

# Productive Knowledge of English Binomials by Japanese Learners of English

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It has been well acknowledged that fluent comprehension and production of language relies heavily on multiword units. One part of a multiword unit often leads to rapid retrieval of the remaining part from the mental lexicon<sup>1</sup>. Recent studies have focused on various types of multiword units in the second language (L2) including formulaic sequences, idioms, and collocations (cf. for formulaic sequences, Jiang & Nekrasova, 2007; for idioms, Conklin & Schmitt, 2008; for collocations, Yamashita & Jiang, 2010; Wolter & Gyllstad, 2011, 2013). However, only a few studies have targeted binomials. Moreover, most of those studies investigated comprehension, but not production. In this current study, the main target is to investigate L2 productive knowledge of L2 binomials. We will also discuss the strategies used by the participants based on the results of error analysis.

## DEFINITIONS AND PREVIOUS STUDIES

### Definitions

Binomials are a “sequence of two words pertaining to the same form-class, placed on an identical level of syntactic hierarchy, and ordinarily connected by some kind of lexical link” (Malkiel, 1959, p. 113). This study follows this definition, with the binomials connected with “and” targeted for the purpose of study (see Materials for selection reasoning and criteria). Following Benor (2006), the first word will be referred as Item A and the second Item B. For example, in the binomial *before and after*, *before* is Item A and *after* is Item B.

### Previous Studies

A few studies have investigated binomials in L2 by using online and offline tasks. Siyanova-Chanturia, Conklin, & Schmitt (2011) examined L2 English learners' sensitivity to phrasal frequency by using eye-tracking techniques. Using binomials and lower frequency reversed forms, they found that the participants read the binomials faster than the reversed forms. Although it was concluded that the participants were sensitive to phrase frequency and stored and processed binomials as a unit, their results also indicated that the lower proficiency L2 learners may not be as sensitive to phrase frequency compared with the first language (L1) English speakers and higher proficiency L2 learners.

Wylie (2013) compared knowledge of binomials and reversed forms in L1 English children and Irish-

English bilingual children aged 10-11 years. In a computer-based phrasal judgment task, the participants were asked to decide whether high and low frequency phrases were natural English expressions (e.g. *king and queen*) or not (e.g. *poor and rich*). Results showed that both monolingual and bilingual children exhibited sensitivity to word order and frequency effects, with faster and more accurate responses for high frequency binomials in particular. Overall it was concluded that monolingual and bilingual children process binomials in the same way. Interestingly, however, when the performance of the bilingual children was examined in terms of their L2 proficiency, children with lower L2 (Irish) proficiency were more accurate than their peers with higher L2 proficiency, suggesting that degree of bilingualism might affect the ease with which children learning a second language can process formulaic expressions in the first language.

Morita, Sakaue, Matsuno, & Murao (2013) conducted three experiments by utilizing a phrasal judgment task. This task required the participants to decide whether the presented stimulus was meaningful or not. In the first and second experiments, L1 English and Japanese speakers examined binomials and their low frequency reversed forms in their L1s. Both experiments indicated that the participants recognized L1 binomials significantly faster than their low frequency reversed forms, so that it was concluded that binomials in L1 are holistically stored and processed in the mental lexicon. In the third experiment, Japanese learners of English did the same experiment in English in order to see whether L1 word order influenced the processing of L2 binomials. The result showed that there were no significant differences in reaction time and error rates between binomials and low frequency reversed forms regardless of L1 word order. This result suggests that Japanese learners of English process English binomials analytically rather than holistically.

The only study investigating strategies used to determine word order in L2 binomials was Morita, Sakaue, Matsuno, & Murao (2014). The results of questionnaires gathered from 124 Japanese learners showed that diverse strategies such as world knowledge as well as the use of semantic and phonological cues were adapted in order to select English binomials over their low frequency reversed forms. However, it was also revealed that only a particular type of strategy, namely the “Me first” principle (Cooper & Ross, 1975), was beneficial. The “Me first” principle claims that “[f]irst conjuncts refer to those factors which describe the prototypical speaker (whom we will sometimes refer to as ‘ME’)” (Cooper and Ross, 1975, p.67). Based on this principle, the first conjuncts should refer to “now”, “here”, “male”, “adult”, “positive”, “friendly,” and so on. Morita et al. (2014) suggested that Japanese learners of English may not notice binomial word order differences between English and Japanese without explicitly learning this type of strategy.

## RESEARCH QUESTIONS

The studies summarized in the previous section indicate that while binomials can be stored and processed holistically by L1 speakers and highly proficient L2 learners, L2 learners of intermediate and lower proficiency store and process L2 binomials analytically. When processing English binomials, Japanese learners of English used a variety of strategies to decide on the binomial word orders. However, all of these studies focused on the comprehension or recognition, not production, of binomials. As having receptive knowledge does not guarantee having corresponding productive knowledge, it is necessary to investigate productive knowledge of L2 binomials in order to gain a more holistic understanding of binomial knowledge in L2 learners. Consequently, the research questions of the current study are (1) which English binomials do Japanese learners of English have productive knowledge of and (2) what strategies do they use to produce

English binomials when they do not know the binomials.

## METHOD

### Participants

One hundred and three Japanese learners of English completed an online survey on binomials. Their average Test of English for International Communication (TOEIC) score was 495.75 ( $SD = 103.50$ )<sup>2</sup>. This score indicates that the participants were of intermediate proficiency in English.

### Materials

Forty-four binomials were used in this study. The binomials were chosen from the previous studies (Morita, et al. 2014; Wylie, 2013). As the present study utilized a task tapping the participants' productive knowledge of binomials, we selected target binomials with two steps. Firstly, it was confirmed that binomials are more frequent than their reversed forms by using BYU-BNC (Davis, 2004-) and The Corpus of Contemporary American English (COCA; Davis, 2008-). Secondly, we selected binomials where two words were combined with "and", and not other conjunctions such as "but" and "or". This is because the participants should easily guess the relationship between Item A and Item B in order to answer Item B by using Item A as a cue. Table 1 shows the selected binomials.

TABLE 1. Selected Items

arrival and departure	front and back	life and death	strength and weakness
before and after	give and take	likes and dislikes	supply and demand
big and small	gold and silver	male and female	true and false
black and white	good and bad	men and women	up and down
boys and girls	heaven and hell	mental and physical	victory and defeat
bride and groom	here and there	name and address	war and peace
buy and sell	high and low	north and south	wet and dry
cause and effect	hot and cold	now and then	young and old
come and go	husband and wife	old and new	
east and west	king and queen	on and off	
eat and drink	knife and fork	rich and poor	
father and mother	law and order	salt and pepper	

The survey was administered and completed via Google Form. Participants were given Item A of a binomial and asked to type a word following "and" (see Figure 1). If they did not know the first word or could not come up with any word following "and", they were asked to type "?" in a blank response box. To avoid order effects, binomials were randomly presented for each participant. At the end of the survey participants were asked to report their latest TOEIC scores.

Type a word following “and” in a box below. Type “?” if you don’t know a word before “and” or don’t come up word any word after “and”.

1. arrival and

2. before and

**FIGURE 1. Sample of the Online Questionnaire**

## RESULTS AND DISCUSSION

There are 20 binomials out of 44 for which the target word was provided by more than 75% of participants (see Table 2; See also Appendix for correct answer rates and common errors for all the items). It seems that the participants had productive knowledge of these binomials with high accuracy rates.

There are, however, some binomials with very low accuracy rates and there seem to be two main reasons for these. Firstly, typing “?” as an answer was the most obvious response to show that the participants did not know certain binomials at all. For example, “*supply and demand*” and “*bride and groom*” were the two top binomials for which the participants either did not know Item A or were unable to come up with anything as the second word.

Secondly, Item A in some binomials was misunderstood. For “*law and order*”, there are two kinds of mistakes. One is to mistake “*l*” for “*r*”, so “*bake*” or “*burn*” were typed in for “*raw*”. The other is the confusion

**TABLE 2. Items with at least 75% Accuracy**

Binomials	Correct Rates
boys and girls	99%
high and low	97%
before and after	96%
up and down	95%
big and small	94%
black and white	94%
east and west	94%
north and south	91%
come and go	89%
men and women	89%
buy and sell	87%
give and take	87%
young and old	87%
good and bad	85%
father and mother	84%
male and female	84%
war and peace	84%
gold and silver	82%
rich and poor	75%

between vowels, “a” and “o”. Some participants answered “high” because they mistook “law” for “low”. All these responses indicated that the participants might not be familiar with even the first words in some of the target binomials.

Our method of examining productive knowledge of binomials allowed the participants to use strategies which they could rely on when they could not produce Item B immediately after seeing Item A. Even though the participants did not know some binomials, they can guess Item B because they have knowledge of the semantic relationships between Item A and Item B. It seemed that the main strategy employed by participants involved using this knowledge of binomials. This view can be supported by error analysis of the participants’ responses.

Many binomials, including several used in this study, consist of antonyms (e.g. *hot and cold*), events in time order (e.g. *cause and effect*), and words in the same conceptual category (e.g. *salt and pepper*). One type of error would suggest that the participants may have been correct in guessing the relationship between Item A and Item B in binomials, yet they responded with other words in the relationship (e.g. antonyms, events in time order, the same conceptual category). The most common error of this type was to answer with other antonyms of Item A; for example, *front and behind*, *hot and cool*, *cause and result*, *true and lie*, and *now and past*. An example for words in the same conceptual category is *salt and sugar*, where *salt and pepper* is the target answer. The Item A, *salt*, usually activates the highly frequently paired word *pepper*, but without this frequency information, the participants chose another type of seasoning, *sugar*. These phrases were semantically acceptable, but not binomials.

The other type of error involved the participants answering with an unexpected relationship. For example, the relationship between *eat and drink* can be classified into the same category as *salt and pepper*. However, some participants wrote *eat and cook* or *eat and sleep* rather than *eat and drink*. These *cook* or *sleep* responses reflect the actions that can take place before or after eating. Morita et al. (2014) indicated that this “order of events” strategy was the third most popular and one of the beneficial strategies in order to determine the order of Item A and Item B. On the other hand, these examples such as *eat and sleep* show that some participants used semantic knowledge but came up with the second word based on an unexpected relationship using the inappropriate strategy, namely “order of events”.

Both types of errors clearly show that the participants did not know the binomials and tried to produce the second words based on semantic expectations. However, the semantic expectation or relational knowledge used to select the second words often led to non-binomial expressions.

## **EDUCATIONAL IMPLICATIONS AND LIMITATIONS OF THIS STUDY**

While it is clear that the participants have productive knowledge of many binomials, several appear to be problematic for L2 learners. For those problematic binomials, the learners need much more exposure to, and experience with, English in order to increase their knowledge in terms of both recognition and production. Relatively low frequency binomials need to be taught explicitly alongside teaching of the “Me first” principle as Morita et al. (2014) suggested. This explicit teaching aims to develop more accurate and effective strategy use for less well-known binomials.

Although this study provides basic insights into the productive knowledge of binomials in Japanese learners, some limitations should be acknowledged. Firstly, this study examined partial, rather than full,

productive knowledge. We employed a method where Item A acted as a cue for Item B. To investigate full productive knowledge, other methods should be utilized. One of these alternative methods is a picture description task. Such a task would also overcome another limitation of this study which relates to examining knowledge via written assessment. Future research might investigate productive knowledge using an oral task which would enable accuracy and speed of response to be examined.

Secondly, this study did not directly investigate the participants' use of strategies. Rather, we speculated about the strategy employed on the basis of an analysis of errors. In order to further support the results of this study, participants could be asked about their strategy use in a follow-up interview or questionnaire. Such a follow-up could provide more direct and accurate information on the range and extent of strategy use.

Finally, a small set of binomials was examined in this study. Future studies should include a more comprehensive set of binomial expressions, thus providing a clearer picture of the kinds of binomials with which learners are familiar and the types of strategies they employ when processing these multi-word expressions.

## CONCLUSION

This study investigated productive knowledge of binomials by Japanese learners of English. Our results indicate that learners had productive knowledge for certain binomials, and also that they did not have productive knowledge for many other binomials. They seemed to rely heavily on semantic relationships between Item A and B in binomials to come up with Item B when they did not know the binomial. It was suggested that giving more input to learners, as well as teaching the "Me first" principle explicitly would help the learners to develop more accurate knowledge of binomials and effective strategies for uncertain or unfamiliar binomials.

## NOTE

- 1) This phenomenon can be explained by assuming that multiword units are stored and processed holistically or that a part of multiword unit can automatically predict what comes next with high probability (Sivanova-Chanturia & Martinez, 2014).
- 2) TOEIC consists of listening and reading sections. Scores from 10 to 990 are possible.

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APPENDIX

Top 3 Answers for All Binomials

arrival and		before and		big and		black and		boys and		bride and		buy and	
?	30%	after	96%	small	94%	white	94%	girls	99%	?	73%	sell	87%
departure	18%	?	2%	large	3%	blue	2%	dogs	1%	bloom	1%	?	4%
depart	10%	ago	1%	huge	1%	form	1%			river	1%	sold	3%
cause and		come and		east and		eat and		father and		front and		give and	
?	36%	go	89%	west	94%	drink	59%	mother	84%	back	74%	take	87%
result	30%	back	4%	?	2%	?	13%	?	5%	rear	9%	?	5%
happen	5%	leave	3%	south	2%	cook	9%	mother	5%	?	4%	get	3%
gold and		good and		heaven and		here and		high and		hot and		husband and	
silver	82%	bad	85%	hell	62%	there	72%	low	97%	cold	67%	wife	67%
?	6%	?	4%	?	29%	?	13%	?	1%	cool	24%	?	21%
money	2%	better	2%	death	3%	that	6%	speed	1%	?	4%	daughter	2%
king and		knife and		law and		life and		likes and		male and		men and	
queen	59%	folk	50%	?	43%	death	55%	dislikes	32%	females	84%	women	89%
?	16%	?	23%	high	22%	?	26%	?	20%	?	10%	female	2%
civic	3%	gun	5%	order	3%	live	4%	hate	10%	drink	2%	male	1%
mental and		name and		north and		now and		old and		one and		rich and	
physical	59%	?	50%	south	91%	past	53%	young	52%	off	33%	poor	75%
?	17%	age	6%	west	4%	future	17%	new	42%	in	20%	?	17%
body	12%	number	5%	?	3%	?	7%	now	2%	under	26%	unrich	2%
salt and		strength and		supply and		true and		up and		victory and		war and	
sugar	48%	?	31%	?	44%	0	33%	down	95%	lose	50%	peace	84%
pepper	24%	weakness	28%	demand	27%	lie	20%	?	1%	?	17%	?	8%
?	14%	weak	16%	consume	3%	?	16%	bottom	1%	defeat	5%	argue	1%
wet and		young and											
dry	65%	old	87%										
?	24%	adult	3%										
moist	2%	senior	3%										



## ABSTRACT

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The purpose of this research is to reveal (1) which English binomials Japanese learners of English have productive knowledge of and (2) what strategies they use to produce English binomials when they do not know the binomials. One hundred and three Japanese learners of English with intermediate proficiency level completed an online survey of 44 binomials. The participants were given the first word of a binomial and asked to type a word following “and”. The target word was provided by more than 75% of participants for 19 of the 44 binomials, meaning that learners have productive knowledge for certain binomials. An analysis of errors suggested that the participants relied heavily on semantic relationships between items in binomials. However, the use of a semantic strategy for producing the second words often leads to non-binomial expressions. From these results we suggest that giving more input to learners, as well as teaching the “Me first” principle (Cooper & Ross, 1975) explicitly would help the learners to develop more accurate and effective strategies for uncertain or unfamiliar binomials.

## 要 約

### 日本人英語学習者が持つ二項表現の生産的知識についての調査

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本研究では、日本人英語学習者の持つ二項表現の生産的知識を調査することで、(1) どの二項表現について生産的知識を持っているのか、(2) 二項表現がわからない場合に、どのような方略で二項表現を生み出すのか、という二点を明らかにした。103 名の中級レベルの日本人英語学習者を対象に、44 の二項表現の最初の 1 語を与え、and の次に来る語を答えさせる課題を与えた結果、75% 以上の正答率を得た二項表現が 19 あり、日本人英語学習者でも特定の二項表現については生産的知識を持っていることが分かった。また、誤答を分析した結果、意味を中心とした方略を用いている事が多く、二項表現として期待される意味関係が分かっていない場合や、意味関係が正しくても、期待される語を答えられない場合があることが分かった。これらの結果を踏まえ、英語学習者により多くのインプットを与えることで、二項表現に触れる機会を増やすとともに、“Me first” principle (Cooper & Ross, 1975) を明示的に教えることで、馴染みのない二項表現に対するより効果的な方略を育てることが提案された。