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# “They whispered me the answer” in Australia and the US: A comparative experimental study<sup>1</sup>

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## 1 Introduction

Mismatches between grammaticality judgments of linguists and actual usage are surprisingly common, particularly where linguists invoke subtle contrasts such as between different types of dative transfer verbs or between different types of dative communication verbs. For example, as Levin's (1993) compendium of verb classes in the linguistic literature shows, linguists have judged verbs of manner of communication like *mutter* or *whisper* as ungrammatical in the double object form in contrast to the prepositional alternative (*\*whisper John the answer* vs. *whisper the answer to John*), while they have judged verbs of communication by instrument like *phone* or *text* grammatical in each of the alternative structures (*phone John the answer*, *phone the answer to John*). Similarly, linguists have

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judged verbs of continuous transfer like *lower* or *carry* as ungrammatical in the double object form (*\*lower John the rope* vs. *lower the rope to John*) in contrast to verbs of instantaneous transfer like *throw*, *toss* (*throw John the rope*, *throw the rope to John*). The verbs that are judged ungrammatical in one of the alternative structures are termed “non-alternating”. Yet the non-alternating verbs can be found in the reportedly ungrammatical kinds of structures in actual usage, in contexts where they appear grammatical (Fellbaum 2005, Bresnan, Cueni, Nikitina, and Baayen 2007, Bresnan and Nikitina 2009).

Why do these mismatches between judgments and usage occur? Although we lack specific probability estimates for all of the relevant verbs, we know that differing classes of dative verbs have different frequencies of usage in the double object form in internet samples (Lapata 1999). It is also known that different argument types are more likely to occur in double object structures. That is, the sequence V [ ... Pronoun ...] NP is far more frequent than V [ ... Noun ...] NP in a corpus of telephone conversations (Bresnan, 2007).

Bresnan 2007 hypothesized that ratings of the naturalness of non-alternating verbs in reportedly ungrammatical structures would be higher when these verbs appeared in more probable syntactic contexts; specifically, in the context V [ ... Pronoun ...] NP compared to V [ ... Noun ...] NP. She used datives with six alternating verbs (verbs of communication by instrument, *phone*, *text*, and *IM*, and verbs of instantaneous transfer, *flip*, *throw*, and *toss*). She also used datives with eight reportedly non-alternating verbs (verbs of manner of communication, *whisper*, *mutter*, *mumble*, *yell*, and verbs of continuous transfer, *carry*, *push*, *drag*, and *lower*). Thirty items were constructed by searching for examples from the internet and then creating their alternative double object form. Half of the items used alternating verbs and half used reportedly non-alternating verbs. Each item consisted of the context for the original dative followed by the two alternative dative forms, as exemplified by (1).

- (1) My mother and I went out of our way to go to Scottsdale. When we got there, she drove to the Luau, a good hotel, one they'd listed in Town and Country. I sat in a chair on one side of the lobby while she went up to the desk. She came back
- (i) and whispered the price to me.  
(ii) and whispered me the price.

Participants were asked to read each passage and rate the relative naturalness of the numbered alternatives using 100 points divided between the two alternatives. The results showed that for all verb classes, datives

with the pronominal recipient were rated higher than datives with the lexical NP recipient and for supposedly non-alternating datives with a pronominal recipient the ratings were as high as those for alternating datives with lexical NP recipients. These results are consistent with findings from other studies indicating that language users have implicit knowledge of syntactic frequencies and probabilities (Ford, Bresnan, and Kaplan 1982; Gahl and Garnsey 2004; Bresnan, Cueni, Nikitina, and Baayen 2007; Diessel 2007; Bresnan and Hay 2008; Szmrecsányi and Hinrichs 2008; Tily, Gahl, Arnon, Snider, Kothari, and Bresnan 2009; Bresnan and Ford 2010; Jaeger 2010).

If knowledge of syntax is probabilistic, then one might expect to find different responses to the same verb classes across varieties of the same language. Bresnan and Ford 2010, using dative items, have found differences between Americans and Australians in ratings and in processing dative structures while reading and Ford and Bresnan Submitted have found differences in mini databases of datives and genitives obtained from Americans and Australians in a completion task where participants complete richly contextualized sentence fragments. The converging evidence obtained from different types of studies gives added weight to the suggestion that there is more to grammaticality than a simple categorical division.

The previous work comparing Americans and Australians in dative ratings and processing did not consider possible differences in dative verb classes across the varieties. In the present study, we investigate the responses of the two varieties in rating and processing datives with different verb classes, including reportedly non-alternating verb classes.

## 2 The Ratings Study

Twenty Australian participants from Griffith University who had grown up in Australia speaking only English were given the same 30 items used by Bresnan 2007, although with the contexts localized to Australian English. Thus, for example, (1) was modified slightly for the Australians as shown in (2), with changes shown in bold.

- (2) My mother and I went out of our way to go to **Canberra**. When we got there, she drove to the **Plaza**, a good hotel, one they'd listed in **Travel Australia**. I sat in a chair on one side of the lobby while she went up to **reception**. She came back
- (i) and whispered the price to me.
  - (ii) and whispered me the price.

The participants performed the same split-100 ratings task as the American participants.

The ratings of the Americans and Australians for the double object alternatives were analyzed using mixed effects regression models (Baayen 2008, Baayen, Davidson, and Bates 2008, Jaeger 2008, Johnson 2008, Quené and van den Bergh 2008) as implemented in the lme4 package in languageR (Bates, Maechler, and Dai, 2009). In one model, the data from the communication verbs were analyzed and in another the transfer verbs were analyzed. For both models, the effects of interest were variety, verb type within the broad verb class (either communication by instrument and manner of communication or instantaneous transfer and continuous transfer), recipient pronominality, and the possible interaction of these factors. Given that the order in which participants receive the items could influence ratings, item order was also included in the models. There were three random effects incorporated into the initial models. These were the participant, the verb, and item order interacting with participant. For both models it was found by likelihood ratio tests (Bates et al. 2009) that the random effect of item order interacting with participant was not needed and so it was eliminated. In this and other analyses presented here, we tested whether fixed effect variables and their interactions could be removed by seeing if the magnitudes of the estimates were less than the standard error, but it was found that none could be eliminated. Here, as elsewhere, we use \* for significant at  $p < 0.05$ , \*\* for significant at  $p < 0.01$ , and \*\*\* for significant at  $p < 0.001$ . The resulting models for the communication verbs and the transfer verbs are shown in Tables 1 and 2, respectively.

Positive coefficients indicate higher ratings, while negative coefficients indicate lower ratings. The results in Table 1 show that for the communication verbs, ratings for the double objects increased with item order and that there is an interaction between variety and pronominality, such that the Americans, but not the Australians, showed a pronominality effect. Examination of the mean ratings showed that for the Americans the pronominal recipient increased rating of the communication by instrument datives by 12.86 and increased rating of the manner of communication datives by 9.87, while for the Australians, the corresponding increases were only 4.38 and 5.22, respectively.

Turning now to the transfer verbs, the results in Table 2 show, again, that ratings of the double object datives increased with item order. There was also a significant main effect of pronominality, such that the datives with a pronominal recipient were rated higher than those with a lexical NP recipient for both varieties. Examination of the mean ratings for the two transfer verbs showed that both varieties have a large, consistent, pronominality effect; for Americans the pronominal recipient increased rating by 24.49 for the instantaneous transfer datives and 18.33 for the continuous transfer datives, and for the Australians the corresponding increases in rating were 20.06 and 22, respectively.

Fixed Effects				
	Estimate	95% Confidence Limits		<i>p</i>
		Lower	Upper	
(Intercept)	30.323	20.748	40.006	0.0000 ***
variety = US	-6.553	-14.226	1.361	0.1168
verb type = manner	-8.377	-19.050	2.545	0.0555
recipient = pronoun	-3.563	-11.041	4.066	0.3553
item order	0.664	0.374	0.932	0.0000 ***
verb type (manner): recipient (pronoun)	9.784	-0.167	19.740	0.0548
variety (US): verb type( manner)	-0.947	-10.175	8.017	0.8358
variety (US): recipient (pronoun)	14.291	4.199	23.873	0.0048 **
variety (US): verb type (manner): recipient (pronoun)	-9.641	23.522	3.287	0.1561
Random Effects				
participant standard deviation			8.275	
verb standard deviation			3.808	

Table 1. Model parameters for the American and Australian ratings for communication verb double object datives

We see, then, that both varieties show a pronominality effect for transfer verbs, but only the Americans show a pronominality effect for communication verbs. Hence for transfer verbs, both varieties show that more frequent contexts improve the ratings of reportedly non-alternating verbs as would be expected given Bresnan (2007), while for communication verbs, only the American variety shows the effect. As suggested previously, such differences between varieties are to be expected for speakers of different variants of a language. Given the pervasive variability of usage probabilities for different structures in a language (Hinrichs and Szmrecsányi 2007; Schneider 2007; Bresnan and Hay 2008; Rohdenburg and Schlüter 2009; Wolk, Bresnan, Rosenbach, and Szmrecsányi To Appear), it would be purely coincidental for probabilistic

knowledge of language to be the same across varieties. Of course much more research needs to be done to determine the exact differences in probabilistic knowledge.

	Fixed Effects			<i>p</i>
	Estimate	95% Confidence Limits		
		Lower	Upper	
(Intercept)	25.363	12.877	37.866	0.0000 ***
variety = US	-6.083	-15.547	3.297	0.2248
verb type = instantaneous	4.283	-14.041	22.635	0.5812
recipient = pronoun	22.417	15.391	29.716	0.0000 ***
item order	0.295	0.014	0.584	0.0368 *
verb type (instantaneous): recipient (pronoun)	-2.350	-14.075	9.414	0.6901
variety (US): verb type(instantaneous)	1.458	-10.487	14.096	0.8150
variety (US): recipient (pronoun)	-3.667	-12.870	6.448	0.4477
variety (US): verb type (instantaneous): recipient (pronoun)	8.292	-7.353	23.180	0.278
	Random Effects			
	participant standard deviation	9.7666		
	verb standard deviation	8.1920		

Table 2. Model parameters for the American and Australian ratings for transfer verb double object datives

### 3 The Word by Word Processing Task

While the contextualized ratings task is sensitive to probabilistic differences in sentence types (Bresnan and Ford 2010, Ford and Bresnan to appear), it does not capture time-bounded effects on sentence processing tasks such as reading. For this reason we undertook a second study using a word by word reaction time task during reading as a measure of sentence processing complexity. Our expectation was that more probable sentence

types would require fewer resources during reading, so that processing complexity during reading would decrease in predicted high-probability sentences.

Thus, given the ratings results, we expected that Americans would process both communication and transfer verb double object datives faster when there is a pronominal recipient, whereas the Australians would only show this pronominality effect for transfer verb datives.

In the self-paced reading task, participants are presented with a sentence one word at a time on a computer screen and must press a button as quickly as possible each time they read a word. For our purposes, a context is presented before with the word by word presentation of the part of the sentence we are interested in. The task is similar to that used by Bresnan and Ford 2010, though without any lexical decision being made for each word. Twenty experimental items were used, half had communication by instrument verbs, and half had continuous transfer verbs. There were two basic versions of the items. In both versions, half of the communication verb items and half of the transfer verb items used a pronominal recipient and half used a lexical NP recipient. Any item with a pronominal recipient in one version used a lexical NP in the other version. This was balanced over variety and gender. Each context was given as a block and the word by word decision making began with the dative verb. The points of interest were the determiner and noun after the recipient.

The participants were 36 US speakers (18 males and 18 females) and 36 Australian speakers (18 males and 18 females). 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 participants had not taken part in the ratings study.

The data were analyzed using mixed effects regression models. Examination of the data showed that the Americans had faster reaction times (RTs) than the Australians, with a mean reaction time of 322.19 milliseconds compared with 396.27. Further, while the Americans showed no significant effects at the determiner except item order, for the Australians it was at the noun position that there was no effect except item order. Significant effects appeared at the determiner for the Australians, and at the following noun for the Americans. In other words, for the Americans the expected linguistic effects lagged the Australians, occurring later in the sentence---perhaps because the Americans were processing the sentences more quickly. Here we will present the results for the

Australians at the determiner and the Americans at the noun. For both models, the effects we were interested in were verb class, recipient pronominality, and their possible interactions. We also collected gender information and so included that in the possible interaction. Item order was also included in the model. The random effects were participant, verb, and item order interacting with participant. For neither model could any of these be eliminated. All RTs were logged to reduce the effect of extreme values (Baayen 2008).

The model parameters for the Australians at the determiner are presented in Table 3, though due to space limitations possible 3- and 4-way interactions, which could not be eliminated but which were all non-significant, are not presented. Positive coefficients indicate higher RTs, while negative coefficients indicate lower times.

It can be seen that RTs significantly decreased with item order. There is also a significant interaction between verb class and pronominality of the recipient. As predicted, the Australians have faster RTs after a pronominal recipient for transfer verbs, but not communication verbs. Examination of the raw data for the Australians shows that RTs for the transfer verb datives with a pronominal recipient were on average 45.21 milliseconds less than for transfer verb datives with a lexical recipient. The difference for communication verb datives due to recipient pronominality was only 24.55.

The model parameters for the Americans at the noun are presented in Table 4, though due to space limitations possible 3- and 4-way interactions are not presented.<sup>2</sup> Once again RTs decreased with item order. As predicted, the Americans have a significant main effect of pronominality but no interaction between verb class and pronominality. Examination of mean RTs showed that the decrease in RTs due to a pronoun recipient was 46.54 milliseconds. There were significant interactions found in the data, as shown in Table 4, though none concerned any verb class pronominality interaction.

With the word by word processing task as our measure of sentence processing complexity we expected that more probable / more highly rated sentence types would require fewer resources during reading, so that RTs measured in the task would decrease in high-probability / highly rated

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<sup>2</sup> The 3- and 4-way interactions could not be eliminated, and all but one of these interactions (item order\*gender\*pronominality) were non-significant. The effects shown remain significant when a further control for previous word RT is added

sentences. Specifically, Americans would process both communication and transfer verb double object datives faster when there is a pronominal recipient, whereas the Australians would only show this pronominality effect for transfer verb datives. With the proviso that the effect for the American participants lagged by one word, this is what we found.

Fixed Effects				
	Estimate	95% Confidence Limits		<i>p</i>
		Lower	Upper	
(Intercept)	6.159	5.985	6.323	0.0000 ***
verb type = transfer	0.102	-0.100	0.326	0.3337
recipient = pronoun	-0.044	-0.205	0.118	0.5786
gender = male	-0.046	-0.247	0.161	0.7079
item order	-0.023	-0.036	-0.011	0.0002 **
verb type (transfer): recipient (pronoun)	-0.233	-0.487	-0.007	0.0468 *
gender (male): verb type = transfer	-0.229	-0.475	-0.004	0.0505
gender (male): recipient (pronoun)	0.068	-0.156	0.307	0.5487
item order: verb type = transfer	-0.006	-0.025	0.011	0.4830
item order: recipient (pronoun)	-0.002	-0.015	0.010	0.7053
item order: gender = male	0.003	-0.013	0.017	0.7379
Random Effects				
participant standard deviation				0.2830
verb standard deviation				0.0704
participant / item order standard deviation				0.0118

Table 3. Model parameters for all main effects and 2-way interactions for Australian RTs at the determiner after the recipient in double object datives

Fixed Effects				
	Estimate	95% Confidence Limits		<i>p</i>
		Lower	Upper	
(Intercept)	6.183	5.993	6.363	0.0000 ***
verb type = transfer	-0.189	-0.420	0.059	0.1184
recipient = pronoun	-0.318	-0.509	-0.128	0.0008 **
gender = male	-0.238	-0.451	-0.007	0.0568
item order	-0.037	-0.051	-0.023	0.0000 ***
verb type (transfer): recipient (pronoun)	0.152	-0.115	0.427	0.2731
gender (male): verb type = transfer	0.159	-0.116	0.435	0.2504
gender (male): recipient (pronoun)	0.347	0.090	0.631	0.0096 **
item order: verb type = transfer	0.015	-0.004	0.037	0.1332
item order: recipient (pronoun)	0.019	0.004	0.033	0.0117 *
item order: gender = male	0.011	-0.005	0.029	0.1854
Random Effects				
participant standard deviation				0.2431
verb standard deviation				0.0752
participant / item order standard deviation				0.0130

Table 4. Model parameters for all main effects and 2-way interactions for American RTs at the noun after the recipient in double object datives

#### 4 Concluding Remarks

Our data in two very different experimental tasks have pointed to the same finding: overall, there seems to be more variation between speakers of the two varieties in judging and reading pronominal recipient objects with communication verbs than with transfer verbs. Why should this be?

In the transfer events with our dative verbs, the theme is expressed as an NP, never as a clause or PP. The semantics of these dative verbs, whether instantaneous (*flip, throw, toss*) or continuous (*push, drag, lower*) constrain the relations among the participants in the described action quite specifically in comparison to the communication verbs. With the communication verbs, there is much more choice about how to convey the theme. The topic of communication could be a clause, a quotation, or a PP. Consider:

- (3) she texted me with all the details
- (4) he texted me on the weekend saying he has a surprise for me

Using Google with the searches “verb you” and “verb her” in a sample of both Australian and American web pages and for all verbs used, we were able to confirm the intuition that, in usage, transfer verbs are quite constrained in the manner in which a theme and recipient are expressed, with 30/64 results for communication verbs being other than *NP NP* or *NP to NP* and only 1/37 results for transfer verbs being other than *NP NP* or *NP to NP*. A Fisher’s Exact test shows that this is a highly significant difference,  $p = .000$ . So, with the transfer verbs, there are fewer ways the Australian and US populations can differ in their usage. But with communication verbs, there are many more possible differences in usage preferences. These considerations suggest that the true explanation for the covariation may lie in the varying usage probabilities of specific verb-argument combinations in Australia and the US. More research in the future will clarify ways in which usage varies for the two varieties.

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