Phonomimesis and directional predication in the acquisition of L1 Japanese and L2 English

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1 Introduction

Although mimetic forms have been much commented upon in studies of Japanese, such observations have generally been descriptive (e.g. Shibatani, 1990), pedagogically oriented (e.g. Akutsu, 1994), or playful (e.g. Galef, 1984). Only recently has the question been addressed of how such forms might be formally integrated into syntax to enable their productive use in language beyond isolated interjections (e.g. Akita, to appear; Kageyama, 2007; Tsujimura, 2005). The current paper adopts a fresh perspective on the syntax of sound symbolism, examining the knowledge language learners have of plausibly universal constraints on the integration of phonomimesis (onomatopoeia) into the syntax of motion events. In the following section, brief descriptions are given of the relevant phenomena in Japanese and English, in terms of both lexicalization and syntactic environments. Section 3 sets out posited universals in the syntax of motion events, in order to elaborate a framework in which the grammatical properties of phonomimesis can be made transparent. In Sections 4 and 5, two experi-

ments are discussed whose results bear on this issue. Elicited production data from a comparative first language (L1) experiment suggest that Japanese and English children reveal very early knowledge of arguably universal principles at work in the syntax of motion events; they know that directionality must be syntactically coerced, invariably merging mimetic expressions (whether in main predicates, complex predicates or adjuncts) with inherently directional verbs (V) or pre/postpositions (P) in directional contexts. In a distinct set of experiments, judgment data from a preference task and grammaticality judgment task suggest that both Japanese and Korean adult second language (L2) learners of English are able to successfully integrate phonomimesis into syntax in the form of prepositional modifiers; they do so throughout the proficiency range, even through this option is not available in the L1, and despite a poverty of the stimulus. Taken together, these results indicate a knowledge of syntactic universals on the part of both children and adult learners. This research was conducted with a focus on broader questions of comparative syntax and acquisition, rather than on sound symbolism in particular; the results bearing on phonomimesis highlight the need to expand research on motion events to specifically incorporate the expression of Manner of motion through mimesis.

2. Relevant forms of onomatopoeia in Japanese and English

2.1 Japanese mimetics

There is general agreement that Japanese mimetics may be divided into three general types: *giseigo (giongo)* 'phonomimes', *gitaigo* 'phenomimes', and *gishougo* 'psychomimes' (e.g. Ono, 1994; Shibatani, 1990). Examples of each are given below.

(1) *giseigo* 'phonomimes': sounds

pata pata: flapping wings	*pachin*: pow
zaa zaa: pouring rain	*botchaan*: splash

(2) *gitaigo* 'phenomimes': external states, conditions or manners

niko niko: smiling	*kira kira*: sparkling
munya munya: chubby	*pittari*: fitting perfectly

(3) *gishougo* 'psychomimes': internal states or sensations

ira ira: nervous	*ziin*: poignant
uki uki: happy	*hatto*: relief

As can be seen from the examples, many but not all forms involve reduplication. Both reduplicated and simple forms often exhibit variation in terms of voicing opposition and vowel quality, which is used to express differences in degree or duration (e.g. *hyu hyu* 'breeze' → *pyu pyu* 'wind'

→ *byu byu* 'gale'; *kasa kasa* 'light rustling'; *gasa gasa* 'heavy rustling'), or carries negative implications (e.g. *kira kira* ' sparkling' → *gira gira* 'gaudy'; *sittori* 'refreshingly wet' → *zittori* 'uncomfortably humid'). Shibatani (1990: 153-157) observes that they may function as adverbs, often with the particles *to* or *ni* or the affix *–te* or as adjectives with *na*; they may appear in complex predicates with light verbs such as *suru* 'do' or the copula *da*. Mimetic forms are not directly lexicalized as verbs, although verbs can serve as a source of such forms (e.g. *masu* 'increase, grow' → *masu masu* 'more and more'; *naderu* ' stroke' → *nade nade* 'stroking'). Tsujimura (2005: 144) argues that 'mimetic words inherently do not have categorial status', so that syntactic interpretation of mimetic terms is wholly dependent on the functional elements with which they combine (case markers, particles, light verbs, etc.). Of the various perspectives that could be taken on the issue of their integration into syntax, recent research has emphasized constructionism (Tsujimura, 2005), the possible import of iconicity for particular lexicalization patterns (Akita, to appear), and transitivity across classes of mimetic verb constructions (Kageyama, 2007).

The focus here is on the incorporation of phonomimesis into the syntax of motion events; to this end, a further use of mimetic forms is particularly relevant. Whereas a language such as English has distinct verbs to express the Manner of a particular action, Japanese often expresses Manner through mimesis, as shown in the following examples.

(4)

	cry	*waa waa naku*	laugh	*ha ha to warau*
	weep	*meso meso naku*	smile	*niko niko to warau*
	sob	*kusun kusun naku*	chuckle	*kutsu kutsu to warau*
	blubber	*oi oi naku*	giggle	*gera gera to warau*
	whimper	*shiki shiku*	titter	*kusu kusu to warau*
	howl	*wan wan naku*	grin	*nikori to warau*

(adapted from Shibatani, 1990: 155)

Given the importance of Manner in the syntax of motion events, regardless of theoretical framework, there is clearly a need to extend studies of Manner so that mimesis is taken into account.

2.2 English onomatopoeia: Sound emission in verbs and modifiers

Unlike in Japanese, sound emission in motion events is frequently encoded in matrix verbs in English. The class of predicates known as verbs of sound emission is quite large, and includes lexical items such as the following.

(5) *babble, bang, boom, burble, clack, clang, crash, creak, patter, ping, plonk, purr, rattle, ring, roar, rustle, scream, screech, splash, swish, tick, tinkle, tootle, trill, wheeze, whir, whistle, whoosh….*

These verbs share certain commonalities. Most can be used with directional PPs (*The hedgehog rustled though the leaves*; *The actress swished into the room*). They form adjectives with *-ing* but not adjectival passives (*pattering feet/*pattered feet*). They are found as zero-related nominals (*a scream*) and agentive nominalization is productive (*a screamer*). Vowel alternations may indicate degree, as in *splish*, *splash*, *splosh*, *sploosh*. However, it is not at all clear that they form a transparent class in terms of their syntactic behavior. The most detailed investigations of such predicates have been conducted by Beth Levin and her colleagues (e.g. Levin, 1993; Levin, Song & Atkins, 1997). The results of these surveys reveal that some verbs of sound emission may be found in the locative alternation (*Fireworks boomed in the sky/The sky boomed with fireworks*) and some may not (*Mice creaked in the attic/*The attic creaked with mice*). Some may be found in the causative alternation (*The alarm rang/I rang the alarm*), and some may not (*The truck rumbled/*I rumbled the truck*). A more fine-grained classification is clearly necessary. Levin, Song and Atkins (1997) argue that participation in the causative alternation is dependent on whether the verb encodes an internally or externally caused event, which appears to capture most of the restricted forms (compare *The bell tinkled / I tinkled the bell* vs. *The bird screeched / *I screeched the bird*), although more research is clearly necessary to explain all the differences in syntactic environments associated with these verbs.

Another means of integrating onomatopoeia into the syntax of motion events is in the form of prepositional (P-) modifiers (Stringer, 2005b; Stringer, Burghardt, Seo and Wang, 2009), as shown below.

(6) a. Paddy drove [crash into the tree]].
b. *Paddy drove [into crash the tree].
c. [Crash into the tree] drove Paddy.
d. *[Into the tree] drove crash Paddy.

In the above examples, in the absence of inserted pauses, constraints on movement reveal that the onomatopoeic form *crash* is not a verbal particle, but a P-modifier in a fixed position within the PP constituent.

3 Lexical and syntactic universals in the syntax of motion events

On the surface, Japanese and English appear to differ substantially in the syntax they employ in the expression of motion events. Japanese is a 'V (verb)-framed' language which generally encodes Path (direction) in verbs and Manner in adjuncts, while English is an 'S (satellite)-framed' language, usually expressing Manner in the main verb and Path in prepositions or particles (Talmy, 1985, 1991). Although it has been argued that this is a formal syntactic difference between the two languages (Inagaki,

2001; Oh and Zubizarreta, 2007), in previous work I have argued that each language allows both frames, and that differences in expression follow from lexicalization tendencies rather than a syntactic parameter (Stringer, 2005a, 2005b). When semantic features are the same in the lexical items being compared, both Japanese and English can be shown to exhibit a universal syntax of motion events. For example, the fact that (7) below cannot be translated as (8) is not due to a difference in syntax.

(7) John danced into the room.

(8) *John ga heya ni odotta.
John TOP room LOC danced

The difference is lexical: the English P *into* is both inessive and directional, while the Japanese P *ni* is a general locative with neither of these meanings encoded inherently. If the English PP is replaced by *in the room*, the directional reading is impossible, just as in Japanese. Not only must the semantics of the adpositions line up for direct translation to be possible, but also those of the verbs. While verbs such as *run*, *jump* and *fly* may incorporate a covert PATH in English, this is not possible even in colloquial speech with verbs such as *dance*, *wiggle* or *float* (*on Path interpretation).

(9) John {ran/jumped/flew/*danced/*wiggled/*floated} in the room.

This distinction exists crosslinguistically, although the verb classes differ from language to language. Thus Folli (2001) claims that the Italian verbs *correre* 'run', *gattonare* 'crawl', and *saltellare* ' hop' pattern like English *run* in allowing a directional interpretation with locative PP complements, while *danzare* 'dance', *camminare* 'walk', and *nuotare* 'swim' pattern like English *dance*. However, 'swim' can select directional PPs in French and Japanese, while 'crawl' and 'hop' cannot, and there appears to be dialectal variation in Italian too (which is not unexpected). In Japanese, while (10a) is the preferred form, (10b) is acceptable in colloquial speech, and there is a definite contrast between (10b) and (10c).

(10) a. Gakko ni hashitte itta (yo).
school LocP run-TE went (PART)
'(S/he) ran to the station.'
b. Gakko ni hashitta (yo).
school LocP ran (PART)
'(S/he) ran to the station.'
c. *Gakko ni odotta (yo).
school LocP danced (PART)
'(S/he) danced to the station.'

For a formal account of selection in such cases, see Stringer (2005b). The relevance of these crosslinguistic regularities to onomatopoeia is that, as we shall see, mimetic forms appear to pattern like non-directional Manner verbs, in that they must be supported by inherently directional V or P in directional contexts.

4 Phonomimesis in the acquisition of L1 Japanese

In order to investigate the acquisition of the syntax of motion events, an elicited production experiment was conducted with with 31 Japanese and 33 English monolingual test subjects. In each language, the children were divided into 5 age groups from 3 to 7 years, and there was a sixth group with adult test subjects. Directional predicates were elicited using a purpose-designed picture-story, illustrating events with both Manner and Path. The story follows the adventures of a monkey as he chases a parrot, trying to retrieve his stolen banana. On each stimulus page, he follows a particular trajectory and he exhibits a particular manner of motion (e.g. he slides down a tree-trunk, runs under a bridge, jumps over a rock etc.). All responses related to the materials were recorded, and 1038 Japanese and English examples of Path predication were selected for analysis. The general findings are reported elsewhere (e.g. Stringer, 2005a, 2005b, 2006, 2007); the focus here is strictly on mimetics.

Use of of mimetics in the child Japanese data was striking, in contrast to the adult Japanese and all the English data. The disparity between the two languages confirms previously reported differences between Japanese and English use of onomatopoeia in childhood (Küntay and Nakamura, 2004). As can be seen in Table 1, the proportion of syntactically integrated onomatopoeia to instances of path predication was 60/164 (36.6%) at 3-4 yrs, but only 12/286 (4.5%) at 5-7 yrs, and 0/82 (0%) for adults. The disparity between Japanese children and adults was in part a task effect, as adults were more sensitive to the formality of the experimental setting: such forms are regularly used by parents and caregivers when speaking to children, and by adults speaking informally; the adult participants were later asked to judge the child responses, and deemed them to be grammatical. The extent of the use onomatopoeia by children and adults in Japanese descriptions of motion events is indicated in Table 1.

Table 1. Monkey Book Exp: Proportions of the use of mimetics in the predication of Path in Japanese across the age range (3-7 years, and Adults).

Age Group	*#Mimesis*	*#Path Pred.*	*%Mimesis*
J3-4	60	164	36.6%
J5-7	12	268	4.5%
JA	0	82	0.0%

Mimetics were used in contexts in which English analogues would be verbs expressing Manner of motion (with Sound of motion arguably a subset of Manner). Examples include *piyon/piyuu* 'jump/boing'; *bochaan/ zapon/pasha-pasha/basha-basha/jabun/pacha-pacha* 'splash'; *shuu/suru-suru/shii/bii* 'slide/whoosh'; *don* 'bump'; *dokan* 'crash/bang'; *koro-koro /goro-goro/kuru-kuru/guru-guru* 'roll'; *koron koron* 'tumble'; *biyun/piyuu* 'dash/whoosh'; *korori* 'fall over/kerplunk'; *pata-pata* 'flap'; *tsururi* 'slip'; *kyu* 'squeak'; *gyu* 'squeeze/squash'.

Path predication invovling onomatopoeia took various forms, including: (i) 'geometric' Path verbs such as *hairu* 'enter', *wataru* 'cross' or *oriru* 'go-down'; (ii) the merging of DeicticV (e.g. *iku* 'go') with a PP (with or without MannerV); and (iv) onomatopoeia carried by a light verb merging directly with a PP. These are respectively exemplified below.

(11) jabun-te haitte ne sorekara deta (3 yrs)
splash-TE enter-TE PART then got-out
'He splashed in and then he got out.'

(12) saru-san kokkara oriyo-to shite, kyu-te kochi e ichatta (5 yrs)
monkey-HON from-here go-down-INT-TO do-TE,
squeak-TE here to go-ASP-PST
'The monkey wanted to go down, so he went 'weee' to here.

(13) o-yama kara kuru-kuru-tte korogachatta (4 yrs)
HON-mountain from roly-poly-TE roll-ASP-PST
'He roly-polied down the mountain.'

(14) ishi no ue kara piyon-tte shita (3 yrs)
rock GEN top from boing-TE did
'He boinged from the top of the rock.'

Following the distinctions between locative and directional V and P discussed in Section 3, one generalization that emerges from the data is that mimetic expressions, just like non-directional MannerV, may not support Path interpretation in the absence of the overt expression of Path, that is, in PathV or PathP. Thus the interpretation of Path in (14) comes entirely from the PathP *kara* 'from'.

The English data were less revealing, as there were relatively few examles of spontaneous onomatopoeia: only 5/221 (2.3%) at 3-4 yrs, always lexicalized in V, e.g.

(15) he splashes into the river (3 yrs)

(16) he boings over (3 yrs)

However, the same generalization concerning the requirement of overt expression of Path with onomatopoeia can be made for both languages. Ungrammatical examples are easily constructed, though such examples were not at all attested in the production data. Such examples reveal the similarity between onomatopoeia and non-directional manner verbs (e.g. *dance*) and the contrast with directional MannerV (e.g. *jump*).

(17) *Dokutsu no naka ni biyon-tte suru.
cave GEN inside PLOC whoosh-TE do
'He whooshes into the cave.'

(18) *Kawa ni pasha-pasha-te nachatta.
river PLOC splash-TE go-ASP-PST
'He splashed into the river.'

(19) *He splashes in the river. (*on PATH interpretation)

(20) *He boings on the rock. (*on PATH interpretation)

In summary, the descriptive generalization is as follows: Onomatopoeia cannot encode directionality in either language, but must be syntactically supported by a Path predicate. That this is somewhat surprising, as many instances of onomatopoeia are typically found in directional contexts (e.g. *whoosh*, *tumble*, *boing*), and intuitively are more akin to directional MannerV. In general, Path interpretation is only possible in either language if the feature Path is carried on V, or on P, or when a subset of directional Manner verbs coerce a Path interpretation from a locative PP. Children appear from the outset to have knowledge of the relevant principles of lexical mapping and syntactic combination, which are hypothetically universal. From the descriptive generalization emerges the prediction to be tested in future research that examples analogous to (17-20) should never be attested in production in any language, and should be ruled out in judgment tasks (controlling for lexical knowledge of V and P).

5 Phonomimesis in the acquisition of P modifiers in L2 English

Results from a second set of experiments may be brought to bear on the issue of universals in the integration of sound into the syntax of motion events. In this case, just as Japanese children appear to be error-free in their syntactic encoding of mimetics as they acquire their first language, Japanese adults also appear to exhibit prior knowledge of syntax as they acquire onomatopoeic modifiers of prepositions (P) in English as a second language, despite the lack of such modifiers in Japanese.

As part of a larger investigation, a preliminary report of which is given in Stringer, Burghardt, Seo and Wang (2009), a binary choice preference task and a forced grammaticality judgment (GJ) task were adminis-

tered to a total of 131 students with 17 different L1 backgrounds across 6 proficiency levels of an Intensive English Program at a large public university in the Midwest of the United States. Learners were tested in a language lab with a main screen and surround speakers. A computer-animated narrative was designed to contextualize PPs and their modifiers, involving characters and scenes which are variations on the Middle-Eastern folk-tale of Aladdin. In a cave filled with treasure, Aladdin takes a magic lamp from a wizard. He then jumps onto a magic carpet, flies out of the cave, and continues to pass through various spatial environments, each of which provides a plausible context for a targeted combination of prepositions and modifiers (e.g. *straight through into the city*, *back over to the waterfall*, etc.). In the course of his journey, three combinations with onomatopoeia were manipulated, with sound effects embedded into the visual stimuli: (a) *He goes crash into the birds*; (b) *He flies whoosh over a lake*; (c) *The wizard falls splash into the lake*. In the preference task, learners were asked which of two aurally delivered sentences sounded better in context. In one, the modifier was to the left of P, and in the other the order was reversed, e.g. *crash into/*into crash*. In the GJ task, subjects heard a question and a sentence fragment, e.g. *Where does he fly? *Into crash the birds*. Stimuli (a) and (c) were ungrammatical, while stimulus (b) was grammatical.

Learners were divided into three groups on the basis of global proficiency. The results are shown below in terms of mean accuracy rates, by level of proficiency in Tables 3-4, and by L1 background in Tables 5-6 for those languages that had over 10 speakers in the study: Japanese, Korean, Turkish, Arabic and Chinese.

Table 2. Aladdin results by proficiency level: Exp 1 (preference task):

Proficiency levels	Level 1 (N=44)	Level 2 (N=42)	Level 3 (N=38)
% accuracy	83.33%	85.71%	88.60%

Table 3. Aladdin results by proficiency level: Exp 2 (GJ task)

Proficiency levels	Level 1 (N=44)	Level 2 (N=41)	Level 3 (N=37)
% accuracy	87.88%	92.68%	90.09%

Table 4. Aladdin Results by L1: Exp 1 (preference task)

L1 Groups	J (N=11)	K (N=38)	T (N=25)	A (N=15)	C (N=14)
% accuracy	81.82%	91.23%	82.67%	77.78%	90.48%

Table 5. Aladdin Results by L1: Exp 2 (GJ task)

L1 Groups	J (N=11)	K (N=38)	T (N=25)	A (N=14)	C (N=14)
% accuracy	96.97%	89.47%	93.33%	80.95%	95.24%

For the analysis by proficiency level, a two-tailed comparison of proportions revealed that the mean accuracy rates for the three levels were significantly above chance (for all, $p<0.001$); there were no significant differences either between levels or across the two tasks. The analysis by language background also showed very significant rates of mean accuracy irrespective of L1 (for all, $p<0.001$), and again, there were no significant differences between groups or across tasks. These results were both striking and unexpected. As with other prepositional modifiers, the relevant aspects of grammar are not explicitly taught, and such combinations are rare in the input, leading to a poverty of the stimulus problem. Expectations were that the syntax of P-modifiers would either emerge gradually as learners establish appropriate L2 lexical and prosodic representations; or remain inaccessible to learners who lack L1 analogues. However, the results were robustly above chance and remarkably flat (i) across the two tasks, (ii) across L1s, and (iii) across the proficiency range.

With regard to the Japanese results, significant results were achieved despite a relatively low number of test subjects, due to high levels of performance. Just as children acquiring mimesis in Japanese as a first language exhibit knowledge of combinatorial principles from the outset, adult Japanese learners of English demonstrate knowledge of syntactic integration of onomatopoeia as P modifiers, even though this option is not available in the L1.

7 Conclusion

Japanese children reveal very early knowledge of arguably universal principles at work in the grammar of motion events; they know that directionality must be syntactically coerced, invariably merging mimetic expressions with inherently directional V or P in directional contexts, regardless of their expression in main predicates, complex predicates or adjuncts. Similarly, adult Japanese learners of English appear to have a prior understanding of the possibility of integrating onomatopoeia as P-modifiers, drawing on plausibly universal principles of syntax to encode sound and motion in the L2. These results support recent work on the syntax of motion events that de-emphasizes typological differences and reaffirms common syntactic principles (Beavers, Levin and Tham, 2008; den Dikken, 2006; van Riemsdijk and Huybregts, 2007; Svenonius, to appear). The experiments reported here were broad in scope and onomatopoeia was an ancillary concern. However, the pervasive use of phonomimesis in L1 Japanese descriptions of motion events and the facility of L2 learners in this domain underscore the need for more focused investigation. Research on the syntax of motion events stands to gain by lending an ear to such phenomena.

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