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Lingua xxx (2007) xxx–xxx
Lingua
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# Gradient grammar: An effect of animacy on the syntax of *give* in New Zealand and American English

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Received 3 April 2006; received in revised form 9 May 2006; accepted 1 February 2007

**Abstract**

Bresnan et al. (2007) show that a statistical model can predict United States (US) English speakers' syntactic choices with 'give'-type verbs extremely accurately. They argue that these results are consistent with probabilistic models of grammar, which assume that grammar is quantitive, and learned from exposure to other speakers. Such a model would also predict syntactic differences across time and space which are reflected not only in the use of clear dialectal features or clear-cut changes in progress, but also in subtle factors such as the relative importance of conditioning factors, and changes over time in speakers' preferences between equally well-formed variants. This paper investigates these predictions by comparing the grammar of phrases involving 'give' in New Zealand (NZ) and US English. We find that the grammar developed by Bresnan et al. for US English generalizes remarkably well to NZ English. NZ English is, however, subtly different, in that NZ English speakers appear to be more sensitive to the role of animacy. Further, we investigate changes over time in NZ English and find that the overall behavior of 'give' phrases has subtly shifted. We argue that these subtle differences in space and time provide support for the gradient nature of grammar, and are consistent with usage-based, probabilistic syntactic models.
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*Keywords:* New Zealand English; US English; Dative alternation; Animacy; Probabilistic grammar

## 1. Introduction

Linguistic theory has long adopted the simplifying assumption that knowledge of language is characterized by a categorical system of grammar. This idealization has been fruitful, but it ultimately underestimates human language capacities. Language users reliably and systematically

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0024-3841/$ – see front matter © 2007 Published by Elsevier B.V.
doi:10.1016/j.lingua.2007.02.007

make probabilistic syntactic choices from multidimensional information (Arnold et al., 2000; Bresnan et al., 2007; Bresnan, in press-a; Gries, 2003, 2005a,b; Hay and Bresnan, 2006; Hinrichs and Szmrecsányi, in press; Jaeger, 2006; Roland et al., 2005; O'Connor et al., 2005; Rosenbach, 2002, 2003, this volume; Strunk, 2005; Szmrecsányi, 2005, 2006). In a recent study of English speakers' syntactic choices with *give*-type verbs during spontaneous conversations, Bresnan et al. (2007) present a multivariable, multilevel logistic regression model that can accurately predict the choices on unseen data. They further show that the model generalizes both across individual speakers and between spoken and written modalities, even predicting statistical differences between data from different corpora. Their findings show that the statistical model, in its apparent task-independence and systematicity, has some of the characteristics of grammar. These results are highly compatible with probabilistic models of grammar which assume that grammar is quantitative, and learned from exposure to other speakers (Bod and Kaplan, 2003).

It is well known that different dialects of English may display categorically different syntactic constraints. Some dialects, for example, allow double modal constructions such as *might could* and others do not. Similarly, dialects frequently undergo syntactic change, where the usage of a particular variant dramatically increases or decreases (see e.g. Hay and Schreier (2004) for changing verb agreement patterns in New Zealand English). A probabilistic, usage-based approach to grammar is able to account for such variation by assuming that different communities differ in the types and frequencies of the constructions that they are exposed to. However, a probabilistic approach also predicts that variation across space and time should exist in less obvious ways—even affecting the subtle probabilistic choices that are made between two variants which are equally acceptable for that dialect. That is, we expect to observe syntactic differences in time and space which are reflected not only in the use of clear dialectal features or clear-cut changes in progress, but also in extremely subtle factors such as the relative probabilistic weights of conditioning factors, and changes over time in speakers' preferences between equally well-formed variants.

In this study, we conduct a comparative study of the grammar of phrases involving *give* in New Zealand (NZ) and United States (US) English. We demonstrate that the probabilistic grammar developed by Bresnan et al. (2007) for US English generalizes remarkably well to New Zealand English. New Zealand English is, however, subtly different, in that New Zealand English speakers appear to be more sensitive to the role of animacy. Further, we investigate changes over time in New Zealand English and find that the overall behavior of 'give' phrases has subtly shifted. These subtle differences in space and time provide further evidence of the gradient nature of grammar, and support usage-based, probabilistic syntactic models.

## 2. Background

In English, verbs of giving – called 'dative' verbs – flexibly occur in alternative constructions conveying the same message:

(1) a. *Who gave you that wonderful watch?* ← double object construction
b. *Who gave that wonderful watch to you?* ← prepositional dative

Although alternative forms often have differing semantics (Pinker, 1989; Levin, 1993), frequently explained in terms of "the principle of contrast" (Clark, 1987), the alternatives in

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(1a and b) are very close paraphrases. Indeed, the alternative constructions can be found in contexts of repetition, as in the following example (Graham Green. *Doctor Fischer of Geneva or the Bomb Party.* London: The Bodley Head), cited by Davidse (1996:291):

(2) ''You don't know how difficult it is to find something which will please everybody—especially the men.''
''Why not just **give them cheques**?'' I asked.
''You can't **give cheques to people**. It would be insulting.''

Moreover, subtle intuitions of fine-grained lexical semantic differences between these constructions have turned out to be inconsistent and unreliable (Bresnan and Nikitina, 2003; Bresnan et al., 2007; Bresnan, in press-a,b; Fellbaum, 2005). For these reasons, we view the prepositional dative and double object constructions as having overlapping meanings which permit them to be used as alternative expressions or paraphrases.

The existence of pairs of alternative paraphrases for *give* and other dative verbs is referred to as 'the dative alternation'. In the dative alternation the 'recipient' – *you* in (1b) and *them*, *people* in (2) – is the object of *to* in the prepositional dative, and the first object following the verb in the double object construction. The 'theme' – *that wonderful watch* in (1b), *cheques* in (2) – is the object of the verb in the prepositional dative and the second object in the double object construction.

Which of these alternative constructions is used depends on multiple and often conflicting syntactic, informational, and semantic properties (Arnold et al., 2000; Bock and Irwin, 1980; Bock et al., 1992; Collins, 1995; Gries, 2003; Hawkins, 1994; Lapata, 1999; Prat-Sala and Branigan, 2000; Snyder, 2003; Thompson, 1990; Wasow, 2002 a.o.). These include the sense of the verb in its context of use (is it describing the giving of a concrete object, information, or something else?), the accessibility of the referents in the context (has the recipient just been mentioned or is it new information to the hearer?), the complexity and pronominality of the descriptions of the referents (shorter before longer, pronouns before nouns), and the like. Previous studies have shown that the probability of a construction is increased when the first phrase following the verb is a pronoun, is definite, refers to a highly accessible referent, has an animate referent, or is short. Furthermore, recent studies using multivariable analysis have shown that each of these variables contributes to the choice of construction; in particular, animacy as a predictor is not reducible to any of the other variables, such as givenness, complexity or pronominality (Gries, 2003; Bresnan et al., 2007). From these and other variables such as the previous occurrence of a parallel structure (Bock, 1986; Gries, 2005b; Pickering et al., 2002; Szmrecsányi, 2005), it is possible to predict the choice of construction for dative verbs in spoken English with 94% accuracy (Bresnan et al., 2007).

All of the multivariable analytic studies cited control for the semantics of the expressions, because the question of interest is what influences higher-level linguistic choices which are semantically equivalent paraphrases. In other words, these studies all assume that the dependent variable of construction choice in the model is a linguistic 'variable' (Chambers, 2003). Other useful lines of study examine the descriptive statistics of occurrence of various related constructions (Mukherjee, 2005; Strunk, 2004; cf. Strunk, 2005). In particular, Mukherjee (2005) gives valuable information about the probability distributions of a wide range of complements and semantic networks of each of a set of dative verbs. But such approaches do not address the question of particular interest here, which is to isolate the dynamics of grammatical choice from

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the more general discursive choices of what to talk about (Weiner and Labov, 1983)—and to examine the role of animacy in it.

Some indicative evidence of variation in the overall probability of the use of the prepositional dative comes from Mukherjee and Hoffman (2006), who show that the overall rates of the prepositional dative with *give* are higher in Indian English than British English. They do not, however, carefully examine the potential conditioning factors in the data, to determine whether there may have been some difference in the two datasets which would predict this pattern.

With the availability of accurate probabilistic models of the choices between these alternative paraphrases, we can now investigate whether different dialects or varieties of a language vary in the probabilities of these choices over space and time.

This possibility is investigated in studies of US and New Zealand varieties of English described in the next sections.

## 3. The data from NZ and US English

In order to assess the degree to which the findings of Bresnan et al. (2007) extend to other dialects, we conducted a follow-up study using data from the ONZE (Origins of New Zealand English) corpus. In order to maximize comparability between the datasets for the dialects, we chose to focus on just one verb—*give*. The lexical item *give* constitutes 51% of the total cases considered by Bresnan et al.

We analyzed utterances containing *give* from the Origins of New Zealand English corpora. ONZE is a collection of recordings housed at the University of Canterbury, New Zealand. It includes recordings of speakers born between the 1850s and the 1980s, and continues to grow every year. There are three subcorpora. The 'Mobile Unit' contains recordings of early New Zealand English—speakers born between 1851 and 1910. These recordings originated as radio interviews conducted in the 1940s using a Mobile van, which toured New Zealand collecting reminiscences from New Zealand towns. The Intermediate Archive is a collection of recordings of speakers born between 1890 and 1930. Some of these are recordings made by historians for oral history projects, some are interviews for radio broadcast, and some are interviews of descendants of Mobile Unit speakers, conducted by members of the ONZE team. The Canterbury Corpus is a series of interviews conducted by students enrolled in a third year 'New Zealand English' class. The Canterbury Corpus contains speakers born between 1930 and 1984, and is added to every year. When adding speakers to the Canterbury Corpus, an attempt is made to fill a stratified sample, along the lines of age, gender and social class. See Gordon et al. (in press) for further details about the ONZE corpora.

We considered 2842 tokens of *give* from 523 New Zealand speakers from the ONZE Corpus, born between 1851 and 1984. One thousand one hundred and twenty-seven of these tokens occurred in the dative alternation. Six hundred ninty-six of these were produced by male speakers, and 431 were produced by female speakers.

These 1127 tokens were then combined with 1263 tokens from the Switchboard Corpus (Godfrey et al., 1992), and 404 written tokens from the *Treebank Wall-Street Journal* (Marcus et al., 1993).

The coding scheme we used was based on that of Bresnan et al., described in detail in Cueni (2004). We coded for the syntactic complexity, pronominality, discourse accessibility, and animacy of the recipient and theme complements to *give* and for the semantic class of usage of the verb.

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Note that the NZ data were not coded for speaker identity in this study. The Bresnan et al. (2007) model was found to generalize across individual speakers in the Switchboard corpus, so we set aside that factor for the present study.

### 3.1. Syntactic complexity

Measures of syntactic complexity are ''so highly correlated as to be empirically indistinguishable'' (Cueni, 2004), and can be efficiently measured by counting the number of graphemic words (Arnold et al., 2000; Szmrecsányi, 2004; Wasow, 2002). We chose this metric, taking the log of the length in graphemic words to compress outliers and bring the distribution more closely into the logistic regression model assumption of linearity in logit space.

### 3.2. Animacy

Bresnan et al. coded for animacy using a modification of the coding practices of Garretson et al. (2004). Garretson et al. develop an animacy coding system with the seven categories 'human', 'animal', 'organization', 'concrete inanimate', 'non-concrete inanimate', 'place', and 'time'. The Bresnan et al. coding simplified these to the four categories 'Human', 'Organization', 'Animal/Intelligent Machine', and 'Inanimate'. Because of data sparseness, animacy was further simplified for the Bresnan et al. model to a binary category of human or animal versus other, which we adopted for the ONZE data. 'Human' referents were individual humans and humanoid beings (such as gods, ghosts, or androids) and groups of humans which do not meet the criteria for organizations—i.e. they do not have a collective voice and/or purpose. (For example ''people that come into this country'', ''qualified students'', ''their customers'' refer to groups of humans and not to organizations.) We coded members of the animal kingdom as animals.

### 3.3. Discourse accessibility

For coding for discourse accessibility Bresnan et al. (2007) used Michaelis and Hartwell (in press), which is based on Prince (1981) and Gundel et al. (1993). But in the Bresnan et al. model this variable was simplified to a binary category ('evoked'/'situationally evoked' versus other) again because of data sparseness. We coded the ONZE data directly for this binarized accessibility category. 'Evoked' was operationalized as co-referentiality with a phrase that has occurred in the previous 10 lines of discourse. 'Situationally evoked' was used for first and second person pronouns because their referents are assumed to be automatically evoked by virtue of their salience in the speech situation. (The generic uses of *you* were counted as situationally evoked because we considered them to include the hearer semantically.) 'Evoked' and 'situationally evoked' together comprise the 'given' value of discourse accessibility; all other accessibility categories are non-given.

In sum, a theme or recipient phrase was coded as 'given' if (i) its referent was mentioned in the previous 10 lines of discourse or (ii) it was a first or second person pronoun. This operationizing of discourse accessibility is straightforward and sufficient for our purposes.

### 3.4. Pronominality

Pronominality was defined to distinguish phrases headed by pronouns (personal, demonstrative, and indefinite) from those headed by non-pronouns such as nouns and gerunds.

### 3.5. Semantic class

Each instance of the verb *give* was semantically classified based on its use in context. Those instances that described a transfer of possession of a concrete object were labeled 'transfer', those that described giving information were labeled 'communication' (for example, ''give my name to you'', uttered in a telephone conversation), and all other instances were labeled 'abstract'.

Our operationalization of the simplified coding of these variables was designed for efficiency given limited resources. Thus, discourse accessibility could be determined largely by formal criteria: Was the referent either mentioned or denoted by a first or second person pronoun within the previous 10 lines? Semantic class is more subjectively defined, but still quite distinguishable: concrete objects are relatively easily distinguishable from non-concrete (''give an armband'' versus ''give a headache''), and among events involving the non-concrete giving, communication events (''give my name to you'' uttered in a telephone conversation) are relatively easily distinguishable from all others.

The most difficult of these coding categories, as operationalized, is animacy: it is a subtle matter to decide whether a plural referring expression denotes a group of humans (and is therefore human) or an organization of some kind (and therefore not human). What is required to distinguish an organization of some kind from a plurality of humans? The coding documentation of Garretson et al. (2004) includes a decision tree, for such cases, but we also tested for intercoder reliability on animacy, as discussed below.

## 4. The *Give* model across space

For the comparative study of the NZ and US varieties of English, we decided to fit a logistic regression model to the combined dataset, using the coded variables described above, and adding another variable to distinguish the different sources of data. There are advantages to this design over fitting separate regression models to each dataset. The most important is that separate regressions may reveal differences but cannot tell us whether they are significant. In addition, this design lessens the chances of overfitting the individual component datasets.

The anova table for the model (Table 1) shows that the main effects found by Bresnan et al. are also significant in the data of the present study. The odds ratios (Table 2) show the magnitudes and directions of the effects for specific values of the predictors. For example, a non-animate recipient is over 11 times more likely than an animate recipient to be expressed in the prepositional dative. And each increment in the log length of the recipient is associated with a 6-fold increase in the likelihood of occurrence in the prepositional dative. Odds ratios less than 1 occur when the prepositional dative is disfavored. For example, each increment in the log length of the theme decreases the likelihood of the prepositional dative by nearly one-tenth (0.093).

The complementary directions of the effects (Table 2) are the same as in the earlier study: longer, nominal, inanimate, or non-given recipients favor the dative PP construction, and shorter, pronominal, animate, or given recipients favor the double NP constructions. Similar properties influence the theme argument in the opposite ways: longer, nominal, or non-given themes favor the double object construction, while shorter, pronominal, or given themes favor the dative PP construction.

The data in the Bresnan et al. study included 38 dative verbs, many of which were sparsely represented in a number of categories of interest. For that reason interactions among all of the variables were not examined. In the present study, in contrast, we investigated the most frequent

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Table 1
Wald statistics for `Give model`

| | $\chi^2$ | d.f. | *P* |
|---|---|---|---|
| log length of recipient | 39.87 | 1 | < 0.0001 |
| log length of theme | 75.93 | 1 | < 0.0001 |
| Pronominality of recipient | 56.14 | 1 | < 0.0001 |
| Pronominality of theme | 87.32 | 1 | < 0.0001 |
| Givenness of recipient | 24.30 | 1 | < 0.0001 |
| Givenness of theme (factor + H.O. factors) | 49.51 | 3 | < 0.0001 |
| *All interactions* | 16.61 | 2 | 0.0002 |
| Animacy of recipient (factor + H.O. factors) | 32.85 | 3 | < 0.0001 |
| *All interactions* | 6.32 | 2 | 0.0424 |
| Semantic class (factor + H.O. factors) | 42.82 | 4 | < 0.0001 |
| *All interactions* | 16.61 | 2 | 0.0002 |
| Variety (factor + H.O. factors) | 19.85 | 4 | 0.0005 |
| *All interactions* | 6.32 | 2 | 0.0424 |
| Givenness of theme × semantic class (factor + H.O. factors) | 16.61 | 2 | 0.0002 |
| Animacy of recipient × variety (factor + H.O. factors) | 6.32 | 2 | 0.0424 |
| Total interaction | 22.74 | 4 | 0.0001 |
| Total | 384.99 | 15 | < 0.0001 |

H.O.: higher order.

dative verb (*give*), and were able to examine the interactions of all of the variables with each other and with ‘variety’, now divided into the three values spoken NZ, spoken US, and written US.

The model shows a significant interaction of givenness of theme with semantic class. In particular, non-givenness of theme significantly increases the odds of a double object construction for the transfer uses of *give*, compared to abstract uses. (The communicative uses of *give* do not differ significantly from the abstract in this respect.) This is not surprising because

Table 2
Odds ratios for prepositional dative in the `Give model`

| | |
|---|---|
| Intercept | 0.196 |
| log length of recipient | 6.780 |
| log length of theme | 0.093 |
| Recipient = pronoun | 0.052 |
| Theme = pronoun | 25.662 |
| Recipient = not given | 3.927 |
| Theme = not given | 0.551 (n.s.) |
| Recipient = non-animate | 11.712 |
| Semantic class = communication | 6.884 |
| Semantic class = transfer | 12.406 |
| Variety = spoken US | 2.896 |
| Variety = written US | 2.705 |
| Theme = not given × semantic class = communication | 0.574 (n.s.) |
| Theme = not given × semantic class = transfer | 0.132 |
| Recipient = not animate × variety = spoken US | 0.144 |
| Recipient = not animate × variety = written US | 0.377 (n.s.) |

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there is a connection between givenness of theme and semantic class of the verb which was not separated out in our coding. Abstract themes with *give* often denote actions, whether literal (give a try, give a kiss) or figurative (give a hand, give the strap), and neither actions nor the entities denoted by other more idiomatic uses of *give* with themes (give a headache, the creeps, etc.) have the clear and stable spatiotemporal boundaries that sustain co-reference, which is central to our operationalization of givenness. An analysis of the givenness of themes of the three semantic classes in fact shows that 35% of the theme objects of transfer uses of *give* are given, compared to 10% of abstract uses and 11% of communicative uses.

Finally, there is an interaction of variety with animacy, shown in Fig. 1. Non-animate recipients are more likely to be used in the double object construction in the NZ than in US spoken data, and this is so, of course, independently of the other variables.

The overall quality of this model is very good. The concordance statistic $C = 0.977$, and Somers' $D_{xy} = 0.953$; these figures indicate the ability of the model to discriminate between all pairs of the dative observations that differ in construction type. The Nagelkerke $R^2 = 0.772$; this statistic indicates the proportion of the variance that the model accounts for. There is little overfitting: under bootstrap validation with 10,000 repeated fits, a 1.5% reduction in $R^2$ occurred, to a value of 0.761.

There were two different coders for the NZ and US data. To assess the degree of coder agreement for animacy, we randomly sampled 10% of each of the two spoken datasets, which were then independently coded for animacy by a third coder. While the original coder of the US data worked with the seven Garretson et al. animacy categories and then modified them to the four binned categories noted above, the coder of the NZ data from the outset used the simplified categories adopted in the Bresnan et al. analysis—human or animal versus other, and this simplified animacy category was also used by the third coder. Hence, both coders of NZ data used the simplified animacy category, while only one coder of US data did.

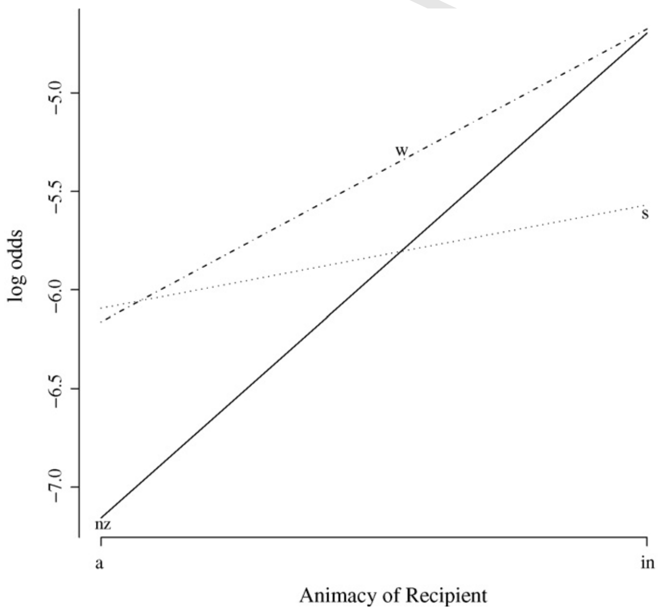


Fig. 1. Interaction of recipient animacy with variety: New Zealand spoken ('nz'), US spoken ('s'), and US written ('w').

Table 3
Proportions of Agreement for Animacy Coding

| | Animate | Non-animate |
|---|---|---|
| NZ data sample | | |
| Animate | 104 | 1 |
| Non-animate | 2 | 117 |
| US spoken data sample | | |
| Animate | 103 | 16 |
| Non-animate | 0 | 131 |
| **Proportion agreeing** | **NZ** | **US** |
| Overall | 0.987 | 0.936 |
| Animate | 0.986 | 0.928 |
| Non-animate | 0.987 | 0.942 |

Table 3 displays the contingency tables for the animacy classifications of the two pairs of coders. The overall agreement is highest for the NZ data, but the proportion of overall agreement for the US data is also high. The levels of agreement between both pairs of coders are highly significant: by Fisher's exact test, $P(Observed \geq Expected) = 7.0737 \times 10^{-61}$ for the NZ sample, $P(Observed \geq Expected) = 1.4235 \times 10^{-53}$ for the US sample.

The proportions of specific agreement for both animacy and non-animacy are also high. The proportion agreeing on animate for the US data is calculated as the number of agreeing individual coder votes for 'animate' ($103 \times 2$) divided by the total number of individual coder votes for 'animate' ($103 \times 2 + 0 + 16$). This estimates the conditional probability of a coder choosing 'animate' given the other (arbitrarily chosen) coder's choosing 'animate'. Both the proportion agreeing on animate and the proportion agreeing on non-animate are high, indicating a higher than chance level of coder agreement (Spitzer and Fleiss, 1974; Cicchetti and Feinstein, 1990).[1]

## 5. The *Give* model across time

Because the New Zealand data span a relatively wide time span, we also fit the model separately to that dataset, and considered whether there was any additional effect of the year in which the speaker was born. The resulting model is shown in Table 4. All of the effects remain significant except for givenness of recipient, which may simply be because we are now dealing with a smaller dataset.

Again the overall model quality is very good: the concordance statistic $C = 0.985$, Somers' $D_{xy} = 0.97$, and the Nagelkerke $R^2 = 0.824$. There is somewhat more overfitting of the NZ dataset by this model: under bootstrap validation with 10000 simulations, $R^2$ diminished from 0.824 to 0.796, a 3.6% reduction, still an acceptable amount.

Interpreting the model, we see that the year of birth of the speaker has a significant non-linear effect. This is shown in Fig. 2. Earlier and later born New Zealanders are more likely to use the prepositional construction than our 'intermediate' speakers, born in the early 20th C.

This U-shaped curve parallels some other variables observed in the ONZE corpora. For example Hay and Schreier (2004) demonstrate that the use of singular concord in existential

[1] For purposes of comparison, we note that the Cohen's kappa statistics for nominally classified data are $kappa = 0.973124, Z = 14.5157$, $p = 0$ for the NZ sample, and $kappa = 0.871546, Z = 13.7046$, $p = 0$ for the US sample.

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Table 4
Wald Statistics for `Give model`—NZ data only

| | $\chi^2$ | d.f. | *P* |
|---|---|---|---|
| log length of recipient | 11.95 | 1 | 0.0005 |
| log length of theme | 7.76 | 1 | 0.0053 |
| Pronominal recipient | 26.42 | 1 | < 0.0001 |
| Pronominal theme | 37.94 | 1 | < 0.0001 |
| Givenness of recipient | 2.81 | 1 | 0.0935 |
| Givenness of theme (factor + H.O. factors) | 24.87 | 3 | < 0.0001 |
| *All interactions* | 14.82 | 2 | 0.0006 |
| Animacy of recipient | 12.60 | 1 | 0.0004 |
| Semantic class (factor + H.O. factors) | 20.53 | 4 | 0.0004 |
| *All interactions* | 14.82 | 2 | 0.0006 |
| Age | 6.16 | 2 | 0.0460 |
| *Non-linear* | 5.67 | 1 | 0.0172 |
| Givenness of theme × semantic class (factor + H.O. factors) | 14.82 | 2 | 0.0006 |
| Total non-linear + interaction | 18.58 | 3 | 0.0003 |
| Total | 110.32 | 13 | < 0.0001 |

H.O.: higher order.

constructions declined in NZ until around 1900, and then steadily increased, and is relatively common today. Gordon et al. (2004) and Schreier et al. (2004) show that the use of [hw] in words like *which* and *whistle* increased in early New Zealand English, and then reversed its trajectory around 1900. It is relatively rare today. Thus, while the reversal of trajectories of language change

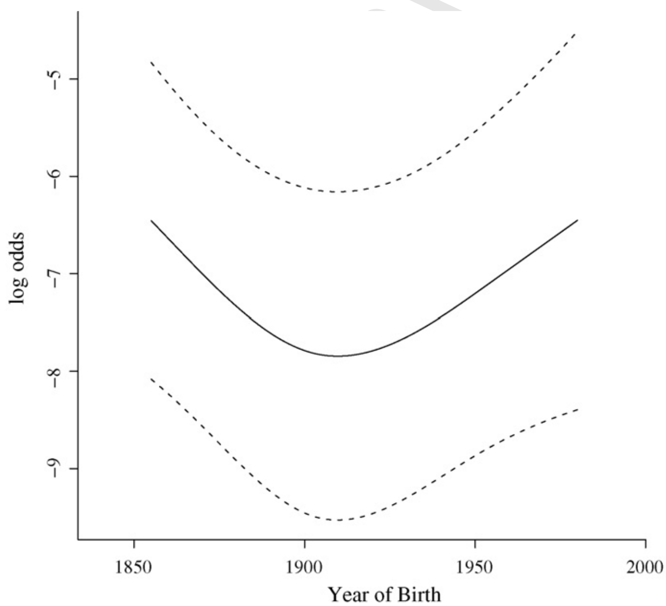


Fig. 2. Age effect from NZ model of ‘give’ alternation. Dashed lines represent 95% confidence intervals.

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may be unusual, it seems to be emerging as an intriguing pattern in the New Zealand context. New Zealand English is a relatively new variety of English, and thus the early recordings in this archive contain the first generation of New Zealand English speakers. The early speakers, then, are in a fairly unstable, dialect contact situation—a time of rapid change. A relatively homogeneous dialect had emerged by the turn of the century, by which time New Zealand English existed as a distinct entitity (for extensive discussion see Gordon et al. (2004) and Trudgill (2004). Different processes were at work before the early 1900s and after the 1900s—one a time of dialect leveling, and the other approximating more 'normal' processes of language change. That these may exert different types of pressure on a language system is evidenced by these three changes, which appear to have reversed trajectory around the same time. That there should be a change around this time is also consistent with Schneider's (2003) model of the emergence of new Englishes. He considers the early part of the 20th Century in New Zealand to mark the transition from a 'phase 2' dialect (where speakers consider themselves an outpost of the colonizing nation, and accept the external norm), to a 'phase 3' dialect, where the 'mother country' is felt to be less of a 'mother'. While existing models of new dialect formation do not explicitly predict that the different stages might place opposite pressures on a particular variable, the data from NZ English certainly seems to suggest that this might be the case. Examining the details of these and other changes will be an interesting challenge for future work.

For the purposes of this study, however, the age effect is interesting in that it suggests that the overall propensity to use PPs is itself something which is prone to sociolinguistic forces. There may be different dialects, and/or different periods within a single dialect, where the use of the PP is stylistically preferred or dispreferred. Just like sound changes, and syntactic changes, choices between perfectly well-formed alternate variants vary over time.

Overall, we have evidence that the weight of constraints can vary across speaker groups (as with the animacy difference between the dialects), as can the overall probability of the use of PP (as with NZers of different generations).

## 6. Conclusion

The discovery that varieties of English differ quantitatively in the effect of animacy on the syntax of *give* should not be surprising. Quantitative differences in the effect of animacy on the choice of syntactic paraphrases have also been observed in another area of English grammar, the genitive alternation (see Hundt (1998) on NZ English, and Rosenbach (2002, 2003), and Hinrichs and Szmrecsányi (2006) on American and British English). Rosenbach's (2002, 2003) controlled experimental study found differences in the response to animacy in English speakers in the US and UK; the US speakers tended to place more inanimates in the initial ('*s* genitive) position than the UK speakers. Furthermore, in a number of unrelated languages from different parts of the world, animacy has been found to determine word order choices in ditransitive constructions with dative verbs (Shona, Sesotho: Hawkinson and Hyman (1974) and Morolong and Hyman (1977), Spoken Eastern Armenian: Polinsky (1996), Mayali, Gunwinjguan: Evans (1997), and other typologically diverse languages: Haspelmath (2003, 2004)). See Rosenbach (this volume) for a synthetic overview of animacy and grammatical variation. Whether they are a direct or indirect effect (cf. Rosenbach's, 2003 experimental study and Hinrich and Szmrecsányi's, 2006 corpus study), the quantitative differences in animacy we have found appear to reflect the dynamics of higher-level choices that change grammar in subtle, gradient ways.

The variability we have found provides evidence in favor of models of grammar which are quantitative and learned from exposure to other speakers. Any such grammar is likely to display some variability, depending on the nature of the exemplars that successive generations are exposed to. Two broad classes of theoretically motivated grammars are currently available—probabilistic grammars and exemplar-based models. To the degree that the language experiences of different speakers and speaker groups varies, we expect gradient differences in the grammar to emerge, given either of these classes of grammar models.

Probabilistic grammars associate probabilities with conventional rules, constraints, parameters, or grammars, which define a probability distribution over their outputs (see Anttila and Fong, 2004; Bresnan and Nikitina, 2003; Hale, 2003; Jäger and Rosenbach, 2006; Levy, 2005; Manning, 2003; Smith and Cormack, 2002 and Yang, 2004, for various perspectives). The sensitivity of probabilistic grammars to use and context is explained by statistical learning algorithms or by deriving their properties from models of language perception and production (Boersma and Hayes, 2001; Boersma, 2004; Ferreira, 1996; Goldwater and Johnson, 2003; Jäger, in press; Chang et al., 2006). Exemplar-based models of syntax provide another solution (Bod, 1998). According to the exemplar-based conception, there are no explicit rules of grammar. The grammar arises as a set of analogical generalizations over stored chunks of previously experienced language – lexicalized phrases or constructions – which are used to build new expressions analogically. The view that syntactic competence involves representations of previous language experiences, and not abstract rules has been perhaps most thoroughly articulated with the LFG representational basis (Bod and Kaplan, 2003; Bod, 2006), but is available across a family of lexical constraint-based grammatical theories including Construction Grammar, HPSG, and LFG (see Jackendoff (2002) for a synthesis and Bod et al. (2003) for a variety of formalizations), as well as Cognitive Grammar (Langacker, 1998). Phonetic evidence suggesting that *give* phrases may be stored is discussed in Hay and Bresnan (2006).

In conclusion, we have shown that a statistical model of the syntax of *give* reveals gradient properties of grammar. Following up Bresnan et al.'s (2007) demonstration that the statistical model is relatively stable and systematic across speakers and modalities of US English, we have shown that while it is largely shared with the English of New Zealand, it also shows quantitative variation across speaker groups in space and time. The two varieties differ in the degree of influence of animacy on the dative alternation, and there are quantitative changes in the alternation over the historical time of the development of the NZ English variety. These results indicate that the variability captured in the statistical model is unlikely to be explained by considerations of 'performance' or cognitive processing resources, since we lack antecedently known differences in cognitive resources between the speaker groups studied. Instead we suggest that the results support statistical theories of linguistic competence—what we have called 'gradient grammar'.

## Acknowledgements

We are very grateful to Therese Aitchison for her extensive help with coding the syntactic variables in the New Zealand English data, Anna Cueni for providing coding notes, and Lis Norcliffe for separately coding animacy in samples of both New Zealand and US spoken varieties. This study uses data from the Origins of New Zealand English (ONZE) project at the University of Canterbury. The Mobile Unit data was collected by the Mobile Disc recording unit of the NZ Broadcasting Service, the Intermediate Corpus data was collected by Rosemary Goodyear, Lesley Evans and members of the ONZE team, and the Canterbury Corpus data was collected by members of the NZ English class of the Linguistics Department, University of Canterbury. The work done by members of the ONZE team in preparing the data, making

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transcripts and obtaining background information is gratefully acknowledged. We are also grateful for the University of Canterbury Visiting Erskine Fellowship to Bresnan during February and March of 2005, which enabled our collaboration.

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