

# How to hammer a shirt apart (and talk about it)

Unusual instrument-theme configurations and complex predicates across languages

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MAX-PLANCK-GESELLSCHAFT 2

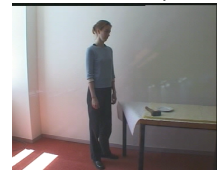
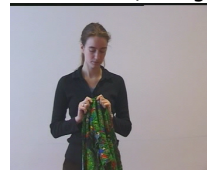
## Overview

- An unusual event
- The CUT and BREAK domain
- The amazing bipolar world of complex predicates
- Design of our study
- Complex predicate types in our corpus
- Results and analysis
- Discussion
- Conclusions

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## An unusual event

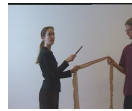
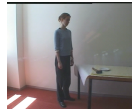
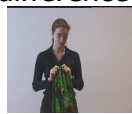
- what makes this unusual
  - intuitively, a mismatch
    - b/w the state change the theme undergoes...
    - ...and the instrument used to effect that change
- more canonical alternatives
  - for the theme/change
  - for the instrument/action



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An unusual event (Cont.)

- linguistic descriptions reflect this difference
  - especially the selection of verbs in single-clause descriptions
    - *tear (apart)* (4 out of 5 speakers), *rip*
    - *break (into pieces)* (3 out of 5), *smash* (2 out of 5)
    - *cut (through/in two)* (5 out of 5)
    - *cut in two/half, break, hit, slash*



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An unusual event (Cont.)

- the atypical configuration elicits more inter-speaker variation
  - because none of the available verbs seems to quite do justice to this scene:
    - (1.1) *He hit the shirt w/ a mallet*
      - fails to encode state change
    - (1.2) *?He slashed the shirt w/ a mallet*
      - *slash* entails or strongly implicates a bladed instrument
    - (1.3) *??He cut the shirt (in half/two parts) w/ a mallet*
      - *cut* entails a bladed instrument
    - (1.4) *?He broke the shirt w/ a mallet*
      - *break* implicates a (semi-)rigid theme
        - wood, glass, metal, stone – anything of non-malleable shape



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(1.5) *He tore/ripped the shirt w/ a mallet*

- *tear* and *rip* seem the best options for describing the change affecting the theme
- but they implicate forces pulling at it



(1.6) *?He hammered the shirt apart w/ a mallet*

- *hammer apart* seems to best fit the separation of distinct interlocked rigid objects
- why isn't there a verb for tearing fabric into pieces by hitting it with a blunt object?
  - possible answers
    - (material) culture – *We don't do it that way*
    - (folk) physics – *It's not smart to do it that way*
    - lexicalization – *We don't talk that way*

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## The CUT and BREAK domain

- C(UT)&B(BREAK) verbs lexicalize externally caused state changes
- they encode a minimum of two subevents
  - a state change of "separation in material integrity" (Hale & Keyser 1987)
  - and its external cause
    - which *may* be an activity involving the use of a certain kind of instrument in a certain manner
- across languages, *simplex* (monomorphemic) C&B verb roots tend to lexicalize
  - *either* the use of an instrument of certain properties => CUT-type verbs
    - e.g., *cut* – bladed instrument; *saw* – serrated instrument; *stab* – pointed instrument; ...

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The CUT and BREAK domain (Cont.)

- *or* a kind of change and/or a kind of object undergoing it
  - e.g., *break* – object of non-malleable shape; *tear* – fabric; *shatter* – glass or ceramics; ...

- these lexicalization patterns produce distinct a(rgument)-structure classes
  - cf. Fillmore 1967; Guerssel *et al.* 1985; Levin 1993; Bohnemeyer in press
  - only BREAK-type verbs produce transparently related inchoative/anticausative forms
    - (2.1) a. *Floyd broke/cracked/shattered the vase*
    - b. *The vase broke/cracked/shattered*
  - CUT-type verbs refer to the cause of an event they describe as part of their lexical core meaning
    - since they entail the use of an instrument

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The CUT and BREAK domain (Cont.)

- and it is impossible to refer to an instrument w/o referring to a cause (Keyser & Roeper 1984)

(2.2) a. *Floyd cut/cubed/sliced the bread*  
 b. *\*The bread cut/cubed/sliced*

- but CUT-type verbs are acceptable in conative VPs
  - to the extent that the kind of change effected is not part of their core meaning

(2.3) *Floyd cut (\*|cubed \*/sliced) at the bread*

(2.4) *\*Floyd broke/cracked/shattered at the vase*

- use of CUT-type verbs may Q2-implicate stereotypical themes/types of change...
  - Cf. Atlas & Levinson 1981, Levinson 2000: 112-134
    - e.g., *hammer*, *drill* +> mineral/metal or wood
  - and use of BREAK verbs may Q2-implicate stereotypical (use of) instruments
    - e.g., *tear*, *rip* +> forces (e.g., hands) pulling at theme

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The CUT and BREAK domain (Cont.)

- ...these implicatures tap into cultural and universal (folk-physics) assumptions

- about prototypical instrument-theme configurations
  - e.g., stereotypical instrument for "fragmenting" ceramics – a heavy, blunt instrument such as a hammer
  - stereotypical instrument for "fragmenting" wood – a bladed instrument
  - typical theme for a saw – wood
  - typical theme for scissors – paper or fabric

- this combination of lexicalization patterns and stereotype implicatures means
  - that to describe a C&B scene, we categorize it either by instrument or by theme/change
  - and either way get an entire stereotypical configuration as a package deal

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- “bipolar” C&B roots...
  - i.e., roots that are semantically specific on both the theme/change and the instrument used
  - ...do occur, though
    - an example are CARVE-type verbs in English such as *carve, slice, cube, grind* (Levin 1993: 157-158 )
      - these neither inchoative-alternate nor conative-alternate
- (2.5) a. *Carol carved (\*at) the stone*  
 b. *\*The stone carved* (Levin 1993: 158)
- but, first and foremost, “bipolar” semantics is the domain of **complex predicates**

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## The amazing bipolar world of complex predicates

- an informal working definition

### Complex Predicates:

(a) Event type descriptions composed of multiple words or morphemes  
 (b) whose components may, but need not, head their own syntactic projections,  
 (c) but which have a single a-structure which cannot be ascribed to any component.  
 (d) This a-structure may be a property of the individual complex predicate type,  
 (e) but it can also be a property of a template that licenses the productive and semi-compositional formation of complex predicate types.

- (b) accommodates resultative constructions, serial verb (SVCs) and light verb constructions (LVCs)
  - where the components may have their own dependents
- (3.1) *The dog barked him completely/wide awake*
- (3.2) *Sally gave Floyd a quick/fleeting kiss/kick/hug*
  - but it also admits verb-particle constructions, compound verbs, etc., where this is not the case

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- (e) allows for Goldbergian constructions to license complex predicates

- cf. Ackerman & Webelhuth 1998 for discussion

- complex predicates have bipolar semantics
  - if their components specify different subevents
    - as predicted, complex predicates with bipolar semantics neither inchoative- nor conative-alternate
- (3.3) a. *Sally cut/sawed (at) the twig*  
 b. *Sally cut/sawed (\*at) the twig off/in half*  
 c. *\*The twig cut/sawed off/in half*
- (3.4) a. *Floyd pounded (at) the yams*  
 b. *Floyd pounded (\*at) the yams into a pulp*  
 c. *\*The yams pounded into a pulp*

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### – monopolar complex predicates

- both components referring to the same subevent
- as predicted, monopolar complex predicates with BREAK-type semantics inchoative-alternate
  - but not conative-alternate

- (3.5) a. *Sally broke (\*at) the twig*  
 b. *Sally broke (\*at) the twig off/in half*  
 c. *The twig broke off/in half*
- (3.6) a. *Floyd tore (\*at) the shirt*  
 b. *Floyd tore (\*at) the shirt apart*  
 c. *The shirt tore apart*

- given the potential for bipolar semantics
  - do atypical instrument-theme/change configurations universally favor complex predicates?

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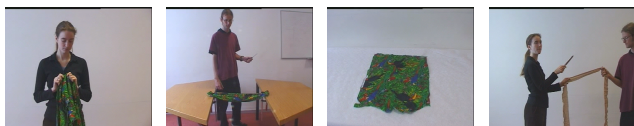
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# Design of our study

Design of our study (Cont.)

- the CUT & BREAK Clips
  - Bohmeyer, Bowerman, & Brown 2001
  - 61 short digital video clips
  - featuring C&B scenes varied in terms of
    - presence of a discernible cause
    - type of theme (fabric, rope, carrots, sticks, ...)
    - type of instrument used (bare hands, hammer, scissors, saw,...)
    - manner of action (controlled vs. "frenzied")
    - degree of change (complete vs. partial)



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- plus, some clips featured events of opening objects
  - to see whether these are ever described with the same verb as any of the C&B scenes
- protocol
  - participants watched each clip several times
  - then answered two questions asked in their native language
    - a) "What did the [actor] do in this clip?"
      - if appropriate, i.e., with the exception of "spontaneous breaking" clips
    - b) "What happened to the [theme] in this clip?"
  - further elicitation
    - if still necessary, the applicability of three types of descriptions was subsequently tested:
      - active transitive, intransitive activity, and intransitive state change descriptions

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Design of our study (Cont.)

- aims
  - study universals and crosslinguistic variation in lexicalization and a-structure classes
  - examine the acquisition of language-specific a-structure patterns
- the sample
  - adult language C&B data has been collected from speakers of about 30 languages so far
    - cf., e.g., Majid & Bowerman (eds.), Bohmeyer in press, Majid, van Staden, Boster, & Bowerman (ms.)
  - for the following, we draw on a sub-sample of four languages
    - all of which have complex predicate constructions of various kinds

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Design of our study (Cont.)

Table 1: Language sample of the present study

language	genealogical grouping	where recorded	researcher
German	Germanic	The Netherlands	van Staden
Lao	Tai-Kadai	Laos	Enfield
Sranan	English-based Creole	Surinam	Essegbey
Yucatec	Mayan	Mexico	Bohmeyer

- five speakers per language were recorded
- the analysis presented in the following is based on responses to 43 of the 61 scenes
  - all minus the "magic causation" and opening scenes
- only responses to questions (a) are considered
  - a) "What did the [actor] do in this clip?"
    - plus, where necessary, subsequent elicitation of a caused state change description

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Design of our study (Cont.)

- inter-speaker variation as a measure of typicality
  - we propose that inter-speaker variation is inversely proportional to the "semantic typicality" of a scene
  - our working assumption
    - the closer a particular scene is to the prototype of any one (complex or simplex) predicate of the language
      - the more likely the speakers of this language are to converge on this predicate in their descriptions of the scene
    - conversely, the farther removed the scene from the prototype of any predicate
      - the more likely the speakers are to diverge in their responses
  - we cannot evaluate this assumption here
    - except through the matching of high- and low-variation scenes in our corpus with our intuitions about typicality

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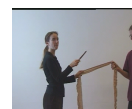
Design of our study (Cont.)

- English examples (five speakers)

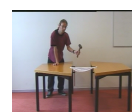
- 1 response type: *cut* (5)



- 3 response types: *cut* (3); *cut through* (1); *cut in two* (1)



- 5 response types: *cut in two/half*, *break*, *hit*, *slash*



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## Complex predicates in our corpus

- German
  - prefix verbs (e.g., Ackerman & Lesourd 1997, Ackerman & Weibelhuth 1998)
 

(5.1) Er **zer-hämmert** Omas Kleid  
 GER he apart-hammers granny's dress  
 'He hammers granny's dress apart'


  - particle verbs (e.g., Müller 2002)
 

(5.2) Sie **durch=trennt** ein Stück Stoff  
 GER she through=separates a piece of cloth  
 'She severs the piece of cloth'




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Complex predicates in our corpus (Cont.)

- resultative constructions (e.g., Müller 2002)
 

(5.3) Ein Mann **schneidet** ein Seil **in zwei Stücke**  
 GER a man cuts a rope in two pieces  
 'A man cuts a rope in two'




- light verb constructions (e.g., Jackendoff 1974; Jun 2003; Mohanan 1997)

- (5.4) Eine Frau **macht einen Schlitz** in eine Melone  
 GER a woman makes a slash into a melon  
 'A woman makes a cut into a melon'
- 

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Complex predicates in our corpus (Cont.)

- Lao; Sranan
  - various types of serial verb constructions
    - e.g., Durie 1997; Enfield in press; Schiller 1989; Sebba 1987
  - (5.5) laaw2 **qaw3** khòòn4\_tii3 **faat4** phaa5 **khaat5**  
 LAO 3SG take hammer thwack cloth sever  
 'He takes a hammer thwacks the cloth apart'
  - (5.6) A boi **naki** a krosi **prati**  
 SRA DEF boy hit DEF cloth split  
 'The boy hit the cloth split'

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Complex predicates in our corpus (Cont.)

- Yucatec
  - compound verbs (e.g., Bohnemeyer 2003; Li 1993; Thompson 1973)
 

(5.7) T-u=**t'ok+hats'**-t-ah le=nòok'  
 YUC PRV-A3=rip+hit-APP-CMP(B3SG) DET=cloth  
 y=éetel martiiyo=o'  
 A3=with hammer=D2  
 'He rip-hit the cloth with a hammer'
- so how are these predicate types used in response to (a-)typical C&B scenes?

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## Results and analysis

- overall token frequencies of simplex- vs. complex-predicate responses

Table 2: Token frequencies of simplex- vs. complex-predicate responses

	Simplex	Complex	All
German	24 (11.2%)	190 (88.8%)	214
Lao	137 (63.3%)	78 (36.7%)	215
Yucatec	166 (77.2%)	49 (22.8%)	215
Sranan	192 (90.1%)	21 (9.9%)	213

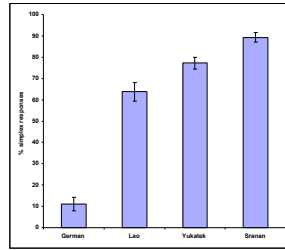


Figure 1: Percentage of simplex responses for German, Lao, Yucatec and Sranan (bars represent standard error)

- highly significant effect of language ( $F(3, 126) = 127.55, p < .0001$ ); all languages significantly different from each other (all  $t(42) > 2.85, p < .007$ )

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Results and analysis (Cont.)

- the extremely high frequency of complex-predicate responses in German stands out
- many caused-state-change scenes cannot be idiomatically described with simplex verbs

- (6.1) a. Floyd kratzte Sally  
 Floyd scratched Sally.  
 'Floyd scratched Sally.'
- b. ?Floyd kratzte das Glas  
 Floyd apart-scratched the glass  
 'Floyd scratched the glass.'
- c. Floyd **zer-kratzte** das Glas  
 Floyd apart-scratched the glass  
 'Floyd scratched the glass.'

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Results and analysis (Cont.)

- overall type frequencies of simplex vs. complex predicates

Table 3: Type frequencies of simplex vs. complex predicates

	Simplex	Complex	All
German	15 (20%)	60 (80%)	75
Lao	18 (31.6%)	39 (68.4%)	57
Yucatec	20 (37%)	34 (63%)	54
Sranan	12 (54.5%)	10 (45.5%)	22

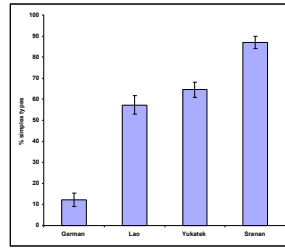


Figure 2: Percentage of simplex types for German, Lao, Yucatec and Sranan (bars represent standard error)

- significant effect of language ( $F(3, 126) = 83.63, p < .0001$ ); pairwise comparisons are significant (all  $t(42) > 5.12, p < .0001$ ) except for Lao-Yucatec

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Results and analysis (Cont.)

- generalizations

- the more complex C&B predicate types a language has
  - the more frequently its speakers use complex as opposed to simplex verbs in the C&B domain
  - i.o.w., for any two languages A and B, if A has more (or a higher proportion of) complex C&B verb types than B
    - than speakers of A also produce more (or a higher proportion of) complex C&B verb tokens than speakers of B
- all languages except for Sranan have more complex than simplex types of C&B verbs
- but all speakers except for the Germans use simplex C&B verbs more frequently

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Results and analysis (Cont.)

- a baseline for inter-speaker variation
  - the number of "unique responses"
    - i.e., the sum over the number of response types for each scene within each population
  - the more unique responses, the higher the overall level of variation within one population

Table 4: Number of unique responses and type/token frequency of complex predicates

Language	N unique responses	Percentage complex types	Percentage complex tokens
German	161	80%	88.8%
Lao	136	68.4%	36.7%
Yucatec	119	63%	22.8%
Sranan	90	45.5%	9.9%

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Results and analysis (Cont.)

- the overall level of variation across speakers
  - increases with both the number of complex predicate types in the language
    - and with the frequency with which they are used
  - conversely, the more complex predicate types, the more variation
    - and the more frequently complex predicates are used, the more variation
- however, it is difficult to test the significance of these correlations

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- language-specific variation maxima/minima
  - language-specific variation maxima
    - scenes that elicited five different predicate types in a given language
  - language-specific variation minima
    - scenes that elicited only a single predicate type in a given language

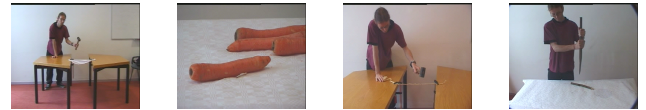
Table 5: Number of unique responses and type/token frequency of complex predicates

Language	N unique responses	N variation-maximal scenes	N variation-minimal scenes
German	161	12	1
Lao	136	8	3
Yucatec	119	4	3
Sranan	90	1	16

- the higher the overall level of variation, the higher the number of variation-maximal scenes

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- cross-sample variation maxima/minima
  - no scene elicited absolutely variation-maximal or minimal responses in all four languages
  - we determined cross-sample variation maxima
    - as scenes that elicited 17 response types or more across the four languages combined
      - there are four such scenes



- it does seem intuitively plausible that inter-speaker variation is driven by the low typicality
  - of the instrument-theme/change configurations

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- similarly, cross-sample variation minima
  - are scenes that elicited 7 or fewer response types across the four languages combined
    - there are six such scenes



- as expected, it seems intuitively that these scenes feature rather more stereotypical configurations

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- cross-sample agreement in "codability"
  - there is a correlation across languages in which scenes elicit the most variable responses
  - however this correlation is not significant b/w German and Sranan and b/w German and Yucatec

Table 6: Correlation of types across languages (\* indicates significant at  $p < .05$ ; \*\* indicates significant at  $p < .01$ )

	German	Lao	Sranan	Yukatek
German				
Lao	0.357*			
Sranan	0.272	0.594**		
Yukatek	0.176	0.543**	0.502**	

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- correlation b/w variability of responses and frequency of complex/simplex predicates
  - the higher the amount of inter-speaker variation a scene elicits in a given language
    - the more likely the speakers of that language are to prefer a complex over a simplex predicate

Table 7: Correlations ( $r$ ) for use of complex predicates and simplex predicates with how variably scenes were described. Positive correlation indicates that as predicate type increased, variability increased; negative correlation indicates that as predicate type increased, variability decreased. \*\*\* indicates significant at  $p < .0001$ 

Variation		Complex predicate	Simplex predicate
German		0.121	-0.062
Lao		0.724***	-0.724***
Sranan		0.715***	-0.652***
Yukatek		0.560***	-0.560***

- the correlation is not significant for German
  - but highly significant for the other languages

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## Discussion

- why do atypical instrument-theme/change configurations favor complex predicates?
    - **stereotype vs. manner implicatures** – in a contrast between complex and simplex predicates
      - simplex predicates pick up Q2 implicatures to stereotypicality of states of affairs
      - complex predicates pick up M1/3 implicatures to lack of typicality of states of affairs
        - e.g., consider the contrast between simplex and periphrastic causatives (McCawley 1978; Levinson 2000: 140-142)
- (7.1) a. *Floyd stopped the car*  
[Q2+> 'in some stereotypical manner, probably by hitting the brakes']
- b. *Floyd caused the car to stop*  
[M1/3+> 'in some less straightforward way, e.g., pulling the emergency brake']

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Discussion (Cont.)

- **productivity** – complex predicates may instantiate productive templates/constructions
    - which may be adapted to atypical instrument-theme/change configurations on the fly
    - example: *zer-hämmern*
- (7.2) Er **zer-hämmert** Omas Kleid  
GER he apart-hammers granny's dress  
'He hammers granny's dress apart'
  - Google produces a combined 1,263 hits for all morphological forms of this verb, which one is unlikely to find in a dictionary- **bipolar semantics** – semantically bipolar complex predicates are not as restricted by typicality
  - compared to monopolar predicates
    - which may trigger implicatures to either stereotypical instrument use or stereotypical theme/change

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Discussion (Cont.)

- why does the correlation not hold for German?
  - for independent (and as yet unknown) reasons, the use of complex predicates is near ceiling level
  - the use of simplex predicates is a marginal strategy in the C&B domain
    - so there is no clear division of labor b/w simplex verbs (Q2 implicatures) and complex ones (M implicatures)

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## Conclusions

- inter-speaker variation as a measure of prototypicality
  - the amount of variation among speakers of the same language in describing a particular scene
    - seems to reflect the distance of relevant properties of that scene from the prototypes of available descriptors
- stereotype implicatures from "mono-polar" verbs of cutting and breaking
  - CUT-type verbs entail some kind of instrument use and may implicate a typical theme or change
  - BREAK-type verbs specify a kind of theme or change and may implicate a typical instrument

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Conclusions (Cont.)

- "bipolar" semantics
  - verbs may lexically encode both a kind of theme and/or state change and a form of instrument use
  - syntactically, such "bipolar" verbs are inert
    - they show neither the characteristic a-structure properties of BREAK-type verbs nor those of CUT verbs
- complex predicates in the C&B domain
  - are "mono-polar" (and, most likely, BREAK-type) if both constituents specify the same subevent
    - and "bipolar" otherwise

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- complex C&B verbs and atypical C&B scenes
  - there is a strong correlation between inter-speaker variation in the responses to a particular scene
    - and preference for complex vs. simplex C&B predicates
      - in three of the four languages of our sample: Lao, Sranan, and Yucatec – but not in German
  - the more varied the responses to a C&B scene are
    - the more likely speakers are to use a complex predicate to describe it
  - we tentatively interpret this correlation
    - to the effect that atypical instrument-theme configurations favor complex predicates

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- possible explanations for the correlation
  - the division of labor between stereotype implicatures triggered by simplex verbs
    - and manner implicatures triggered by complex verbs
  - the adaptability of complex predicates to unusual states of affairs that comes with their productivity
  - the ability of complex predicates to express “bipolar” meanings

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- the surprisingly Mandarin-like preference for complex C&B verbs in German
  - in descriptions of C&B scenes involving inanimate themes
    - German speakers produce complex predicates at near ceiling level
  - this preference for complex verbs upsets the “normal” division of labor b/w simple and complex
    - as a result, the correlation between atypicality and use of complex predicates does not hold for German

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