

# Cross-constructional determinants of syntactic productivity

Experiments with argument structure alternations

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## Productivity

- Common notion in morphology
  - Property of a word formation process to be used to coin new words
  - e.g., *-th* (*length, depth*) vs. *-ness* (*kindness, nouniness*)
- Parallel in syntax
  - Ability of a construction to accommodate new words
  - e.g., *She tried to cough the pill out of her throat* (Carol Neumann, *Out of Tears*)
  - ≠ “generative” productivity

## Syntactic productivity: an illustration

- In language change:
  - Over time, constructions can attract existing words or novel ones (loans or coinages)
  - e.g., argument structure constructions in Icelandic (Barðdal 2008): the DO of many verbs changed from Dative or Genitive case in Old Icelandic to Accusative case in Present-day Icelandic
- In language acquisition:
  - Children form generalizations over their input and use them to form novel combinations
  - Overgeneralization errors: *Don't say me that!* (Gropen et al. 1989)

## Determinants of productivity: state of the art

- Basic principles (cf. Barðdal 2008, Suttle & Goldberg 2011):
  - Speakers use constructions in similar ways to their previous usage
  - Unless there is evidence inviting them to depart from the “norm”:
    - Type frequency (how many different verb stems are used in the construction)
    - Semantic coverage (how semantically different they are)
- So far, focus on usage properties of individual constructions
- Main question of the present project:
  - Can the productivity of a construction also be influenced by the usage of other constructions?

## Why cross-constructural determinants of productivity?

- Verbs often share parts of their syntactic distribution, e.g.:

John	broke	the ice.	The ice	broke.
	cracked			cracked.
	melted			melted.
	...			...

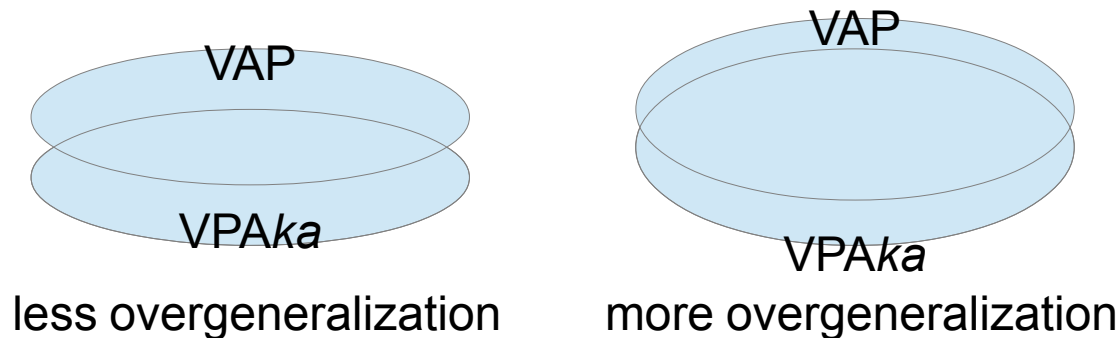
- Can speakers use such distributional facts to make predictions about syntactic productivity?
  - Wonnacott et al. (2008): alternations promote productivity
  - Perek (2012): productive use of a verb is influenced by its prior distribution

## Wonnacott et al.'s (2008) experiment

- Artificial language experiment
  - A made-up language was taught to participants
  - 12 nonce verbs (transitive action), 2 synonymous constructions:  
Verb Agent Patient                  Verb Patient Agent *ka*
  - The distribution of constructions in the input was manipulated across experiments (3 classes: VPA-only, VPA*ka*-only, alternating)
  - Production was elicited from the participants
- Main finding: effect of the number of alternating verbs on productivity

## Wonnacott et al.'s (2008) experiment

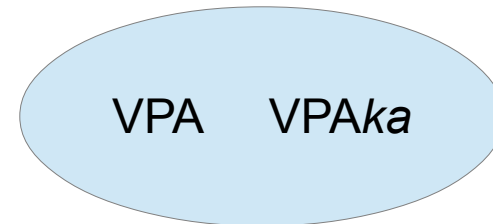
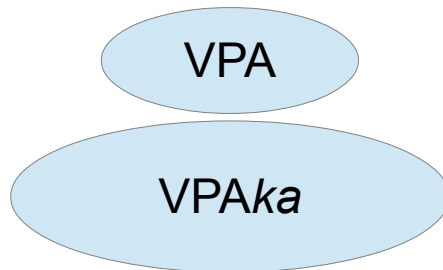
- Overgeneralization increases with the size of the alternating class



- “[T]he presence of the large alternating verb class provided evidence for generalization which outweighed evidence of lexically specific behavior” (Wonnacott et al. 2012: 188-189)
- NB: same type frequency and same semantic coverage for the two constructions in both conditions!

## Wonnacott et al.'s (2008) experiment

- Conservative vs. productive behavior in a “lexicalist” (no alternation) vs. “generalist” (all verb alternate) language



- No overgeneralization (**despite difference in type frequency**)
- Hapaxes (i.e., verbs presented only once in either construction) used conservatively
- Hapaxes used in the most frequent construction



## Wonnacott et al.'s (2008) findings

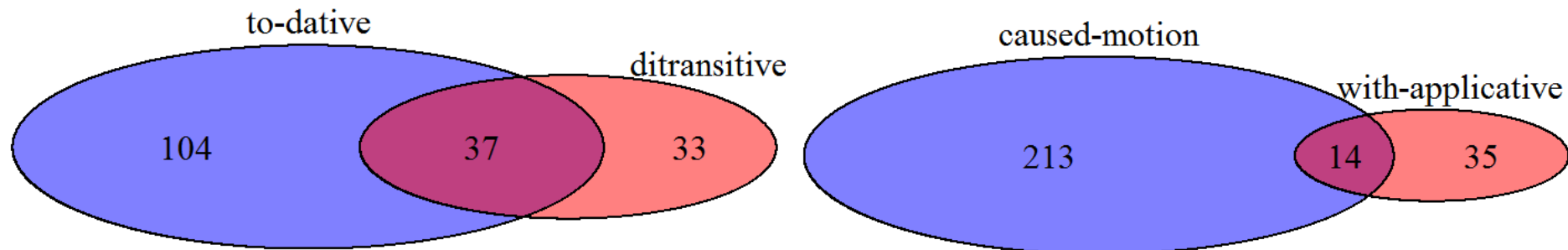
- Evidence that productivity does not only depend on the usage of independent constructions
- Shared patterns of usage also seem to play a role
- How do these findings carry over to natural languages?
  - Experiment with dative and locative constructions in English (Perek 2012)

## Dative and locative constructions in English

- English too has constructions with similar semantics, often referred to as variants of an alternation, e.g.:
  - Dative alternation: events of giving, telling and the like
    - Ditransitive: *John gave Mary a book*
    - To-dative: *John gave a book to Mary*
  - Locative alternation: events of caused change of location
    - Caused-motion: *John loaded three bales onto the cart*
    - With-applicative: *John loaded the cart with three bales*
  - Not entirely synonymous, but interchangeable in many cases

## Dative and locative constructions in English

- Different distributions from that found in Wonnacott et al.'s artificial languages (source: ICE-GB)



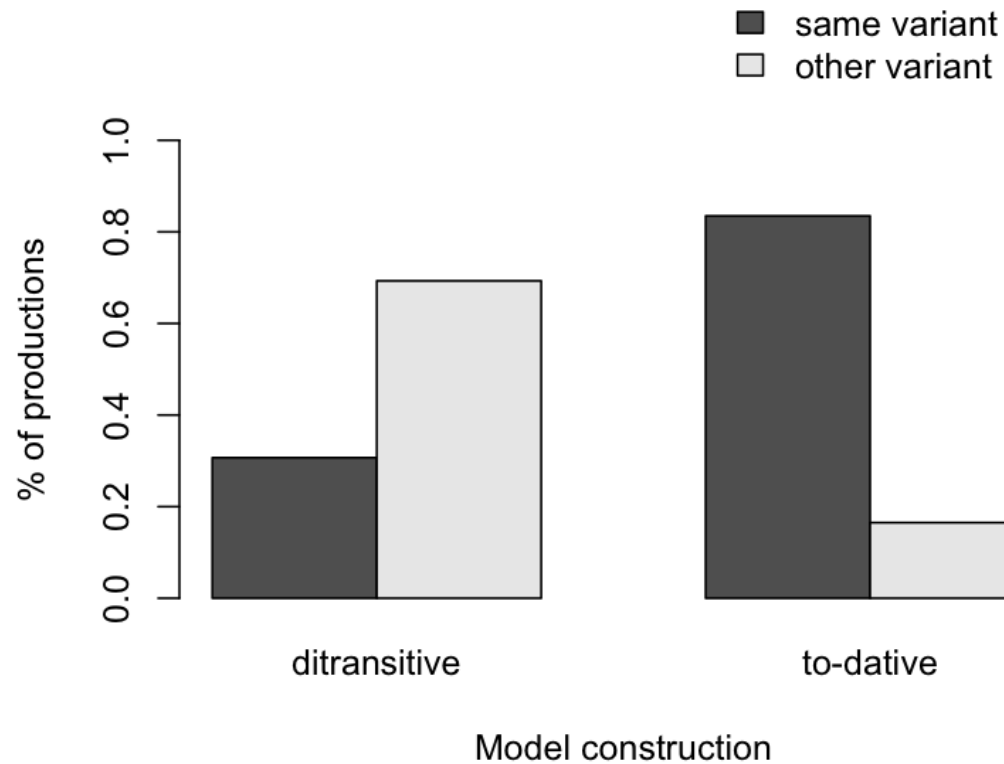
- Type frequency imbalance between constructions
- Small alternating class, larger for the dative alternation
- How do these facts affect the productivity of these constructions?

## The experiment (Perek 2012)

- Novel verbs taught to participants in short stories
  - Intended meaning hinted at by contextual cues (physical transfer, communication, placing/applying)
  - Used in one of the variants of the dative or locative alternation
- After reading the short story, subjects had to:
  - Decide on the meaning of the verb by choosing a definition out of 3
  - Use the verb by completing a sentence prompt according to what happened in the story
    - Both variants were equally acceptable
    - Syntactic priming was used to promote productive use
    - We look at the kind of production: conservative (same variant), productive (other variant), or other

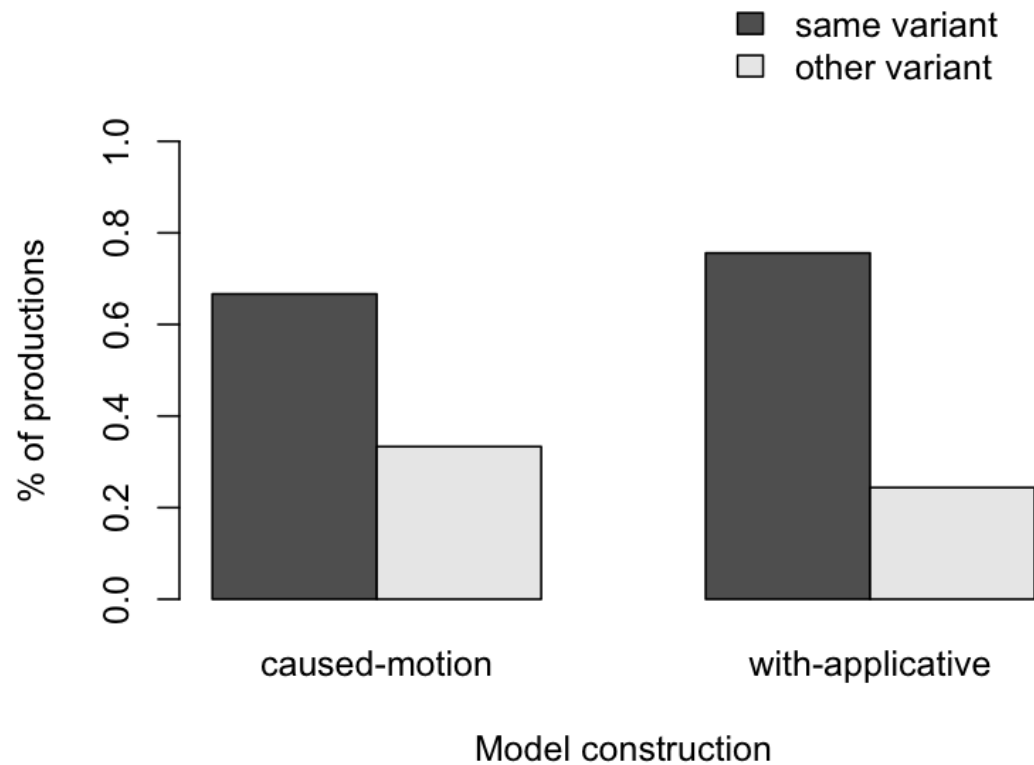
## Results

- Dative alternation: productivity asymmetry towards the *to*-dative



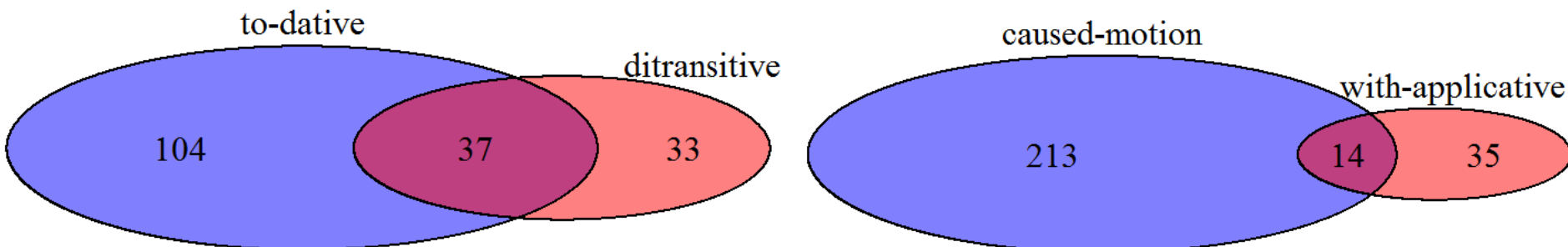
## Results

- Locative alternation: no asymmetry, conservative behavior



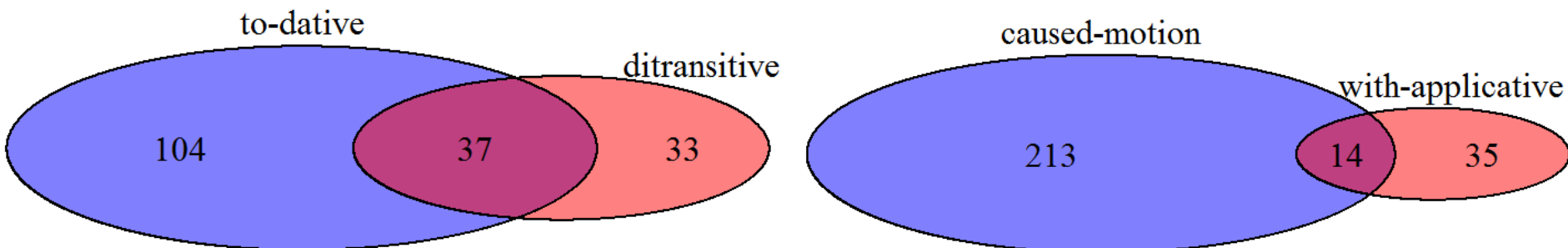
## Results

- How does it line up with patterns of type frequency?
  - *To*-dative and caused-motion have the highest type frequency
  - Both should be more productive than their variants
  - Yet, only the *to*-dative attract new members
  - This is because of the larger alternating class in the dative alternation, in line with Wonnacott et al.'s (2008) findings



## Results

- It is more likely for a *to*-dative verb to belong to the '*to*-dative-only' class than to the 'alternating' class
- Conversely, it is roughly equally likely for a ditransitive verb to belong to the 'alternating' class or to the 'ditransitive-only' class
- Similarly, it is more likely for a caused-motion or with-applicative verb to belong to a non-alternating class than to the alternating class





## Conclusion

- Cross-constructional determinants of productivity:
  - Shared distributional patterns play a role in productivity
  - They allow speakers to make hypotheses about the possible occurrence of a lexical item in a construction A on the basis of its occurrence in another construction B, i.e.:
    - If there are more items witnessed in both A and B than only in A, then the occurrence of a new lexeme L in A entails that L can also be used in B.
    - Conversely, if there are more items witnessed only in A than items occurring in both A and B, then new items witnessed in A are assumed to be able to occur in A only.

## Conclusion

- Pending questions
  - Possible confound in Perek's (2012) experiment (?)
    - Are the two alternations qualitatively comparable?
    - Is a baseline condition needed?
    - It might be desirable to re-do the experiment in a different form
  - How are these results best modeled?
    - Overarching generalization, or verb classes (outcome of statistical preemption)?
    - Additional artificial language experiments could settle the remaining questions

## Thanks for your attention!

Barðdal, J. (2008). *Productivity: Evidence from Case and Argument Structure in Icelandic*. Amsterdam/Philadelphia: Benjamins.

Gropen, J., S. Pinker, M. Hollander, R. Goldberg, and R. Wilson (1989). The learnability and acquisition of the dative alternation in English. *Language* 65.2: 203–257.

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Suttle, L. & A. Goldberg (2011). The partial productivity of constructions as induction. *Linguistics* 49.6: 1237-1269.

Wonnacott, E., E. Newport and M. Tanenhaus (2008). Acquiring and processing verb argument structure: Distributional learning in a miniature language. *Cognitive Psychology* 56: 165-209.