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Jessie and Gary or Gary and Jessie?: Cognitive Accessibility Predicts Order in English and Japanese

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Abstract

Notably, while English tends to prefer shorter before longer complements (*explained to us a very clear effect*), Japanese displays the opposite tendency. Far less cross-linguistic work has investigated possible differences in the ordering of nouns within conjunctions (“binomials”), although a corpus study suggests that the same factors predict binomial ordering in Japanese and English. To investigate the issue experimentally, we report Japanese and English speakers’ productions of names of the members of couples that they knew personally. Results confirm that conceptual accessibility is the most important factor in the ordering of familiar name binomials in both languages. That is, both groups tended to name the member they felt closer to first. Length (syllables/mora) was not a significant predictor in either language. Differences in the preferred order of verbs’ complements are then attributable to other factors, possibly a very general preference to minimize the average distance between semantically related elements.

Keywords: accessibility; binomials; Japanese; English; word order

Introduction

Accessibility refers to the speed and accuracy with which concepts are activated in memory. When English speakers produce utterances, more accessible and shorter grammatical phrases tend to be produced before less accessible, longer phrases (Bock 1982, 1987; Levelt 1989; Bock & Levelt 1994; McDonald, Bock & Kelly 1993; Bock & Warren 1985; Carroll 1958; Tomlin 1995; Downing & Noonan 1995). This has been argued to allow for more efficient processing insofar as it reduces the need to hold accessible phrases in working memory while less accessible phrases are retrieved and produced first (Ferreira and Dell 2000; Branigan and Feleki 1999; Prat-Sala and Branigan 2000; Ferreira & Yoshita 2003; Kempen & Harbusch 2004).

The factors that have been evoked in discussions of accessibility are quite diverse. They include animacy (McDonald, Bock, & Kelly 1993; Ferreira 1994; Prat-Sala & Branigan 2000; Christianson & Ferreira 2005); givenness in discourse Ferreira & Yoshita 2003; Prat-Sala and Branigan 2000); prototypicality (Onishi, Murphy, and Bock 2008); and basic level status (Lohmann & Takada 2014).

Several of these factors can be quite difficult to tease apart. For example, animacy and discourse-givenness tend to be

correlated because people--or agentive entities more generally--are the most common topics of conversation. Moreover, discourse-givenness correlates strongly with length, since previously introduced entities are commonly referred to using pronouns, which are short, and in many languages, discourse-given arguments need not be expressed at all (Ariel 1988; Byrne & Davidson, 1985; McDonald et al., 1993; Narasimhan & Dimroth, 2008).

Yet there is good reason to try to distinguish or control for animacy and discourse-givenness in investigations of length and conceptual accessibility. Importantly, certain factors that result in a shorter-earlier tendency in English (Arnold, Wasow, Losongco, & Grinstead, 2000; Arnold, 2003; Gries, 1999; Stallings, MacDonald, & O’Seaghdha, 1998; Stallings & MacDonald, 2011; Wasow, 2002) produce the *opposite* order in Japanese (Chang, 2009; Hakuta, 1981; Yamashita & Chang, 2001). For instance, in English, particle placement, the dative-alternation and “heavy NP shift” all prefer particularly long complements to be uttered later in the string, while in Japanese especially long complements tend to be produced earlier (Dryer 2000; Hawkins 1994, 2004; Gibson 1998; Yamashita and Chang, 2001).

The first study to experimentally demonstrate a preference for longer-earlier in Japanese was Yamashita and Chang (2001). They interpreted this finding in a way that attempted to preserve the idea that *all* speakers prefer to express more accessible entities first, by invoking a distinction between formal complexity and cognitive accessibility. They suggested that longer phrases should be considered more semantically or conceptually accessible, even though they are more complex. This raised the following possibility, as described by Jaeger and Norcliffe (2009:876): “Japanese speakers [may be] more sensitive to conveying meaning (putting enriched material earlier), while English speakers prefer to sequence forms (putting easier to produce, e.g., shorter, words earlier, (Yamashita and Chang 2001, 2006).”

The current study tests the possible distinction between conceptual accessibility and length—here, the number of syllables or mora—on how English and Japanese speakers produce the names of familiar couples. If Japanese speakers are influenced more by conceptual accessibility and less affected by length when compared to English speakers, it would provide evidence that a distinction between conceptual accessibility and length underlies the difference between English and Japanese’ word order preferences. We refer to

this hypothesis in what follows as the Conceptual Accessibility vs. Formal Accessibility hypothesis (CA v. FA).

Hawkins (1994, 2004) suggested an alternative explanation for the shorter-earlier preference Japanese and the longer-earlier preference in English. He argued that both Japanese and English display a preference to minimize the average distance between a verb and its non-subject complements. His “minimal distance” proposal is satisfied in Japanese and other verb final languages by positioning longer complements before shorter complements (<longer> <short> >V). English and other VO languages obey the same preference by expressing short complements *before* longer complements (V<short> <longer>). But if Hawkins’ proposal accounts for the shorter-earlier preference in VO and the longer-earlier preference in OV, it raises the question as to whether there *also* exists an accessible-early preference in Japanese, English and other languages.

We address these important issues by considering the preferred word order in both Japanese and English, given a case that clearly involves conceptual accessibility. This allows us to determine whether speakers of both languages prefer to order more conceptually accessible terms earlier (or both prefer to order them later). The idea that the difference between shorter-earlier English and longer-earlier Japanese is due to a Japanese preference for conceptually-accessible-earlier and an English preference for formally-accessible-earlier would predict that Japanese speakers should weigh conceptual accessibility more strongly than length, while English be more strongly affected by length than conceptual accessibility.

We report experimental results which compared the ordering of “binomial” conjunctions (<noun> and <noun>) by speakers of English and speakers of Japanese. Specifically, we investigate the ordering of the names of couples that are personally known to participants (e.g., *Jessie and Gary*). We hypothesized that the person the speaker feels a closer connection to will be named before the other member of the couple in both languages. We recognize that feelings of emotional closeness are hard to decompose, but at the same time, we take it as self-evident that if semantic accessibility is to be a meaningful construct at all, our mental representation of an individual whom we feel closer to should, *ceteris paribus*, be more semantically accessible than our mental representation of someone we feel comparatively less close to. We recognize that if one member of the couple is already under discussion, then all things are not equal. Therefore discourse-givenness is controlled for in the current experiment: participants simply generate the names of couples that they know with no additional context provided. Thus, if, in both Japanese and in English, the name mentioned first tends to be the name of the member of the couple whom the participant feels a greater personal attachment to, it will be evidence that *both* languages prefer to order more cognitively accessible words first.

There already exists a good deal of work on how English speakers order binomial phrases, but with rare exceptions

described below, comparative work on the construction is exceedingly rare. Moreover, studies of English binomials have offered a wide range of often quite specific predictors of ordering but have only rarely invoked accessibility explicitly. For instance, Cooper and Ross (1975) suggested 19 factors which included the first element of a binomial being more “Here, Now, Adult, Male, Positive, singular, Living, Friendly, Solid, Agentive, Powerful, at Home, and Patriotic” (pg. 67).

This classic study led to a number of refinements. For example, Benor and Levy (2006) quantified a model that included 20 constraints related to aspects of lexical semantics, phonetics, and frequency. Morgan and Levy (2016) reduced this list to the following seven factors (in order of effect size): iconic sequencing (e.g., early before later), perceptual markedness (which encompassed the majority of factors proposed by Cooper & Ross), formal markedness, power, final stress, length, and frequency. These weighted constraints produced a model that predicted the preferred order in a large corpus of natural speech with 77% accuracy. Notably absent from these discussions was mention of a possible role for accessibility. Onishi et al. (2008), a rare study that did explicitly evoke accessibility as a key factor in English binomial order, introduced yet another predictor: more prototypical members of categories tended to be produced before less-prototypical members.

Importantly, Morgan & Levy (2016) also demonstrated that experience with specific binomial expressions influences the way familiar binomials are expressed. Specifically, they found that the frequency of familiar binomials correlated with reading time when binomials were ordered in the familiar way, and frequency correlated negatively when the two nouns were read in reverse order. Morgan & Levy proposed that the generative factors they proposed influenced the ordering of *novel* combinations of words. While a large number of binomial expressions are familiar, it is equally important to ask how conventional binomials (“freezes”) come to be ordered in the particular ways they are (Mollin, 2014). To this end, an early cross-linguistic study of English, Russian and German by Fenk-Oczlon (1989) found that the relative frequency of words determined the ordering of 400 frozen binomial expressions with 84% accuracy; however, Lohmann & Takada (2014) found frequency to be much less influential.

Lohmann & Takada (2014) provides an important precedent for the current work, as they compare results from corpus analyses of binomial expressions in Japanese and English texts. This study included a number of potential predictors including power (including male and “importance”), iconicity (early before later), frequency, discourse-givenness, length (in syllables or mora), and conceptual accessibility. Conceptual accessibility, in this study, was treated as an umbrella category that included animacy, concreteness, prototypicality, basic level, proximal and self before other. In this work, which likely included a number of “frozen” binomials since it was based on corpus data, significant effects were found for length, power,

iconicity, discourse-givenness and accessibility but not frequency in both languages. The Lohmann & Takada work explicitly omitted conjoined proper names from their analyses. But by considering personal names that are known to the participants, the current work is able to index cognitive accessibility with a single factor, closeness. In addition, the ordering of names of familiar couples in our experimental context avoids potential confounds of animacy and givenness, as well as avoiding freezes that are influenced by the language at large. Possibly relevant factors of length and gender are included in the preregistered analyses.

There are two other key precedents for the current study. Like the current study, Wright et al. (2005) also considered the ordering of “Name and Name” phrases. Critically, however, that study differed from the current one in that the experimenters provided names without referents. Therefore, participants had no opportunity to rely on personal experience with the people involved. The study found a bias to order male before female names and shorter before longer names, two factors that have been proposed for English binomials generally, but which are not necessarily related to cognitive accessibility, the key factor of interest in the current work.

A precedent for considering “psychological closeness” to be relevant to binomial order comes from Iliev & Smirnova (2014). This work hypothesized that “psychological closeness of the speaker to one of the poles in the word pair” should predict order with the closer entity positioned earlier (pg. 210). Unlike the current study, all proper names were excluded from analysis. Instead, in one study, websites about cars, politics, religion were analyzed. Results demonstrated that sites sponsored by Honda, for example, were more likely to mention *Honda* before its competitors; liberal leaning websites were more likely to mention *liberal* before *conservative*, and to a lesser extent, websites about Islam showed a tendency to mention *Muslim* before *Christian*. A second study focused on gender and results were more equivocal. The authors hypothesized that male authors should be more likely to order male terms before female, while female authors might show the reverse tendency. Notably, however, male terms were ordered before female terms 93% of the time by male authors and 90% of the time by female authors. The strong skewing toward male-first, also found in previous work, may partially be due to the fact that many relevant phrases are conventionally frozen in English (e.g., *men and women*; *husband and wife*). A final study was experimental rather than based on corpus data; it elicited various binomials from participants by asking for the top two colleges in Chicago, the two main political parties in the US, the traditional two genders and so on. Participants showed a tendency to name their university first (Northwestern, 67%), and liberal students were more likely to name *Democrat* before *Republican* than were conservative students. Echoing theirs and others’ corpus work, an overwhelming majority of respondents produced *male* before *female* (91%), although of the participants who produced *female* first, 80% were women.

An analysis of how participants order the names of familiar couples satisfies several desiderata. It allows us to avoid expressions that are conventional in the language at large, which are recognized to be subject to many general influences as documented in other work. Names are particularly well-suited as an index of cognitive accessibility because a name selects an individual rather than a category: We might know several people named *Gary*, but when we talk about *Gary and Jessie* we have particular individuals in mind, and our representation of Gary, Jessie and their names are dependent on our own particular experiences. The experimental context enables us to control for animacy and discourse-givenness, while keeping the generation of names similar to that of natural production. Finally, by comparing Japanese and English, we can determine whether either or both languages tend to order more conceptually accessible names earlier.

Method

Participants

60 native speakers of English living in the US and 60 native speakers of Japanese living in Japan were recruited on Amazon Mechanical Turk as participants and moderately compensated for their time.

Procedure

Participants first answered questions about their gender and native language. They were then asked to name 3 sets of important couples in their life. They entered the name of each member of the couple in blank boxes. For the Japanese survey, participants were also asked to provide the phonetic spelling for each name. The rest of the survey asked whether or not participants were related to either or both of members of each couple, who they felt they were closer to, and the gender of each member of the couple. For these questions, the order of names that had been given were randomized for each participant.

Response coding & model development

To analyze the data, we followed the model of ordering preference for binomial expression introduced in previous work by Levy and colleagues (Benor & Levy 2006; Morgan & Levy 2016). The model predicts the likelihood that the ordering preference for a given pair is consistent with various planned fixed effects. First, each pair was coded in an essentially arbitrary way, specifically whether or not the names were ordered alphabetically. This was used as the outcome variable. Next, for each response, each fixed effect was assigned 1 if the factor predicted the alphabetical order and 0 if it predicted a non-alphabetical order. For example, if the participant indicated that they were closer to Gary than Jessie, closeness would receive a 1 because both alphabetical order and closeness predicted the same order, *Gary and Jessie*. If they had indicated that they were closer to Jessie than Gary, then closeness would receive a 0 because the alphabetical order (*Gary and Jessie*) does not match the closeness preference (*Jessie and Gary*). Note that we are not

testing whether or not there is a preference for alphabetical order. Rather, we use alphabetical order as a basis to get a binary code to compare with the order the participant provided.

To see if the length of names affected their ordering, we counted the number of syllables in each name for English and for Japanese, the number of morae, a more appropriate measure of length in that language (Otake, Hatano, & Mehler, 1993). We then calculated the difference in number of syllables/morae between each pair of names. We assigned this number a positive score if alphabetical order and ordering based on longer-before-short matched (the longer name was earlier in the alphabet) and a negative score when they did not.

Results

Before presenting the results of the model, we present the raw percentages of responses in the pooled data for each coded factor in Table 1. The person whom the participant reported feeling closer to was named first 65% of the time in Japanese and 77% of the time in English.

Cognitive accessibility (closeness) (%)					
	Gender (%)	Length (%)			
JAPANESE					
1 st	65	M-F	56	Long-Short	31
2 nd	35	F-M	30	Short-Long	21
		Same	14	Same	48
ENGLISH					
1 st	77	M-F	54	Long-Short	33
2 nd	23	F-M	43	Short-Long	40
		Same	3	Same	27

Table 1. % of responses for each fixed effect for Japanese (top) and English (bottom). Percentages rounded to the closest integer.

We first created models for each language independently. For this we used a multilevel model with closeness, gender, and length as fixed effects, random intercepts for subject, and alphabetical order as the outcome (Barr, Levy, Scheepers, & Tily 2013), using the lmerTest library (R Development Core Team 2008).

For the English data, the model revealed a significant effect of closeness ($\beta = -0.52, t = -7.31, p < 0.0001$); the tendency to order males first was not significant, ($\beta = -0.32, t = -1.45, p = 0.15$) and neither was a tendency to order shorter before longer names ($\beta = -0.002, t = 0.10, p = 0.9$).

The model for the Japanese data also revealed a significant effect of closeness ($\beta = -0.29, t = -4.19, p < 0.0001$) and no effect of length ($\beta = 0.04, t = 0.90, p = 0.37$). Unlike the English data, a marginal effect of gender was found with male names being more likely to appear before female names ($\beta = -0.23, t = 1.98, p = 0.05$).

In order to better quantify the importance of each of these effects, we used a leave-one-out method in which we compared a model without each effect to the full model. For both English and Japanese, conceptual accessibility (as operationalized as closeness) significantly improved the model (English, $\chi^2 = 46.02, p < 0.0001$; Japanese, $\chi^2 = 16.79, p < 0.0001$). Length did not improve either model (English, $\chi^2 = 0.01, p = 0.92$; Japanese, $\chi^2 = 0.69, p = 0.41$). Gender significantly improved the model only for Japanese ($\chi^2 = 13.30, p = 0.001$), and not for English ($\chi^2 = 3.72, p = 0.16$). While there seems to be a difference in importance of gender in Japanese and English (or rather Japan and US), all analyses indicate that conceptual accessibility is the most important predictor of binomial expression of proper names.

In order to compare the effect size of conceptual accessibility (closeness) in the two languages, we looked at the interaction of closeness and language using the combined data. For this we used a multilevel model with gender and length as independent fixed effects, closeness and language as interacting fixed effects, random intercepts for subject, and alphabetical order as the outcome. The model found a significant effect of closeness ($\beta = -0.53, t = 7.05, p < 0.0001$), and a significant interaction of closeness and language ($\beta = 0.25, t = 2.53, p = 0.01$), suggesting that closeness is a larger effect for English than Japanese.

Discussion

The ordering of the names of familiar couples was found to be strongly predicted by which member of the couple the speaker felt closer to. Taking personal closeness as an index of cognitive accessibility, we find that cognitive accessibility was the strongest predictor of name ordering in both English and Japanese, operating in the same direction in both languages: more cognitive accessible names tended to be produced first. This effect was stronger in English than in Japanese, although it is possible that the difference in effect size was due to the fact that a gender effect (male-before-female) was only evident in Japanese. That is, given that gender accounted for some of the variance, it is not surprising that the only other significant effect (cognitive accessibility) accounted for somewhat less in Japanese.

The lack of male-before-female bias in the current English data is intriguing, given that a male-before-female bias has been consistently found in prior corpus work (Cooper & Ross 1975; Lohmann & Takada 2014), and notably, on work involving on non-referential proper names (Wright, Hay, & Bent 2005). The reason a male-first bias exists at all deserves more discussion than we can offer here. Insofar as it is rooted in cultural sexism, it may be relevant that personal contact is recognized to reduce this and other forms of prejudice

(Pettigrew & Tropp, 2006). Japanese society obeys more stereotypical gender norms than the US (Bresnahan, Inoue & Kagawa, 2006; Saito, 2007), which might lead to a weak effect of male-before-female bias in Japanese.

Length was not a significant factor in English or Japanese, nor was there an interaction. And this lack of significance was apparent regardless of whether we treated length as a continuous or binary value. We note that it is possible that the lack of an interaction was due to a lack of power, since the names of each couple were commonly equal in length. That is, 27% of the couple names in English were of equal number of syllables and 48% the two names had the same number of morae in Japanese. Intriguingly, if we consider only the combinations of names that did differ in length, the trends in Japanese and English numerically pattern in opposite directions. Specifically, the ratio of shorter-first in English was roughly 4:3, while in Japanese, the ratio of *Longer-First* was roughly 3:2. Iliiev & Smirnova (2014) had found evidence of shorter-first in binomials in both languages, but they had found the effect to be 3x as large in English as Japanese. Thus it is possible that a shorter-first bias only exists in English binomials. Future work with a larger sample may be necessary to confirm this trend.

Let us return to the striking difference in preferred order of especially long complements in English and Japanese. Previous work had appealed to a distinction between conceptual accessibility and lexical accessibility, suggesting that longer phrases are “semantically richer” and that “This semantic richness increases the overall accessibility of the phrase in the conceptual arena” (Chang & Yamashita 2001:B53). Shorter phrases were recognized to be more accessible in the formal (lexical) domain. The difference between Japanese and English then, was that “In English, weight-based shifts [word order variation] seem to be less sensitive to conceptual factors.” However, in the current work, we have seen that if anything, English shows a *stronger* conceptually-accessible-early bias than Japanese does.

The current work allows that cognitive and formal/lexical accessibility need not be mutually dissociable. Clearly, certain episodic memories, smells, or images may be more or less cognitively accessible, depending on context and encoding. So clearly conceptual accessibility cannot be reduced to formal or lexical accessibility. But it is reasonable to assume that lexical (or formal) accessibility is simply a type of cognitive accessibility.

Our results are consistent with Hawkin’s (1994; 2004) proposal that languages prefer to minimize the distance between the verb and its (non-subject) complements. This

ordering is beneficial to listeners since the interpretation of a verb often critically depends on its co-occurring complements. This is clear in English, for instance, in the contrasts between, e.g., *hitting on an idea; hitting on someone; hitting someone up for something; hitting a place vs. a person vs. a goal*. See also Chang (2009) for interesting discussion how the minimal distance idea may emerge over the course of learning. In fact, the minimal-distance preference has been generalized to other kinds of semantic dependency relations and validated across a number of languages (Choi, 2007 for Korean; Faghiri & Samvelian 2014 for Farsi¹; Gildea & Temperley 2010 for English and German; Liu, 2008 for 15 languages; and Futrell et al., 2015 for 20 languages).

The present work finds that both English and Japanese show a preference to produce more conceptually accessible terms first. Prior work has established that languages also generally appear to prefer to minimize the distance between a verb and its arguments. While these types of processing biases may differ in their strength across languages, the present work supports the idea that language processing systems emerge in much the same way in speakers of different languages. This is perhaps to be expected insofar as language processing is shaped by constraints on memory, learning and interpretability.

Conclusion

To conclude, results in both English and Japanese confirmed that the order of names of couples, personally familiar to a participant, were most strongly predicted by which member of the couple the participant felt a closer personal attachment to. By investigating the ordering of the names of familiar couples, animacy and discourse-givenness were controlled for. Investigating the names of couples known to participants was also advantageous because the ordering is not expected to be affected by language-wide conventions. Results did not reveal length to be a significant factor, and gender only played a (relatively small) role in the Japanese data. Therefore, we submit that feelings of personal closeness serve as a useful and relatively direct index of cognitive accessibility.

Thus, the present work provides evidence that cognitive accessibility plays a similar strong role in word order in both Japanese and English. This undermines the possibility that the reverse ordering preferences in Japanese and English clauses is a result of cognitive accessibility influencing the two languages in different ways. Instead, the Japanese

¹ Hawkins had argued for a more specific proposal, namely that the *heads* of dependents should be as close as possible to their external head. This proposal motivates the idea that verb final languages tend to have *postpositions*, while verb-medial languages tend to have *prepositions*. However, Faghiri & Samvelian (2014) find that Farsi speakers prefer longer-early, parallel to Japanese. But while Farsi is an SOV language like Japanese, it has prepositions rather than postpositions. Therefore as Faghiri & Samvelian (2014) observe, the longer-early preference in Farsi cannot be explained in

terms of a preference to minimize the distance between a verb and the *head* of its complement, since when a PP is long, the long-early preference actually lengthens the distance between the V and P: <[P long]>_{IO} <short>_{DO} V. Nonetheless, Farsi is consistent with the idea that languages and speakers prefer to reduce the average distance between semantically related units (Gildea & Temperley, 2010).

ordering preference for grammatical phrases (longer-early) must be due to some other factor, quite possibly a preference to indicate a verb's arguments as close to the verb as possible (Hawkins 1994, 2004). The current study demonstrates that, *ceteris paribus*, speakers of both Japanese and English prefer to produce more cognitively accessible words early (Arnold et al. 2000; Ferreira & Dell 2000).

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