Cognitive indigenization effects in the English dative alternation

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Quantitative Lexicology and Variational Linguistics

Workshop: Probabilistic variation across dialects and varieties, April 4-5, Leuven
Introduction
Cognitive indigenization effects
in
the English dative alternation
Cognitive indigenization

- nativization/indigenization = “the emergence of locally characteristic linguistic patterns” (Schneider 2007: 6)
- = indigenization on the level of underlying stochastic patterns that are shaped by language-internal (cognitive) factors (e.g. end-weight)
Cognitive indigenization effects in the English dative alternation
The dative alternation
The dative alternation

(1) **ditransitive dative**

He gives [Mary]$_{recipient}$ [a present]$_{theme}$

(2) **prepositional dative**

He gives [a present]$_{theme}$ to [Mary]$_{recipient}$

→ “alternate ways of saying ‘the same’ thing” (Labov 1972: 188)
Research questions

- What is the extent to which varieties of English share a stable probabilistic grammar?
- Are some factors more amenable to regional differences than others?
today

1. setting the frameworks
2. data & methods
3. analysis & results
4. discussion
5. outlook
6. unresolved issues
setting the frameworks
theoretical frameworks

- Probabilistic Grammar framework
  - grammar is gradient and probabilistic
  - constraint-based accounts
  - probabilistic indigenization
theoretical frameworks

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  - grammar is gradient and probabilistic
  - constraint-based accounts
  - probabilistic indigenization

- Connection to: Cognitive sociolinguistics
  - cognitive factors and sociocultural factors both constrain linguistic variation, language planning, production, and comprehension
theoretical frameworks

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  - grammar is gradient and probabilistic
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- Connection to: Psycholinguistic explanations
  - linguistic experience and statistical properties of the input shape language form
previous research

- statistical tendencies and processing principles underlying the dative alternation are shared across varieties
  (e.g. Bresnan and Hay 2008; Bresnan and Ford 2010)
previous research

▸ statistical tendencies and processing principles underlying the dative alternation are shared across varieties

▸ stability in probabilistic grammars
  ▸ ‘easy’ comes first → congruent effect
  ▸ easy = animate, definite, pronominal, short

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previous research

- statistical tendencies and processing principles underlying the dative alternation are shared across varieties
- stability in probabilistic grammars
  - ‘easy’ comes first → congruent effect
  - easy = animate, definite, pronominal, short
- variability (indigenization) in probabilistic grammars
  - recipient animacy: NZE vs. AmE
  - end-weight: AmE vs. AusE

(e.g. Bresnan and Hay 2008; Bresnan and Ford 2010)
data & methods
the corpus

- International Corpus of English (ICE) - series
- 60% spoken (transcriptions), 40% written texts
- 1m words per subcorpus
- 500 texts, 2,000 words per text
- 12 different registers, same corpus structure
the data

- British E, Canadian E, Indian E, Singapore E, Irish E, New Zealand E, Hong Kong E, Jamaican E, Philippine E
methods

(e.g. Bresnan et al. 2007)

1. extract dative tokens using verb list
2. define choice context (incl. pronouns), leave out, e.g.:
   - fixed and idiomatic expressions (e.g. *bring it to the boil*)
   - spatial goals (e.g. *send their daughter to school*)
   - beneficiaries (e.g. *We get them uh typed photo copies*)

\[ N = 8,549 \]
explanatory factors

- length (end-weight): measured as weight ratio $= \ln(\# \text{ of characters in recipient} / \# \text{ of characters in theme})$
explanatory factors

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- syntactic complexity: postmodified $= \text{‘complex’}$, no postmodification $= \text{‘simple’}$
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- concreteness of theme: perceivable by 5 senses = ‘concrete’
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- animacy of recipient: human/animal $= \text{‘animate’}$
- concreteness of theme: perceivable by 5 senses $= \text{‘concrete’}$
- verb sense: t, f, p, c, a
explanatory factors

verb sense

> transfer: I pay you ten dollars
> future transfer: They award him a silver medal
> prevention: I’ll charge you some money
> communication: I owe you an apology
> abstract: Can you please pay attention to the graph
explanatory factors

- variety: BrE, CanE, SinE, etc.
- register
- corpus metadata: e.g. FileID, text category, etc.
variety

Dative proportions across all nine ICE corpora, \( N=8549 \)
<table>
<thead>
<tr>
<th></th>
<th>Dialogues</th>
<th>Private</th>
<th>Face-to-face conversations</th>
<th>Phonecalls</th>
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<td>Public</td>
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<td>Broadcast Discussions</td>
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<td>Broadcast Interviews</td>
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<td>Parliamentary Debates</td>
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<td>Legal cross-examinations</td>
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<td>Business Transactions</td>
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<td>Monologues</td>
<td>120</td>
<td>Unscripted</td>
<td>Spontaneous commentaries</td>
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<td></td>
<td></td>
<td></td>
<td>Unscripted Speeches</td>
<td>30</td>
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<td>Demonstrations</td>
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<td></td>
<td>Legal Presentations</td>
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<tr>
<td>Scripted</td>
<td>50</td>
<td></td>
<td>Broadcast News</td>
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<td>Broadcast Talks</td>
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<td>Non-broadcast Talks</td>
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<td>200 Non-printed</td>
<td>50</td>
<td>Student Writing</td>
<td>Student Essays</td>
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<td>Exam Scripts</td>
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<td>Social Letters</td>
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<td></td>
<td></td>
<td>Business Letters</td>
<td>15</td>
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<td>Printed</td>
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<td>Academic writing</td>
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<td>Popular Writing</td>
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<td>Natural Sciences</td>
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<td></td>
<td></td>
<td>Technology</td>
<td>10</td>
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<td>Reportage</td>
<td>Press news reports</td>
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<tr>
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<td></td>
<td>Instructional writing</td>
<td>Administrative Writing</td>
<td>10</td>
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<td></td>
<td>Skills/Hobbies</td>
<td>10</td>
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<tr>
<td></td>
<td></td>
<td>Persuasive writing</td>
<td>Press editorials</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Creative writing</td>
<td>Novels &amp; short stories</td>
<td>20</td>
</tr>
</tbody>
</table>

**Register coding ICE**
register coding in this study

(Koch and Oesterreicher 1985)
register coding in this study

(Koch and Oesterreicher 1985)

4 levels → SpokInf, SpokForm, WritInf, WritForm
analysis & results
analysis

- mixed-effects logistic regression
- deviation coding for VARIETY and REGISTER: compare every level to the mean of ALL levels
- predicted outcome: prepositional dative
- glmer() function in Rs lme4 package
  (Bates, Maechler, and Bolker Bates et al.; Harrell 2001)
- random effects include
  - verb lemma and verb sense
  - corpus structure
  - recipient and theme head lemmas
dative model

Response = \{ditransitive, prepositional\}

Response \sim (1|\text{VerbLemma}/\text{VerbSense})
  + (1|\text{ThemeHead})
  + (1|\text{CorpusStructure})
  + \text{RecComplexity}
  + \text{RecGivenness}
  + \text{ThemeComplexity}
  + \text{RecPerson}
  + \text{RecDefiniteness}
  + \text{ThemePron}
  + \text{RecAnimacy}
  + \text{ThemeGivenness}
  + \text{ThemeDefiniteness}
  + \text{Variety} \ast
(\text{Register} + \text{RecPron} + \text{ThemeConcreteness} + \text{WeightRatio})
importance of predictors

Predicted outcome: PD; C-value: 0.98; Accuracy: 93.6% (baseline: 69%)
What is the extent to which varieties of English share a stable probabilistic grammar?

Are some factors more amenable to regional differences than others?
### main effects

<table>
<thead>
<tr>
<th>Predictor</th>
<th>b</th>
<th>SE</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>(intercept)</td>
<td>2.525</td>
<td>0.405</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>RECIPIENT COMPLEXITY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>simple ⇒ complex</td>
<td>0.898</td>
<td>0.204</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>THEME COMPLEXITY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>simple ⇒ complex</td>
<td>-0.692</td>
<td>0.164</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>RECIPIENT PERSON</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>local ⇒ non-local</td>
<td>0.882</td>
<td>0.175</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>RECIPIENT ACCESSIBILITY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>given ⇒ new</td>
<td>0.388</td>
<td>0.130</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td><strong>RECIPIENT ANIMACY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>animate ⇒ inanimate</td>
<td>0.994</td>
<td>0.140</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>THEME PRONOMINALITY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>non-pronoun ⇒ pronoun</td>
<td>1.552</td>
<td>0.468</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>RECIPIENT PRONOMINALITY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pronoun ⇒ non-pronoun</td>
<td>1.945</td>
<td>0.191</td>
<td>&lt;0.001</td>
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<tr>
<td><strong>RECIPIENT DEFINITENESS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>definite ⇒ indefinite</td>
<td>0.556</td>
<td>0.144</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>THEME DEFINITENESS</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>indefinite ⇒ definite</td>
<td>0.696</td>
<td>0.126</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>WEIGHT RATIO (rec/theme)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>all ⇒ CanE</td>
<td>-1.586</td>
<td>0.365</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>all ⇒ IndE</td>
<td>0.919</td>
<td>0.256</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>VARIETY</strong></td>
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<tr>
<td>all ⇒ CanE</td>
<td>2.950</td>
<td>0.230</td>
<td>&lt;0.001</td>
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<tr>
<td>all ⇒ IndE</td>
<td>0.919</td>
<td>0.256</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
main effects

- all predictors influence the choice of construction as predicted:
  - given > new
  - animate > inanimate
  - definite > indefinite
  - pron > non-pron
  - short > long

recipient > theme \rightarrow \textit{ditransitive}
theme > recipient \rightarrow \textit{prepositional}
interactions

<table>
<thead>
<tr>
<th>Predictor</th>
<th>b</th>
<th>SE</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VARIETY : RECIPIENT PRONOMINALITY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CanE + non-pronoun</td>
<td>0.902</td>
<td>0.402</td>
<td>0.025</td>
</tr>
<tr>
<td>IndE + non-pronoun</td>
<td>1.108</td>
<td>0.353</td>
<td>0.002</td>
</tr>
<tr>
<td>JamE + non-pronoun</td>
<td>-1.253</td>
<td>0.402</td>
<td>0.002</td>
</tr>
<tr>
<td><strong>VARIETY : WEIGHT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IndE</td>
<td>-1.080</td>
<td>0.452</td>
<td>0.017</td>
</tr>
<tr>
<td>JamE</td>
<td>1.960</td>
<td>0.606</td>
<td>0.001</td>
</tr>
<tr>
<td><strong>VARIETY : THEME CONCRETENESS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CanE + concrete</td>
<td>1.250</td>
<td>0.397</td>
<td>0.002</td>
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<tr>
<td><strong>VARIETY : REGISTER</strong></td>
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<tr>
<td>IrE + SpokForm</td>
<td>0.692</td>
<td>0.278</td>
<td>0.013</td>
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<tr>
<td>IrE + SpokInf</td>
<td>-0.604</td>
<td>0.287</td>
<td>0.035</td>
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<tr>
<td>HKE + SpokInf</td>
<td>0.679</td>
<td>0.244</td>
<td>0.005</td>
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<tr>
<td>HKE + WrittenForm</td>
<td>-0.912</td>
<td>0.293</td>
<td>0.002</td>
</tr>
<tr>
<td>HKE + WrittenInf</td>
<td>0.566</td>
<td>0.220</td>
<td>0.010</td>
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<tr>
<td>JamE + SpokInf</td>
<td>-0.703</td>
<td>0.312</td>
<td>0.024</td>
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<tr>
<td>JamE + WrittenForm</td>
<td>0.873</td>
<td>0.433</td>
<td>0.044</td>
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<tr>
<td>NZE + WrittenForm</td>
<td>0.673</td>
<td>0.295</td>
<td>0.023</td>
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</table>
cross-varietal differences

Table: Cross-varietal differences in effect size; - indicates decreased effect size, + indicates increased effect size

<table>
<thead>
<tr>
<th>Variety</th>
<th>WeightRatio</th>
<th>RecPron</th>
<th>ThemeConcreteness</th>
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<tbody>
<tr>
<td>CanE</td>
<td>=</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>IndE</td>
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<td>+</td>
<td>=</td>
</tr>
<tr>
<td>JamE</td>
<td>+</td>
<td>-</td>
<td>=</td>
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</tbody>
</table>
discussion
discussion

- general processes of language production and comprehension
  - ...shape distributional patterns in speakers' experience
  - ...which gives rise to subtle variation in the probabilistic effects of different linguistic features
discussion

- MacDonald (2013): Easy First, Plan Reuse
discussion

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  - consistent interplay between principles creates statistical regularities in language usage
discussion

- MacDonald (2013): Easy First, Plan Reuse
  - consistent interplay between principles creates statistical regularities in language usage
  - Easy First: creates stability in effect direction
MacDonald (2013): Easy First, Plan Reuse

- Consistent interplay between principles creates statistical regularities in language usage
- Easy First: creates stability in effect direction
- Plan Reuse: constantly reinforces the regularization of linguistic input → strengthens diverging statistical patterns of use
MacDonald (2013): Easy First, Plan Reuse

- consistent interplay between principles creates statistical regularities in language usage
- Easy First: creates stability in effect direction
- Plan Reuse: constantly reinforces the regularization of linguistic input → strengthens diverging statistical patterns of use
- changes in lexis-syntax associations can result in diverging statistical regularities since the strength of effects that modulate these statistical regularities change as well
discussion
language and dialect contact

- emergence of localized linguistic structure with new lexical items in syntactic constructions
language and dialect contact

- emergence of localized linguistic structure with new lexical items in syntactic constructions
  - generalizing beyond the input
language and dialect contact

- emergence of localized linguistic structure with new lexical items in syntactic constructions
  - generalizing beyond the input
  - changes in abstract rules
second language acquisition
second language acquisition

- overuse of more transparent option (PD)
  → changes in the strength of specific cues as variants are used by L2 speakers in contexts where L1 speakers would not
second language acquisition

- overuse of more transparent option (PD)
  → changes in the strength of specific cues as variants are used by L2 speakers in contexts where L1 speakers would not

- transfer of cue strength from L1 (MacWhinney 1997)
constructional / semantic changes

- due to “normal” language usage
constructional / semantic changes

- due to “normal” language usage
- semasiological profile of variant might differ cross-variational
constructional / semantic changes

▶ due to “normal” language usage
▶ semasiological profile of variant might differ cross-variational
▶ 1st lang acq.: DO associated with certain lexical items
constructional / semantic changes

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- semasiological profile of variant might differ cross-variational
- 1st lang acq.: DO associated with certain lexical items
- 2nd lang acq.: DO is associated with certain lexical items
why length and RecPron?

- most amenable to probabilistic indigenization = length and recipient pronominality
why length and RecPron?

- most amenable to probabilistic indigenization = length and recipient pronominality
- most influential predictors = high cue validity
how does the study fit in with previous research?
how does the study fit in with previous research?

What about recipient animacy?
how does the study fit in with previous research?

Investigating the effect of recipient animacy:

▷ restrict dataset to *give*
▷ follow procedure in Bresnan and Hay 2008 in selection of predictors
▷ et voilà: → recipient animacy is a significant factor!
how does the study fit in with previous research?

(Left: GIVE model; right: all verbs)
conclusion

- some effects seem to be sensitive to the lexical items that are used as syntactic constituents: verb-specific sensitivities vary across varieties
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▸ combining social as well as cognitive aspects is fruitful in order to more fully understand mechanisms of language production and comprehension
outlook
outlook

- focus on social constraint (Toronto)
- ..and other syntactic alternations (Toronto)
- extend annotation (persistence)
- extend corpus material to include web-based language (GloWbE)
- separate analysis without pronouns?
unresolved issues
unresolved issues

1. Does cognitive indigenization also take place in other aspects of grammar (apart from syntax)?
2. The granularity of syntactic structure: to which extent is grammar tied to microCxs or specific lexical items?
3. How does the fact that L2 speakers are learners of English help us interpret the results?
4. How do substrate languages / creoles influence the effect that we observe?
Thank you!

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