Productivity and schematicity of the *way*-construction in Late Modern English

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Diachronic construction grammar

• Language change consists either of constructionalization or constructional change (Traugott & Trousdale 2013)
• Three aspects of constructional change:
  – Compositionality: how semantically transparent a construction is
  – Productivity: the range of lexical items that may occur in it
  – Schematicity: the level of detail (esp. semantic) with which the construction is stored; defines restrictions on use
• This talk focuses on how the last two can be characterized from corpus data
Productivity and schematicity

• Productivity can be observed in corpus data; what about schematicity?
• The two are commonly thought to be interrelated
  – More schematic constructions have more schematic slots: fewer constraints on the lexical items that can be used
  – Conversely, the occurrence of more diverse items makes a slot more schematic
Productivity and schematicity

• By no means a one-to-one relation
  – Compatibility of an item with a schema does not mean that it will necessarily be attested
  – Conversely, new coinages can happen outside of a schema, e.g., by analogical extension
• Schematicity vs. productivity ~ licensing vs. coining
• How to characterize schematicity when only attested types are observable?
Case study: the way-construction

• Verb one’s way PP, e.g., *He pushed his way through the crowd*
• Describes motion of the subject referent
• Three senses of the construction:
  – Path-creation: the verb describes what enables motion
    *They hacked their way through the jungle.*
  – Manner: the verb describes the manner of motion
    *They trudged their way through the snow*
  – Incidental-action: the verb refers to some co-occurring action unrelated to motion
    *He whistled his way across the room*
The *way*-construction in diachrony

- Previous research mostly focused on the origins of the construction (Israel 1996, Traugott & Trousdale 2003)
- Little discussion of the recent history of the construction (19th–20th)
  - Grammatically stable since the 19th century
  - Good case for the study of syntactic productivity
- Exception: Mondorf (2011)
  - But her focus is on the comparison with the *self*-resultative construction (e.g., *He worked himself to exhaustion*)
  - Only ten verbs, few datapoints
Data

• All tokens of “V Poss way Prep” between 1830 and 2009 extracted from the Corpus of Historical American English (COHA, Davies 2010)
• Manually filtered, annotated for constructional meaning: path-creation, manner, incidental-action
• Quantitative measures of productivity
  – Token frequency: how often the construction is used?
  – Type frequency: with how many different verbs?
- Token frequency is relatively stable
- Steady increase in type frequency: the construction is used with more and more different verbs
Type frequency

• Type frequency reflects the lexical range of a construction
• But it is a purely quantitative measure
  – Only indirectly related to semantic diversity
  – No account of how different items are
• Questions:
  – What kinds of verbs joined the distribution?
  – Did it become more semantically diverse?
  – Are there particular semantic domains favored by the construction?
Distributional semantics

• Most studies in DiaCxG draw on semantic intuitions
• This paper takes a different approach: using distributional semantics to measure semantic similarity (Perek 2014, 2016)
• Words that occur in similar contexts tend to have related meanings (Miller & Charles 1991)
  “You shall know a word by the company it keeps.” (Firth 1957: 11)
• Therefore, a way to characterize the meaning of words is through their distribution in large corpora
• Widely used in computational linguistics
• Benefits:
  – Fully automatic
  – Data-driven and objective
Distributional semantic model

- The more frequent collocates are shared by two words, the more similar they will be considered
- “Bag of words” approach
  - Extraction of lexical collocates of each verb in a 5-word window from a large corpus
  - Each verb is assigned an array of values (= a vector) derived from co-occurrence frequencies
  - High correlation between vectors is an indication of semantic relatedness
Distributional semantic plots

• Output: pairwise distances between verbs
• Define a semantic space that can be plotted for visualization
  – By means of $t$-Distributed Stochastic Neighbor Embedding algorithm ($t$-SNE) (Van der Maaten & Hinton 2008)
  – Places objects in a 2-dimensional space such that the between-object distances are preserved as well as possible
  – Superior to multidimensional scaling (MDS) for dense spaces with many dimensions
  – Distance matrix converted to coordinates for each verb
• Three senses of the construction examined separately
The path-creation sense
Clear concrete/abstract divide in the distributional semantic plot

Higher density of verbs describing forceful actions (cut, push, kick, ..) , especially in earlier periods
From period 2 onwards: ingestion (*eat, drink, nibble, puff, sip, smoke, ..*), commerce & finance (*buy, export, fund, invest, pay, spend, ..*), misconduct (*bribe, bully, cheat, conspire, kill, murder, plot, rape, trick, ..*)
From period 3 onwards: social interaction (chat, chatter, joke, kid, nod, quarrel, talk), emotion (grin, laugh, smile, shrug, laugh), cognition (brood, fret, puzzle, think, worry)
The path-creation sense

• Initially centered on forceful actions
  – Pushing, hitting, cutting, etc.
  – Other regions are more sparsely populated
  – In line with the diachronic origin of the construction: literal creation of a physical path
• Over time, the distribution becomes more even
• More abstract verbs: interaction, commerce, cognition, etc.
The path-creation sense

• The new verbs tend to refer to increasingly unusual ways to cause motion
• They are especially prone to cause abstract, metaphorical motion, e.g.:
  [T]hey talk about Uncle Paul having **bought his way into the Senate**!
  By the time he was four he could **spell his way through his book** with only occasional pauses for breath.
  I sit and watch [...], **grazing my way through a muffuletta**.
  I saw Wallace Shawn [...] **lisp[ing] his way through a mournful monologue**.
• Can be seen as reflecting an increase in the schematicity of the motion component of the construction
The manner sense
Verbs describing slow, indirect, or difficult motion: *thread, trial, weave, wind, plod, toil, tramp, trudge.*
Clumsy or unsteady motion: blunder, limp, scramble, stagger, stumble, totter

Surrounded by verbs that encode body movements to facilitate motion: bend, jerk, lean, lunge, stoop, thrash, twist, wrench, wriggle, writhe
More ‘neutral’ manners of motion: walking (*stride*, *strut*, *tiptoe*, *walk*, ..), rapid motion (*power*, *run*, *speed*, ..), liquid motion (*course*, *drip*, *sift*, *ooze*, ..), vehicle/theme (*fly*, *paddle*, *ply*, *sail*, *ski*, ..)
The manner sense

- **Difficult motion** = semantic ‘core’ of the construction (Goldberg 1995)
  - Stable throughout the last 180 years
  - Several high-frequency members
  - Source of productivity: unsteady motion, body movements
- **Non-difficult motion** more prominent in later periods
- Likely interpretation: increase in schematicity of the verb slot, from difficult motion to general manner of motion
The incidental-activity sense
High semantic diversity from the start

Sound emission dominates in later periods: noise (bang, creak, crunch, thump), speech (babble, chatter, joke, swear, talk), cry (bellow, howl, roar, scream, shriek), other human sounds (grunt, sigh, sob, whine, yawn)
The incidental-activity sense

• Likely to be highly schematic from the start
  – No clear semantic core in the distribution
  – High semantic diversity from the start
  – Constructional meaning is rather open

• Increase in productivity, no increase in schematicity
  – Prominence of sound emission in mid and late 20\textsuperscript{th} century
  – Probably explained by higher compatibility with schema
  – But not from the start (\textit{contra} Israel 1996)
Conclusions

• Productivity and schematicity of the *way*-construction
  – Substantial distributional changes in the 19\textsuperscript{th} and 20\textsuperscript{th} centuries for all three senses of the construction
  – Likely to correspond to higher schematicity for two senses

• The usefulness of distributional semantic plots
  – Close examination of the semantic spread of a construction over time
  – Makes it possible to inform hypotheses about schematicity
Thank you!

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