processing-based account of the contrast in (3) and (4), according to which the higher acceptability of telic unergative sentences with FNQs like those in (3b) and (4b) is due to an initial unaccusative analysis of these sentences that temporarily licenses the FNQs. If the proposed analysis is on the right track, FNQ-licensing should remain a valid syntactic unaccusative diagnostic, yet its outcomes must be carefully evaluated considering potential effects of various syntactic and non-syntactic factors on the processing of these sentences. The findings in this study also highlight the effectiveness of acceptability judgment experiments in studying subtle acceptability contrasts that involve syntactic and non-syntactic factors (Sprouse 2007), and the importance of considering different possible sources of acceptability contrasts, as acceptability contrasts do not always translate into grammatical contrasts (Chomsky 1965; Schütze 1996; Cowart 1997).

2. Two telicity-driven approaches to FNQ-licensing

Miyagawa's (1989) stranding analysis of FNQs makes crucial reference to the alleged syntactic difference between unaccusatives and unergatives in (1) and provides indirect evidence for the Unaccusative Hypothesis. However, the claim that the presence of a telic adjunct improves the acceptability of unergative sentences with FNQs, as in (3b) and (4b), has led to proposals that telicity of events has grammatical consequences in unergative sentences with FNQs. This section discusses two such telicity-driven approaches to FNQ-licensing: *the Lexical Conceptual Structure/discourse-driven delimitation analysis* (Mihara 1998) and *the aspect phrase analysis* (Miyagawa 2012).

2.1. The Lexical Conceptual Structure/discourse pragmatic approach (Mihara 1998)

Mihara (1998) argues that VP-internal FNQs quantify result-states of internal arguments in the Lexical Conceptual Structure (LCS). Thus, VP-internal FNQs are readily licensed with direct objects of transitive verbs in telic sentences (5) or subjects of unaccusative verbs that denote telic events (6).

(5) 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 [$_{\text{STATE}}$ *read*]] & [$_{\text{AMOUNT}}$ *two*]]]

(6) 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 [$_{\text{STATE}}$ *arrived*]] & [$_{\text{AMOUNT}}$ *two*]]

On the other hand, unergative sentences often fail to license VP-internal FNQs because they usually denote atelic events and lack an internal argument. According to Mihara, however, unergative subjects may license VP-internal FNQs when the denoted events are interpreted as "bounded" because of the presence of telic adjuncts. Cases such as (3b) and (4b), in which the external argument licenses a VP-internal FNQ, do not involve result-states, but they do involve an interpretation in which the denoted event is temporally delimited. This temporally delimited interpretation can arise due to a number of different reasons including the presence of a particular time adverbial, discourse contexts, and the speaker's knowledge about the world. Mihara calls this type of delimited interpretations due to event-external factors "discourse-driven aspect delimitation" and distinguishes it from the delimitation of events in LCS as in (5) and (6) (Mihara 1998, 108).

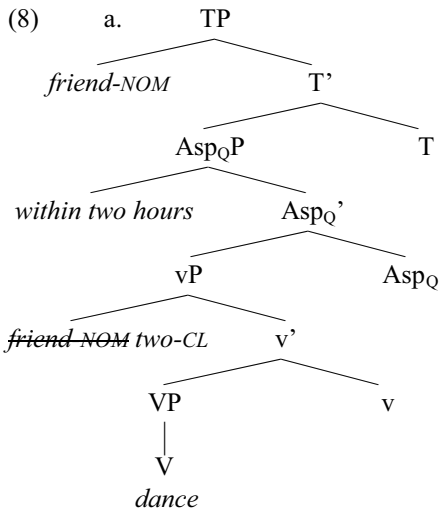
2.2. The aspect phrase approach (Miyagawa 2012)

Miyagawa (2012) proposes a syntactic account for FNQ-licensing in unergative sentences such as (3) and (4), based on the following assumption.

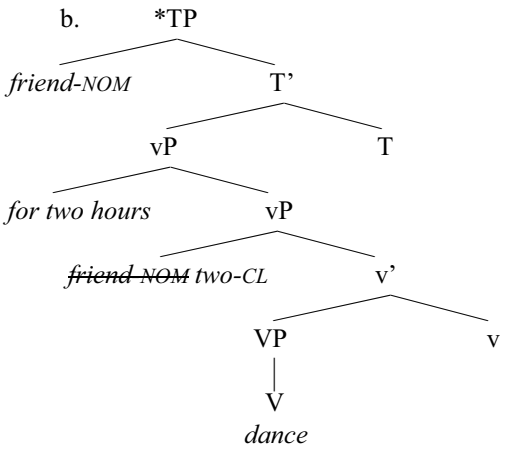
(7) Telicity and the External Argument (TEA): Once the external argument moves to [Spec, TP], its lower copy in the predicate-internal subject position is visible under telic interpretation.

Following Borer (2005), Miyagawa adopts the hypothesis that telic sentences involve a functional project of Asp(ect)$_{\text{Q}}$, where the subscript "Q" stands for "quantity". Miyagawa argues that subjects of telic unergative sentences like (3b) and (4b) can license FNQs because these sentences involve a projection of Asp$_{\text{Q}}$, whose specifier position is occupied by a telic adjunct. The presence of the Asp$_{\text{Q}}$P makes the lower copy of the unergative subject in [Spec, vP] visible in syntax by TEA (7), licensing the FNQ (8a). In contrast, atelic unergative sentences like (3a) and (4a) lack a projection of Asp$_{\text{Q}}$, so the lower copy of the unergative subject is invisible in syntax. Thus, the FNQ is not licensed, making the sentence unacceptable (8b).

(8) a.



b.



Under the aspect phrase analysis, telicity of events plays the determining role in FNQ-licensing only when external argument subjects are involved. Miyagawa (2012) maintains that copies of A-movement inside the VP are visible regardless of the telicity of events. Thus, FNQs in unaccusative sentences with an atelic interpretation, such as (9), are judged as acceptable.

(9) **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 (9), as they do not denote telic events where FNQs may quantify result-states of subjects.

Although the underlying assumptions for these two telicity-driven approaches to FNQ-licensing in unergative sentences are vastly different, they share the following core claim.

(10) The contrast in FNQ-licensing in (3) and (4) is a *grammatical contrast* that requires a *grammatical account*, and telicity of events is responsible for it.

An important implication of (10) is that FNQ-licensing would no longer be a reliable unaccusative diagnostic in Japanese, as manipulation of telicity effectively nullifies its sensitivity to unaccusativity.

3. Hypothesizing effects of telicity and agentivity on FNQ-licensing

The empirical data that have been used to motivate the claim that telicity of events affects acceptability of FNQ-licensing in unergative sentences involve a comparison between two unergative sentences, one with an atelic interpretation (11a) and the other with a telic interpretation (11b).

(11) a. ***Shoogakusee-no** **kodomotachi-ga** suteeji-de **go-nin** odot-ta.
elementary_school-GEN children-NOM stage-LOC five-CL dance-PST
('Five elementary school children danced on the stage.')

b. **Shoogakusee-no** **kodomotachi-ga** ni-jikan-de **go-nin** odot-ta.
elementary_school-GEN children-NOM two-hour-in five-CL dance-PST
'Five elementary school children danced in two hours.'

A problem in the comparison in (11) is that these two sentences involve two different adjuncts, *suteeji-de* 'on the stage' and *ni-jikan-de* 'in two hours'. While the difference in telicity between these adjuncts is assumed to be the very reason for the acceptability contrast, they could also have other

unpredicted differences, or confounding factors, that could affect the acceptability of these sentences. This issue can be addressed by adding two more sentence types that are identical to (11a-b) except that they lack FNQs.

(12) a. **Shoogakusei-no** **kodomotachi-ga** **go-nin** suteeji-de odot-ta.
elementary_school-GEN children-NOM five-CL stage-LOC dance-PST
'Five elementary school children danced on the stage.'

b. **Shoogakusei-no** **kodomotachi-ga** **go-nin** ni-jikan-de odot-ta.
elementary_school-GEN children-NOM five-CL two-hour-in dance-PST
'Five elementary school children danced in two hours.'

The four sentence types in (11) and (12) together constitute a factorial design with two factors: (i) presence/absence of FNQs ([±FNQ]) and (ii) telicity of denoted events ([±telic]). With this design, the effects of telicity on FNQ-licensing in unergative sentences can be examined by comparing the difference in mean acceptability judgments between the [-FNQ] condition and the [+FNQ] condition within the [-telic] condition on the one hand, and within the [+telic] condition on the other. With the assumption in (10), the telicity-driven approaches predict a categorical difference between the [-telic] and [+telic] conditions, with a significant difference in mean acceptability judgments between the [-FNQ] and [+FNQ] condition within the [-telic] condition, but not within the [+telic] condition.

Alternatively, one may question the assumption in (10) and hypothesize that the contrast in (3), (4) and (11) may not be a reflection of a grammatical contrast, but rather a reflection of different levels of processing difficulty. Under this "processing-based" approach, the contrast in (3), (4) and (11) may be hypothesized as due to interactions among various processing cues that are relevant to unaccusativity, for example syntactic cues such as FNQs and non-syntactic cues such as telicity of events and animacy (and therefore potential agentivity) of subjects. Assuming that the parser incrementally builds structures even in head-final languages like Japanese (e.g., Mazuka and Itoh 1995; Miyamoto 2002; Aoshima, Yoshida and Philips 2009) while incorporating various levels of linguistic information, i.e., lexical, syntactic and pragmatic (e.g., MacDonald, Pearlmutter and Seidenberg 1994; Trueswell, Tanehaus and Garnsey 1994), it is possible that telic unergative sentences with FNQs such as (3b), (4b) and (11b) are initially analyzed as unaccusative sentences, making the FNQs temporarily acceptable (until the unergative verb appears at the end of these sentences), while no such analysis is available with atelic unergative sentences with FNQs such as (3a), (4a) and (11a). Here, it is important to note that Japanese is head-final; thus, the unaccusative-unergative distinction becomes clear only at the end of the sentence. This hypothesis receives initial support from the general observation that processing factors can have effects on sentence acceptability independently of grammaticality contrasts (e.g., Miller and Chomsky 1963; Gibson 1998; Luka and Barsalou 2005; Fanselow and Frisch 2006; Sprouse 2007; Hofmeister, Jaeger, Arnon, Sag and Snider 2013) as well as from experimental evidence that violations that occur in an early part of a sentence affect the sentence's acceptability more than violations that occur closer to its end (Marks 1967; Schütze 1996; Fanselow and Frisch 2006).

Like the telicity-driven approaches, the processing-based approach also predicts a difference between the [-telic] and [+telic] unergative sentences in the [+FNQ] condition, but the difference is predicted to be less clear-cut. In addition to telicity of events, the processing approach also predicts possible effects of another lexical semantic factor that is also relevant to unaccusativity, namely animacy of subjects. While unergative sentences often require animate subjects because they typically denote agentive activity events, unaccusative sentences do not impose such a restriction. If speakers are sensitive to this difference, the presence of human subjects may affect processing of unaccusative sentences with FNQs by initially favoring an unergative analysis. This prediction can be tested by manipulating (i) presence/absence of FNQs [±FNQ] and (ii) animacy of subjects [±human].

(13) a. **Chiisai** **otokononko-ga** **futa-ri** chikaku-no kooen-ni ki-ta.
Small boy-NOM two-CL near-GEN park-LOC come-PST
'Two little boys came to the near-by park.' ([-FNQ] & [+human])

b. **Ookina** **kozutsumi-ga** **futa-tsu** Taroo-no ruumumeito-ni ki-ta.
large packages- NOM twoo- CLT-GEN roommate-LOC come-PST
'Two large packages came to Taro's roommate.' ([-FNQ] & [-human])

(14) a. **Chiisai** **otokononko-ga** chikaku-no kooen-ni **futa-ri** ki-ta.
Small boy-NOM near-GEN park-LOC two-CL come-PST
'Two little boys came to the near-by park.' ([+FNQ] & [+human])

b. **Ookina** **kozutsumi-ga** Taroo-no ruumumeito-ni **futa-tsu** ki-ta.
large packages- NOM T-GEN roommate-LOC 2-CL come-PST
'Two large packages came to Taro's roommate.' ([+FNQ] & [-human])

The processing-based approach predicts that the difference in mean acceptability judgments between the [+FNQ] and [-FNQ] conditions within unaccusative sentences with [+human] subjects would be larger than the difference in mean acceptability judgments between the [+FNQ] and [-FNQ] conditions within unaccusative sentences with [-human] subjects. The telicity-driven approaches, on the other hand, make no prediction about possible effects of animacy (and potential agentivity) of unaccusative subjects on FNQ-licensing.

4. Experiment

In order to test the above predictions, an acceptability judgment experiment was designed. Unergative and unaccusative sentences were presented with and without FNQ ([±FNQ]) with the unergative sentences further divided into atelic [-telic] and telic [+telic] conditions and the unaccusative sentences into human subject [+human] and inanimate subject [-human] conditions.

4.1. Predictions

4.1.1. The unergative conditions

The telicity-driven approaches predict a categorical difference between unergative sentences in the [+telic] and [-telic] conditions within the [+FNQ] condition, with the difference in mean acceptability judgments of the [-FNQ] and [+FNQ] conditions significantly different within the [-telic] condition but not within the [+telic] condition. The processing-based approach also predicts a difference between unergative sentences in the [-telic] and [+telic] conditions within the [+FNQ] condition but the difference is expected to be less drastic, with the difference between the means of the [+FNQ] and [-FNQ] conditions within the [-telic] condition being larger than the difference between the [+FNQ] and [-FNQ] conditions within the [+telic] condition. Figures 1 and 2 summarize these predictions.

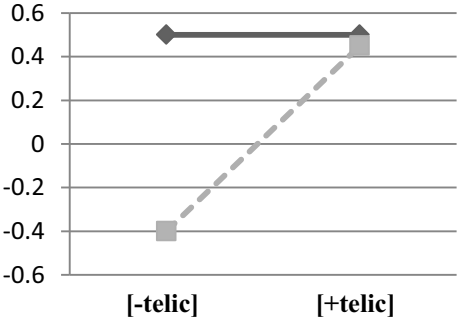


Figure1: Predictions for unergatives by the telicity-driven approaches

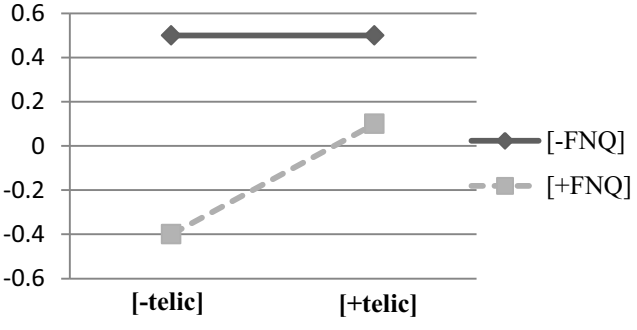


Figure 2: Predictions for unergatives by the processing-based approach

4.1.2. The unaccusative conditions

The telicity-driven approaches make no predictions concerning possible effects of the [+human] and [-human] conditions on unaccusative sentences with [+FNQs]. The processing-based approach, on

the other hand, predicts that a difference in mean acceptability judgments of unaccusative sentences between the [-FNQ] and the [+FNQ] conditions will be larger within the [+human] condition than within the [-human] condition. These predictions are summarized in Figures 3 and 4.

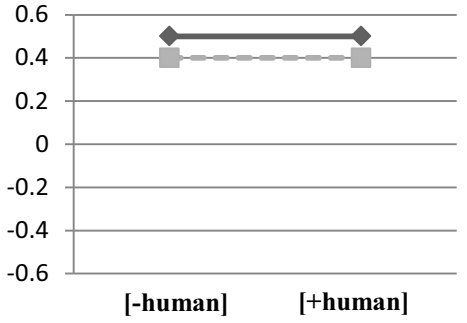


Figure3: Predictions for unaccusatives by the telicity-driven approaches

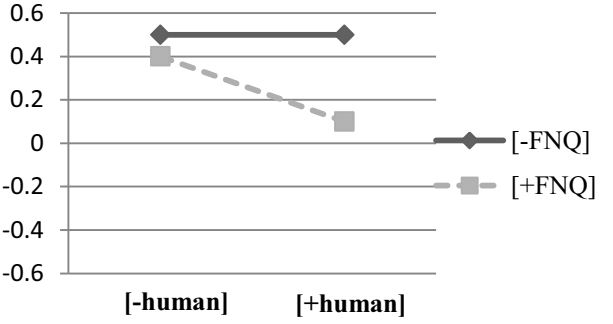


Figure 4: Predictions for unaccusatives by the processing-based approach

4.2. Materials

Four unaccusative verbs (*ku-ru* 'come', *hair-u* 'enter', *ochi-ru* 'fall', and *i-ru*/*ar-u* 'be') and four unergative verbs (*odor-u* 'dance', *asob-u* 'play', *oyog-u* 'swim', and *hashir-u* 'run') chosen from previous studies on unaccusativity in Japanese were used to create the experimental sentences. The unaccusative sub-experiment had a 2 x 2 design with FNQ ([+FNQ] vs. [-FNQ]) and AGENCY ([+human] vs. [-human]), and the unergative sub-experiment also had a 2 x 2 design with FNQ ([+FNQ] vs. [-FNQ]) and TELICITY ([-telic] vs. [+telic] adjuncts). Four lexicalizations of each of the four conditions for the eight verbs were created, and they were distributed into four lists using a Latin Square design. Each of the four lists of thirty-two experimental sentences was combined with the same twenty-four fillers with various levels of acceptability, and their order was pseudo-randomized. The examples in (11), (12), (13), and (14) above are examples of the actual experimental sentences used in the experiment.

4.3. Procedure

The task was an acceptability judgment task with a 5-point scale, and it was presented in either a paper-and-pencil format or an electronic format using an online website designed to host acceptability judgment experiments (http://spellout.net/ibexfarm/). Thirty-one self-identified native Japanese speakers participated. The obtained ratings were standardized (z-score transformed) before they were analyzed using the statistical software R, with linear mixed effects model analysis with FNQ and TELICITY as the fixed effects for the unergative sentences, and FNQ and AGENCY as the fixed factors for the unaccusative sentences, and subjects and items as random factors for both verb types. Planned pairwise comparisons were also conducted to isolate the effects of FNQ and TELICITY for the unergative sentences and the effects of FNQ and AGENCY for the unaccusative sentences.

4.4. Results

4.4.1. The unergative conditions

The mean acceptability judgments of the four sentence types within the unergative sub-experiment are summarized in Figure 5 below. The results of the overall analysis for the unergative sentences show that FNQ is a significant predictor of the acceptability of the unergative sentences ($p < .01$) but TELICITY is not ($p < .09$). The interaction between these two factors is significant ($p < .0215$). The planned pairwise comparisons reveal that FNQ is significant within the [-telic] condition ($p < .01$) but not within the [+telic] condition ($p = .1856$). The effect of TELICITY is not significant within the [-FNQ] condition ($p = .0976$) or the [+FNQ] condition ($p = .1129$).

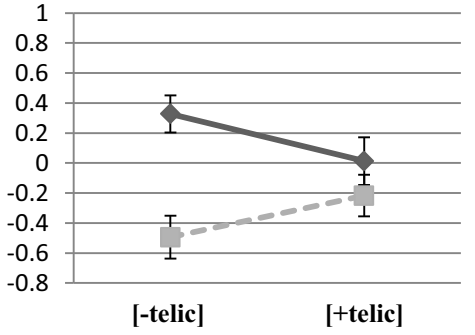


Figure 5: The mean acceptability judgments for the unergative sentences with the error bars showing 95% confidence intervals

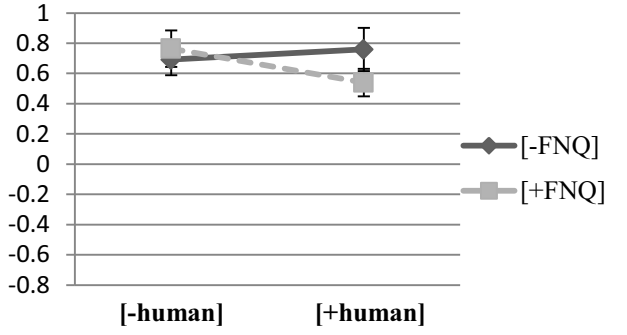


Figure 6: The mean acceptability judgments for the unaccusative sentences with the error bars showing 95% confidence intervals

4.4.2. The unaccusative conditions

The mean acceptability judgments of the four sentence types within the unaccusative sub-experiment are summarized in Figure 6. The results of the overall analysis show that FNQ is not a significant predictor of the acceptability of the unaccusative sentences (p = .3844), and neither is AGENCY (p = .3386). Their interaction is marginally significant, however (p =. 0635). The planned pairwise comparisons reveal that FNQ is significant within the [+human] condition (p < .025) but not within the [-human] ondition (p = .521). The effect of AGENCY is marginally significant within the [+FNQ] condition (p = .0754) but not significant within the [-FNQ] condition (p = .472).

5. Discussion

First, the results of the experiment show a significant interaction between FNQ and TELICITY (p < .0215). While this confirms the observation in (3) and (4), the results of the planned pairwise comparisons also reveal that the highly significant interaction between these two factors is due to both (i) the decreased acceptability of the [-FNQ] sentences and (ii) the increased acceptability of the [+FNQ] sentences between the [-telic] and the [+telic] conditions. Importantly, the increased acceptability observed with [+FNQ] sentences between the [-telic] and [+telic] conditions is not significant (p = .1129). This finding fails to support the prediction of the telicity-driven approaches, that is, a categorical change in the acceptability of the [+FNQ] sentences between the [-telic] and the [+telic] conditions. Second, the marginally significant interaction between FNQ and AGENCY (p = .0635) suggests weak effects of animacy of subjects on the acceptability of unaccusative sentences with FNQs. The pairwise comparisons reveal a nearly significant decrease in acceptability between the [-human] and the [+human] condition within the [+FNQ] sentences (p = .0754), which seems to be predominantly responsible for this interaction between FNQ and AGENCY. These effects of animacy of unaccusative subjects are unexpected under the telicity-driven approaches. Taken together, the results of the experiment fail to provide support for the telicity-driven approaches.

Under the processing-based approach, the above findings are interpreted as resulting from the effects on processing of the telicity of unergative sentences and potential agentivity of unaccusative subjects. First, the decreased acceptability between the unergative sentences that are [-FNQ] and [-telic] and the unergative sentences that are [-FNQ] and [+telic], schematically represented in (15a) and (15b), can be accounted for under the assumption that the telic adjunct in (15b) favors an unaccusative analysis of (15b). This analysis is then contradicted by the unergative verb at the end of the sentence, requiring a reanalysis, whereas no such reanalysis is necessary for (15a). The processing-based analysis also accounts for the contrast between the unergative sentences that are [+FNQ] and [-telic] and the unergative sentences that are [+FNQ] and [+telic], schematically represented in (16a) and (16b). Atelic unergative sentences with an FNQ (16a) arguably involve two instances of reanalysis. An unergative analysis of these sentences is initially supported up to the atelic adjunct, yet at the point

where the FNQ is encountered, the syntax of FNQ motivates an unaccusative analysis. The unaccusative analysis is then abandoned at the end of the sentence where the unergative verb appears. In contrast, telic unergative sentences with an FNQ (16b) require only one reanalysis. Both the telic adjunct and the FNQ favor an unaccusative analysis, which is then revised at the end of the sentence with the presence of the unergative verb. Thus, (16b) is perceived as more acceptable than (16a) because of (i) the initially available unaccusative analysis of (16b) that is compatible with FNQs and (ii) the two instances of reanalysis incurred by the FNQ and the unergative verb in (16a).

(15)	a.	Subject	NQ	**atelic adjunct**	$V_{UNERGATIVE}$
	b.	Subject	NQ	**telic adjunct**	$V_{UNERGATIVE}$
(16)	a.	*Subject	**atelic adjunct**	NQ	$V_{UNERGATIVE}$
	b.	Subject	**telic adjunct**	NQ	$V_{UNERGATIVE}$

The results with the unaccusative sentences can be analyzed in the following way. First, the unaccusative sentences with [-human] subjects (schematically represented in (17b) and (18b)) cause no processing difficulties, as the inanimate subjects unambiguously identify these sentences as unaccusative sentences. The unaccusative sentences with [+human] subjects (schematically represented in (17a) and (18a)) might initially be analyzed as unergative sentences because of the potential agentivity of the subject, and this arguably is responsible for the lower acceptability of the [+human] subject unaccusative sentences with an FNQ like (18a).

(17)	a.	Subject [+human]	NQ	**adjunct**	$V_{UNACCUSATIVE}$
	b.	Subject [-human]	NQ	**adjunct**	$V_{UNACCUSATIVE}$
(18)	a.	Subject [+human]	**adjunct**	NQ	$V_{UNACCUSATIVE}$
	b.	Subject [-human]	**adjunct**	NQ	$V_{UNACCUSATIVE}$

6. Conclusions

FNQ-licensing by intransitive subjects has been the best known syntactic unaccusative diagnostic in Japanese, as it makes direct reference to the difference between unaccusatives and unergatives in the Unaccusative Hypothesis. The subsequent discovery of the effects of telicity of events on FNQ-licensing in unergative sentences, however, led previous studies to argue that telicity of events triggers a grammatical change in unergative sentences that makes them compatible with FNQs. This study challenged the core assumption of the telicity-driven approaches – that the effects of telicity on FNQ-licensing in unergative sentences is grammatical – based on the results of an acceptability judgement study. The results indicate that the effects of telicity of events on FNQ-licensing in unergative sentences are not drastic enough to support the assumption of the telicity-driven approaches, and that animacy of unaccusative subjects also affects FNQ-licensing. Given these findings, the processing-based approach has been proposed, according to which the results of the experiment are analyzed as due to (i) various syntactic and non-syntactic cues affecting the processing of intransitive sentence, which in turn affects their acceptability, and (ii) the acceptability of a partial structure affecting the global acceptability of sentences. If the proposed analysis is on the right track, FNQ-licensing remains a valid syntactic unaccusative diagnostic, but its outcomes must be carefully evaluated considering the potential effects of various factors that affect the processing of sentences with FNQs. The findings in this study also highlight the effectiveness of acceptability judgment experiments in studying subtle acceptability contrasts that involve multiple factors (Sprouse 2007), and the importance of considering different potential sources of acceptability contrasts, as acceptability contrasts do not always motivate grammatical contrasts (Chomsky 1965; Schütze 1996; Cowart 1997).

References

Aoshima, Sachiko, Masaya Yoshida, and Collin Phillips. 2009. "Incremental Processing of Coreference and Binding in Japanese." *Syntax* 12 (2): 93–134.

Borer, Hagit. 2005. *Structuring Sense.* Vol. 2, *The Normal Course of Events*. Oxford: Oxford University Press.

Burzio, Luigi. 1986. *Italian Syntax: A Government and Binding Approach*. Dordrecht: Reidel.

Chomsky, Noam. 1965. *Aspects of the Theory of Syntax*. Cambridge, MA: MIT Press.

Cowart, Wayne. 1997. *Experimental Syntax: Applying Objective Methods to Sentence Judgments.* Thousand Oaks, CA: Sage.

Dowty, David. 1991. "Thematic Proto-roles and Argument Selection." *Language* 67:547–619.

Fanselow, Gisbert, and Stephan Frisch. 2006. "Effects of Processing Difficulty on Judgments of Acceptability." In *Gradience in Grammar*, edited by Gisbert Fanselow, Caroline Fery, Matthias Schlesewsky, and Ralf Vogel, 291–316. Oxford: Oxford University Press.

Gibson, Edward. 1998. "Linguistic Complexity: Locality of Syntactic Dependencies." *Cognition* 68:1–76.

Hofmeister, Philip, T. Florian Jaeger, Inbal Arnon, Ivan A. Sag, and Neal Snider. 2013. "The Source Ambiguity Problem: Distinguishing the Effects of Grammar and Processing on Acceptability Judgments." *Language and Cognitive Processes* 28 (1–2): 48–87.

Kishimoto, Hideki. 1996. "Split Intransitivity in Japanese and the Unaccusative Hypothesis." *Language* 72:248–86.

Levin, Beth, and Malka Rappaport-Hovav. 1989. "An Approach to Unaccusative Mismatches." *NELS* 19:314–28.

Levin, Beth, and Malka Rappaport-Hovav. 1995. *Unaccusativity: At the Syntax–Lexical Semantics Interface.* Cambridge, MA: MIT Press.

Luka, Barbara J., and Lawrence W. Barsalou. 2005. "Structural Facilitation: Mere Exposure Effects for Grammatical Acceptability as Evidence for Syntactic Priming in Comprehension." *Journal of Memory and Language* 52:436–59.

MacDonald, Maryellen C., Neal J. Pearlmutter, and Mark S. Seidenberg. 1994. "Lexical Nature of Syntactic Ambiguity Resolution." *Psychological Review* 101 (4): 676–703.

Marks, Lawrence E. 1967. "Judgements of Grammaticalness of Some English Sentences and Semi-sentences." *The American Journal of Psychology* 80 (2): 196–204.

Mazuka, Reiko, and Kenji Itoh. 1995. "Can Japanese Speakers Be Led Down the Garden Path?" In *Japanese Sentence Processing*, edited by Reiko Mazuka and Noriko Nagai, 295–329. Hillsdale, NJ: Lawrence Erlbaum.

Mihara, Ken-Ichi. 1998. "Suuryooshi renketsu koobun-to 'kekka'-no gan'i [Quantifier linking construction and the implication of 'resultative']." *Gengo* [*Language*] 6:86–95; 7:94–102; 8:104–13.

Miller, George A., and Noam Chomsky. 1963. "Finitary Models of Language Users." In *Handbook of Mathematical Psychology*, vol. 2, edited by Robert D. Luce, Robert R. Bush, and Eugene Galanter, 419–91. New York: John Wiley.

Miyagawa, Shigeru. 1989. *Structure and Case Marking in Japanese*. San Diego, CA: Academic Press.

Miyagawa, Shigeru. 2012. *Case, Argument Structure, and Word Order. Oxford: Routledge.*

Miyamoto, Edison. 2002. "Case Markers as Clause Boundary Inducers in Japanese." *Journal of Psycholinguistic Research* 31 (4): 307–47.

Nakanishi, Kimiko. 2008. "Syntax and Semantics of Floating Numeral Quantifiers." In *Oxford Handbook of Japanese Linguistics*, edited by Shigeru Miyagawa and Mamoru Saito, 287–319. Oxford: Oxford University Press.

Perlmutter, David M. 1978. "Impersonal Passives and the Unaccusative Hypothesis." *BLS* 4:157–85.

Perlmutter, David M. 1989. "Multiattachment and the Unaccusative Hypothesis: The Perfect Auxiliary in Italian." *Probus* 1 (1): 63–119.

Rosen, Carol. 1984. "The Interface between Semantic Roles and Initial Grammatical Relations." In *Studies in Relational Grammar*, vol. 2, edited by David M. Perlmutter and Carol Rosen, 38–80. Chicago: University of Chicago Press.

Schütze, Carson. 1996. *The Empirical Base of Linguistics: Grammaticality Judgments and Linguistic Methodology.* Chicago: University of Chicago Press.

Sorace, Antonella. 2000. "Gradients in Auxiliary Selection with Intransitive Verbs." *Language* 76:859–90.

Sprouse, Jon. 2007. "A Program for Experimental Syntax." PhD dissertation, University of Maryland.

Trueswell, John C., Michael K. Tanenhaus, and Susan M. Garnsey. 1994. "Semantic Influences on Parsing: Use of Thematic Role Information in Syntactic Ambiguity Resolution." *Journal of Memory and Language* 33:285–318.

Tsujimura, Natsuko. 1994. "Unaccusative Mismatches and Resultatives in Japanese." In *Formal Approaches to Japanese Linguistics, Proceedings of FAJL 1*, edited by Masatoshi Koizumi and Hiroyuki Ura. *MIT Working Papers in Linguistics* 24:335–54.

Tsujimura, Natsuko. 1996. "Another Look at Unaccusative Mismatches in Japanese." *BLS* 22:406–16.

Van Valin, Robert D., Jr. 1990. "Semantic Parameters of Split Intransitivity." *Language* 66:221–60.

Proceedings of the 34th West Coast Conference on Formal Linguistics

edited by Aaron Kaplan, Abby Kaplan, Miranda K. McCarvel, and Edward J. Rubin

Cascadilla Proceedings Project Somerville, MA 2017

ISBN 978-1-57473-471-3 library binding

Ordering information

Orders for the library binding edition are handled by Cascadilla Press.
To place an order, go to www.lingref.com or contact:

Cascadilla Press, P.O. Box 440355, Somerville, MA 02144, USA
phone: 1-617-776-2370, fax: 1-617-776-2271, sales@cascadilla.com

Web access and citation information

This entire proceedings can also be viewed on the web at www.lingref.com. Each paper has a unique document # which can be added to citations to facilitate access. The document # should not replace the full citation.

This paper can be cited as:

Fukuda, Shin. 2017. Effects of Telicity and Agentivity on Floating Numeral Quantifiers as an Unaccusative Diagnostic. In *Proceedings of the 34th West Coast Conference on Formal Linguistics*, ed. Aaron Kaplan et al., 222-231. Somerville, MA: Cascadilla Proceedings Project. www.lingref.com, document #3315.