

Marilyn Ford\* and Joan Bresnan

# Generating data as a proxy for unavailable corpus data: the contextualized sentence completion task

**Abstract:** There is much interest in using large corpora to explore predictors of the probability of higher level linguistic structures, but suitable corpora are not available for all languages and their varieties. We explore a task that uses discourse contexts from an existing corpus as prompts for sentence completion to investigate the usefulness of the method for generating data as a proxy for unavailable corpus data. Mini databases of dative and genitive structures were obtained with the method using American and Australian participants. It is shown that the databases are indeed a good proxy for corpus data.

**Keywords:** Contextualized sentence completion task, corpus, datives, genitives, variety differences

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## 1 Introduction

When linguistic structures are contextually more predictable, speakers produce speech more rapidly and more fluently, they comprehend the structures more quickly, and their preferences for different structures reflect the differences in probabilities (Stallings et al. 1998; Gregory et al. 1999; Aylett and Turk 2004; Gahl and Garnsey 2004; Bell et al. 2009; Bresnan and Ford 2010; Jaeger 2010; see also Ford et al. 1982 and Jurafsky 1996). Probability effects hold true not merely for low-level syllable and word levels but also for higher-level structures, with, for example, greater preference or faster comprehension of more probable syntactic alternatives (Stallings et al. 1998; Bresnan and Ford 2010).

With the move toward recognition of the probabilistic nature of syntax and a growing interest in the predictors of alternative structures, there is now more emphasis on usage data in the form of computer-readable corpora containing

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\*Corresponding author: Marilyn Ford, School of Information and Communication Technology, Griffith University, Meadowbrook, Australia, E-mail: m.ford@griffith.edu.au  
Joan Bresnan, Department of Linguistics, Stanford, California, U.S.A. 94305

speech and writing from various sources (Bresnan et al. 2007; Bresnan and Ford 2010; Jaeger 2010; see Diessel 2007 for an overview). The predictability of higher-level structures, given possible predictors, can be measured by statistical models of corpus data (Gregory et al. 1999; Gries 2003a; Gahl and Garnsey 2004; Bresnan 2007; Bresnan et al. 2007; Roland et al. 2007; Bresnan and Hay 2008; Tily et al. 2009) so that the nature of probability differences and the influence of probability on language can be investigated. However, compared to small structures of linguistic interest, such as single words, morphemes, and phones, large syntactic structures, such as phrases or specific groups of phrases, are relatively infrequent in corpora. Thus, for higher-level structures of any particular type, large corpora are often needed. Unfortunately, not all languages or varieties of a language are well-studied, and so appropriate corpora might be lacking. The question arises: what can researchers do when suitable corpora are lacking for the language or variety of a language they wish to study?

Common methods in the past to help determine the different probability of structures involved having participants create sentences by completing simple phrases or by using particular verbs. Connine et al. (1984) gave participants verbs and a topic or a setting for the sentence: for example, the verb might be *remembered* and the topic might be *sports* or the setting might be *home*. Kennison (1999) simply gave participants past tense verbs to use in a sentence. Holmes et al. (1989) gave their participants a pronoun followed by a complement verb: for example, *They admitted ...*. Trueswell et al. (1993) and Garnsey et al. (1997) used a person's name followed by a verb: for example, *John insisted ...*. Pappert et al. (2005) gave participants German fragments consisting of Noun Phrase – Auxiliary – Noun Phrase: for example, *Der Doktor wird den Krankenpfleger ...*. It has become apparent, however, that there are problems with these methods.

Merlo (1994) compared verb biases toward different structures in subsets of the Penn Treebank corpora (Marcus et al. 1993) with verb bias counts obtained by Connine et al. (1984), Holmes et al. (1989), Trueswell et al. (1993) and Garnsey (1994). She found that the verb bias counts from the corpora were not strongly correlated with the counts from the simple sentence completion counts. Roland and Jurafsky (1998, 2002) compared verb bias counts obtained from other subsets of the Penn Treebank Corpora with counts from the simple sentence completion studies of Connine et al. (1984) and Garnsey et al. (1997) and found that the two types of sources yielded very different results. They note that the 'test-tube' sentences obtained from simple sentence completion studies are not the same as 'wild' sentences and that "seemingly innocuous methodological devices, such as beginning sentences-to-be-completed with proper nouns (*Debbie remembered ...*) can have a strong effect on resulting probabilities" (Roland and Jurafsky 2002: 327). More generally, they find, because

psycholinguistic experiments usually involve constructed sentences isolated from connected discourse, experimental data lack discourse cohesion and experiment participants resort to default referents. The prompts used in experiments also have significant effects.

Roland and Jurafsky (2002) also found differences between the different Penn Treebank corpora, specifically the Brown, Switchboard, and Wall Street Journal corpora. They postulated two important influences on probabilities. First, the *discourse context* of a sentence influences the sentence and, of course, discourse context varies from corpus to corpus. Second, different *verb senses* have different subcategorization biases and, of course, different verb senses occur with different frequencies in different corpora. Similarly, in their study of single versus double object sentences, Pappert et al. (2005) argued that counts for alternative structures differ depending on the semantic information being conveyed. In a more comprehensive study of several syntactic structures in a variety of corpora, Roland et al. (2007: 370) conclude that “the likelihood of a particular structure is influenced by a wide variety of contextual factors including discourse type, the topics under discussion, the information demands of the situation, the degree of fluency of speech, and the senses of the words being used”.

The importance of discourse context and verb sense in corpora is clear. Lapata et al. (2001) suggest that the problem could be addressed by conducting completion experiments that use materials taken from corpora and presented in their discourse context. They state:

We argued that the norming studies reported in the literature are unrealistic because they do not provide discourse context for their materials and [/or] fail to control for verb sense ambiguities ... Both factors were shown by Roland and Jurafsky (2001) to influence verb frame frequencies. This problem could be addressed by conducting realistic completion experiments that use materials extracted from corpora and present them in a discourse context. (Lapata et al. 2001: 434)

In the current study, we present an experimental method that does this. By using text found in corpora as discourse contexts for a completion task, we wish to avoid obtaining the ‘test-tube’ sentences that Roland and Jurafsky (2002) note come from simple sentence completion studies and we also wish to avoid what they term “seemingly innocuous methodological devices” such as *Debbie remembered* .... A “contextualized completion task” where participants are given multi-sentence materials taken from corpora to complete can, we suggest, be used where suitable corpora are lacking to produce mini databases of rich examples of structures of interest. Moreover, for us, it is not a matter of simply seeing whether a certain context is more likely to produce a certain structure. We explore the possible predictors of structures, which include different features

of the different instances of the structure, such as the animacy or length of the arguments in the particular instance, together with features of the context such as givenness and structural persistence. Each completion produced by one context can have its own features which can then feed into an analysis. We examine usage of the task to study two major constructions of English, the dative and the genitive alternations.

## 2 The dative and genitive alternations

In English, there are many verbs that take two arguments that can be expressed either in a *prepositional NP PP* form or a *double object NP NP* form. These alternative forms, exemplified in (1), are known as the dative alternation.

- (1) a. We sent our DNA swabs to the genetic testing service. (NP PP dative)  
 b. We sent the genetic testing service our DNA swabs. (NP NP dative)

To indicate possession in English, the possessor and possessum can be expressed in an 's structure or an *of* structure. The alternatives, exemplified in (2), are known as the genitive alternation.

- (2) a. The accident had a dramatic effect on this young man's (s-genitive) life.  
 b. The accident had a dramatic effect on the life of this (of-genitive) young man.

It has been shown that there are various factors that predict the probability of one alternative compared with another. For the dative alternation, Bresnan et al. (2007), building on previous corpus work by Thompson (1990), Collins (1995), Gries (2003b), Snyder (2003), and others, have shown, using the Switchboard corpus of American English, that after adjusting for verb sense biases, there is a preferred pattern in the alignment of the two dative arguments (referred to as natural or Harmonic Alignment), with preferences for the ordering shown in (3).

- (3) **discourse given** before **nongiven**  
**pronoun** before **nonpronoun**  
**animate** before **inanimate**  
**definite** before **indefinite**  
**shorter** before **longer**

That is, the corpus analysis shows that the features Given, Pronominal, Animate, Definite, and Short favor an argument coming first out of two arguments, while the features Nongiven, Nonpronominal, Inanimate, Indefinite, and Long favor an argument coming second of two arguments, though the strengths of these effects are not necessarily equal (see, for example, the models in Bresnan et al.). Compare (4a and b) and (5a and b).

- (4) a. She gave those to a man. (more probable)  
 b. She gave a man those. (less probable)
- (5) a. She gave a backpack to me. (less probable)  
 b. She gave me a backpack. (more probable)

In (4), although the recipient (*a man*) is animate, it is longer than the theme (*those*) and unlike the theme it is indefinite and it is a lexical noun phrase. According to Harmonic Alignment the recipient in (4) is thus more likely to come after the theme. In (5), the recipient (*me*) is shorter than the theme (*a backpack*) and unlike the theme it is definite and a pronoun. According to Harmonic Alignment the recipient in (5) is thus more likely to come before the theme.

It has also been shown that the form of a dative preceding another in the same dialogue influences the later dative, with a preference for the second dative to be the same form as the first (Szmrecsányi 2005; Gries 2005; Bresnan and Ford 2010). Different verb senses also influence the probability of one alternative over another. Let's consider the italicized dative in (6), taken from the Switchboard corpus.

- (6) *Speaker:*  
 A lot of women I know now do job sharing. And one of my supervisors, when she went on LOA to have her baby, we hooked up a terminal at her house and we could send her messages, and she kept in touch like that, and basically, just worked out of her house. I would just *take her the actual paperwork* once every week or two.

The dative in (6) is given in the double object NP NP form and in fact, using the dative model of Bresnan et al. (2007) or Bresnan and Ford (2010), the NP NP form has a higher probability for this dialogue compared with the NP PP form. Although the verb sense is actually biased toward the prepositional NP PP form (see Bresnan and Ford), other factors lead to a greater probability of the double object NP NP: in contrast to the phrase *the actual paperwork*, the referent to *her* is given previously in the discourse, *her* is a pronoun, and it is short. Harmonic

Alignment in this case leads to a preference for *her* to occur before *the actual paperwork*. Moreover, there is a preceding double object NP NP (*send her messages*), adding to this bias.

Similar factors have also been shown to influence the probability of genitive type in corpora. There is a very strong bias for an animate possessor to come first, yielding a preference for the *s*-genitive (Rosenbach 2002 and Rosenbach 2005; Hinrichs and Szmrecsányi 2007; Tagliamonte and Jarmasz 2008; Shih et al. In Press, Grafmiller to appear). There is a strong preference for short arguments to come before long (Rosenbach 2002 and Rosenbach 2005; Hinrichs and Szmrecsányi 2007; Shih et al. In Press, Grafmiller to appear). Some literature suggests that there is a tendency for discourse given arguments to come before those not referred to in the previous discourse (Quirk et al. 1985; Biber et al. 1999), though recent studies have not shown consistent effects (Hinrichs and Szmrecsányi 2007; Shih et al. In Press; Grafmiller to appear). Given Harmonic Alignment patterns, one might also expect a preference for definite possessors to come before indefinite possessors. Indeed, Rosenbach and Vezzosi (2000) found such an effect in a corpus analysis of Early Modern English, though Wolk et al. (to appear) did not find a significant effect for this in their corpus analysis of Late Modern English. For genitives, the final sound of a possessor is also important. When a possessor ends in a sibilant, there is a reduction in the preference for the *s*-genitive (Szmrecsányi 2006; Hinrichs and Szmrecsányi 2007; Szmrecsányi and Hinrichs 2008; Shih et al. In Press; Grafmiller to appear). A persistence effect has been found by Szmrecsányi (2006) and Szmrecsányi and Hinrichs (2008), with the occurrence of an *s*-genitive increasing the likelihood of the next genitive also being an *s*-genitive. Finally, the type of semantic relation encoded in the genitive may influence the type of genitive. Rosenbach (2002) makes a binary distinction between prototypical relations, comprising legal ownership, body part relations, kinship, and part-whole relations, and nonprototypical relations, comprising all other relations (such as *the bag's contents* and *the employer's rights*). Prototypical relations have been found to favor the *s*-genitive, while nonprototypical, the *of*-genitive (Rosenbach 2002; Grafmiller to appear; Wolk et al. to appear).

To assess the relative influence of each possible predictor on the probability of an alternative and to yield a probability value for a particular alternative in a given discourse, a form of logistic regression, generalized mixed effects modeling, can be used (Pinheiro and Bates 2000; Quené and van den Bergh 2004 and Quené and van den Bergh 2008; Richter 2006; Baayen et al. 2008). To use this technique, all the relevant items in a large corpus are first annotated for possible predictors; for example, pronominality, givenness, animacy, definiteness, and length of each argument, as well as verb sense and presence of a preceding

structure of a certain type. Using a generalized mixed effects modeling algorithm (such as that given by *glmer* in the free software environment R, [www.r-project.org](http://www.r-project.org)), the strength of the positive or negative effect of each predictor can be determined, conditioned on random effects such as the particular speakers or lexical material, and the probability of an item occurring in one alternative form can be calculated (see Ford and Bresnan to appear). To develop their corpus model, Bresnan et al. (2007) used the three-million-word Switchboard corpus containing 2360 datives, 79% of which were of the NP NP form. They found that their model predicted the correct dative form for unseen data with an average of 94% accuracy (compared with a rate of 79% if NP NP is always predicted). Shih et al. (In Press) used the Switchboard corpus to develop a model of genitives. The corpus was found to contain 1115 genitives, 59% of which were *of*-genitives. Their model predicted the correct genitive form with an average of 92.3% accuracy, compared with 59% if an *of*-genitive is always predicted.

### 3 The contextualized completion task

The dative and genitive models of Bresnan et al. (2007) and Shih et al. (In Press) were developed using a large corpus of American English. To allow comparison with other varieties of English, or indeed other languages, for which a large corpus does not exist or is not readily available, we are proposing a completion task that incorporates discourse contexts harvested from usage. Bresnan and Ford (2010) initially used the technique simply to compare the percentage of NP NP to NP PP datives for American and Australian speakers and for that purpose used only 20 American and 20 Australian participants. By increasing the number of participants, a mini database of items of interest can be obtained, with all relevant discourse factors present and available for study.

#### 3.1 Obtaining dative completions

Given that large corpora already exist for some varieties of a language, it is possible to take items and their context and then modify the context so that it is compatible with another variety. Consider (7), taken from the Switchboard corpus, though edited for fluency.

(7) *Speaker A:*

I moved to Arkansas and Texas after living in Ohio and the schools down here rate, you know, bottom ten percent across the country and having

been through grade school up there and coming down here to high school I can understand why. Because they're so far behind and so poorly staffed, half the time the teachers don't know what's going on.

*Speaker B:*

Well, that's really too bad because it's giving some people unfair advantage.

The item refers to American places and uses American terminology, such as “grade school”. A version of this item localized to Australian English (Bresnan and Ford 2010) and another version localized to British English for a ratings task (Theijssen 2012) are given in (8) and (9), respectively, with the changes given in bold.

(8) *Speaker A:*

I moved to **Inala** and **Durack** after living in **Cairns** and the schools down here rate, you know, bottom ten percent across the country and having been through **primary** school up there and coming down here to high school I can understand why. Because they're so far behind and so poorly staffed, half the time the teachers don't know what's going on.

*Speaker B:*

Well, that's really too bad because it's giving some people unfair advantage.

(9) *Speaker A:*

I moved to **London** after living in **Surrey** and the schools down here **are rated**, you know, bottom ten percent across the country and having been through **first** school up there and coming down here to **secondary** school I can understand why. Because they're so far behind and so poorly staffed, half the time the teachers don't know what's going on.

*Speaker B:*

Well, that's really too bad because it's giving some people unfair advantage.

In a contextualized completion task to elicit datives, items like those in (7)–(9) are given in written form to participants, though they are given in incomplete form, ending with the dative verb (*giving* in this case) and followed by a couple of lines for the written completion. Participants are told that two speakers are talking informally about different topics and that they are to read each item and complete it in the way that feels most natural to them. They are instructed that



they need not spend a lot of time deciding how to complete an item, but to just write down what seems natural. The instructions are given in Appendix 1.

In modifying the items for a contextualized completion task, it is advisable to minimize changes in order to keep constant the contextual variables that are predicted to influence the alternative form of a structure. Thus, for example, given the dative model presented in Bresnan and Ford (2010), it would be important to keep constant the existence of a preceding NP NP or NP PP and also the dative verb used. Although participants will produce quite different completions, the presence of an equivalent context for all participants makes analysis easier because each participant will experience the same types of constraints, for example in verb sense or presence of a certain structure or a certain referent, giving all participants an equal likelihood of experiencing the different influences.

### 3.2 Obtaining genitive completions

While eliciting datives is quite easy due to the presence of a dative verb, eliciting genitives is a little more difficult. Consider (10), taken from the Switchboard corpus, though edited for fluency.

(10) *Speaker A:*

Do you have a favorite instrument?

*Speaker B:*

Actually one of my favorite instruments is a harpsichord. I really like those. In fact, I had a harpsichord played at my wedding.

*Speaker A:*

Oh, did you?

*Speaker B:*

Yeah. Which was real nice. I got married during the Christmas season and we played old fashioned Christmas carols instead of normal wedding marches and it was real nice. I liked that a lot. I liked the sound of the harpsichord.

If the context were to be presented up to and including the word immediately preceding the genitive *the sound of the harpsichord*, the chances of eliciting a genitive would be rather low. For the datives, the presence of a dative verb increases the chance of a dative, but for the genitive constructions there is no such preceding marker of an upcoming possessive relation. To increase the

chances, the incomplete item together with the two arguments of the given genitive are presented, as in (11).

(11) *Speaker A:*

Do you have a favorite instrument?

*Speaker B:*

Actually one of my favorite instruments is a harpsichord. I really like those. In fact, I had a harpsichord played at my wedding.

*Speaker A:*

Oh, did you?

*Speaker B:*

Yeah. Which was real nice. I got married during the Christmas season and we played old fashioned Christmas carols instead of normal wedding marches and it was real nice. I liked that a lot. I liked

.....  
 .....

[the harpsichord]

[sound]

The last word in the context is the word that immediately preceded the genitive in the Switchboard corpus. Half of the participants receive the bracketed phrases in one order and half in the other order.

Participants are instructed to read each item and complete the unfinished sentence in the way that feels most natural, but incorporating the two given phrases or words into their completion. They are instructed that the given words or phrases can be given in any order and that grammatical modifications can be made. The instructions include an example of a context followed by two phrases to be used in the completion, together with a possible completion. The example in the instructions is not one expected to elicit a genitive and the example completion is a dative and it is one where one of the given phrases has been modified. Giving an example completion in the instructions with a non-genitive is to avoid priming participants to produce genitives simply because the instructions included one. The example in (12) is given in the instructions, together with the sample completion in (13).

(12) *Speaker A:*

I really use my computer a lot at home. I am an accountant but I work at home. So I use it for that quite often. We have, you know, used some of it

for some personal things. We keep track of personal budgets and things like that on it. Since it's tax season, I'm doing a lot of taxes, so I do a lot of that work on it as well.

*Speaker B:*

I was amazed when I took

.....  
 .....

[a new accountant]

[tax]

- (13) I was amazed when I took *our taxes to a new accountant that he did not have a computer on his desk.*

The instructions lessen the chances of a genitive somewhat, but they allow participants to produce the completions more freely and naturally. Any modification of an item to suit a particular variety is kept to a minimum and the given phrases or words in brackets at the end of the context are held constant. Other variables predicted to influence the alternative form of the genitive should be kept constant; for example, the presence of another mention of the possessor in the context. It may be that a participant produces a genitive that is different from the original. That is fine, since the aim is simply the production of genitives in similar contexts by speakers of different varieties of a language. The instructions are given in Appendix 2.

## 4 Contextualized completion data

In what follows, we will compare the data obtained from the contextualized completion task to data from other corpora and other studies. Specifically, we expect the written completion data to be similar to spontaneously produced spoken data with respect to the Harmonic Alignment of well established properties (animacy, pronominality, etc.), as has been found for spoken and written corpus datives (Bresnan et al. 2007; Theijssen 2012) and spoken and written corpus genitives (Hinrichs and Szmrecsányi 2007; Szmrecsányi and Hinrichs 2008; Shih et al. In Press; Grafmiller to appear).

What has been termed “Harmonic Alignment” is a prominent feature of both dative and genitive data in corpora of American English (see Bresnan et al. 2007 and Shih et al. In Press) and other languages (Choi 2007) as well as American and British English from the 17th century through the 20th (Wolk et al. to appear). It is also a prominent feature in the ratings of alternative dative

structures by American, Australian, and British speakers (Bresnan et al. 2007; Theijssen 2012) and in preferences for alternative genitive structures given by British and American speakers (Rosenbach 2002 and Rosenbach 2003). And importantly, variation across macro-regional varieties of English has been found in the relative weights of harmonically aligning properties. Thus, for example, there is evidence of differences in the importance of animacy for datives in American and New Zealand English (Bresnan and Hay 2008) and in the importance of animacy for genitives in early New Zealand English and early British English (Hundt and Szmrecsányi 2012). If the contextualized completion task is suitable for the development of a mini database then the direction of any significant effects should be the same as that expected by the Harmonic Alignment pattern, though the magnitudes might vary. Of course, for the contextualized completion task to be successful, it is also important that the task generate enough items for statistical analysis.

#### 4.1 Dative completions

To determine whether the contextualized completion task is suitable for developing a mini database of datives, we gave participants incomplete versions of the 30 dative items used by Bresnan and Ford (2010), though ending with the dative verb followed by two lines for a written completion. The items were presented in a partial random order. That is, booklets containing the 30 items were developed with three items on each page, but the participants received each page in a random order. The items contained contexts that were drawn from items across the range of probability levels for one dative over another. While it is customary in psycholinguistic experiments to give participants distractor items, that is, items that have a different structure from those under investigation, it was felt that since the contexts do not actually give the structure being studied and since they need not be completed using such a structure, then distractor items were not necessary. Moreover, the contexts themselves are very different passages that have distracting value, compared to a repetitive task involving responses to simple lists of sentences. The data obtained and the reactions of participants supported this belief. Calculations showed that 45.9% of the completions did not contain datives. Moreover, no participant commented on commonality between the items, and those who actually asked after the study what the study was about gave no indication that they had recognized what was being studied.

The participants were 40 US speakers (20 males and 20 females) and 40 Australian speakers (20 males and 20 females). None of the participants had taken a course in syntax or linguistics. The US speakers received the US versions

of the items, while the Australians received the items contextualized for Australians. The US participants were paid volunteers from the Stanford University community and had grown up in the US speaking only English. The Australians were paid volunteers from the Griffith University community and had grown up in Australia speaking only English.

The task was very successful at eliciting datives. Overall, for the 80 participants there were 1306 datives obtained from a total of 2400 completions (80 participants  $\times$  30 items each). As an example of some completions, consider (14a–j) where 10 dative completions randomly chosen from the 71 obtained dative completions for the context based on (7)/(8) are presented, though for convenience only the American localization is presented. Note that the whole completions are given, with the dative component in italics.

(14) *Speaker A:*

I moved to Arkansas and Texas after living in Ohio and the schools down here rate, you know, bottom 10% across the country and having been through grade school up there and coming down here to high school I can understand why. Because they're so far behind and so poorly staffed, half the time the teachers don't know what's going on.

*Speaker B:*

Well, that's really too bad because it's giving

.....  
 .....

- a. *a generation of kids a bad start to their adult life whereas the other schools have given their kids are [sic] headstart.*
- b. *bad education to kids.*
- c. *Brisbane and Queensland a bad reputation for education, something needs to be done.*
- d. *kids a bad start, holding them back.*
- e. *not only the kids the bad education, but also killing their opportunities in the future.*
- f. *our children an opportunity to learn, but they aren't learning anything.*
- g. *the students from that area less of a head start when compared to other schools students.*
- h. *the students terrible preparation for college.*
- i. *you a bad experience with education.*
- j. *you a hard time.*

It can be seen that the participants are effectively producing their own items and that the completions seem very natural, like sentences found in corpora. The

mean number of dative completions for each context was 43.53, with a standard deviation of 23.91. An example of a context that elicited fewer datives than (14) was (15), presented here with 10 randomly chosen dative completions from the 31 it elicited.

(15) *Speaker A:*

I think the quality of education in the high school system here is better. I think the teachers that we have now are more professional, and I think the students are more education minded than they were twenty years ago.

*Speaker B:*

I think the problem isn't so much the school system as in the things that go on around it. My personal opinion is that so many parents, especially those parents who are in a lower income and have to spend more of their energy on work, they say. Well, I don't have to teach

.....  
 .....

- a. *my children anything* since I don't have the time to; that's why I work so hard to pay for their education.
- b. *my children basic knowledge or communication*, especially rules boundaries if schools are doing it.
- c. *my children manners or morals*, they learn that in school.
- d. *my children maths or english* because the teachers at school do.
- e. *my kid anything* because the school should be doing it already.
- f. *my kids anything to do with schoolwork*, I just don't have the time.
- g. *my kids shit*.
- h. *my own child anything*, the school will.
- i. *students chemistry and physics*, it is there [sic] choice so they can get into university and make a good life for themselves.
- j. *them so that just gives me more time to make more money*.

The vast majority of dative completions used the given dative verb, though there were 19 that came about by participants adding an additional dative verb to the one ending the given context. An example is (15j) which has the dative *gives me more time to make more money*.

Of the 1306 obtained datives, 502 (38.4%) were prepositional and 804 (61.6%) were double object datives. Table 1 presents the average number of prepositional and double object datives produced by US and Australian males and females.

The percentage of prepositional datives is higher than in the Switchboard corpus (21%), but this is not surprising because the contexts given to participants

**Table 1:** Means and standard deviations for completions as a function of dative completion type, variety, and gender.

	US		Australian	
	Males	Females	Males	Females
Prepositional datives Mean (std. dev.)	6.35 (2.28)	5.85 (2.8)	7.15 (2.48)	5.75 (1.86)
Double object datives Mean (std. dev.)	10.1 (2.73)	9.9 (2.9)	9.35 (2.37)	10.85 (2.76)

in our study were not chosen randomly, but were drawn *relatively evenly from across the probability range* for the use of the prepositional dative alternative. The contexts were chosen in this way to increase the chances of having a variety of items differing in characteristics related to Harmonic Alignment and verb sense, so that we could examine whether Harmonic Alignment effects are found in the data obtained by the contextualized completion task. That is, it is not the simple percentage of prepositional to double object datives that is of interest. It is the possible effects of variables that predict the alternatives that are of interest. Harmonic Alignment variables have been shown in corpus studies to be important predictors of alternative choice and so they should be important in data obtained by the contextualized completion task.

#### 4.1.1 Harmonic alignment and the obtained datives

To see whether there is evidence of Harmonic Alignment, which would be expected in corpus data, the data were analyzed using mixed effects regression models (Baayen 2008; Baayen et al. 2008; Jaeger 2008; Johnson 2008; Quené and van den Bergh 2008) using the lme4 package in languageR (Bates et al. 2009). The obtained datives were coded for pronominality of the theme, pronominality of the recipient, animacy of the recipient, definiteness of the theme, length of the recipient, length of the theme, and presence or absence of a preceding NP NP or NP PP dative or no dative. That is, each dative produced was coded as being preceded in the given context, or in the completion given by the participant to that context, by either an NP NP dative, an NP PP dative, or no dative. If there happened to be more than one dative in the context or in the completion before the relevant dative, the dative was coded according to the nearest dative. Given that length of the recipient and the theme would be correlated somewhat with pronominality of the recipient and theme we decorrelated the two predictors by replacing length with the residuals of a linear

regression of length against pronominality. Given that participants received the 30 items in a different order, the item order for each participant was also added to the initial model. Also included were gender and the mean number of words a participant used in non-dative completions (a measure of the “wordiness” of the participant). There were two random effects incorporated into the initial model to control for random differences among experiment participants and among items. These were the participant and the verb–theme combinations, operationalized by pairs of the verb lemma and the very fine-grained semantics of the head of the theme. Regarding verb–theme combinations, consider *gave them money* and *gave them more than 10,000 dollars*. The semantics of the head of the themes in both phrases concerns money and thus both theme heads would be coded as having the semantics of *money*. Different verbs can be associated with the same type of theme head. Thus, for example, *owe me two hours worth of pay* also has a theme head with the semantics of *money*. The inclusion of a random effect that captures the combination of verb and semantics of the theme head as a refined proxy for verb sense was suggested by Theijssen (2012). In sum, completion type is seen as a function of a number of possible predictors and the possible predictors of completion type are given in the model. The initial model specification is given in (16).

(16) Completion type (NP NP or NP PP dative) is a function of:

**Fixed effects:**

variety interacting with  
 (pronominality of recipient +  
 pronominality of theme +  
 animacy of the recipient +  
 definiteness of the theme +  
 length of the theme (residuals) +  
 length of the recipient (residuals) +  
 preceding dative type or no dative +  
 item order +  
 gender +  
 participant mean word count)

**Random effects:**

participant +  
 verb–theme combinations

All interactions except variety interacting with animacy and variety interacting with gender were eliminated because the magnitudes of the estimated



**Table 2:** Model parameters for the American and Australian dative completions (number of observations: 1306; groups: verb/semantic theme head, 333).

Fixed effects	Estimate	Std. Error	z-value	p
(intercept)	0.3482	0.4179	0.833	0.4047
variety: Australian (default: American)	-0.1580	0.3597	-0.439	0.6605
pronominality of recipient: pronoun (default: nonpron)	-3.1366	0.3139	-9.992	0.0000***
pronominality of theme: pronoun (default: nonpron)	3.5541	0.9223	3.853	0.0001***
definiteness of theme: indefinite (default: definite)	-1.5511	0.2973	-5.217	0.0000***
length of recipient (res)	0.5796	0.1279	4.531	0.0000***
length of theme (res)	-0.4292	0.0785	-5.470	0.0000***
previous dative: NP PP (default: none)	1.9541	0.4058	4.815	0.0000***
previous dative: NP NP (default: none)	-0.7351	0.5352	-1.373	0.1696
animacy of recipient: inanimate (default: animate)	1.2727	0.4345	2.929	0.0034**
gender: male (default: female)	-0.2258	0.3231	-0.699	0.4845
variety(Aus) : recipient = inanimate	-1.2541	0.5303	-2.365	0.0180*
variety(Aus) : gender = male	1.3226	0.4618	2.864	0.0042**
<b>Random effects</b>	<b>Std. dev.</b>			
Verb–theme combinations	1.878			

Note: \*Significant at  $p < 0.05$ , \*\*Significant at  $p < 0.01$ , \*\*\*Significant at  $p < 0.001$ .

coefficients were less than the standard errors. Mean word count and item order were also eliminated for the same reason. It was also found, using likelihood ratio tests, that models with and without the random effect of participant did not differ significantly in goodness of fit and so that too could be eliminated. The resulting model is given in (17) and the model parameters are given in Table 2.

(17) Completion type (NP NP or NP PP dative) is a function of:

**Fixed effects:**

pronominality of recipient +  
 pronominality of theme +  
 definiteness of the theme +  
 length of the recipient (residuals) +  
 length of the theme (residuals) +  
 preceding dative type or no dative +  
 variety interacting with (animacy of the recipient + gender)

**Random effect:**

verb–theme combinations

Positive coefficients indicate a favoring of the prepositional dative, while negative coefficients indicate a favoring of double object datives. Pronominality of the recipient, pronominality of the theme, definiteness of the theme, length of the recipient, length of the theme, and animacy of the recipient all show the Harmonic Alignment effect: they have opposite coefficient signs for recipient and theme, in such a way that an argument with features Pronominal, Definite, Short or Animate tends to appear in whichever construction places it first in order, while the argument with features Lexical, Indefinite, Long or Inanimate, tends to appear in whatever construction places it second. The priming effect of a preceding prepositional dative is also significant. That is, a prepositional dative is more likely to occur after a prepositional dative than after a context with no dative.

There is a significant interaction of variety with animacy of the recipient: although there is a positive coefficient for the main animacy effect showing that inanimate recipients favor prepositional datives as expected by Harmonic Alignment, the significant negative coefficient in the interaction shows that Australians are more likely to produce double object datives for inanimate recipients than are Americans. That is, the American participants have a stronger animacy effect than the Australians. Examination of the raw data shows, in fact, that for the Americans 81.6% of their 125 inanimate recipients were prepositional datives, while for the Australians, only 68.7% of their 163 inanimate recipients were prepositional datives. Looking at animate recipients, which would favor the double object dative, for the Americans 72.6% of their 519 animate recipients were double object datives, while for the Australians, 70.7% of their 499 animate recipients were double object datives. We see, then, that the Australians have a reduced effect of animacy of the recipient. Interestingly, variety differences in the effect of animacy on dative alternation are not novel; they have been observed before. In their analyses of American and New Zealand corpora, Bresnan and Hay (2008) found a stronger effect of animacy in spoken New Zealand English than in spoken American English. That is, they found that New Zealanders favored prepositional datives with inanimate recipients more than American speakers did. In the present study, we find that US participants favored prepositional datives with inanimate recipients more than Australians did. Also relevant is the finding in the diachronic corpus study of Wolk et al. (to appear) that the effect of animacy in dative alternation has decreased in the past century and a half. Of course, more studies need to be carried out, but it seems that Australians may have gone further along this path than Americans or New Zealanders.

There is also a significant interaction of variety and gender: the Australians males were significantly more likely to produce prepositional datives compared

with the Australian females. Examination of the raw data shows that for Australian males, 43.3% of their 330 datives were prepositional, while for Australian females, only 34.6% of their 332 datives were prepositional. For American males 38.6% of their 329 datives were prepositional, while for the American females 37.1% of their 315 datives were prepositional. The model shows that this difference holds even after adjusting for the other predictors and the random effects of verb–theme combinations. Bresnan and Ford (2010) had noted this tendency for a gender effect for Australians in their study, ( $p = 0.057$ ). Further support for the interaction can be found in the ratings study of Theijssen (2012) in which Australian males were found to give significantly higher ratings than Australian females to the prepositional dative form, while no such gender effect was found for the Americans. Thus, there is now converging evidence, from a ratings task and the contextualized completion task, that Australian males show a greater preference for prepositional datives than Australian females do. Why this should be is a question beyond the scope of the present study. Gender differences in Australian English have been observed at many levels (see Pauwels 1991 for a review), but they are intertwined with many other social variables that make their interpretation far from straightforward (see for example Eckert 1989; Eckert and McConnell-Ginet 1992).

#### 4.1.2 Further analyses of the obtained datives

We have seen that the contextualized completion task was successful at eliciting datives, with 1306 datives being obtained from a total of 2400 completions. We have also seen that Harmonic Alignment is a very prominent feature of the obtained dative database for both varieties. All of the Harmonic Alignment effects are in the direction predicted. Moreover, analyses showed differences in varieties and gender that are similar to, or the same as, differences shown in other corpus or ratings studies. Let's now consider the data further.

One question that one might ask, when considering the contextualized completion task, is the following: are there any features of the contexts that could distinguish the more productive from the less productive, for the generation of datives? On examining the number of dative completions for each of the 30 contexts, it appeared that contexts ending in a form of the verb *give* were more likely to produce datives. There were 16 contexts ending in a form of the verb *give* and 14 ending in a form of either *teach*, *pay*, *owe*, *show*, *sell*, *tell*, *bring*, or *take*. This distribution of verbs is in line with the Switchboard corpus, where 53.5% of the datives use some form of the verb *give*. In the contextualized completion task, the average number of completions with datives for contexts

ending in a form of the verb *give* was 54.50, with a standard deviation of 16.42. The average number of completions with datives for contexts ending in a form of a verb *other than give* was 31.00, with a standard deviation of 25.44. An analysis of variance showed that the difference in the number of completions with datives as a function of a *give* or *non-give* verb was significant, with  $F = 9.267$ ,  $p = 0.005$ . Thus, if researchers are interested in datives but, for some reason, are not concerned about obtaining examples from a variety of verbs, then using predominantly *give* contexts would be most productive.

An important feature of the contextualized completion task is that databases from different varieties can be generated under conditions where the context is the same for both varieties. This control lessens the chance that differences found are due to contingent unstudied differences between corpora from different varieties, and it allows for easier comparison. We can also ask how well the data from the contextualized completion task serve as a proxy for the corpus data.

Recall that earlier we stated that we were not interested in the simple percentage of prepositional to double object datives. Rather, we were interested in developing a corpus with enough variety so that complex phenomena like Harmonic Alignment in two varieties could be studied. As Bresnan et al. (2007) have shown, even corpora from different genres and with different percentages of different types of items may have the same underlying model. We thus considered how to assess the degree of similarity between the Switchboard corpus data and the completion data. To address this question, we combined the data from the two sources and constructed a model based on the main effects of (17): specifically, the model had data source as a factor potentially interacting with pronominality of the recipient, pronominality of the theme, definiteness of the theme, log difference in the length of the recipient and the theme, animacy of the recipient, and previous dative. We used log difference in the length of the recipient and the theme, rather than length of the recipient and the theme, because it reduced skewness of the length data from the Switchboard corpus. The model also had the random effects of participant and verb. This model used verb as the random effect (as in several previous corpus models of the dative alternation), because the fine-grained semantics of the theme heads had not been coded for the Switchboard database of datives. Because gender was not significant in the US completion data, it was not included. The results showed that there was a main effect of data source with, as we have already noted, the completion data having a greater percentage of prepositional datives than the Switchboard corpus. There were two significant interactions: the Harmonic Alignment effect of animacy and the persistence effect of a preceding double object dative were stronger in the US dative completion database than in the Switchboard corpus. We considered whether the animacy interaction could

be attributed to random differences in the verb samples in the corpus and the completion task contexts, because animacy of an argument is closely related to verb semantics. (For example, inanimate recipients with “give” often are in abstract or non-transfer senses: “it gives it some variety”, “give it a great deal of thought”, “give your stomach a chance to relax a bit”.) To test this idea we added a random slope for animacy to the random verb intercept in the model, and found that the interaction of data source with animacy disappeared.

We see then that the effects are essentially the same in both the US completion and Switchboard corpora, though two effects are stronger in the US completion data. The question can be asked: how important are the two significant interactions we find between data source and our model predictors? To evaluate this question, we next used a model trained solely on the US completion data to predict construction choice in the corpus data. If the differences in the strengths of predictors are minor, we would expect very good predictive accuracy, which would show that a model of the completion data generalizes well to the corpus data. Thus, we used a model with the main effects of pronominality of the recipient, pronominality of the theme, definiteness of the theme, log difference in the length of the recipient and the theme, animacy of the recipient, and previous dative and the random effect of verb, and trained it on the US completion data ( $n = 644$ ) and then used the resulting fitted model to predict, for each dative in the Switchboard corpus ( $n = 2349$ ), the log odds for it being a prepositional dative. That is, for each dative in the Switchboard corpus, the log odds for it being a prepositional dative was computed by summing the results of multiplying each feature value of the dative (such as pronominality of the recipient, definiteness of the theme, previous dative type if any, etc.) by the values of each relevant coefficient obtained from the model of the US completion data. Only the fixed effects of the model trained on the US completion datives were used to predict the log odds of the corpus datives, because the random effect verb had members in the corpus that were not in the completion data samples. Having obtained, for each dative in the Switchboard corpus, the log odds for it being a prepositional dative given the completion model coefficients, we calculated the concordance index,  $C$ . The concordance index is used to evaluate the discriminatory power and the predictive accuracy of nonlinear statistical models. A  $C$  value of .5 indicates random predictions, a value of 1 indicates perfect prediction, and a value greater than .8 is considered to have useful predictive ability (Harrell 2001: 247). The  $C$  value for the completion model on the Switchboard corpus datives was 0.94. We see, then, that the completion data model has excellent accuracy as a predictor of the corpus data, providing evidence that the information in the completion data regarding the choice of dative constructions generalizes well to the corpus data choices

and that the contextualized completion task is in this sense a good proxy for unavailable corpus data.

## 4.2 Genitive completions

To determine whether the contextualized completion task is suitable for developing a mini database of genitives, we gave participants incomplete versions of 30 genitive items taken from the Switchboard corpus, though edited for fluency. The items were drawn from across the probability range for the use of the *s*-genitive. Just as the dative items given to the Australians were contextualized to Australian speech, so too were the genitive items. Each item presented to the participants ended with the word that immediately preceded the genitive in the Switchboard corpus. For each item, as in (11), the possessor and the possessum of the genitive produced in the Switchboard corpus appeared below the item for inclusion in the completion. The two phrases to be included in the completion did not vary for the two varieties. There were two basic versions of the items. In both versions, half of the items had the original possessor before the original possessum and half had the original possessum before the original possessor. Whatever appeared first in one version appeared second in the other. One half of the participants received one version and half the other version. This was balanced over variety and gender. The items were presented in a partial random order, with each page containing three items, but with the 10 pages being given in random order. Once again, it was felt that distractor items were not needed because the contexts do not give the structure being studied and can be completed without such a structure. Moreover, the contexts themselves are very different passages that have distracting value, compared to a repetitive task involving responses to lists of sentences. Again, no participant commented on commonality between the items, and those who asked after the study what the study was about gave no indication they had recognized what was being studied. Also, calculations showed that 39.2% of the responses did not contain a genitive.

The participants were 40 US speakers (20 males and 20 females) and 40 Australian speakers (20 males and 20 females). None of the participants had taken a course in syntax or linguistics and none had participated in the first study. The US participants were paid volunteers from the Stanford University community and had grown up in the US speaking only English. The Australians were paid volunteers from the Griffith University community and had grown up in Australia speaking only English.

The task was very successful at eliciting genitives. Overall, for the 80 participants there were 1509 genitives obtained from a total of 2400 completions.

As an example of some completions, consider (18a–j) where 10 genitive completions randomly chosen from the 60 genitive completions for the context based on (11) are presented. Note that the whole completions are given, with the genitive component in italics.

(18) *Speaker A:*

Do you have a favorite instrument?

*Speaker B:*

Actually one of my favorite instruments is a harpsichord. I really like those. In fact, I had a harpsichord played at my wedding.

*Speaker A:*

Oh, did you?

*Speaker B:*

Yeah. Which was real nice. I got married during the Christmas season and we played old fashioned Christmas carols instead of normal wedding marches and it was real nice. I liked that a lot. I liked

.....  
 .....

[the harpsichord]

[sound]

- a. how I could hear *the harpsichord's sound* periodically throughout my wedding festivities.
- b. *the annoying, twangy sound of the harpsichord* rather than the beauty of an organ.
- c. *the sound of the harpsichord.*
- d. *the sound of the harpsichord* ever since my grandfather taught me how to play if as a child.
- e. *the sound of the harpsichord* with the voices of everyone singing.
- f. *the sound of the harpsichord.*
- g. *the sound of the music and the songs* when the harpsichord played.
- h. *the sound of the old carols being played on a harpsichord.*
- i. *the wonderful sound of the harpsichord.*
- j. they [sic] way *the harpsichord's sound* echoed around *the churches [sic] roof.*

The mean number of genitive completions for each context was 50.30, with a standard deviation of 21.15. An example of a context that elicited fewer genitives than (18) was (19), presented here with 10 randomly chosen genitive completions from the 30 it elicited.

(19) *Speaker:*

One of my very favorite places is Las Vegas. I would have to say we both end up going to Las Vegas, probably once every year and a half. Presently we have quite a few frequent flyer miles and so I've just requested that they send us two tickets because we have done a lot of flying with Continental and they're recommending that you use those because they don't know

.....

.....

[Continental]  
[future]

- a. about *the future of Continental airlines?*
- b. about *the future of Continental.*
- c. about *the future policies of Continental's frequent flyer miles.*
- d. about *the longevity of Continental's future.*
- e. *Continental's future.*
- f. exactly what *the future of Continental* will be themselves.
- g. if *Continental's future* is looking so good.
- h. *the future financial status of Continental airways.*
- i. *the future of Continental.*
- j. *the future of Continental.* It might be closed down soon.

Of the obtained genitives, 1102 used the two given phrases as possessor or possessum, while 407 used either modified phrases or totally different phrases. Several examples of this can be seen in (18) and (19), specifically, (18b, g, h, i, and j) and (19a, c, d, and h).

Of the obtained genitives, 613 (40.6%) were *s*-genitives and 896 (59.4%) were *of*-genitives. The percentage of *s*-genitives is about the same as that in the Switchboard corpus (41%). Table 3 presents the average number of *s*- and *of*-genitives produced by US and Australian males and females.

**Table 3:** Means and standard deviations for completions as a function of genitive completion type, variety, and gender.

	US		Australian	
	Males	Females	Males	Females
<i>s</i> -genitives mean (std. dev.)	8.9 (3.46)	7.85 (2.78)	7.65 (3.33)	6.25 (2.97)
<i>of</i> -genitives mean (std. dev.)	11.6 (3.7)	12.2 (3.16)	10.45 (3.42)	10.65 (3.31)



#### 4.2.1 Harmonic alignment and the obtained genitives

The data were analyzed using mixed effects regression models. The obtained genitives were coded for animacy of the possessor, definiteness of the possessor, givenness of the possessor, length of the possessor, length of the possessum, presence of a final sibilant in the possessor, and type of semantic relation of the genitive. The occurrence of a preceding *s-* or *of-*genitive was not coded due to data sparseness in regard to this factor. Given that participants received the 30 items in a different order, the item order for each participant was also added to the initial model. Also included were gender and the mean number of words a participant used in non-genitive completions. Because each context was followed by two phrases, one the original possessor and one the original possessum from the Switchboard corpus, each genitive obtained was coded for whether the original possessor or possessum appeared first after the context. In the initial model, the possible interaction of variety with all of the fixed effects was added. There were two random effects incorporated into the initial model: the participant and the pairs of the possessor head lemma and the possessum head lemma, which represent fine-grained lexical and semantic random effects. The initial model specification is given in (20).

(20) Completion type (*s-*genitive or *of-*genitive) is a function of:

**Fixed effects:**

variety interacting with

(animacy of the possessor +  
 definiteness of the possessor +  
 givenness of the possessor +  
 length of the possessor +  
 length of the possessum +  
 presence or absence of a final sibilant in the possessor +  
 semantic relation of the genitive +  
 item order +  
 gender +  
 participant mean word count +  
 prompt order)

**Random effects:**

participant +  
 paired semantic heads for possessor and possessum

All interactions except variety interacting with possessor definiteness and semantic relation could be eliminated because the magnitudes of the estimated

**Table 4:** Model parameters for the American and Australian genitive completions (number of observations: 1509; groups: possessor head/possessum head, 186, participants, 80).

Fixed effects	Estimate	Std. Error	z-value	p
(intercept)	3.1904	1.1653	2.738	0.0062**
variety: Australian (default: American)	0.5387	0.5133	1.049	0.2940
animacy of possessor: inanimate (default: animate)	-3.9799	0.6678	-5.960	0.0000***
length of possessor	-0.7397	0.2011	-3.679	0.0002***
length of possessum	0.8757	0.1703	5.143	0.0000***
final sound of possessor: sibilant (default: nonsibilant)	-1.5692	0.4935	-3.181	0.0015**
gender: male (default: female)	0.3937	0.2728	1.443	0.1490
participant mean word count	-0.1176	0.0513	-2.294	0.0218*
prompt order: "possessor" first (default: "possessor" second)	0.5515	0.1659	3.324	0.0009***
definiteness of possessor: indefinite (default: definite)	-1.8206	0.4903	-3.713	0.0002***
semantics of genitive: nonprototypical (default: prototypical)	-0.0199	0.7874	-0.025	0.9798
variety(Aus) : possessor = indefinite	0.5424	0.3845	1.411	0.1583
variety(Aus) : semantics = nonprototypical	-1.1613	0.5048	-2.301	0.0214*
Random effects	Std. dev.			
Participants	0.96495			
Paired semantic heads	2.79879			

Note: \*Significant at  $p < 0.05$ , \*\*Significant at  $p < 0.01$ , \*\*\*Significant at  $p < 0.001$ .

coefficients were less than the standard errors. Givenness of the possessor and item order could also be eliminated for the same reason. The resulting model is given in (21) and the model parameters are given in Table 4.

(21) Completion type (s-genitive or of-genitive) is a function of:

**Fixed effects:**

animacy of the possessor +  
length of the possessor +  
length of the possessum +  
presence or absence of a final sibilant in the possessor +  
gender +  
participant mean word count +  
prompt order  
variety interacting with (definiteness of the possessor +  
semantic relation of the genitive)

**Random effects:**

participant +  
paired semantic heads for possessor and possessum

Positive coefficients indicate a favoring of the *s*-genitive, while negative coefficients indicate a favoring of the *of*-genitive. Animacy of the possessor, length of the possessor, length of the possessum and definiteness of the possessor all show the Harmonic Alignment effect. Possessors with features Inanimate, Long, or Indefinite are favored in the *of*-genitive, the construction that places them second. Possessums with the feature Long are favored in the *s*-genitive, the construction that places them second. As expected, with possessors having a final sibilant the *of*-genitive is also favored. There is a significant effect of the order in which the original possessor from the Switchboard corpus occurs after the context. Where the original possessor appears first, then the genitive completion is more likely to be an *s*-genitive. Although there was no significant main effect of variety or semantic relation, there is a significant interaction of variety and semantic relation. The Australians are more likely than the American speakers to use an *of*-genitive for nonprototypical genitives. For the Australians, 61.3% of their 475 nonprototypical genitives were *of*-genitives, while 58.2% of their 225 prototypical genitives were *of*-genitives. For the Americans, 57.1% of their 574 nonprototypical genitives were *of*-genitives, while 62.4% of their 237 prototypical genitives were *of*-genitives. There is also a significant effect of participant mean word count in non-genitive completions, such that “wordier” participants were more likely to produce *of*-genitives.

We see that the contextualized completion task was successful in eliciting genitives for a mini database. Moreover, as with the dative completions, analyses show that Harmonic Alignment is a very prominent feature of the database for both varieties. Analyses also showed an interesting difference in the varieties. Nonprototypical genitives have been found to favor the *of*-genitive in Late Modern English (Wolk et al. to appear) and in the responses of British and American speakers to present-day novelistic English (Rosenbach 2002). In the present study, no significant main effect of semantics was found in participants' completions of the spoken English contexts, but the significant interaction of variety and semantics shows that for the Australians, though not the Americans, nonprototypical genitives favor *of*-genitives more so than the *s*-genitives.

**4.2.2 Further analyses of the obtained genitives**

We have seen that the contextualized completion task was successful at eliciting genitives, with 1509 genitives being obtained from a total of 2400 completions.

We have also seen that Harmonic Alignment is a very prominent feature of the obtained genitive database for both varieties. As with the dative analysis, we asked what features of the contexts could distinguish the more productive from the less productive. On examining the number of genitive completions for each of the 30 contexts, it appeared that when the prompts stemmed from a prototypical relationship (such as kinship, ownership, body part, or part-whole) they were more likely to elicit completions with genitives compared with prompts stemming from nonprototypical relationships. The prompts in (18) and (19) suggest nonprototypical relationships. An example of a context with a prompt stemming from a prototypical relationship is given in (22), together with 10 randomly chosen genitive completions from the 70 it elicited.

(22) *Speaker A:*

And now it's back again. It's sort of a popular view of what happened way back then. Of course, no one will ever know.

*Speaker B:*

I know, I wondered if the tribe that was the evil tribe, if they were really as bad as it made them out to be.

*Speaker A:*

Well, who knows. I mean it sort of showed two different types of tribes, like one was a warring tribe, and the other one was vegetarian kind of feel-good tribe.

*Speaker B:*

Right.

*Speaker A:*

They possibly were because you always have conflict in the world. Nobody can get along peacefully.

*Speaker B:*

Yeah, but I wonder, because they made a big deal about how this film was such a big leap for the people who were the descendants of this Maori tribe and that was so wonderful that they did that and I wonder how

.....  
 .....

[this warlike tribe]

[descendants]

- a. *the actual descendants [sic] of this warlike tribe* felt about it.
- b. *the descendants of other tribes* felt about this warlike tribe.
- c. *the descendants of this warlike tribe* feel being pinpointed as evil doers hampering the peace and prosperity of this supposedly better tribe.
- d. *the descendants of this warlike tribe* felt about how they were portrayed.
- e. *the descendants of this warlike tribe* must feel about that.
- f. *the descendants of this warlike tribe* reacted to it.
- g. *the descendants of this warlike tribe* survived.
- h. *the descendants of this warlike tribe* think about the movie/study.
- i. *the descendants of this warlike tribe* would feel about their ancestors being remembered that way?
- j. *this warlike tribe's descendants* view the actions of their ancestors.

The average number of completions containing genitives for contexts with prototypical relation prompts was 63.00, with a standard deviation of 26.63. The average number of completions containing genitives for contexts with nonprototypical relation prompts was 45.68, with a standard deviation of 17.25. An analysis of variance showed that this contrast was significant: the average number of completions with genitives was significantly greater for the contexts with prompts stemming from prototypical relations, with  $F = 4.393$ ,  $p = 0.0452$ . Contexts with prototypical prompts do produce more genitive completions. One might also suspect that prototypical prompts yield less variety in the genitive completions. Thus, for example, (22) generated 70 completions containing genitives, but only 11 unique genitives. In contrast, (18) elicited 60 completions containing genitives, with 19 of the actual genitives being unique and (19) elicited 30 completions with genitives, with 16 of the actual genitives being unique. The average number of unique genitives from contexts with prototypical relation prompts was 7.63, with a standard deviation of 6.43, while the average number of unique genitives from contexts with nonprototypical relation prompts was 14.32, with a standard deviation of 6.73. An analysis of variance showed that this contrast was also significant, with  $F = 5.932$ ,  $p = 0.0215$ . Thus, although contexts with prototypical prompts produce more completions containing genitives, they produce fewer unique genitives.

Again, as for the dative analysis, we considered how to assess the degree of similarity between the corpus data and the completion data. To address this question, we combined the data from the two sources and constructed a model based on the main effects of (21), though eliminating predictors irrelevant to or

unavailable in the Switchboard corpus or not significant in the US completion data. Specifically, the model had data source as a factor potentially interacting with animacy of the possessor, length of the possessor, length of the possessum, presence or absence of a final sibilant in the possessor, and definiteness of the possessor. The model also had the random effects of participant and paired semantic heads. The results showed that there were three significant interactions. The Harmonic Alignment effects of possessum length and definiteness of the possessor were stronger in the US genitive completion database than in the Switchboard corpus. The Harmonic Alignment effect of animacy of the recipient was weaker in the US completion database, though note that animacy was still significant in the completion data and did not interact with variety.

We see then that the effects from both data sources are the same in direction, though two effects are stronger in the US completion data and one effect is weaker, though still significant. The question can be asked now: how important are the three significant interactions we find between data source and our model predictors? To evaluate this question, we next used a model trained solely on the US genitive completion data to predict construction choice in the corpus data. Thus, we used a model with the main effects animacy of the possessor, length of the possessor, length of the possessum, presence or absence of a final sibilant in the possessor, and definiteness of the possessor and the random effects of participant and paired semantic heads. We trained this model on the US completion data ( $n = 811$ ) and then used the resulting fitted model to predict, for each genitive in the Switchboard corpus ( $n = 1111$ ), the log odds for it being an *s*-genitive. That is, for each genitive in the Switchboard corpus, the log odds for it being an *s*-genitive was computed by summing the results of multiplying the value of each feature of the genitive (such as animacy of the possessor, length of the possessor, etc.) by each relevant coefficient obtained from the model of the US completion data. As with the dative analysis, only the fixed effects could be used to predict the log odds of the corpus genitive choices. Having obtained, for each genitive in the Switchboard corpus, the log odds for it being an *s*-genitive predicted by the completion model, we calculated the concordance index, *C*. The *C* value for the completion model predictions of the Switchboard corpus genitive log odds was 0.87. While this value is below that obtained for the dative data, it is still well above 0.8. The fact that the *C* value is so high even though the log odds for the Switchboard corpus genitives were computed without the inclusion of random effect predictions gives more evidence that the completion task yields data that is a reasonably good proxy for the corpus choices of the genitive alternation.

## 5 Conclusion

Large corpora of spoken or written language are extremely useful for studying the probability of one linguistic structure over another and the variables that affect construction choice in language production. However, suitable corpora are not available for all languages and varieties. There may be no corpus for a variety of interest or it may be that any existing corpus is so small that there are not enough items containing the structures of interest. We therefore explored a sentence completion task aimed at generating structures of interest. Given the importance of discourse context and verb sense, as stressed, for example, by Lapata et al. (2001) and Roland and Jurafsky (2002), we used discourse contexts from an existing corpus as prompts for sentence completion. Lapata et al. had actually suggested using such a technique as a way of conducting more realistic completion studies than those that do not give a discourse context or do not control for verb sense. By using discourse contexts from existing corpora or smaller collections of authentic texts (such as transcriptions of oral stories and narratives) the experimenter can provide a rich, realistic sounding, discourse context to generate completions that, like spontaneous sentences, are ‘wild’ compared to test-tube sentences.

Because the discourse contexts came from one variety of English, American English, we slightly modified versions of the discourse contexts to suit Australian English speakers. In this way, both Americans and Australians could be asked to complete discourse contexts from a large corpus, though edited for fluency and modified slightly to suit the variety of English. Two major constructions of English, the dative and the genitive alternations, were used to investigate the usefulness of the proposed contextualized completion task in generating data as a proxy for unavailable corpus data. Given that quantitative Harmonic Alignment patterns are a prominent feature of the dative and genitive alternation in spoken and written corpora, we expected that the contextualized completion task would, if it is worthwhile, also yield results showing the prominence of Harmonic Alignment. We also expected that the task might show differences across varieties in the size of different effects, because these have been found across different varieties of English. We further suggested that other prominent effects, such as the effect of a final sibilant on a possessor, could also be expected.

The results showed that the contextualized completion task can be used as an efficient and sensitive method to develop a mini database of items of interest when suitable corpora of datives or genitives are not available for languages or varieties of interest. In the dative completion task, 54.1% of the 2400

completions contained a dative. In the genitive completion task, 60.8% of the 2400 completions contained a genitive. The databases generated by the dative and genitive contextualized completion tasks showed clear effects of Harmonic Alignment. The dative task also showed an effect of a preceding prepositional dative on the form of the next dative. The genitive task also revealed the expected final sibilant effect. Variety and gender differences were also found, confirming that the task can be used to study variety differences. It was also shown that the completion models of the US datives and genitives elicited by the contextualized completion task are accurate predictors of the alternatives in the Switchboard corpus, showing that the models of the completion data generalize well to the corpus data and providing more evidence that the completion data is a good proxy for unavailable corpus data.

Further analyses of the data highlighted some interesting methodological points. Using the contextualized completion task, researchers can have some control over the proportion of responses of a certain type. Thus, using a context ending in a form of the verb *give* increases the chance of a completion containing a dative, and giving contexts with *prototypical* relation prompts increases the chance of completions containing genitives, though it decreases the proportion of unique genitives. In the latter case, if a researcher wished to use prototypical relation prompts but to get more variety, then the pool of items could be increased, with participants still getting 30 contexts, but drawn randomly from a larger pool. While we were not concerned in the present study with the percentage of one alternative compared with another in the generated database compared with the Switchboard corpus (because it was the predictors of the alternative we were interested in), if a researcher is interested in that type of comparison then contexts can be chosen so that they reflect characteristics of the corpus of interest. Taking datives and the Switchboard corpus as an example, instead of choosing contexts relatively evenly from across the probability range for prepositional datives, one could choose more items with a higher probability of double object datives, in line with the Switchboard corpus. If one is primarily concerned with comparing syntactic usage in different varieties, then the important thing is to give both varieties the same contexts, though localized to the varieties, because it eliminates many random sources of variation that arise in different corpora.

In sum, the contextualized completion task has the advantage of allowing control of influential contextual information such as referents, information structure, and lexical semantics, and this makes it a useful substitute or supplement for cross-corpus comparative studies. While a potential disadvantage of the method is that the data it yields is somewhat dependent on the specific



properties of the contexts selected for the completion task, this source of variation allows the researcher a measure of control or influence over the kind of data yielded by the method. When corpora are unavailable, the method can be used, with care, to obtain more authentic, ecologically natural, production data about higher-level linguistic structures.

We expect that further studies using the contextualized completion task to study other structures should be equally successful. The task should be particularly helpful for studying languages or varieties where there are no large corpora or where items of a certain type are quite infrequent. Consider the findings of Ford and Bresnan (2012). They found using a ratings task and a processing task that Australian and US participants showed different effects for dative alternatives for communication verbs, such as *whisper*, *mutter*, *mumble*, and *yell*. They suggested that there may be different usage probabilities of specific verb–argument combinations in Australia and the US for these verbs, but at the moment this cannot be tested by examining corpora as there are no existing corpora with enough relevant items. However, using the contextualized completion task, one could generate enough items to study possible differences in the varieties with such verbs. Finally, field linguists who study endangered languages spoken by small communities of speakers may find the task useful for helping to build databases of structures of interest by selecting contexts from recordings of narratives, stories, and conversations.

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## Appendix 1

### Instructions for the contextualized completion task (for dative elicitation)

In the following passages, one or two speakers talk informally about different topics. The final sentence in each item is left unfinished. Your task is to read each passage and then complete the unfinished sentence. Complete it in the way that feels most natural to you. So, you need not spend a lot of time deciding how to complete it. Just write down what seems natural.

Please read the passages carefully and write completions that seem most natural to you.

## Appendix 2

### Instructions for the contextualized completion task (for genitive elicitation)

In the following passages, one or two real speakers talk informally about different topics. The final sentence in each item is left unfinished. Here is an example for you:

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*Speaker A:*

I really use my computer a lot at home. I am an accountant but I work at home. So I use it for that quite often. We have, you know, used some of it for some personal things. We keep track of personal budgets and things like that on it. Since it's tax season, I'm doing a lot of taxes, so I do a lot of that work on it as well.

*Speaker B:*

I was amazed when I took

.....  
.....

---

Your task is to read each passage and then complete the unfinished sentence. Complete it in the way that feels most natural to you. However, for each completion, you are given two words or phrases and you are to incorporate the two words or phrases in your completion. For example, after the passage above, you might get something like this:

**[a new accountant]**  
**[tax]**

You would incorporate these into your completion. You might write something like the following, for example:

“I was amazed when I took *our taxes to a new accountant that he did not have a computer on his desk.*”

Please note:

You can put the given words or phrases in any order. Grammatical modifications of the words can be used. Thus, for example, if you are given the word “tax” you could use “taxes” or “taxed” if you like.

Please read the passages carefully and write completions containing the required words given in any order. There is no need to spend a lot of time working out what to write. Just write what seems most natural to you.

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## Bionotes

### Marilyn Ford

Marilyn Ford is an Associate Professor in the School of Information and Communication Technology at Griffith University in Australia and a member of the Spoken Syntax Lab at Stanford's Center for the Study of Language and Information. She is also a member of the Institute for Integrated and Intelligent Systems at Griffith University.

### Joan Bresnan

Joan Bresnan, Sadie Dernham Patek Professor Emerita in Humanities at Stanford University, is Senior Researcher of the Spoken Syntax Lab at Stanford's Center for the Study of Language and Information.