LEXICAL CONSTRAINTS ON THE ACQUISITION OF SPLIT INTRANSITIVITY

Evidence from L2 Japanese

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This study investigates the acquisition of the unaccusative-unergative distinction in L2 Japanese by English learners. The aim is to establish whether learners of Japanese are sensitive to the lexical-semantic characteristics of verbs in similar ways as learners of Romance languages who were found to follow the Split Intransitivity Hierarchy (Sorace, 1993a, 1995a). Two groups of learners participated in the study, one consisting of learners who had not had any previous exposure to Japanese outside the classroom, and the other consisting of learners at the end of a 9-month period of continuous stay in Japan. A control group of native Japanese speakers also took part in the experiment. Subjects were tested on their knowledge of the different behavior of unaccusative and unergative verbs with respect to quantifier floating (Miyagawa, 1989); the native group was also tested on Case drop (Kageyama, 1993). The results show that both the native and the nonnative speakers are conditioned by the Split Intransitivity Hierarchy in their judgments on unergative verbs; however, their judgments on unaccusative verbs do not pattern according to the predictions. It is argued that this difference stems from the ambiguity of the Japanese input on unaccusative verbs, which are characterized by syntactic optionality.

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The Unaccusative Hypothesis (Burzio, 1986; Perlmutter, 1978) stipulates that across languages intransitive verbs are of two types, called unaccusative and unergative, which have distinct syntactic and semantic properties. The single argument of unaccusative verbs is syntactically equivalent to the direct object of transitive verbs, whereas the single argument of unergative verbs is syntactically equivalent to the subject of transitive verbs; this difference is illustrated by the bracketed phrases in (1).

(1)   a.   Unaccusative: _____ [$_{VP}$ V NP]
      b.   Unergative: NP [$_{VP}$ V]

The distinction is also systematically related to certain semantic characteristics of the predicate: *Agentivity* tends to correlate with unergativity, and *patienthood* correlates with unaccusativity (Dowty, 1991). The alignment between syntactic and semantic properties, however, is not as perfect as the original formulation of the Unaccusative Hypothesis predicted: A mismatch has often been observed between the semantic components postulated for a verb and the syntactic behavior that might be predicted on the basis of those components. Nevertheless, a substantial body of research has shown that most of the syntactic diagnostics of unaccusativity-unergativity (e.g., auxiliary selection in Italian, impersonal passives in Dutch, resultative constructions in English) tend to identify semantically coherent subsets of verbs (Levin & Rappaport Hovav, 1995). The theoretical challenge has thus become how to single out the syntactically relevant components of meaning in different languages, on the principle that the unaccusative-unergative distinction is syntactically encoded but semantically determined. This principle assumes that a syntactic characterization of unaccusativity is necessary to account for phenomena not easily reducible to semantic explanations, such as the similarity between unaccusatives and passives, the resultative construction in English, or the cliticization of partitive *ne* in Italian. For example, the resultative construction in English is subject to a Direct Object Restriction (see Levin & Rappaport Hovav, 1995); that is, it can be predicated only of a direct object NP governed by the verb, as shown in (2).

(2)   a.   Transitive: *John licked his finger clean.*
      b.   Unaccusative: *The bottle broke open.*
      c.   Unergative: **John shouted hoarse.*[1]

The identification of syntactic constraints, however, is not sufficient; it is also crucial to explain how lexical-semantic or aspectual representations underlying individual verbs are mapped onto binary syntactic representations.[2] Various theories of argument structure (i.e., of the syntactically relevant properties of verb arguments) and event structure (i.e., of the temporal and aspectual organization of the event described by a verb) that have been developed in recent years have set out to pursue this goal (Grimshaw, 1990; van Hout,

1996; Pesetsky, 1995; Pustejovsky & Busa, 1995; Rappaport Hovav & Levin, 1998, among others).

The systematic linking of a multicategorial lexical-semantic level to a necessarily binary syntactic level was also the focus of a series of studies by Sorace and her collaborators (Keller & Sorace, 2000; Sorace, 1993a, 1993b, 1995a, 1995b, 2000a; Sorace & Cennamo, 2000).[3] The starting point of these studies is the following facts, which characterize split intransitivity in a number of Western European languages: (a) Across languages some verbs tend to show consistent unaccusative-unergative behavior whereas others do not; and (b) within languages some verbs are invariably unaccusative-unergative regardless of context, whereas others exhibit variation. Sorace's studies provide supporting evidence for these generalizations, mostly based on experiments testing native speakers' intuitions about auxiliary selection (perhaps the best-known diagnostic of unaccusativity) in various languages that have a choice of perfective auxiliaries (French, Italian, Paduan, Dutch, and German). In all these languages, unaccusative verbs select the counterpart of English auxiliary *be* and unergative verbs select the counterpart of auxiliary *have*; however, native intuitions on auxiliaries are more determinate for certain types of verbs and less determinate for others. For example, native speakers have a very strong preference for auxiliary *be* with change of location verbs but express a weaker preference for the same auxiliary (or have no preference at all) with stative verbs. Additionally, Sorace (1995a, 1995b) showed that *ne*-cliticization in Italian displays the same systematic variation as does auxiliary selection.

Sorace's (1995a, 2000a) account of these systematic differences within the syntactic classes of unaccusative and unergative verbs is that gradient dimensions or "hierarchies" exist that distinguish core unaccusative and unergative monadic verbs from progressively more peripheral verbs. These hierarchies, which are based on (potentially universal) aspectual parameters, identify the notion of "telic dynamic change" at the core of unaccusativity and that of "agentive nonmotional activity" at the core of unergativity. The extremes of the hierarchy thus consist of maximally distinct core verbs—verbs of change of location (e.g., *arrive*) and verbs of agentive nonmotional activity (e.g., *work*)—which consistently display unaccusative or unergative characteristics, respectively.[4] In contrast, peripheral verb types between the extremes are susceptible to variable syntactic behavior.[5] The overall hierarchy of split intransitivity is represented in Figure 1.

Peripheral verb types include (arranged in order of closeness to the core): verbs denoting indefinite change in a particular direction (e.g., *rise*), change of condition (e.g., *wilt*), appearance (e.g., *appear*), continuation of a preexisting condition (e.g., *stay*), and states (e.g., *exist*, *suffice*).[6] Peripheral verbs closer to the unergative core include verbs denoting motional processes (e.g., *swim*), and various kinds of uncontrolled processes (such as bodily functions [e.g., *sweat*]), involuntary reaction (e.g., *tremble*) and emission (e.g., *rattle*). The hierarchy does not include dyadic verbs alternating with transitive variants
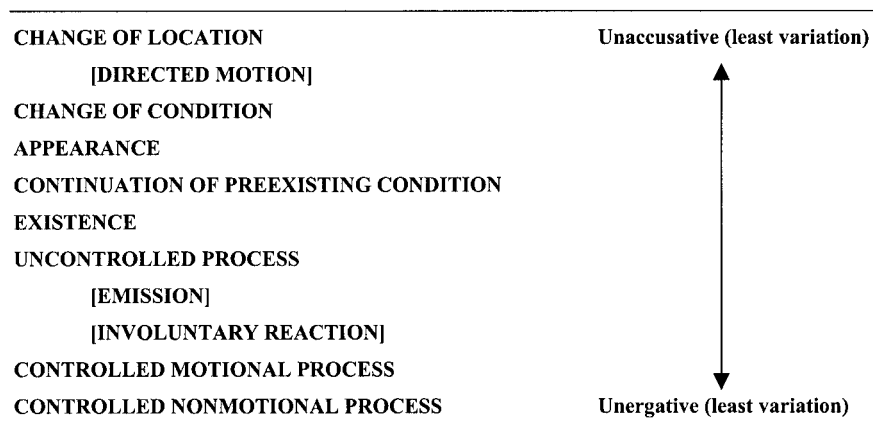
CHANGE OF LOCATION	Unaccusative (least variation)
[DIRECTED MOTION]	
CHANGE OF CONDITION	
APPEARANCE	
CONTINUATION OF PREEXISTING CONDITION	
EXISTENCE	
UNCONTROLLED PROCESS	
[EMISSION]	
[INVOLUNTARY REACTION]	
CONTROLLED MOTIONAL PROCESS	
CONTROLLED NONMOTIONAL PROCESS	Unergative (least variation)

Figure 1.   Split intransitivity hierarchy.

(e.g., *break*, *increase*), which are weakly unaccusative and display unergative behavior in some languages (see Sorace, 2000a; Labelle, 1992, on French; Haegeman, 1994, on English).

In common with others (e.g., Levin & Rappaport Hovav, 1995, in press), this lexicon-centered approach assumes that verb classes at the lexical-semantic level are mapped onto argument structure, which in turn projects to the discrete, binary level of syntactic representation. The mapping is achieved by linking rules, which relate portions of the lexical-semantic hierarchy to either external or internal arguments in argument structure; these in turn are projected to the positions of subject or direct object at argument structure, determining the syntactic status of a verb as either unaccusative or unergative. The prediction is that, although mappings may vary across languages because different languages may have different cutoff points along the hierarchy, the mapping of the core verbs to unaccusative or unergative syntax is largely invariant across languages. Note that the hierarchy does not predict that all languages differentiate among all verb classes, but only that there should not be complete reversals of the hierarchical order of verb types (e.g., languages in which stative verbs are core unaccusatives, or verbs denoting involuntary processes are core unergatives). The experimental evidence from European languages in Sorace's (1995a, 2000a) studies has shown that the extent of variation in the syntactic behavior of intransitive verbs, both within and across languages, is a function of the position of a verb in the hierarchical lexical-semantic structures: Gradient variation can in fact be found both in native and in nonnative grammars, as will be shown in this paper.

It may be argued, however, that these gradient phenomena are found only in Western European languages, or even that they characterize only auxiliary selection but not split intransitivity in general.[7] This paper will offer new evi-

dence on the acquisition of Japanese, a language with very different manifestations of split intransitivity from Western European languages. If similar gradients are found to affect the intuitions of both native and nonnative speakers of Japanese, this would lend support to the hypothesis that this pattern might have wider typological validity, rather than being a peculiarity of a particular language family. Let us first consider how the unaccusative-unergative distinction is manifested in Japanese.

SPLIT INTRANSITIVITY IN JAPANESE

A number of studies in recent years have focused on the characterization of split intransitivity in Japanese. Like the literature on European languages, these studies are differentiated by whether they take a purely syntactic approach (Miyagawa, 1989; Takezawa, 1991), a purely semantic approach (Kishimoto, 1996), or a syntax-semantics interface approach (Kageyama 1993, 1996; Tsujimura 1990a, 1990b, 1990c, 1991, 1994, 1996, 1999). These studies have shown that split intransitivity is manifested in a number of phenomena that distinguish unaccusative and unergative verbs. Six main diagnostics have been discussed in the literature: quantifier floating (Miyagawa) and Case drop (Kageyama, 1993), which are constructions optionally available with unaccusative verbs but not with unergative verbs; the form *takusan* "a lot," which can occur with both unaccusative and unergative verbs but with different interpretations; the resultative construction (Tsujimura, 1990a, 1990b, 1994, 1996) and the deverbal nominalization formed with the addition of the prefix *kake* "half-way, about to" (Kishimoto), which are impossible with unergative verbs and allowed only by a subset of unaccusative verbs; and finally the *te-iru* construction (McClure, 1995; Takezawa), which, similarly to the *takusan* test, is possible with both unaccusative and unergative verbs but is associated with different interpretations. The following sections will focus on quantifier floating, Case drop, and *takusan* diagnostics.[8] Although only quantifier floating and (to a lesser extent) Case drop are relevant to the experiments reported in this paper, the *takusan* test has been employed in the literature on the L2 acquisition of Japanese and will be referred to below.

Quantifier Floating

The phenomenon known as Quantifier Floating has been analyzed as evidence for a movement analysis of scrambling in Japanese. Miyagawa (1989) claimed that an NP and its numeral quantifier (henceforth NQ) have to be adjacent because they must c-command each other. Compare examples (3) and (4), taken from Culicover (1997).

(3) Unergative:
   a. *Gakusei-ga sannin wazato   waratta.*
       student-NOM three   intentionally laughed
       "Three students intentionally laughed."

    b. *_Gakusei-ga wazato   sannin waratta._
        student-NOM intentionally three laughed
        "Three students intentionally laughed."

(4) Unaccusative:
    a. _Gakusei-ga sannin Tokyo-ni tsuita._
        student-NOM three Tokyo-at arrived
        "Three students arrived in Tokyo."
    b. _Gakusei-ga Tokyo-ni sannin tsuita._
        student-NOM Tokyo-at three arrived
        "Three students arrived in Tokyo."

In (3a), the NQ *sannin* modifies the subject NP. The sentence is grammatical because both are outside the VP and they c-command each other.[9] In (3b), the NQ cannot quantify the subject NP because it is inside the VP, so the relationship of mutual c-command does not obtain. Example (4a) is grammatical just like (3a); however, (4b) is also grammatical, in contrast to (3b). Miyagawa explained this phenomenon by positing different syntactic structures for (3) and (4): The surface subject in (3) originates outside the VP (see [5]), but the surface subject in (4) originates in the direct object position (see [6a]) and moves into the subject position, leaving behind a trace (see [6b]). The mutual c-command relationship with the numeral quantifier is maintained in (6b) but not in (5b).

(5) a. $[_{IP}$ NP NQ $[_{VP}$ V$]]$ (= [3a])
     b. *$[_{IP}$ NP $[_{VP}$ NQ V$]]$ (= [3b])

(6) a. $[_{IP}$ $[_{VP}$ NP NQ V$]$ (= [4a])
     b. $[_{IP}$ NP$_i$ $[_{VP}$ t$_i$ NQ V$]$ (= [4b])

Thus, the different syntactic behavior of unaccusative and unergative verbs in the presence of quantifier floating is evidence for the existence of syntactic unaccusativity in Japanese.

The *Takusan* Test

Kageyama (1993, 1996) argued that the interpretation of the form *takusan* "a lot" is a reliable diagnostic test of unaccusativity. This form can modify both a subject and an object, as shown in (7a) and (7b) (examples from Hirakawa, 1999).

(7) a. _Takusan-no hito-ga   sono hon-o   yon-da._
        a lot-GEN   people-NOM the book-ACC read-PAST
        "A lot of people read the book."
    b. _Tanaka-san-ga takusan-no hon-o   yon-da._
        Tanaka-Mr.-NOM a lot-GEN   book-ACC read-PAST
        "Mr. Tanaka read a lot of books."

When the subject is null, the form can have two different functions: It can be a quantified NP, as in (8a), or an adverb, as in (8b).

(8) a. *Takusan yon-da.*
    a lot   read-PAST
    "He (she, they, etc.) read a lot."
  b. *Takusan naita.*
    a lot   cry-PAST
    "He (she, they, etc.) cried a lot."

The relevant contrasts are manifested when *takusan* occurs with intransitive verbs: It is interpreted as a subject NP with unaccusatives but as an adverbial modifier of the verb with unergatives. This is shown in (9).

(9) a. *Takusan tuita.*
    a lot   arrived
    "A lot of people arrived."
  b. *Takusan oyoida.*
    a lot   swam
    "We (they, he, etc.) swam a lot." (not: *A lot of people swam.)

Kageyama (1993) proposed that *takusan* is generated within the VP and modifies only an internal argument. Example (9a) is grammatical under the interpretation in which *takusan* is a quantified NP because the apparent subject of the unaccusative verb is an internal argument, which is generated within the VP and (according to Kageyama) stays within it, therefore receiving Case. It should be noted, however, that sentences such as those in (8) and (9) are heavily dependent on context for their interpretation and would be unlikely to occur outside a context that can disambiguate them.

Case Drop

In Japanese, every NP is marked with a case particle. There are five main case particles: the nominative *ga*, the accusative *o*, the dative *ni*, the genitive *no*, and the topic *wa*. The nominative *ga* occurs with the subject, whereas the accusative *o* occurs with the direct object, as shown in (10).

(10) a. *Mary-ga uta-o utat-ta.*
    Mary-NOM song-ACC sing-PAST
    "Mary sang a song."
  b. *Mary-ga oyoi-da.*
    Mary-NOM swim-PAST
    "Mary swam."

The subject of unaccusative verbs is also marked by the nominative case *ga*, as in (11).

(11) *Fune ga shizun-da.*
    boat-NOM sink-PAST
    "The boat sank."

The phenomenon of Case drop occurs when case markers are omitted in informal speech.

The accusative case marker *o* can be dropped in transitive sentences, as shown in (12). There is a difference of behavior in Case drop between unaccusative and unergative constructions. Compare examples (13) and (14) (from Kageyama, 1993, p. 56). (NOML indicates a nominal marker, and Q indicates a question marker.)

(12) a. *Kodomo-tachi* *(*ga*) *hon* (*o*) *yomu no*   *mi-ta*   *koto nai.*
          child-PL   NOM book (ACC) read NOML see-PAST thing not-be
          "I have never seen the children reading books."
      b. *Kono chikaku ni tabako*   (*o*)   *utteru mise ari-masen-ka.*
          this near   by cigarette (ACC) sell   shop be-NEG-Q
          "Is there any shop nearby that sells cigarettes?"

(13) a. *Kanja-**(*ga*) *abare-ta*   *no*   *shitte-imasu-ka.*
          patient-NOM become-violent-PAST NOML know-be-Q
          "Do you know that the patient became violent?"
      b. *Tanaka-kun-**(*ga*) *shigoto-suru no*   *mi-ta*   *koto nai.*
          Tanaka-title-NOM work-do   NOML see-PAST thing not be
          "I have never seen Mr. Tanaka working."

(14) a. *Kootuu-jiko-*(*ga*)   *okoru* *no*   *mi-ta*   *koto aru.*
          traffic accident-(NOM) happen NOML see-PAST thing be
          "Have you ever seen traffic accidents happen?"
      b. *Ano kodomo nando*   *de oyu-*(*ga*)   *waku-ka*   *shira-nai.*
          that child   what-degree at hot water-(NOM) boil-whether know-NEG
          "That child doesn't know what degree water boils at."

The nominative case marker *ga* is obligatory in transitive and unergative constructions (cf. [12]–[13]), whereas it can be omitted in unaccusative structures (cf. [14]), confirming the familiar parallelism between the subject of unaccusatives and the object of transitive verbs. Note, however, that this phenomenon is not widespread. It is subject to regional variation (with some speakers never producing it) and it definitely belongs to an informal register.

Applicability of the Split Intransitivity Hierarchy to Japanese

As mentioned before, research on the Split Intransitivity Hierarchy has been conducted exclusively on European languages. There is currently no experimental evidence that the hierarchy is applicable to typologically different languages. Because the decision to test the hierarchy on Japanese is logically dependent on the hypothesis that the generalizations embodied by it might be extended to this language, this hypothesis requires some independent justification.

There are three pieces of evidence that make the hypothesis defensible. First, research on syntax-semantics correspondences suggests that certain verb classes are remarkably uniform in their argument realization, whereas other verb classes are susceptible to optional argument realizations, both crosslin-

guistically and within individual languages (see Levin & Rappaport Hovav, in press, for discussion). This fact, as mentioned before, was one of the motivating factors for postulating the Split Intransitivity Hierarchy. Whether it is the same verbs that are uniform or variable in Japanese (as appears to be the case in European languages) is therefore a legitimate research question.

Second, the existing research on Japanese indicates that this language is not widely different from other languages in the way it encodes the syntactic reflexes of aspectual distinctions. McClure (1995), in his detailed comparison of aspect and unaccusativity in Japanese and Italian, concluded that in both languages unaccusative verbs can only be achievements or states, although not all achievements and states are unaccusatives. In both languages, stative verbs are the most susceptible to variable behavior because they have an unspecified aspectual structure, which can be expanded into activities or achievements, depending on the contribution of other contextual or sentential factors. These verbs are therefore compatible with both unaccusative and unergative syntax. In contrast, achievements are aspectually stable. This view is also argued for by Rappaport Hovav and Levin (1998), who proposed that certain verbs show more "elasticity of meaning" because their event structure template may be augmented (i.e., more complex templates can be built on simpler ones), as long as certain conditions on syntactic realization are met.[10] Again, state templates can be freely augmented (e.g., to derive achievements), giving rise to systematic ambiguities between change-of-state and be-in-state interpretations (e.g., *The plant bloomed for two weeks*, *The plant bloomed overnight*). Thus, although it is clear that not all languages are the same in their choice of semantic determinants of unaccusativity, it is plausible to expect that differences will be more prominent in verb classes that, because of their aspectual characteristics, have independently been shown to be prone to multiple classifications. This claim is consistent with the Split Intransitivity Hierarchy, which assumes that languages may have different cutoff points along the hierarchy.

Third, the two semantic determinants of unaccusativity that have been discussed in the literature on Japanese are volitionality and telicity. Volitional control has been argued to be the main semantic determinant of split intransitivity in Japanese (see Kishimoto, 1996). Telicity has been shown to cause event-type shifts from activity readings to achievement readings, which affect the syntactic behavior of unergative verbs denoting manner of motion. Tsujimura (1994) showed that the presence of the goal phrase *made* "as far as" with manner of motion verbs turns the predicate into a resultative construction that describes a change of location. This resultative predicate satisfies unaccusativity diagnostics such as quantifier floating (QF), as shown in (15). (CL indicates a classifier.)

(15) a.   QF impossible:
            Kodomo-ga inu-to   awatete   san-nin hasitta.
            child-NOM   dog-with hurriedly three-CL run
            "Three children ran hurriedly with a dog."

    b.   QF possible:
        Kodomo-ga inu-to   awatete san-nin kooen-made hasitta.
        child-NOM   dog-with hurriedly three-CL park-as-far-as run
        "Three children ran hurriedly to the park with a dog."

The Split Intransitivity Hierarchy also assumes that telicity and agentivity are the crucial semantic determinants of unaccusativity and unergativity, respectively.

    To summarize, the available evidence from research on syntax-semantic correspondences and split intransitivity in Japanese is consistent with the predictions of the Split Intransitivity Hierarchy. It is of course possible that Japanese may weigh these components differently from European languages, that it may combine verb classes or make finer distinctions within verb classes, but these differences can be discovered only by testing the hierarchy. It seems therefore legitimate to assume, as a working hypothesis, that the hierarchy affects split intransitivity in Japanese.

Diagnostics of Split Intransitivity and Available Evidence

This brief overview of split intransitivity in Japanese has revealed that the syntactic diagnostics of the distinction generally consist in optional constructions that are possible with unaccusative verbs but not with unergative verbs. Japanese unaccusative verbs are not unambiguously identifiable by the presence of morphosyntactic markers (such as auxiliary BE in Italian and Dutch). They may appear in sentences with floated numeral quantifiers, but they are also grammatical without QF; they may occur with Case drop in informal speech, but they also occur without Case drop. There are no obligatory markers of unaccusativity, nor are there obligatory markers of unergativity. Unergativity is defined negatively by what is not possible: QF and Case drop are not permissible. Learners of Japanese have to learn that a wider range of sentences are grammatical with unaccusative verbs than with unergative verbs. In other words, they have to notice optionality in the input and make it part of their interlanguage grammar. In some respects, their situation is similar to that of L2 learners of English, who also do not get overt and systematic evidence about unaccusativity in the input.[11]

    This optionality raises some interesting learnability questions. What evidence does the learner rely on to acquire the distinction? Is there a difference between the learners of L2 Italian, who receive unambiguous evidence for the unaccusative-unergative distinction, and the learners of L2 Japanese, who do not? This question is relevant to much research on the acquisition of split intransitivity to date.

THE L2 ACQUISITION OF SPLIT INTRANSITIVITY

Research on the L2 acquisition of split intransitivity has been mostly concerned with English and, to a lesser extent, other European languages such as

French, Italian, Spanish, and Turkish. Recently, split intransitivity in non-Indo-European languages has become an object of investigation; a number of studies have appeared on Chinese and Japanese, which are particularly relevant to the present investigation.

Three aspects have received particular attention: (a) the production of passive unaccusatives in L2 English, (b) the transitive-inchoative alternation with dyadic verbs, and (c) the lexical-semantic features of unaccusative and unergative verbs and their mapping onto syntactic configurations. The studies on passive unaccusatives focus on a phenomenon first described by Zobl (1989), which consists of errors such as the ones in (16) typically produced by Japanese and Korean learners of English.

(16)   a.   *The most memorable experience of my life <u>was happened</u> last year.*
       b.   *My mother <u>was died</u> when I was a baby.*

Another typical pattern of errors involves the production of the subject of intransitive verbs in postverbal position, with or without an expletive subject. These errors tend to be produced by Spanish and Italian learners (the examples in [17] are from Oshita, 1998) but are also exhibited by Arabic learners (Rutherford, 1989).

(17)   a.   *It <u>existed</u> a lot of restrictions.*
       b.   *One day <u>happened</u> a revolution.*

In the vast majority of cases, these errors involve unaccusative verbs, many of which are monadic at argument structure and denote a state or a change of state.

Zobl's (1989) account of the pattern of errors in (16) attributed it to the learners' overgeneralization of the passive construction, in which an NP that originates as a direct object moves to the subject position at S-structure (see also Balcom, 1997). Crucial to this account is the assumption that learners realize that the subject of unaccusative verbs is a direct object or, in other words, that learners recognize the unaccusative-unergative distinction in English, despite the relative poverty of overt morphosyntactic manifestations. This realization, however, may not take place in the early stages of interlanguage development. Oshita (1998) proposed the Unaccusative Trap Hypothesis to account for both passivized unaccusatives and postverbal subjects with unaccusative verbs. The hypothesis assumes a developmental path from an initial stage in which learners assign an external argument to both unaccusatives and unergatives (and thus in effect do not recognize the distinction), to an intermediate stage in which they (a) discover that unaccusatives do not have an external argument and (b) attempt to mark them by overt morphosyntax in ways that are partly language specific. Oshita argued that the third stage, which involves the acquisition of nativelike knowledge, is, in all likelihood, very seldom attained.

A different analysis of the interlanguage phenomenon in (16) is argued for by Yip (1995), who maintained that passive unaccusatives result from the learners' attempt to extend causativization to all unaccusative verbs. According to this account, learners notice the existence of patterns such as *The shop increased the prices* versus *The prices increased* in the input, which is exhibited only by a subset of verbs denoting change of state brought about by a causer that can be left unspecified (see Levin & Rappaport Hovav, 1995); they then overgeneralize this pattern to nonalternating verbs, creating ungrammatical verbal passives. As Oshita (2000) rightly noted, however, this analysis would need to be corroborated by the existence of passive unaccusative sentences in which the *by*-phrase is maintained (as in *a nice thing was happened by John*). The scarcity of such data, and the fact that most passivized unaccusatives have stative meanings or denote events that do not have an identifiable causer, considerably weakens the hypothesis.

Montrul (1997, 1999) investigated the acquisition of the transitivity alternation in three languages—English, Spanish, and Turkish—each learned by the other two groups. She pointed out that the task faced by L2 learners is to determine (a) the components of meaning that distinguish the verbs participating in the alternation from the verbs excluded from it, as well as the mechanisms through which these components are projected onto argument structure, and (b) the morphosyntactic manifestations of the alternation in the particular language they are acquiring. The transitivity alternation is a prime example of noncanonical argument realization and is particularly marked in English because both members are morphologically identical, unlike Spanish and Turkish in which one of the variants is morphologically marked. The adult learners in Montrul's study, just like child acquirers, tended to causativize intransitive verbs to a significantly greater extent than they anticausativized transitive verbs. Montrul's explanation for this asymmetry is that the learners' initial hypothesis is a "default transitive template," which has all arguments in canonical positions and which is overgeneralized to nonalternating verbs. Like Yip (1995), Montrul assumed that passive unaccusatives result from treating unaccusatives as if they were transitive. However, it may be argued that these errors derive from learners' attempts to mark unaccusativity with overt morphosyntax. Montrul's data do in fact show that L2 learners prefer overt morphological marking with alternating intransitives, although this preference manifests itself in L1-specific ways. For example, Spanish learners of English accept the *get* construction with alternating verbs (e.g., *the window got broken*) more often than Turkish learners, and Turkish learners are more sensitive to the Spanish reflexive markers with intransitive alternating verbs than English learners.

The generalization that can be drawn by research on the acquisition of English unaccusatives is that learners are aware of the unaccusative-unergative distinction, but are confused by the evidence they receive in the input and by the lack of overt unambiguous markers.[12] A similar situation seems to obtain

with learners of other languages in which the evidence for split intransitivity is ambiguous.

Yuan (1996) conducted a study on the acquisition of unaccusativity in Chinese L2 by English-speaking learners. The only syntactic manifestation of the distinction in Chinese is the optional occurrence of the subject of unaccusative verbs in postverbal position; their appearance in this position is further conditioned by the constraint that the NP must be indefinite. The subject of unergative verbs, in contrast, can only appear in preverbal position. However, unergative verbs shift to unaccusative behavior in the presence of a telic expression, as in many other languages. This contrast is shown in (18) and (19) (examples from Yuan). (PF indicates a perfective marker.)

(18) a. *shang ge yue,   san   sou chuan zai zhe ge hai yu   chen le.*
         last   CL month three CL   ship   in   this CL sea area sink PF
         "Last month, three ships sank in this part of the sea."
     b. *shang ge hue,   zai zhe ge hai yu   chen le san   sou chuan.*
         last   CL month in   this CL sea area sink PF three CL   ship
         "Last month, three ships sank in this part of the sea."

(19) a. *ji ge   haizi   zai chuang shang tiao.*
         a few children in   bed   on   jump
         "A few children jumped on the bed."
     b. **zai chuang shang tiao   ji ge   haizi.*
         in   bed   on   jump a few children
         "A few children jumped on the bed."

Chinese is therefore, like Japanese, a language in which the syntactic manifestations of unaccusativity are optional: Unaccusative verbs appear both with subjects in preverbal position and with subjects in postverbal position, and learners get evidence of both constructions. Yuan's (1996) results showed that the majority of subjects in the advanced group (which included some very proficient learners) still have indeterminate judgments about unaccusative verbs: They tend to either accept postverbal subjects with unergative verbs, and with definite subjects of unaccusative verbs, or to reject postverbal subjects across the board.

A recent study on unaccusativity in Japanese was conducted by Hirakawa (1999). A picture verification task and an acceptability judgment test were employed to test English-speaking learners' knowledge of two syntactic diagnostics of unaccusativity: the scope of *takusan* in sentences with null subjects, such as in (8) and (9), and Case drop, which Hirakawa regarded as diagnostics of deep and surface unaccusativity, respectively. The prediction was that the syntactic manifestation of deep unaccusativity would be easier to acquire than that of surface unaccusativity. Hirakawa's results, however, do not present a clear-cut picture. Neither the learners nor the Japanese controls responded as expected on the Case drop test. Native Japanese speakers on the whole tended to reject Case drop with both unergative and unaccusative verbs. The performance on the *takusan* test, although overall more determi-

nate, was to some extent problematic. Several subjects from all groups, including the controls, had to be eliminated because they did not distinguish between (grammatical) *takusan* modifying the direct object of transitive sentences and (ungrammatical) *takusan* modifying the subject of transitive verbs. Of the remaining subjects, many accepted *takusan* as a modifier of the subject of unergative verbs, although on the whole they preferred it as a modifier of the subject of unaccusative verbs.

In sum, both Yuan's (1996) and Hirakawa's (1999) results suggested that learners of languages in which split intransitivity is not overtly and unambiguously marked in the input are aware of the distinction, but have protracted difficulty in learning precisely how unaccusatives and unergatives are differentiated syntactically. The question arises whether, in such a situation, learners would resort to semantic evidence in the process of acquiring the distinction. Would the lexical-semantic features of particular verbs facilitate their classification as unergative or unaccusative?

This question was addressed in a series of studies by Sorace (1993a, 1993b, 1995a, 1995b, 1996, 2000a), which investigated the influence of lexical-semantic features on the acquisition of the syntax of split intransitivity in Italian and French. These studies, based on the Split Intransitivity Hierarchy described earlier, demonstrate that two of the main syntactic manifestations of the unaccusative-unergative distinction in Italian—auxiliary selection and *ne*-cliticization—are lexically constrained and tend to be acquired in a gradient fashion, starting with core unaccusative verbs and gradually spreading to other peripheral verbs. They also show that the distinction is easier to acquire in a language such as Italian, which presents robust and unambiguous evidence, at least with core verbs, in the form of different auxiliaries selected by the two classes of intransitives. French, in contrast, is more opaque and offers more ambiguous and less systematic evidence for the distinction, and, as a result, the distinction is more difficult to acquire. However, Italian peripheral unaccusative and unergative verbs, which are less consistent and often display optionality in auxiliary selection, also cause more difficulty to learners of Italian L2 and are typically acquired at a later developmental stage. Therefore, ease or difficulty in the acquisition of split intransitivity seems to be determined by two factors: one the one hand, the interplay of semantic components and syntactic manifestations; on the other hand, the robustness and lack of ambiguity of the evidence for the distinction.

THE EXPERIMENT

This study aims to explore the interplay of these factors in the acquisition of split intransitivity in L2 Japanese. The research questions investigated were the following:

1. Will L2 learners of Japanese display a differential sensitivity to the unaccusative-unergative distinction depending on the position of monadic verbs on the Split Intransitivity Hierarchy?

2. Will L2 learners of Japanese show more sensitivity to unergative behavior with verbs denoting nonmotional processes and less sensitivity with verbs denoting involuntary processes? Will they display more sensitivity to unaccusative syntactic behavior with verbs denoting change of location and less sensitivity with stative verbs?

Recall that unaccusativity in Japanese is manifested in the grammaticality of some optional constructions, which are ungrammatical with unergative verbs. In operational terms, the research questions stated above thus predict that (a) learners would show a stronger preference for grammatical sentences over ungrammatical sentences with core unergative verbs, and a weaker preference with peripheral unergative verbs; and (b) learners would be better able to recognize the grammaticality of optional constructions with core unaccusative verbs than with peripheral unaccusative verbs.

Subjects

A total of 60 subjects participated in the study: a group of 29 adult native speakers of English who had just started a 9-month Japanese course at an institution in Osaka (postbeginners, henceforth Group 1), and a group of 31 adult native speakers of English who had almost completed a 9-month Japanese course offered at three different institutions in Tokyo (intermediate, henceforth Group 2). The study was conducted at different places because of constraints on the availability of adult native speakers of English who shared a similar background concerning their prior experience with Japanese. All subjects filled in a background questionnaire. Subjects ranged in age between 20 and 27 years; all of them had learned Japanese in a classroom setting at least for two years but with little exposure to Japanese outside the school setting until they came to study in Japan. The difference between Group 1 and Group 2 therefore is that the former had had no previous exposure to Japanese in Japan, whereas the latter had just had a 9-month period of continuous exposure to the language. A control group of 12 native speakers of Japanese (henceforth Group 3) also participated in this study. The controls were tested first and on a wider range of constructions (see section entitled "Materials").

At the beginning of the experiment, all subjects in Groups 1 and 2 took a vocabulary test, aimed to ascertain their familiarity with the lexical items in the task, and a cloze test, designed to ensure that they were at two different levels of proficiency. The cloze test consisted of a short passage in Japanese with six blanks, obtained by deleting every ninth word. Multiple choices were provided for each blank, of which only one was correct. Subjects were asked to choose the appropriate word among those provided. Because of time constraints, the vocabulary test consisted of only 10 of the verbs used as experimental items. Subjects were asked to match each verb with its meaning, provided in English. The results of these tests are shown in Table 1. The analysis of the results shows a significant difference between the two groups in

Table 1. Results of the cloze test and
vocabulary test

Group	Cloze test		Vocabulary test	
	Mean	*SD*	Mean	*SD*
1 (*n* = 29)	2.62	0.78	8.69	2.27
2 (*n* = 31)	3.26	0.86	9.23	1.78

the cloze test ($t = 3.02$, $p < .004$), confirming that they are different in profi-
ciency. No significant difference was found in the vocabulary test ($t = 1.02$, $p <$
.31, *ns*), on which both groups obtained high scores.

Experimental Method

The technique used for the elicitation of acceptability judgments was magni-
tude estimation (ME), a method originally developed in psychophysics and
recently applied to the measurement of linguistic acceptability (Bard, Robert-
son, & Sorace, 1996; Sorace, 1996). The technique consists of asking subjects
to assign any number to the first sentence and then to assign proportional
numbers to successive sentences, so as to reflect the perceived degree of ac-
ceptability of each sentence with respect to the first one. For example, if a
sentence appears to be 10 times as acceptable as the previous one, it should
be given a number 10 times as large. Higher numbers correspond to more ac-
ceptable sentences. Compared with conventional category rating scales, ME
yields data on an interval scale and gives subjects the freedom to set up their
own range and categories of judgments, thus enabling them to make finer dis-
tinctions in their judgments (see Bard, Robertson, & Sorace; and Sorace for
details).[13]

Materials

A total of 134 sentences were presented, consisting of 30 sentences with uner-
gative verbs, 40 sentences with unaccusative verbs, and 64 sentences that in-
cluded other types of constructions that will not be discussed in this paper.
Three verbs from each of the categories along the Split Intransitivity Hierar-
chy were employed.[14] These verbs are presented in Appendix A.

   The native controls were tested on two diagnostic tests: Quantifier Floating
(QF) and Case Drop (CD). Their performance on the CD test revealed that the
natives generally did not accept this construction as optionally possible with
any verb category (see Table 2).[15] It was therefore decided to test the learners'
knowledge of QF only. For each unergative verb, there was a grammatical sen-
tence without QF ([−QF]) and an ungrammatical sentence with QF ([+QF]). For
each unaccusative verb, there were two grammatical [+QF] and [−QF] sen-

Table 2. Group 3 (natives): Mean acceptability judgments on Case drop sentences

Verb types	Non–Case drop		Case drop	
	Mean	*SD*	Mean	*SD*
Unergative				
Nonmotional process	2.96	1.12	2.33	1.12
Motional process	2.77	1.22	2.10	1.07
Bodily function	2.95	1.10	2.40	1.09
Involuntary reaction	2.98	1.11	2.33	1.17
Emission	3.06	1.04	2.77	1.02
Unaccusative				
Change	3.03	1.06	2.61	1.00
Appearance	3.11	0.99	2.69	0.96
Preexisting condition	3.07	1.03	2.73	0.94
State	3.02	1.05	2.68	1.08

tences. Sentences were presented in random order. Some examples are shown in (20) and (21).

(20) Unergative:
  a. *Shoonen-ga sannin umi-de oyoi-da.* [–QF]
     boy-NOM 3CL sea-in swim-PAST
     "Three boys swam in the sea."
  b. **Shoonen-ga umi-de sannin oyoi-da.* [+QF]
     boy-NOM sea-in 3CL swim-PAST
     "Three boys swam in the sea."

(21) Unaccusative:
  a. *Kyaku-ga futari kaijyou-kara sat-ta.* [-QF]
     guest-NOM 2CL event-hall-from leave-PAST
     "Two guests left the event hall."
  b. *Kyaku-ga kaijyou-kara futari sat-ta.* [+QF]
     guest-NOM event-hall-from 2CL leave-PAST
     "Two guests left the event hall."

Procedure

The subjects were presented with the sentences in isolation, one at a time on an overhead projector screen. Sentences had also been recorded on tape, and subjects listened to them as they appeared on the screen. There was an interval of 7 seconds between one sentence and the following one. Subjects were provided with written instructions (in English for the learners and in Japanese for the controls) at the beginning of the experimental session. They had a short practice session in which they were asked to judge line lengths (see Bard, Robertson, & Sorace, 1996, for details), so that they could familiarize themselves with the concept of proportionality. The instructions included sev-

eral examples of sentences with intermediate grammaticality (illustrating grammatical aspects irrelevant to the experiment). Subjects were encouraged to ask clarification questions before starting the experiment.

Analysis

The data were log-transformed and all mathematical and statistical operations were performed on the log scores.[16] A three-way repeated measures ANOVA was performed on unaccusative sentences and unergative sentences separately. For both unergative and unaccusative verbs, variables were verb type, construction, and proficiency group. Further ANOVAs were performed on the results for each group, on both unergative and unaccusative verbs. If the ANOVA showed a significant effect or interaction, post hoc pairwise comparison tests were performed on the means to determine the location of the difference. Comparisons were performed both within categories and across categories for each group. The results of the control group (Group 3) on the CD test were analyzed separately. Only the significant differences at a minimum significance level of $p < .05$ will be reported here.

A preliminary analysis of the data revealed no significant differences among the first three categories of unaccusative verbs: verbs of change of location, directed motion, and change of state for any group; these categories were therefore combined into a single category "verbs of change." Similarly, no significant differences were obtained among the last three categories: verbs of concrete state, simple position, and abstract state; these verbs were therefore combined into a single category "verbs of state."[17] ANOVAs and pairwise comparisons of means were therefore performed on these combined categories. The following sections report these results. (Descriptive statistics can be found in Appendix B.)

RESULTS

Unergative Verbs

A graphical representation of the judgments of the three groups on unergative verbs is shown in Figures 2, 3, and 4. Recall that quantifier floating is ungrammatical with unergatives. The graphs indicate that the judgments on the five types of unergative verbs were not the same in any group. The controls (Group 3) clearly differentiate between [–QF] sentences and [+QF] sentences, accepting the former and rejecting the latter (Figure 4). Moreover, they reject QF with verbs of nonmotional process and verbs of motional process significantly more forcefully than with the other three verb types, as predicted. Verbs of emission appear to be the least determinate of the five types: Sentences with QF are more acceptable with this verb type than with any other.

Although the controls do not make a distinction between verbs denoting nonmotional and motional processes, judging both verbs in [+QF] sentences
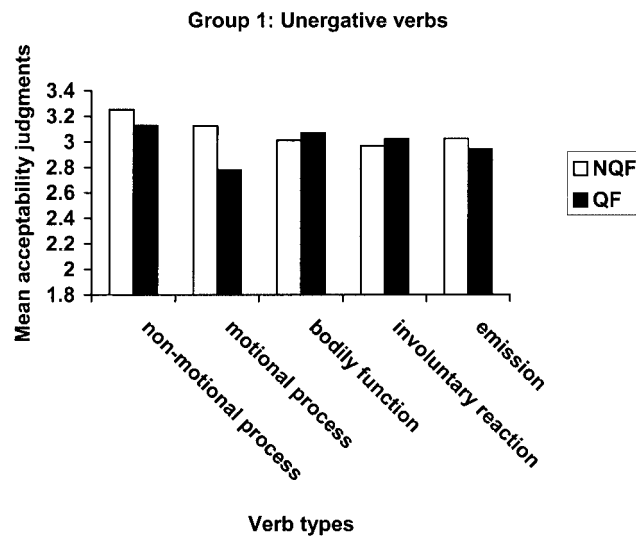
Group 1: Unergative verbs

Figure 2. Group 1 (postbeginner): Mean acceptability judgments on unergative verbs (NQF = without quantifier floating; QF = with quantifier floating).
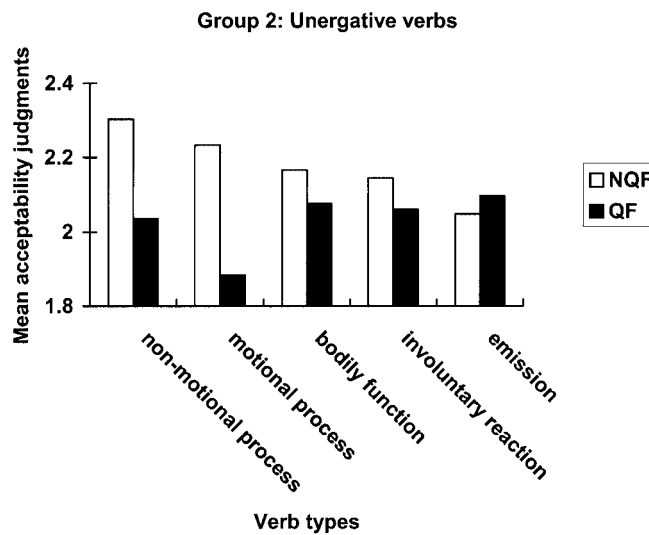
Group 2: Unergative verbs

Figure 3. Group 2 (intermediate): Mean acceptability judgments on unergative verbs (NQF = without quantifier floating; QF = with quantifier floating).
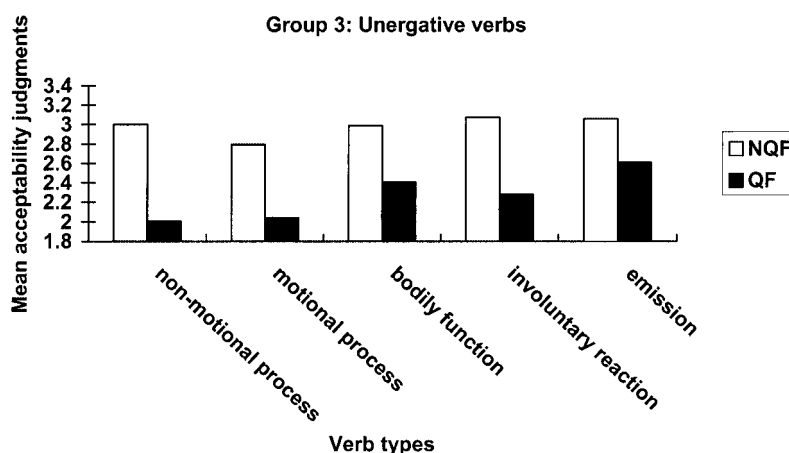
Figure 4. Group 3 (native): Mean acceptability judgments on unergative verbs (NQF = without quantifier floating; QF = with quantifier floating).

as strongly ungrammatical, the two learner groups tend to judge [+QF] sentences with motional verbs as more ungrammatical than [+QF] sentences with nonmotional verbs (Figures 2 and 3), contrary to prediction. There is some progress between Group 1 and Group 2 in terms of their knowledge: Although Group 1 does not distinguish between [+QF] and [−QF] sentences, except with motional verbs, Group 2 shows the correct preference with all verbs, with the exception of emission verbs, for which the preferences are reversed. However, the differences between grammatical and ungrammatical sentences are significant only for nonmotional and motional process verbs; this is also consistent with the predictions.

This overall picture is borne out by the statistical analyses. The general ANOVA produces a main effect of verb type, $F(4, 69) = 2.96$, $p < .02$, a main effect of group, $F = (2, 69) = 4.81$, $p < .03$, a significant interaction of construction with group, $F(1, 69) = 7.88$, $p < .007$, and a significant interaction of verb type with group, $F(4, 69) = 3.21$, $p < .02$; this confirms that the three groups differ in their judgments on the unergative verbs and that they distinguish among verb types but not across the board. The ANOVA for Group 1 shows a main effect of verb type, $F(4, 28) = 3.79$, $p < .02$, a main effect for construction, $F(1, 28) = 4.52$, $p < .04$, and a tendency toward a significant interaction of verb type with construction, $F(4, 28) = 2.84$, $p < .03$. Pairwise comparisons for judgments on ungrammatical [+QF] sentences produce a within-type significant difference only for verbs of motional process. This verb type clearly is the most determinate for the postbeginners.

The ANOVA for Group 2 shows a main effect of construction, $F(4, 30) = 8.49$, $p < .007$, and a significant interaction of verb type and construction, $F(4,$

30) = 6.95, $p < .0001$, thus confirming that intermediate subjects distinguish between [+QF] and [−QF] only with some verb types. Within-type differences between [+QF] and [−QF] are significant for both nonmotional and motional process verbs. Compared to Group 1, Group 2 subjects appear to have acquired the correct knowledge of unergativity with the two types that were predicted to be most salient.[18] A similar pattern of responses is exhibited by the controls. The ANOVA for Group 3 produces a main effect of verb type, $F(4, 11) = 5.96$, $p < .013$, and a main effect of construction, $F(1, 11) = 7.42$, $p < .02$. Pairwise comparisons of means yield significant differences between [+QF] sentences and [−QF] sentences for all verb types. This indicates that the natives, as predicted, know that [+QF] sentences are ungrammatical with unergative verbs. However, they do not judge all verb types in the same way: [+QF] with verbs of emission is more acceptable to them than [+QF] with the other verb types.

Comparisons of mean judgments on ungrammatical [+QF] sentences across verb types in fact produce the following pattern of significant differences:

1. Group 1: nonmotional process vs. motional process; nonmotional process vs. emission; nonmotional process vs. bodily function.
2. Group 2: motional process vs.bodily function; motional process vs. involuntary reaction; motional process vs. emission.
3. Group 3: nonmotional vs. bodily function; nonmotional vs. emission; motional vs. bodily function; motional vs. emission; bodily function vs. involuntary reaction.

This pattern of across-type differences suggests that the native Japanese subjects make finer distinctions among verb types, consistent with the Split Intransitivity Hierarchy and with the predictions of this study. Increase in proficiency and in the amount of exposure to Japanese determine an increase in the ability to perceive the differences among verb types, in the direction of the native pattern.

Unaccusatives

Figures 5, 6, and 7 show the mean acceptability judgments of the three subject groups on unaccusative verbs. The graphs indicate a rather uneven pattern of responses. The native controls (Figure 7) accept both [+QF] and [−QF] sentences only with verbs of appearance and verbs denoting a preexisting state; however, they have a marked preference for [−QF] sentences not only with stative verbs, as predicted, but also with verbs of change, contrary to prediction. The postbeginner subjects in Group 1 (Figure 5) accept both [+QF] and [−QF] sentences with verbs of change and assign a slightly higher acceptability value to this verb category, as predicted. Their judgments on the other verb types, however, do not show the expected gradience. The intermediate subjects in Group 2 (Figure 6) have a slight preference for [−QF] sentences with verbs of change, verbs of preexisting state, and verbs of state. They also
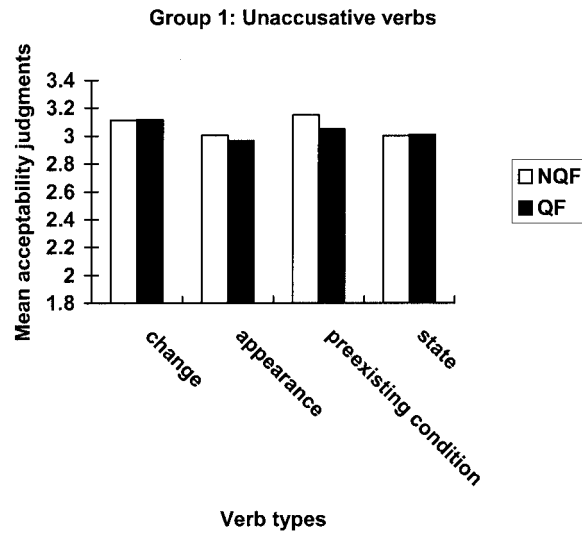
Group 1: Unaccusative verbs

Figure 5. Group 1 (postbeginner): Mean acceptability judgments on unaccusative verbs (NQF = without quantifier floating; QF = with quantifier floating).
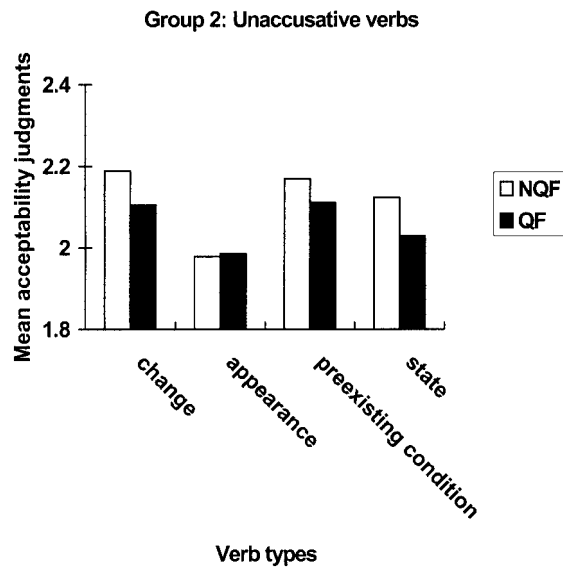
Group 2: Unaccusative verbs

Figure 6. Group 2 (intermediate): Mean acceptability judgments on unaccusative verbs (NQF = without quantifier floating; QF = with quantifier floating).
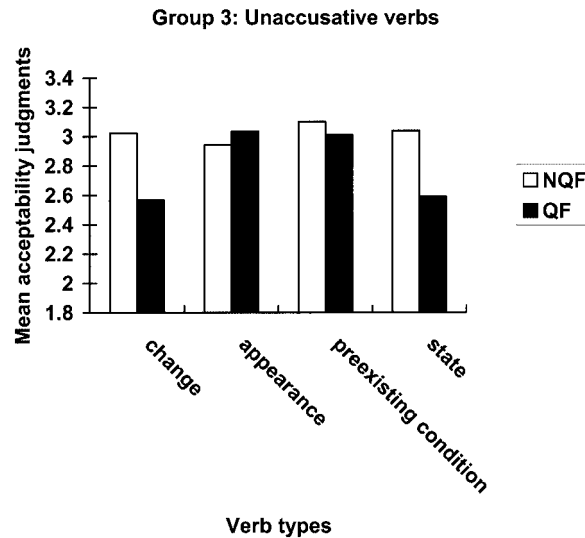
Group 3: Unaccusative verbs

Figure 7. Group 3 (native): Mean acceptability judgments on unaccusative verbs (NQF = without quantifier floating; QF = with quantifier floating).

accept both sentences with verbs of appearance, but their judgments on this verb category are less determinate. The overall ANOVA confirms the difference among groups, giving both a main effect of group, $F(2, 69) = 9.04$, $p < .004$, a main effect of verb type, $F(3, 69) = 6.53$, $p < .0001$, and a significant interaction of verb type and group, $F(3, 69) = 5.18$, $p < .004$. There is no main effect of construction, nor is there an interaction of construction with verb type or construction with group, which confirms that both sentence types are generally judged in the same way by all groups.

A separate ANOVA for Group 3 produces main effects for verb type, $F(3, 11) = 5.96$, $p < .002$, and construction, $F(1, 11) = 11.08$, $p < .007$, as well as an interaction of verb type with construction, $F(3, 11) = 9.63$, $p < .004$. This confirms that the native Japanese distinguish between [+QF] and [−QF], despite the fact that both constructions are grammatical with unaccusative verbs; however, they do so only with some verb types: namely, verbs of change and verbs of preexisting state, as confirmed by the significant within-type differences ($p < .05$) obtained for these verbs in the pairwise comparisons. The ANOVA for the postbeginners shows no significant main effects or interactions for any variable, whereas the ANOVA for Group 2 shows only a significant main effect of verb type, $F(3, 30) = 5.81$, $p < .001$. The indeterminacy of the judgments of Group 1 is thus confirmed. Pairwise comparisons of means for Group 2 indicate a significant within-type difference for stative verbs and sig-

nificant across-type differences between [+QF] sentences with verbs of appearance and [+QF] sentences with each of the other three verb types.

DISCUSSION AND CONCLUSIONS

Let us now return to the research questions that underlie this study, which are repeated here for convenience:

1. Will learners of Japanese display a differential sensitivity to the unaccusative-unergative distinction depending on the position of monadic verbs on the Split Intransitivity Hierarchy?
2. Will learners of Japanese show more sensitivity to unergative syntactic behavior with verbs denoting nonmotional processes and less sensitivity with verbs denoting involuntary processes? Will they display more sensitivity to unaccusative syntactic behavior with verbs denoting change of location and less sensitivity with stative verbs?

The Split Intransitivity Hierarchy has been found to account for systematic variation, both in synchronic and in developmental terms, within the syntactic classes of unaccusative and unergative verbs in a range of Western European languages. This study was in part exploratory because there was no previous evidence that the Split Intransitivity Hierarchy is valid outside these languages. However, to the extent that the development of knowledge of unaccusativity-unergativity in these languages has been found to be consistent with the gradient semantic-aspectual dimensions embodied by the hierarchy, it seemed legitimate to hypothesize that a different language like Japanese might conform to a similar developmental pattern. It seemed even more plausible to advance this hypothesis given that Japanese does not have unambiguous and categorical morphosyntactic markers that identify the two classes of unaccusative and unergative verbs: All major manifestations of the distinction consist of optional constructions allowed by unaccusative verbs. In this situation, learners might have to rely more on semantic evidence in their attempt to make sense of the optionality in the input.

The results of this study bear out the predictions as far as unergative verbs are concerned. Native Japanese speakers do not distinguish between verbs denoting nonmotional processes and verbs denoting a motional process (unlike Italian speakers), but seem to judge both categories as core, to the extent that they have clear and determinate judgments about the ungrammaticality of these verbs with QF.[19] In contrast, they have less determinate intuitions about the ungrammaticality of QF with other unergative verb types and express the least determinate judgments on verbs of emission. The learners do not exhibit the same gradience in their judgments as the native speakers, but they seem to develop in the direction of the native pattern. Their starting point is the verbs of motional process, rather than the verbs of nonmotional process—a fact that deserves further investigation.

The overall pattern of responses on unaccusative verbs is less readily inter-

pretable. The native subjects are on the whole more willing to accept [+QF] sentences with unaccusative verbs than with unergative verbs. However, they have a strong, and unexpected, preference for [−QF] sentences with verbs denoting change, as well as with verbs denoting states. Whether this is a more general pattern will have to be verified with more subjects in future research. Whereas the stronger rejection of [+QF] sentences with stative verbs can be easily accounted for in terms of the Split Intransitivity Hierarchy (given the peripheral status of these verbs), the tendency to reject [+QF] with verbs of change invites some further considerations. 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 [±] agentivity is a crucial determinant of split intransitivity, one consequence might be that syntactic diagnostics such as QF are particularly sensitive to agentivity, in a similar way as the impersonal passive construction in Dutch and German (which is supposed to be impossible with unaccusative verbs but is in fact not completely disallowed by a sizable number of them; see Seibert, 1993; Zaenen, 1993) has been found to be sensitive to this factor.

Within the interface approach adopted in this paper, the lexical semantic characteristics of verbs interact with their syntactic properties; so the appearance of a verb in a particular syntactic configuration is a necessary, but not a sufficient, condition for the verb to satisfy a particular diagnostic. Because some change-of-location verbs, in particular, may be construed as denoting an event initiated by a volitional agent, they oscillate between an unaccusative and an unergative classification, which is reflected in the native Japanese speakers' high rate of rejection of [+QF] sentences. In the context of this study, this cannot be more than a speculation because the experiments did not control for agentivity. More research is needed to explore this issue further.

The postbeginner learners seem to have indeterminate judgments about all verb types in [+QF] and [−QF] constructions. Although this lack of preferences might be taken, at first sight, as evidence of knowledge of the grammaticality of [+QF] with unaccusative verbs, consideration of their very similar lack of preferences with unergative verbs suggests that, overall, learners at this stage do not know the correct pattern of distribution of QF in Japanese. Exposure to Japanese does not seem to improve judgments substantially, although the pattern of preferences for Group 2 is more differentiated and reveals the emergence of a preference for [−QF] sentences, which is also found in the native judgments. This preference reaches significance only with respect to stative verbs. It is of course possible that more prolonged exposure to Japanese might further change this pattern and cause convergence between the nonnative and the native patterns of knowledge. This can be ascertained only by future research with more advanced learners. However, this study has revealed a contrast between unergative and unaccusative verbs at the low-intermediate stage of the developmental continuum: Knowledge of unergative verbs is acquired earlier than knowledge of unaccusative verbs.[20] A potential explanation for this contrast is the nature of the evidence that learn-

ers receive. Unaccusative verbs in Japanese are characterized by syntactic optionality, whereas unergative verbs are not. Previous research has shown that learners are potentially confused by optionality in the input: They may show an absolute preference for one of the options, effectively replacing optional choices with categorical ones, or they may exhibit prolonged indeterminacy in their interlanguage grammars (see Henry, 1997; Papp, 2000; Sorace, 1993a, 2000b). This study cannot tell whether learners of L2 Japanese eventually come to internalize the optionality that they notice in the input; more research with advanced and near-native learners will provide an answer. The tentative conclusion that can be drawn from this study is that learners rely on lexical-semantic features of verbs in acquiring the syntactic manifestations of split intransitivity, and they do so in similar ways to learners of Romance languages. However, the robustness and consistency of the input to which they are exposed plays a role in determining how fast and efficiently they approximate nativelike knowledge.

NOTES

1. Notice that the addition of a "fake reflexive object" to an unergative verb makes the sentence grammatical (*John shouted himself hoarse*). This confirms that the grammaticality of this construction is dependent on the syntactic configuration of the sentence in which it appears.

2. Approaches such as van Valin (1990) and Dowty (1991) emphasize the semantics of unaccusativity but at the same time downplay the importance of the syntax. Both authors have significantly contributed to an understanding of telicity and agentivity as important determinants of split intransitivity, as one anonymous SSLA reviewer has pointed out. However, they argued that a syntactic characterization of the phenomena related to split intransitivity is unnecessary. In contrast, the position taken in this paper is that split intransitivity lies at the lexical semantics-syntax interface: To put it in Levin and Rappaport Hovav's (1995) words, it is "syntactically encoded and semantically determined."

3. "Binary" in this context means that a verb can be either unaccusative or unergative, but not something in between. On the other hand, some aspectual properties of verbs, such as telicity, can be gradient (see Hey, Kennedy, & Levin, 1999; Sorace, 2000a).

4. A reviewer notes that we "employ two types of lexical semantic vocabulary which seem potentially confusing . . . telicity and agentivity, which are the basis of the Split Intransitivity Hierarchy, on the one hand, and semantic classes of verbs such as 'change of location' and 'controlled motional process,' on the other hand." Although telicity and agentivity do in fact underlie the Split Intransitivity Hierarchy, the finer differentiation among verb classes reflects the fact that the two notions are a matter of degree. So it is not particularly revealing to say that telic verbs are unaccusative or that agentive verbs are unergative: verbs of change of location are inherently telic, whereas verbs of indefinite change may or may not be construed as telic; verbs of nonmotional activity tend to be strongly agentive, whereas verbs of emission have a causer which is not a volitional agent. The more clearly a verb denotes one or the other notion, the stronger its syntactic status as unaccusative or unergative.

5. Peripheral verbs have a more unstable event-type structure and are therefore more susceptible to event-type shifts and variable behavior (see Sorace, 2000a, for discussion; Levin & Rappaport Hovav, 1995, on verbs of emissions as members of the category of "verbs with multiple meanings"; McClure, 1995, on the inherent variability of stative verbs). The hierarchy in Figure 1 portrays the fact that noncore verbs may receive multiple argument realizations, depending on how they are conceptualized. Thus, these verb classes do not display stable syntactic behavior across languages: They may be unaccusative in some languages and unergative in another. They may also show variable behavior within individual languages, for example, by allowing the syntactic characteristics of both unaccusative and unergative verbs.

6. One anonymous reviewer asks about the status of verbs denoting a telic change of location and verbs of indefinite motional change that, the reviewer argues, present both features of telicity

and agentivity. The Split Intransitivity Hierarchy does not predict that these two features are mutually exclusive. Rather, it predicts that verbs on the unaccusative end are characterized primarily (and to varying degrees) by telicity, and only secondarily (to a degree inversely proportional to their proximity to the core) by agentivity. Verbs on the unergative end are defined primarily by atelicity and (to varying degrees) by agentivity. So verbs of change of location can (but need not) be agentive; though in many languages this does not affect their syntactic status as unaccusative verbs. It is possible, however, that agentivity is a more prominent determinant of split intransitivity in Japanese (see Kishimoto, 1996), and that it may be a syntactically more relevant factor for unaccusativity than in Western European languages.

7. However, there is already evidence that partitive *ne*-cliticization in Italian tends to follow the same pattern (Sorace, 1995, 2000a).

8. Detailed accounts of the resultative construction in Japanese can be found in Tsujimura (1990c, 1991, 1994); for English, see Simpson (1983) and more recently Tenny (1994) and Levin and Rappaport Hovav (1995). Essentially, this construction singles out the class of dyadic verbs of change of state and acts as a further delimiter of the change denoted by the verb. Because of its semantics, the construction excludes both verbs of inherent directed motion, which are inherently delimited (but see Tortora, 1998, for counterarguments), and stative verbs, which imply no change. The *te-iru* construction has been extensively analyzed by Takezawa (1991) and McClure (1995). This construction is available with both unaccusative and unergative verbs, but with different aspectual meanings: With unergatives it has a progressive interpretation, but with unaccusatives it has a resultative interpretation. According to Kishimoto (1996), deverbal nominalizations with *kake* are subject to the "direct object constraint" but also to the semantic constraint that the argument modified by the deverbal nominal phrase must not be a volitional agent. Additionally, the aspectual nature of the prefix *kake* limits the construction to verbs that express an event that lasts for a certain period of time, or that can be characterized as being about to happen. Stative verbs as well as punctual achievement verbs are therefore nonfelicitous with this construction.

9. As Culicover (1997) pointed out, there are different ways of implementing the idea of an obligatory c-command relation between the NP and the NQ that modifies it. If the NQ is adjoined to the VP, then it c-commands everything within the VP (see Culicover for details).

10. These conditions are essentially identification requirements that require that every subevent introduced through template augmentation correspond to a lexical head, and every participant in the subevent correspond to a syntactic argument.

11. The extent to which English presents poor evidence for split intransitivity is actually debatable. According to Levin and Rappaport Hovav's (1995) comprehensive account of unaccusativity in English, the only reliable diagnostic is the resultative construction. Other types of evidence that have often been discussed in the literature, such as the locative inversion and the *there*-inversion constructions, are not reliable because they are also allowed by a subset of unergative verbs. However, it may be argued that the unergatives that figure in the construction are used to denote general properties of the argument, rather than processes, and that the presence of the locative expression might be claimed to cause the syntactic reclassification of these verbs as unaccusatives. If this were the case, the locative inversion construction may be regarded as a valid diagnostic of unaccusativity that singles out all classes of monadic verbs (see Sorace, 2000a, for discussion).

12. Learners may be aware of the unaccusative-unergative distinction because this is a language universal that they come to expect in the L2 (see Hawkins, 2001, for a similar suggestion).

13. The advantage of magnitude estimation is that, because ratio-scale judgments subsume interval scales, it becomes possible to measure differences in acceptability between the number assigned to one stimulus and that assigned to another. This is a direct measurement of the subjects' preference for one sentence over another. It is important to bear in mind that subjects can use their own scales and typically start from very different numbers (unless they are given a modulus, or a fixed number, to begin with). What matters is therefore not the range of numbers used but rather the ratio judgments expressed. The subjects in the present study used different scales, and Group 2 probably used a narrower range of numbers than the other two groups. However, this difference is not informative; the ratios between one stimulus and another, on the other hand, are relevant.

14. The category of stative verbs of abstract or mental state includes only two verbs because one of the stimuli was repeated by mistake.

15. However, the pattern of judgments on CD with unergative verbs points in the direction predicted by the Split Intransitivity Hierarchy: Sentences including [+CD] tend to be judged as more acceptable with verbs of emission, although the interaction between verb type and construction misses significance, $F(4, 11) = 2.81$, $p < .07$, *ns*.

16. This procedure is standard in the statistical treatment of magnitude estimation results and

has the purpose of reducing the variance that tends to characterize the data (see Bard, Robertson, & Sorace, 1996; Lodge, 1981).

17. This by itself does not necessarily disconfirm the hypothesis of this study. Recall that not all languages are predicted to distinguish all the verb types along the Split Intransitivity Hierarchy. In fact, studies on Dutch (Sorace & Vonk, 1998) and German (Keller & Sorace, 2000) show that native speakers of these languages do not distinguish between change-of-location and change-of-condition verbs. The fact that native Japanese speakers do not distinguish among different types of stative verbs is somewhat surprising. It has been argued in the literature that Japanese has fewer real stative verbs than other languages. In fact, only the verbs in the original category "concrete states" have been identified as unambiguously stative, as shown by the fact that they do not allow the *te-iru* construction (see McClure, 1995, for discussion). These verbs were therefore expected to be judged differently from verbs denoting position or mental states.

18. A reviewer commented that QF with nonmotional verbs is not clearly rejected. Although it is true that QF with these verbs is judged on the whole less ungrammatical than QF with motional verbs, [−QF] sentences with nonmotional verbs are judged as significantly more grammatical than their [+QF] counterparts. This indicates that Group 2, compared to Group 1, has more targetlike knowledge.

19. One anonymous reviewer asks what "determinate" means. Determinacy, in this context, is taken to be the ability to clearly differentiate between correct and incorrect versions of the same sentence type, that is, to clearly accept the correct version and clearly reject the incorrect version.

20. A reviewer objected that "as QF is a feature of unaccusative verbs in Japanese, the rejection of this unaccusative feature in sentences with unergative verbs does not necessarily mean that learners have acquired the knowledge of unergative verbs." This objection, however, does not take into account the difference between features that are (optionally) possible, such as QF with Japanese unaccusative verbs, and features that are categorically excluded, such as QF with Japanese unergative verbs. Knowledge of ungrammaticality has long been identified as a reliable indicator of L2 development (see Sorace, 1996, for discussion); this is in fact the position taken in this paper.

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APPENDIX A

LIST OF VERBS IN THE JUDGMENT TEST

Unergative:

Controlled nonmotional process:	*utau* "sing," *asobu* "play," *matsu* "wait"
Controlled motional process:	*oyogu* "swim," *aruku* "walk," *hashiru* "run"
Uncontrolled process	
(bodily function):	*asebamu* "sweat," *haku* "vomit," *sekikomu* "cough"
(involuntary reaction):	*furueru* "shiver," *yureru* "tremble," *guratsuku* "waver"
(emission):	*hikakru* "flash," *kagayaku* "shine," *niou* "smell"

Unaccusative:

Change of location:	*tuku* "arrive," *kuru* "come," *saru* "leave"
Change of condition	
(directed motion):	*noboru* "ascend," *susumu* "advance," *agaru* "rise"
(change of state):	*kusaru* "rot," *kuchiru* "decay," *shioreru* "wilt"
(appearance):	*arawareru* "appear," *okoru* "happen," *shojiru* "arise"
Continuation of preexisting	
condition:	*todomaru* "stay," *tuduku* "continue," *nokoru* "remain"
Existence of a condition	
(concrete states):	*aru* "be," *iru* "need," *sonzai-suru* "exist"
(simple position):	*yokotawaru* "lie," *motareru* "lean," *shagamu* "crouch"
(abstract or mental state):	*yorokubu* "please," *maniau* "suffice"

APPENDIX B

Table B1.   Mean acceptability judgments on different verb types

Verb types	Group 1 NQF Mean	SD	Group 1 QF Mean	SD	Group 2 NQF Mean	SD	Group 2 QF Mean	SD	Group 3 NQF Mean	SD	Group 3 QF Mean	SD
Unergative												
Nonmotional process	3.25	1.32	3.13	1.27	2.30	1.07	2.04	1.14	3.00	1.09	2.01	1.44
Motional process	3.13	1.29	2.78	1.40	2.23	1.07	1.88	1.03	2.79	1.20	2.04	1.48
Bodily function	3.01	1.16	3.07	1.13	2.17	1.05	2.08	1.02	2.99	1.08	2.41	1.26
Involuntary reaction	2.97	1.18	3.02	1.42	2.15	1.10	2.06	1.01	3.08	1.02	2.29	1.42
Emission	3.03	1.32	2.94	1.27	2.05	1.06	2.10	1.10	3.06	0.98	2.61	1.33
Unaccusative												
Change	3.11	1.17	3.12	1.23	2.19	1.15	2.11	1.07	3.02	1.09	2.57	1.32
Appearance	3.01	1.19	2.97	1.24	1.98	1.07	1.99	1.03	2.94	1.12	3.03	1.16
Preexisting condition	3.15	1.24	3.05	1.31	2.17	1.10	2.11	1.06	3.10	1.04	3.01	1.17
State	3.00	1.24	3.01	1.26	2.12	1.03	2.03	1.07	3.04	1.09	2.59	1.25

Note. NQF = without quantifier floating; QF = with quantifier floating.