

Structural and thematic information in sentence production

Christina Kim
UCLA
chkim@humnet.ucla.edu

NELS 37
University of Illinois, Urbana-Champaign
October 14, 2006

Structural priming & 'structure'

- Structural priming: tendency to produce sentence structures similar to their previous utterances. What type of structure does this tap?
- There are lots of things that linguists are inclined to consider 'structural'. Can we show that such structural representations are actually accessed during sentence production?

Unaccusatives & Passives:

- Superficially: different morphology, different number of arguments
- Shared syntactic properties → do these count for structural priming?

Structural priming & 'structure'

Outline for the talk

- Quick background: Structural priming, Passives, Unaccusatives
- Experiment 1: Do Unaccusatives prime Passives?
- Experiment 2: Priming passive structure without thematic overlap—Psych verbs
- Experiment 3: Unaccusatives and Psych verbs
- Conclusion + future work

Structural priming

Speakers tend to produce sentences that match their previous utterances structurally (Bock 1986; Pickering & Branigan 1998; Bock & Griffin 2000).

Prime: *The boy showed the teacher the drawing* (double object)

Target:



Description: *The girl brought her mother breakfast*

Structural priming = structural similarity

- It's not (just) thematic structure
- Bock & Loebell 1990: locative by-PP primes passives as well as passives do:

The 747 landed by the control tower.
The 747 was alerted by the control tower.

...and goal/recipient datives prime prime location datives as well as other location datives:

The widow gave the Mercedes to the church.
The widow drove the Mercedes to the church.

- Lexical overlap helps (Cleland & Pickering 2003; Pickering & Branigan 1998), but you still get priming with different verbs.

...but what do we mean by "structure"?

- Pickering & Branigan 1998: verb representations linked to combinatorial nodes (= "subcategorization frames"); priming = activation is bumped up from recent selection.

Dative alternation: NP_PP competes with NP_NP

- Chang et al 2000; Bock & Griffin 2000: structural priming is implicit learning—structural options are possible surface orderings of arguments, given the event semantics and set of thematic roles.
- Hare & Goldberg 2000; Chang, et al 2003: what you're priming are constructions (mapping from thematic role array to surface constituent order):

subj	verb	object	object2	subj	verb	object	oblique
agent	recipient	theme		agent	theme	recipient	

...but what do we mean by “structure”?

- Griffin & Weinstein-Tull (2003) say explicitly: only syntactic frames with the same number of arguments are even ‘eligible’ for priming (given a V and some number of arguments, different syntactic frames are different configurations available for that type of verb-argument combination).

Structural priming is about alternations.

- A different notion of structural similarity:

Verbs that map underlying structural representations onto surface representations in the same way are structurally alike.

Passives

- They have active counterparts—which they *must* be related to

Active: *Abby kicked Jill*
Passive: *Jill was kicked by Abby*

- Passive does something to the external argument
- An internal argument gets promoted to subject position
- Transformational accounts: you can’t passivize something without an external argument

Unaccusatives

- The Unaccusative Hypothesis (Perlmutter 1978): two classes of intransitive verbs
 - Unergatives have a single external argument
John ran / jumped / slept.
 - Unaccusatives have a single internal argument
John arrived / died / appeared.
- Surface subjects of unaccusative verbs are derived

Unaccusatives

- Do unaccusatives and passives behave alike for purposes of sentence production?
 - *If structural priming is about alternating argument structure realizations, there may be no reason for unaccusative and passive sentence production to affect each other.*
 - *If there is some abstract structural similarity between unaccusatives and passives, then structural priming might be sensitive to it.*

Experiment 1: passives & unaccusatives

- Participants: 44 monolingual native American English speakers (mostly UCLA undergrads)
- Procedure (adapted from Bock 1986b, following):
 - Participants hear/see a series of sentences/pictures. After each one, they indicate whether they have heard/seen that item before in the experiment, by pressing a button.
 - In addition, participants are instructed to either repeat the sentence or describe the picture (to “aid with the memory task”).
 - Fillers using sets of numbers or words appeared between priming sequences (prime sentence-target picture).

Experiment 1: passives & unaccusatives

- Primes:
 - 24 transitive Vs: 12 active, 12 passive
The babysitter was feeding the children
The children were being fed by the babysitter
 - 12 unaccusative sentences
The guests were finally leaving
- Targets:
 - 36 transitive event-depicting black & white pictures. Agents/Patients were matched for animacy. (cf. Bock 1986b’s humanness effect; Bock, Loebell & Morey 1992’s ‘animacy priming’)

Experiment 1: passives & unaccusatives

"The guests were finally leaving"

Repeat.

Press green for 'Yes' / red for 'No'

Experiment 1: passives & unaccusatives

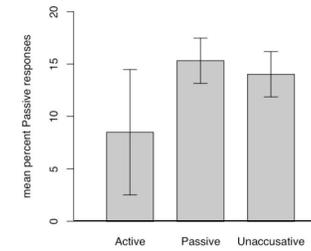


Describe.

Press green for 'Yes' / red for 'No'

Experiment 1: passives & unaccusatives

Passive responses by prime type



More Passive descriptions are produced after Passive ($p < .02$) and Unaccusative ($p < .05$) primes than after Active primes.

Experiment 1: passives & unaccusatives

- Passives prime Passives—good! This replicates Bock & Loebell 1990, Bock & Griffin 2000.
- Unaccusatives prime Passives
 - But, Unaccusatives have active verbal morphology!
 - Due to syntactic structure? Maybe not—e.g. Melinger 2006 finds Unaccusative to Passive priming and attributes the effect to thematic structure.

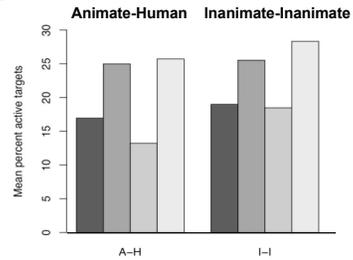
Experiment 1: passives & unaccusatives

- Unaccusatives and Passives have theme subjects:
 - The shipment vanished/appeared/arrived
theme
 - The kid was punched/kicked/questioned by the bully
patient/theme agent

Experiment 1: passives & unaccusatives

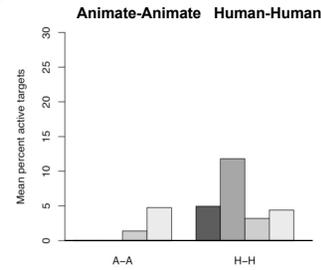
- Possible sources of unaccusative → passive priming
 - Unaccusatives and Passives have derived subjects; Actives preserve base/canonical argument order
 - Thematic structure: Unaccusatives and Passives have theme subjects; Actives have agent subjects
 - Actives have direct objects; Unaccusatives and Passives don't
- Experiment 2:
Is it thematic structure that's responsible for priming Passive syntax?

Experiment 2: agentive & experiencer verbs



Passive Agt > Active Agt ($p < .05$)
 Passive Psy > Active Psy ($p < .025$)

Experiment 2: agentive & experiencer verbs



Passive Agt > Active Agt ($p < .05$)

Experiment 2: agentive & experiencer verbs

• Predicate properties:

- "violent"

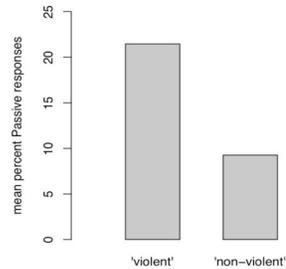
The pit bull is attacking the mailman

- "non-violent"

The cops are chasing the burglar



Experiment 2: agentive & experiencer verbs



violent > non-violent ($p < .0001$)

Experiment 2: agentive & experiencer verbs

- Stepwise regression—best linear model includes (in order of decreasing weight)
 - Argument-pair type
 - Predicate type (violent/non-violent)
 - Prime structure (active/passive)

Experiment 2: agentive & experiencer verbs

Summary:

- Priming from both Agent-Theme and Causer-Experiencer Passives → Agent-Theme Passives
- In addition: target picture properties are reliable predictors of utterance form
 - More Passive descriptions of Animate-Human, Inanimate-Inanimate events than Animate-Animate, Human-Human events
 - More Passive descriptions with "violent" verb meanings than "non-violent" ones

Experiment 2: agentive & experiencer verbs

Possible sources of unaccusative → passive priming

- Unaccusatives and Passives have derived subjects; Actives preserve base/canonical argument order
- Thematic structure: Unaccusatives and Passives have theme subjects; Actives have agent subjects
- Actives have direct objects; Unaccusatives and Passives don't

Passive syntax can be primed in the absence of thematic overlap.

Experiment 2: agentive & experiencer verbs

- Why not test Unaccusatives and Psych verbs directly?
- Methodological issue: it's hard to come up with pictures that reliably elicit either Unaccusatives or Psych verbs
- A different paradigm: Rapid serial visual presentation (RSVP)—Potter & Lombardi 1990.
 - Used by Chang, et al (2003) for spray-load, dative, benefactive alternations; Konopka & Bock (2005), for preposition-stranding alternations/idioms.

Experiment 3: unaccusatives & psych verbs

- RSVP
 - Prime and Target trials are identical
 - Sentence presented word-by-word on computer screen, 100 ms/word (really fast!)
 - Y/N response to numerical distractor task
 - Say the sentence. Due to time/memory pressure, mistakes are frequent; the recalled sentence is subject to structural priming
- Participants: 39 monolingual native American English speakers (UCLA undergrads)

Experiment 3: unaccusatives & psych verbs

• Primes

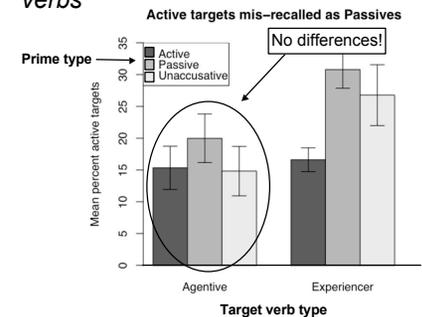
- Agentive Active:
The babysitter is feeding the children
- Agentive Passive:
The children are being fed by the babysitter
- Unaccusative:
The guests are finally arriving

Experiment 3: unaccusatives & psych verbs

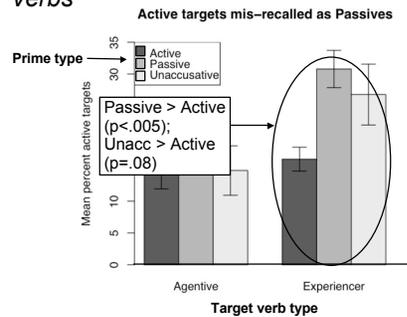
• Targets

- Agentive Active:
The cop is chasing the burglar
- Agentive Passive:
The burglar is being chased by the cop
- Experiencer Active:
The protesters are frightening the bystanders
- Experiencer Passive:
The bystanders are being frightened by the bystanders
- Dependent measure: proportion of Active targets mis-recalled as Passives

Experiment 3: unaccusatives & psych verbs



Experiment 3: unaccusatives & psych verbs



Experiment 3: unaccusatives & psych verbs

- Agent-Theme verbs:
 - No replication of plain old Passive → Passive priming
 - No Unaccusative → Passive priming, unlike expt 1
- Causer-Experiencer verbs:
 - More Actives mis-recalled as Passives after Passive primes
 - Numerically (not quite significant), more Actives mis-recalled as Passives after Unaccusative primes

Experiment 3: unaccusatives & psych verbs

- Very few Active → Passive or Passive → Active switches preserved thematic structure (<5%).
- Typical changes:
- *Emma was frightened by Bill* → *Emma frightened Bill*
 - *The boa constrictor devoured the small rodent* → *The small rodent devoured the boa constrictor*
- Are subjects processing these sentences for meaning? Not necessary to do the task successfully.

Conclusion + future work

Possible sources of unaccusative → passive priming

- Unaccusatives and Passives have derived subjects; Actives preserve base/canonical argument order
- Thematic structure: Unaccusatives and Passives have theme subjects; Actives have agent subjects

Expt 2: Passive structures can be primed without thematic overlap (cf. also Chang, et al 2003)

- Actives have direct objects; Unaccusatives and Passives don't

Melinger 2006: lack of a direct object doesn't give you passive priming

Conclusion + future work

- Try (with picture description):
Unaccusative vs. Unergative primes → *Causer-Experiencer targets*

Conclusion + future work

- Structural operations can make sentences that mean pretty much the same thing surface in different configurations—for purposes of sentence production, it's conceivable that we use templatic frames that look much like constructions.
- But Unaccusative to Passive priming suggests we're able to access 'structural representations' of a non-surfacy type when we use certain verb types.
- Whatever the mechanism, structural priming doesn't seem to be restricted to syntactic alternations.

Conclusion + future work

- Different tasks require different things
 - Picture description: meaning-sensitive, no time pressure
 - RSVP: time/memory pressure, no way to know what meaning is computed
- Independent of structural priming effects: things like the animacy hierarchy, (degree of) affectedness are important for determining what gets said first.

(Not surprising: see e.g. Keenan & Comrie 1977; Tomlin 1983; Aissen 1999; a.o. on properties of subjects. For animacy/humanness effects in sentence production: Bock 1986b; Bock, Loebell & Morey 1992)

Selected references

- Belletti, A & Rizzi, L. 1988. Psych-verbs and theta-theory. *NLLT* 6, 291-352.
- Bock, JK. 1986b. Syntactic persistence in language production. *Cognitive Psychology* 18, 355-387.
- Bock, JK & Griffin, Z. 2000. The persistence of structural priming: transient activation or implicit learning? *J Experimental Psych: General* 129(2), 177-192.
- Bock, JK & Loebell, H. 1990. Framing sentences. *Cognition* 35, 1-39.
- Chang, F, Bock, JK & Goldberg, A. 2003. Can thematic roles leave traces of their places? *Cognition* 90, 29-49.
- Griffin, Z & Weinstein-Tull, J. 2003. Conceptual structure modulates structural priming in the production of complex sentences. *JML* 49, 537-555.
- Melinger, A. 2006. The influence of thematic role assignment on structural priming. CUNY poster.
- Perlmutter, D. 1978. Impersonal passives and the Unaccusative Hypothesis. *Proc BLS*, pp. 157-189. BLS. UC Berkeley.
- Pickering, M & Branigan, H. 1998. The representation of verbs: Evidence from syntactic priming in language production. *JML* 39, 633-651.
- Potter, M & Lombardi, L. 1990. Regeneration in short-term recall of sentences. *JML* 29, 633-654.