Experimental evidence in the unaccusativity debate: Variable behavior verbs in Japanese suggest distinct underlying syntactic structures.

Abstract

There is a longstanding debate about the nature of the unaccusative/unergative split among intransitive verbs. Syntactic approaches such as the Unaccusative Hypothesis postulate two distinct underlying syntactic structures for the two types of verbs, whereas lexical semantic approaches argue that the apparent split is due to the specific lexical semantic constraints of the diagnostic constructions. Verbs that exhibit the properties of both unaccusative verbs and unergative/transitive verbs (variable behavior verbs) have traditionally been interpreted as evidence for a lexical semantic analysis of the split, because these verbs highlight the specific lexical semantic constraints of each construction (Zaenen 1988, van Valin 1990, Dowty 1991, Kishimoto 1996, Leiber and Baayen 1997). In this remark, we argue that, contrary to the traditionally accepted logic, certain variable behavior verbs in Japanese (accusative-oblique verbs) in fact provide strong support in favor of a syntactic analysis of unaccusativity. We present the results of two formal acceptability judgment experiments that suggest that accusative-oblique verbs are associated with two distinct underlying syntactic structures, as predicted by a syntactic approach of unaccusativity. In addition to providing novel evidence for a syntactic approach to unaccusativity, these results further demonstrate the utility of formal acceptability experiments for the collection of cross-linguistic data that relies on the careful manipulation of syntactic and lexical semantic factors.
1 Introduction

One longstanding debate in the syntactic literature concerns the source of the unaccusative/unergative split among intransitive verbs. On the one hand, there are syntactic approaches such as the Unaccusative Hypothesis, which seek to capture the distinct properties of unaccusative and unergative verbs with distinct underlying syntactic structures (Perlmutter 1978, Burzio 1986). According to the syntactic approach to unaccusativity, subjects of unaccusative verbs are originally internal arguments but undergo syntactic movement to become surface subjects, whereas subjects of unergative and transitive verbs are syntactic subjects throughout derivation (i.e. external arguments). On the other hand, there are lexical semantic approaches, which seek to capture the distinct properties of unaccusative and unergative verbs through the specific lexical semantic features of each class (Zaenen 1988, van Valin 1990, Dowty 1991, Kishimoto 1996, Leiber and Baayen 1997). This type of theoretical debate is ideally suited for formal acceptability judgment experiments, as teasing apart these two approaches requires careful manipulation of both syntactic properties and lexical semantic features. Our goal in this paper is to bring the tools of experimental syntax to bear on this debate by focusing on a class of verbs in Japanese that demonstrate both unaccusative and unergative properties. Though such variable behavior verbs are usually interpreted as prima facie evidence for the lexical semantic approach, we will present the results of two formal acceptability judgment experiments that suggest that the variable behaviors of these verbs are in fact realized by two distinct underlying syntactic structures – structures that correlate with the syntactic approach to the unaccusativity/unergative distinction.

The existence of variable behavior verbs – verbs that exhibit both unaccusative and unergative/transitive properties – has been a long-standing problem for syntactic approaches to unaccusativity such as the Unaccusative Hypothesis (Perlmutter 1978, Pesetsky 1982, Hoekstra 1984, Rosen 1984, Levin and Rappaport-Hovav 1989, 1995; Hoekstra and Mulder 1990, van Valin 1990, Dowty 1991, Borer 1994, Tsujimura 1994 among others). For example, it has been claimed that the impersonal passive construction in Dutch is only compatible with unergative verbs, making it a possible diagnostic for the unaccusative/unergative split. However the intransitive verb *vallen* ‘fall’ can be either compatible or incompatible with the impersonal passive construction (Perlmutter 1978, 172), suggesting that it can be both unergative (1a) and unaccusative (1b):

(1) a. In het tweede bedrijf werd er door de nieuwe acteur op het juiste ogenblik gevallen
   ‘In the second act there was fallen by the new actor on cue.’

   b. *Er werd door twee mensen uit de venster van de tweede verdieping gevallen
      (‘There was fallen out of the second-story window by two people.’)

Zaenen (1988) argues that verbs such as *vallen* demonstrate that the impersonal passive construction is not sensitive to the underlying syntactic position of the subject (which by hypothesis is identical in both (1a) and (1b)), but rather the amount of control the subject had over the act of falling. In (1a), the act of falling is volitional, whereas in (1b) it is not. In this case, variable behavior verbs bring the lexical semantic constraints of the diagnostic constructions into sharp relief, suggesting that the real diagnostic value of these constructions is lexical semantic,
not syntactic. To the extent that variable behavior verbs can be identified for every unaccusative/unergative diagnostic construction, this in turn suggests that the syntactic approach to unaccusativity may be incorrect (e.g., van Valin 1990, Dowty 1991, Kishimoto 1996, Leiber and Baayen 1997).

In this remark, we analyze a set of two-place verbs in Japanese that allow their complements to be marked by either accusative case or an oblique marker (Kuno 1973, Teramura 1982). For concreteness, we will call these accusative-oblique alternation verbs:

(3)  
   a. Taro-ga yama-o/ni nobor -ta  
       T-NOM mountain-ACC/GOAL ascend -PST  
       ‘Taro ascended the mountain.’

   b. Taro-ga  ie-o/kara de -ta  
       T-NOM  home-ACC/SOURCE come_off -PST  
       ‘Taro left his home.’

In the first half of this remark, we argue that these accusative-oblique alternation verbs are best analyzed as variable behavior verbs that can be realized as either unaccusative or transitive. In the second half we present evidence from two formal acceptability judgment experiments that suggest that the accusative-oblique alternation verbs are associated with two distinct underlying syntactic structures. In this way, we intend to show that the existence of variable behavior verbs is not necessarily a problem for the syntactic approach to unaccusativity to the extent that the lexical semantic variation that is highlighted by variable behavior verbs is directly correlated with distinct underlying syntactic structures. On the contrary, careful manipulation of syntactic and lexical semantic factors in formal acceptability experiments reveals that the variable behavior of accusative-oblique alternation verbs can in fact be evidence in support of the syntactic approach to unaccusativity.

The rest of this remark is structured as follows. Section 2 reviews two sets of two-place Japanese verbs that are discussed independently by Kuno (1973) and Teramura (1982), and argues that these two sets of verbs should be analyzed as two subtypes of the accusative-oblique alternation verb type. Section 3 presents a syntactic analysis of accusative-oblique alternation verbs as variable behavior verbs. Section 4 presents the results of two formal acceptability judgment experiments that suggest that the accusative-oblique alternation verbs are associated with two distinct underlying syntactic structures: one that has the properties associated with syntactic unaccusativity (the oblique-structure), and one that has the properties of unergativity/transitivity (the accusative-structure). Experiment 1 investigates the compatibility of animate/inanimate subjects with the two alternative complement markings, as the ability to license inanimate subjects has been identified as a property of unaccusative predicates but not unergative predicates (van Valin 1990, Dowty 1991, Kishimoto 1996 among others). Experiment 2 investigates the distribution of numeral classifier phrases (NCPs) with the two alternative complement markings, as the ability to license stranded numeral classifiers has been argued to be a property of syntactic unaccusativity but not unergativity (Miyagawa 1989). The results of these experiments suggest that native speakers consistently differentiate the alternating verbs in the two alternative complement markings with respect to (i) their compatibility with subjects with different animacy and (ii) whether they can license NCPs that are ‘stranded’ in a post-
complement position. These findings strongly suggest that native speakers associate the two complement markings with two different underlying syntactic structures – one that has the properties of syntactic unaccusativity (the oblique-structure), and one that has the properties of unergativity/transitivity (the accusative-structure). Section 5 concludes.

2. Accusative-Oblique Alternation Verbs in Japanese

Kuno (1973) and Teramura (1982) independently discuss two groups of two-place Japanese verbs whose complements can be marked with either accusative case -o or an oblique marker such as -ni ‘to’ and -kara ‘from’. This section reviews data from these two previous studies and argues that these two groups of verbs should be analyzed as sub-types of a single class of verbs.

2.1 Accusative-Goal Alternation Verbs (Kuno 1973)

Kuno (1973) discusses a small number of two-place predicates in Japanese that allow their complements to be marked with either accusative case -o or an oblique marker -ni. Let us call this group of verbs accusative-goal alternation verbs.

(4) a. Taro-ga yama-o/ni nobor -ta T-NOM mountain-ACC/GOAL ascend -PST ‘Taro ascended the mountain.’


According to Kuno, the complement of accusative-goal alternation verbs receives a different interpretation when it is marked with accusative case (the accusative-structure) than when it is marked with an oblique marker (the oblique-structure): the complement in the accusative structure is interpreted as PATH, while the complement in the oblique structure is interpreted as GOAL. Kuno observes that the accusative structure is infelicitous when the referent of the complement can only be naturally interpreted as GOAL, such as yane ‘roof’ in (5a), whereas the oblique structure is infelicitous when the referent of the complement can only be naturally interpreted as PATH, such as kaidan ‘stairs’ in (5b).

(5) a. Kodom-ga yane-ni/#o nobor -ta child-NOM roof- GOAL/#ACC ascend -PST ‘The child climbed up to the roof.’


Thus, it appears that the accusative-goal alternation yields two interpretations based on the complement markings.
2.2  Accusative-Source Alternation Verbs (Teramura 1982)

Teramura (1982) independently notes that another group of Japanese verbs mark their complement either with accusative case or the source marker -kara ‘from’. Let us call this group of verbs *accusative-source alternation verbs*.

(6)  a. Taro-ga ie-o/kara de -ta
     T-NOM home-ACC/SOURCE come_off -PST
     ‘Taro left his home.’

     b. Taro-ga kokyo-o/kara hanare -ta
        T-NOM hometown-ACC/SOURCE leave -PST
        ‘Taro left his hometown.’

According to Teramura, sentences with accusative-source alternation verbs also involve two sets of interpretations with the two different complement markings. These verbs can have inanimate subjects only when they are in the oblique-structure (Teramura 1982: 107).

(7)  a. Midori-iro-no ekitai-ga kizugichi-kara/#o de -ta
     Green-color-GEN liquid-NOM wound-SOURCE/#ACC come_out -PST
     ‘Green substance came out of the wound.’

     b. Kurippu-ga beruto-kara/#o hazure -ta
        clip-NOM belt-SOURCE/#ACC come_off -PST
        ‘The clip came off from the belt’.

This contrast suggests that these verbs impose selectional restrictions on their subjects only when they are in the accusative structure.

2.3  A Case for Accusative-Oblique Alternations

We argue that the two types of verbs discussed by Kuno and Teramura - accusative-goal alternation verbs and accusative-source alternation verbs - should be analyzed as sub-types of the same class of verbs because they exhibit essentially the same semantic contrasts between the accusative structure and the oblique structure.

According to Kuno (1973), interpretations of the complement of accusative-goal alternation verbs change between the accusative structure and the oblique structure. While Teramura (1982) does not discuss interpretations of the complement of accusative-source verbs, contrasts in interpretation of the complement are observed between the accusative structure and the oblique structure with the accusative-source alternation verbs. First, some NPs are compatible with being the complement of the accusative-source alternation verbs only when they are in the oblique structure. The following example (8) has hanare- ‘separate’, an accusative-source alternation verb, and its complement is hitojichi ‘hostage’. As can be seen below, it can only be felicitous in the oblique structure.
(8) Han’nin-ga hitojichi-kara/#o hanare-ta-no-o kakunin…¹
suspect-NOM hostage-SOURCE/ACC separate-PST-NML-ACC confirm
‘Confirming that the suspect got separated from the hostage…’

Second, the following pairs of examples show that there are meaning differences that track the accusative-goal alternation. While the accusative structure is ambiguous between two interpretations, the oblique structure is unambiguous.

(9) a. Taro-ga UCSD-o/kara de -ta
    T-NOM UCSD-ACC/SOURCE come_out -PST
    ACCUSATIVE: ‘Taro left UCSD.’ or ‘Taro graduated from UCSD.’
    OBLIQUE: ‘Taro left UCSD.’

b. Taro-ga shokuba-o/kara hanare -ta
    T-NOM work place-ACC/SOURCE separate -PST
    ACCUSATIVE: ‘Taro left his office.’ or ‘Taro retired/took a break from his work.’
    OBLIQUE: ‘Taro left his office.’

The examples in the accusative structure have two meanings. One expresses that the subject simply moved away from UCSD or the office. The other implicates that the subject was engaged in some activity prior to leaving UCSD/the office. In contrast, their oblique counterparts seem to share only the first meaning.

Teramura (1982) shows that accusative-source alternation verbs impose selectional restrictions on their subjects only when they are in the accusative structure. It turns out that accusative-goal alternation verbs also impose selectional restrictions on their subjects when they are in the accusative structure. However, evidence for selectional restrictions on subjects of accusative-goal alternation verbs is harder to obtain because most of accusative-goal alternation verbs are motion verbs that usually require animate subjects. Nonetheless, at least one accusative-goal alternation verb, sawar- ‘touch’, can readily take inanimate subjects. Crucially, when it has an inanimate subject, it must be in the oblique structure (10a) while such a restriction is not observed with the same verb when it has an animate subject (10b).

(10) a. Keiko-no sukaato-ga yuka-ni/#o sawar -ta
    K-GEN skirt-NOM floor-GOAL/ACC touch -PST
    ‘Keiko’s skirt touched the floor.’

b. Keiko-ga yuka-o/ni sawar -ta
    K-NOM floor-ACC/GOAL touch -PST
    ‘Keiko touched the floor.’

¹ The example was found in an internet search using the search engine Google (http://homepage2.nifty.com/). The judgment was provided by one of the co-authors of this paper,
Moreover, some of accusative-goal alternation verbs can occur with inanimate subjects when they are parts of idiomatic expressions. Yet when they do so, they must be in the oblique structure.

\[(11)\]

a. **Hanketsu**-ga **hikoku**-ni/#o **kudar/ori** -ta
   **verdict**-NOM **accused**-GOAL/ACC **descend/descend** -PST
   ‘A verdict was reached against the accused.’
   (lit. ‘The verdict descended on the accused.’)

b. **Chi**-ga **atama**-ni/#o **nobor** -ta
   **blood**-NOM **head**-GOAL/ACC **ascend** -PST
   ‘I got angry.’ (lit. ‘Blood ascended to my head.’)

Evidence discussed in this section reveals accusative-goal alternation verbs and accusative-source alternation verbs show essentially the same semantic contrasts. These similarities strongly suggest that they are sub-types of the same alternations: namely, they are subtypes of **accusative-oblique alternations**.

### 3. Accusative-Oblique Alternation Verbs as Variable Behavior Verbs

This section presents a syntactic analysis of accusative-oblique alternation verbs as variable behavior verbs. Under this analysis, an alternating verb in the accusative structure is a transitive verb. Its subject is base-generated as [Spec, vP] and its complement is its internal argument licensed by accusative case provided by v (12a). The same verb is a two-place unaccusative verb when it is in the oblique structure. Its subject is base-generated as the internal argument and its complement is the object of a postposition (12b).

\[(12)\]

a. The accusative structure: b. The oblique structure:

In what follows, we outline how the proposed analysis accounts for the two properties of the accusative-oblique alternations discussed in Section 2.
3.1 Selectional Restrictions on Subjects

The proposed analysis accounts for the association between the two complement markings and the presence/absence of the selectional restrictions on subjects based on the standard assumptions about the structure of transitive and unaccusative sentences in the VP syntax (Hale and Kayser 1993, Krazter 1994, 1996; Harley 1995, Chomsky 1995, 2000, 2001, 2008, Watanabe 1996 among others). With the accusative structure, the alternating verbs are transitive verbs. Under the standard analysis of transitive clauses in the VP syntax, transitive subjects receive an external theta-role from v. Therefore, a sentence with an alternating verb in the accusative structure has the underlying structure in (13):

\[
(13) \quad [\text{TP} \ \text{SUBJ}_1^{\text{NOM}} \quad [\text{VP} \ \text{SUBJ}_i^{\text{V}} \quad [\text{VP} \ \text{COMP-ACC} \ V] \ v] \ T]
\]

The assumption that subjects of transitive clauses receive an external theta-role accounts for the selectional restrictions imposed on subjects of the alternating verbs in the accusative structure. Under such an assumption, subjects of the alternating verbs must be compatible with a given external theta-role, and inanimate entities usually lack properties that are required for typical external theta-roles such as AGENT and CAUSER.

With the oblique structure, the same verbs are realized as two-place unaccusative verbs. Therefore, a sentence with an alternating verb in the oblique structure has the underlying structure in (14):

\[
(14) \quad [\text{TP} \ \text{SUBJ}_1^{\text{NOM}} \quad [\text{VP} \ [\text{VP} \ \text{COMP-P}] \ [\text{VP} \ \text{SUBJ}_i^{\text{V}} \ v] \ v] \ T]
\]

Crucially, subjects of unaccusative verbs are internal arguments and they receive theta-roles appropriate for internal arguments, such as THEME. Therefore, subjects of the alternating verbs in the oblique structure are not subject to the same selectional restrictions that subjects of the same verbs in the accusative structure are subject to.

3.2 Interpretations of the Complements

Under the proposed analysis, interpretations of the complement of the alternating verbs differ between the two complement markings because the theta-role assigners of the complements are different between the two structures. When the alternating verbs are in the oblique structure, their complements are structurally and thematically licensed by the postpositions -ni and -kara. Thus, the complements receive the appropriate theta-role from the postpositions.
With the accusative structure, the complements are structurally licensed by accusative case provided by \( v \), but they are thematically licensed by the lexical verbs as their internal arguments. Thus, under the current analysis, the two interpretational contrasts between the two alternative structures are derived from the two distinct underlying structures.

4. Evidence from Acceptability Judgment Experiments

In order to test predictions that the proposed analysis makes about semantic and syntactic behavior of accusative-oblique alternation verbs, two formal acceptability judgment experiments were conducted. The first experiment (Experiment 1) concerns the relationship between the two alternative complement markings and the two sets of interpretations discussed in Section 2. If the proposed analysis is on the right track, native speakers should treat accusative-oblique alternation verbs as a group by giving them similar judgments with respect to the association between the two complement markings and their interpretations. This prediction was tested using selectional restrictions on subjects. The second experiment (Experiment 2) concerns the relationship between the two alternative complement markings and syntactic distribution of subjects of accusative-oblique alternation verbs. According to the proposed analysis, subjects of accusative-oblique alternation verbs are derived subjects when these verbs are in the oblique structure, and they are base-generated subjects when the same verbs are in the accusative structure. The validity of this claim was tested using the distribution of numeral classifier phrases (NCPs) as a diagnostic for base-generated positions of subjects.

4.1 Experiment 1: Selectional Restrictions

According to the structural analysis presented in Section 3, subjects of the accusative-oblique alternation verbs in the accusative structure are assigned an AGENT theta-role, whereas subjects of the same verbs in the oblique structure are assigned a THEME theta-role. AGENT theta-roles are generally only compatible with animate (i.e., entities that are capable of self-propelled movements: Folli and Harley 2008) referents, whereas THEME theta-roles are in principle compatible with both animate and inanimate referents. This difference in theta-role assignment predicts that inanimate subjects will be more strongly dispreferred with these verbs in the accusative structures than the same verbs in the oblique structure. Experiment 1 was designed to test just this prediction.
4.1.1 Materials and Design

Experiment 1 had a 2 x 2 design: two complement markings (accusative vs. oblique) and two animacy levels (animate vs. inanimate). Six different verbs were used in the materials: three accusative-goal verbs (*nobor*- ‘ascend’, *kudar*- ‘descend’ and *sawar*- ‘touch’) and three accusative-source alternation verbs (*de*- ‘come out’, *hanare*- ‘separate’ and *hazure*- ‘come off’). 5 lexicalizations of each verb were constructed for each of the 4 conditions, and distributed among 5 lists using a Latin Square procedure such that each list contained 6 tokens of each of the 4 condition (one token for each of the verbs used) with no overlap between conditions in a single list. The 24 experimental sentences in each list were mixed with 28 filler sentences, such that each subject rated 52 sentences during the experiment. The sentences in each list were pseudo-randomized so that related conditions were never presented in succession. Examples of the experimental sentences are provided below.

**Oblique structure – animate subject**

Sachiko-no gakusei-ga kawaiteinai penki-ni sawar -te -i -ta  
S-GEN student-NOM wet paint-GOAL touch -GER -be -PST  
‘Sachiko’s students were touching the wet paint.’

**Oblique structure – inanimate subject**

Sachiko-no kami-ga kawaiteinai penki-ni sawar -te -i -ta  
S-GEN hair-NOM wet paint-GOAL touch -GER -be -PST  
‘Sachiko’s hair was touching the wet paint.’

**Accusative structure – animate subject**

Sachiko-no gakusei-ga kawaiteinai penki-o sawar -te -i -ta  
S-GEN student-NOM wet paint-ACC touch -GER -be -PST  
‘Sachiko’s students were touching the wet paint.’

**Accusative structure – animate subject**

Sachiko-no kami-ga kawaiteinai penki-o sawar -te -i -ta  
S-GEN hair-NOM wet paint-ACC touch -GER -be -PST  
‘Sachiko’s hair was touching the wet paint.’

The surveys were presented using a free survey website. The task was a 5-point Likert scale task with 1 representing “unnatural” and 5 representing “natural”. Participants were first presented with five practice sentences. Thirty self-reported mono-lingual Japanese speakers participated in the experiment. The participants were recruited by sending e-mail messages using a list of e-mail addresses compiled by one of the co-authors of this paper. They received no compensation.
4.1.2 Results and Discussion

The raw ratings were z-score transformed prior to analysis. The z-score transformation is a standardization procedure that corrects for some kinds of scale bias between participants by converting a participant’s scores into units that convey the number of standard deviations each score is from that participant’s mean score. (Featherston 2005, Sprouse and Almeida submitted). The results were then analyzed using linear mixed-effects models using STRUCTURE and ANIMACY as fixed factors (centered to reduce collinearity) and participants and items as random factors. This analysis is comparable to a repeated-measures two-way ANOVA, but with participants and items entering the model simultaneously rather than separately. Two planned pairwise comparisons (also linear mixed-effects models) were also conducted to isolate the effect of animacy on each of the two complement forms: oblique-animate vs oblique-inanimate, and accusative-animate vs accusative-inanimate. All p-values were estimated using the MCMC method implemented in the languageR package for R (Baayen 2007, Baayen et al 2008). Figure 1 is a graph of the mean ratings for each condition (standard errors and p-values are included for convenience). Table 1 reports the results of the three linear mixed-effects models.

*Figure 1: The effect of animacy for each of the verb forms. The p-values on the left and right are for the two planned pairwise comparisons (oblique-animate vs oblique inanimate, and accusative-animate vs accusative-inanimate). The p-values in the center are for the interaction of STRUCTURE X ANIMACY*

<table>
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<th>Table 1: Linear mixed effects models for experiment 1</th>
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<td>Estimated coefficient</td>
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The first result to notice is that there is a small dispreference for inanimate subjects in the oblique form of these verbs. This is not entirely surprising as linguists have reported a preference for animate subjects in many languages especially with two-place verbs (e.g. de Swart et al. 2008; see Kuno 1973 for discussion of preference for animate subjects in Japanese). However, this difference is only marginally significant in the pairwise comparison (p=.0832). Crucially, the highly significant interaction of STRUCTURE X ANIMACY suggests that the dispreference for inanimate subjects is significantly larger when these verbs are in the accusative structure. This fact is corroborated in the pairwise comparison of animate and inanimate subjects with these verbs in the accusative structure, which is highly significant (p=.0001). In fact, not only is the dispreference for inanimate subjects stronger for the alternating verbs in the accusative structure, but the preference for animate subjects appears to be stronger too. A direct comparison of accusative-animate and oblique-animate reveals that accusative-animate sentences are rated significantly higher than oblique-animate sentences (p=.021). In other words, the alternating verbs in the accusative structure strongly prefer animate subjects and strongly disprefer inanimate subjects as predicted by the unaccusativity analysis presented in Section 3; the same verbs in the oblique structure reveal only a slight (marginally significant) preference for animate subjects.

4.2 Experiment 2: Licensing of “Stranded” Numeral Classifier Phrases

It is well-known that numeral classifier phrases (NCPs) do not always form constituents with the NPs that they modify (the host NPs). An NCP can be either immediately adjacent to the host NP, as in (17a), or another constituent can intervene between the host NP and an NCP, as in (17b).

(17)  
\[
\begin{array}{llll}
\text{a. } & \text{Gakusei}_{\text{1}}-\text{ga} & \text{5-nin}_{\text{1}} & \text{ohisu-ni} & \text{ki -ta} \\
& \text{Student}_{\text{1}}-\text{NOM} & \text{5-C}\text{L}_{\text{4}} & \text{office-\text{GOAL}} & \text{come -PST} \\
\text{b. } & \text{Gakusei}_{\text{1}}-\text{ga} & \text{ohisu-ni} & \text{5-nin}_{\text{1}} & \text{ki -ta} \\
& \text{Student}_{\text{1}}-\text{NOM} & \text{office-\text{GOAL}} & \text{5-C}\text{L}_{\text{4}} & \text{come -PST} \\
\end{array}
\]

‘Five students came to the office.’

There are restrictions on when and where NCPs can be ‘stranded’. For instance, while subjects of unaccusative verbs such as ki- ‘come’ may license an NCP stranded in a pre-verbal position, as
seen in (17b) above, subjects of transitive verbs and unergative verbs do not license NCPs stranded in a pre-verbal position, as shown in (18) and (19).

(18) a. **Gakusei**-ga  **5-nin**-i  **hon-o** kaw -ta  
**Student**-NOM  **5-CL**-i  **book-ACC** buy -PST

   ‘Five students bought books.’

b. * **Gakusei**-ga  **hon-o**  **5-nin**-i  kaw -ta  
**Student**-NOM  **book-ACC**  **5-CL**-i  buy -PST

   ‘Five students bought books.’

(19) a. **Gakusei**-ga  **5-nin**-i  geragerato  waraw -ta  
**student**-NOM  **5-CL**-i  loudly  laugh -PST

   ‘Five students laughed loudly.’

b. * **Gakusei**-ga  geragerato  **5-nin**-i  waraw -ta  
**student**-NOM  loudly  **5-CL**-i  laugh -PST

   ‘Five students laughed loudly.’

In order to account for the distribution of ‘stranded’ NCPs, it has been proposed that NCPs and their host NPs must be in a local syntactic configuration at one point of derivation (Haig 1980, Kuroda 1980, Saito 1985 among others). Miyagawa (1989), in particular, argues that a NCP and its host NP must c-command each other at their base-generated positions. Under this analysis, the subject of *ki-* ‘come’ in (17b) can license the stranded NCP in the preverbal position because *ki-* ‘come’ is an unaccusative verb whose subject is based-generated as an internal argument. Therefore, the subject of *ki-* ‘come’ and the preverbal NCP could both be based-generated inside VP forming a constituent as in (20) below.

(20) **Gakusei**-ga  [vP [VP ohisu-ni  **5-nin**-i  t-ti  ki]] -ta  
**Student**-NOM  [vP [VP office-GOAL  **5-CL**-i  t-ti  come]] -PST

   ‘Five students came to the office.’ (unaccusative)

The ungrammaticality of stranded NCPs with transitive and unergative verbs are accounted for by assuming that subjects of these verbs are generated outside of VP (i.e. [Spec, vP]). If these verbs’ subjects are never inside VP, they could not have been in a mutually c-commanding relation with a NCP inside VP. Thus, they fail to license NCPs in a preverbal position.²

(21) a. * **Gakusei**-ga  [vP  t-ti  [VP hon-o  **5-nin**-i  kaw]] -ta  
**Student**-NOM  [vP  t-ti  [VP book-ACC  **5-CL**-i  buy]] -PST

   (‘Five students bought books.’) (transitive)

b. * **Gakusei**-ga  [vP  t-ti  [VP geragerato  **5-nin**-i  waraw]] -ta  
**student**-NOM  [vP  t-ti  [VP loudly  **5-CL**-i  laugh]] -PST

   (‘Five students laughed loudly.’) (unergative)

² For a recent discussion of counterexamples to Miyagawa’s claim and his replies about such cases, see Miyagawa and Arikawa (2008).
Given the standard analysis of NCPs, the proposed analysis of the accusative-oblique alternations from section 3 makes a clear prediction about the licensing of stranded NCPs by the subjects of accusative-oblique alternation verbs. When these verbs are in the accusative structure, they should be unable to license an NCP stranded in a post-complement position, as in (22) below, just as transitive verbs and unergative verbs cannot license an NCP inside VP.

(22) accusative structure:
*[TP SUBJ-NOM [vP SUBJi [VP COMP-ACC NCPi V] v] T]

In contrast, the same verbs should be able to license an NCP stranded in a post-complement position when they are in the oblique structure, as our hypothesis is that the oblique structure is a type of unaccusative structure:

(23) oblique structure:
[TP SUBJ-NOM [vP [PP COMP-P] [v' SUBJi NCPi V] v] T]

Experiment 2 was designed to test this prediction by first testing the claim from the literature that unaccusative verbs can license stranded NCPs but unergative verbs cannot, and then testing our prediction that the oblique form of these verbs is a type of unaccusative structure.

4.2.2 Materials and Design

Experiment 2 consists of two sub-experiments. Experiment 2A was designed to confirm the previously reported unaccusative-unergative asymmetry with respect to licensing of NCPs, and as such was again a 2x2 design crossing STRUCTURE (unaccusative vs. unergative) and STRANDING (stranded NCP vs. non-stranded NCP). Again, six different verbs were used in the materials: three unaccusative verbs (ki- ‘come’, tsuk- ‘arrive’ and shin- ‘die’) and three unergative verbs (waraw- ‘laugh’, odor- ‘dance’, and oyog- ‘swim’). 5 lexicalizations of each verb were constructed for each of the 4 conditions, and distributed among 5 lists using a Latin Square procedure such that each list contained 3 tokens of each of the 4 conditions (one token for each of the verbs) with no overlap between conditions in a single list. Experiment 2B was designed to test the licensing of stranded NCPs with the two forms of accusative-oblique alternation verbs using a similar 2x2 design of STRUCTURE (oblique vs. accusative) and STRANDING (stranded NCP vs. non-stranded NCP). Four verbs were used in the materials: 2 accusative-goal alternation verbs (sawar- ‘touch’ and nobor- ‘ascend’) and two accusative-source alternation verbs (de- ‘come out’ and hanare- ‘separate’). Again, 5 lexicalizations of each verb were constructed for each of the 4 conditions, and distributed among 5 lists using a Latin Square procedure such that each list contained 2 tokens of each of the 4 condition (one token for each of the verbs) with no overlap between conditions in a single list. This resulted in 5 lists, each with 20 sentences to be rated. The 20 sentences in each list were combined with 40 filler sentences that also involved NCPs, resulting in 60 sentences per list. Each list was then pseudo-randomized such that related conditions were never presented in succession. Examples of the conditions from experiment 2A and 2B are presented below.
Experiment 2A:

**Unaccusative – non-stranded NCP**

Atarashii kokanryugakusei ga jyogo-nin kanada-kara ki ta
new exchange_students-NOM 15-CL Canada-SOURCE come PST
‘Fifteen new exchange students came from Canada.’

**Unaccusative – stranded NCP**

Atarashii kokanryugakusei ga kanada-kara jyogo-nin ki ta
new exchange_students-NOM Canada-SOURCE 15-CL come PST
‘Fifteen new exchange students came from Canada.’

**Unergative – non-stranded NCP**

Supein-no ryugakusei ga go-nin bunkasai-de odor ta
Spanish-GEN exchange_students-NOM 5-CL cultural_festival-LOC dance PST
‘Five exchange students from Spain danced at a cultural festival.’

**Unergative – stranded NCP**

Supein-no ryugakusei ga bunkasai-de go-nin odor ta
Spanish-GEN exchange_students-NOM cultural_festival-LOC 5-CL dance PST
‘Five exchange students from Spain danced at a cultural festival.’

Experiment 2B:

**Oblique – non-stranded NCP**

Jimushitsu-no jyuugyooin ga yo-nin sono kinko-ni sawar ta
Office-GEN employee-NOM 4-CL that safe-GOAL touch PST
‘Four office employees touched the safe.’

**Oblique – stranded NCP**

Jimushitsu-no jyuugyooin ga sono kinko-ni yo-nin sawar ta
Office-GEN employee-NOM that safe-GOAL 4-CL touch PST
‘Four office employees touched the safe.’

**Accusative – non-stranded NCP**

Jimushitsu-no jyuugyooin ga yo-nin sono kinko-o sawar ta
Office-GEN employee-NOM 4-CL that safe-ACC touch PST
‘Four office employees touched the safe.’
The experiment was conducted at Kansai Gaidai University in Osaka, Japan with 53 university students. The task was magnitude estimation (Stevens 1957, Bard et al. 1996, Keller 2000, Featherston 2005, Sprouse and Cunningham under review). The reference sentence (i.e., the standard) was identical for all 5 surveys, and was in the middle range of acceptability (according to Gunji and Hashida 1998):

\begin{align*}
(24) & \text{Shin’nyushain}-\text{ga sake-o imanotokoro yo-nin\textsubscript{i} nom -da} \\
& \text{Incoming-employee-NOM sake-ACC so far 4-CL drink -PST} \\
& \text{‘Four of the new employees drank sake so far.’}
\end{align*}

The reference sentence was assigned value of 100 (the modulus). The acceptability rating task was presented as a paper survey. The experiment began with a practice phase during which participants estimated the lengths of 7 lines using another line as a reference (standard) set to a modulus of 100. This practice phase ensured that participants understood the concept of magnitude estimation. During the main phase of the experiment, 10 items were presented per page, with the standard appearing at the top of every page inside a textbox with black borders.

### 4.2.3 Results and Discussion

As with Experiment 1, the raw ratings were z-score transformed prior to analysis. The results of experiment 2A and 2B were each analyzed using linear mixed-effects models using STRUCTURE and STRANDING as fixed factors (centered to reduce collinearity) and participants and items as random factors. Two planned pairwise comparisons (also linear mixed-effects models) were also conducted for each experiment to isolate the effect of stranding on each of the verb forms. All \( p \)-values were estimated using the MCMC method implemented in the languageR package for R (Baayen 2007, Baayen et al 2008). Figure 2 presents graphs of the mean ratings for each experiment (standard errors and \( p \)-values are included for convenience). Tables 2 and 3 report the results of the three linear mixed-effects models for experiment 2A and 2B respectively.

**Figure 2:** The effect of stranded NCPs on unaccusative and unergative verbs (experiment 2A, left) and the oblique and accusative forms of the alternating verbs (experiment 2B, right). The \( p \)-values on the left and right of each graph are for the two planned pairwise comparisons (unaccusative-non-stranded vs unaccusative-stranded and unergative-non-stranded vs. unergative-stranded; oblique-non-stranded vs. oblique-stranded and accusative-non-stranded vs. accusative-stranded). The \( p \)-values in the center are for the interaction of STRUCTURE X STRANDING.

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3 We would like to express our gratitude to Hajime Ono, who allowed us to run this experiment with his students.
### Table 2: Linear mixed effects models for experiment 2A

<table>
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<tr>
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<th>Estimated coefficient</th>
<th>HPD 95% Credibility interval</th>
<th>MCMC p-value</th>
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### Table 3: Linear mixed effects models for experiment 2B

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<th>Estimated coefficient</th>
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<td>Pairwise: oblique</td>
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First we turn to the results of experiment 2A, which tested the claim in the literature that stranded NCPs are possible with unaccusative verbs but impossible with unergative verbs. Our results do show a trend that corroborates this claim: the difference between stranded and non-stranded NCPs is not significantly different within unaccusative verbs, but stranded NCPs are significantly less acceptable than non-stranded NCPs with unergative verbs. However, this difference only appears in the planned comparisons; the two-way interaction of STRUCTURE X STRANDING is not significant in experiment 2A. The discordant results of the omnibus test and the planned comparisons suggests that the asymmetry reported in the literature may in fact be real, but is relatively weak when investigated with a formal acceptability experiment (see Sprouse and Almeida submitted for a discussion of the potential power loss in formal acceptability judgments). It is possible that a larger sample size, or a more sensitive task, would lead to a significant interaction.

Perhaps surprisingly, the asymmetrical effect of stranded NCPs is clearer with the alternating verbs in experiment 2B, as the interaction of STRUCTURE X STRANDING is highly significant. Planned comparisons within each verb form type suggest that there is a significant dispreference for stranded NCPs in both the oblique and accusative forms of the verbs; however the significant interaction also suggests that dispreference for stranded NCPs is greater for the alternating verbs in the accusative structure than for the same verbs in the oblique structure. This not only confirms the prediction of the analysis proposed in Section 3, but also raises the possibility that accusative-oblique alternation verbs are a better example of the use of stranded NCPs as a structural diagnostic than the canonical unaccusative and unergative verbs used in this experiment.

5 Conclusion

On the surface, variable-behavior verbs such as the accusative-oblique alternating verbs investigated here pose a problem for the syntactic unaccusativity hypothesis. However, we have argued that the variable-behavior of accusative-oblique alternating verbs is in fact further evidence in support of the syntactic unaccusativity hypothesis if one analyzes the accusative structure as an unergative/transitive structure and the oblique structure as an unaccusative structure. We presented two formal experiments that used the licensing of animate subjects and the licensing of stranded numeral classifier phrases as diagnostics of the structural differences predicted by the structural unaccusativity hypothesis. In the end, we found that the accusative-oblique alternating verbs not only demonstrate the structural properties of unaccusativity, but in one case actually better exemplify the properties of unaccusativity than canonical unaccusative verbs.
References


