# Lexical Functional Grammar as a Construction Grammar

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#### Outline



#### What is Construction Grammar?

Computation vs. memorisation Arbitrariness above the word Tenets of CxG

#### Lexical Functional Grammar

#### Lexical Integrity

#### Constructions in LFG

Argument structure constructions Formal idioms Substantive idioms

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# What is Construction Grammar?

# Computation vs. memorisation



- ► Chomskyan syntax: focus on CREATIVITY/GENERATIVITY
- (1) The malt [the rat [the cat [...] killed] ate] lay in the house that Jack built.
- (2) Colourless green ideas sleep furiously.
- (3) 'Twas brillig, and the slithy toves Did gyre and gimble in the wabe: All mimsy were the borogoves, And the mome raths outgrabe.
  - "Autonomy of syntax"

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# Computation vs. memorisation



- But most of the time creativity is decidedly non-native:
- (4) a. Hi, how are you doing?
  - b. What a pleasant event it is to see you. Tell me, how is your life progressing at the moment? (Wray 2002: 12)
- (5) a. I had four uncles.
  - b. The brothers of my parents were four.

(Pawley & Syder 1983: 194)

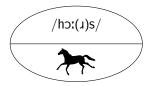
- (6) a. Look out, he's got a gun!
  - b. Pay attention, he possesses a firearm!
  - CONVENTIONS) play a crucial role in language.

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## Saussurean arbitrariness



Most famously, words are conventional pairings of form and meaning – the Saussurean (SIGN).



- Conventions like this must be memorised: no motivation for ⟨/hɔː(ɹ)s/: 冷
  ⟩.
  - ► As evidenced by Fr. ⟨/ʃəval/: ※ ⟩ or Ger. ⟨/pfeːrt/: ※ ⟩

#### Arbitrariness above the word: idioms



- ▶ But such arbitrariness extends above the level of the word:
- (7) Holden pulled a rabbit out of the hat.≈ 'Holden found an unexpected solution to the problem.'
- (8) The thieves have flown the coop.  $\approx$  'The thieves have escaped.'
- (9) We've tried every which way to solve this problem, and there's just no solution.
  - $\approx$  'We've tried every possible means of solving this problem, and there's just no solution.'
- (10) We've let these pirates run amok for too long. ≈ 'We've let these pirates cause chaos for too long.'

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# Arbitrariness above the word: constructions



- (11) The more you tighten your grip, Tarkin, the more star systems will slip through your fingers.
  - $\approx$  'As you tighten your grip, the number of star systems slipping through your fingers will correspondingly increase.' (The *the X-er the Y-er*/comparative correlative construction.)
- (12) What's a nice girl like you doing in a place like this? ≈ 'How come a nice girl like you is in a place like this?' (The what's X doing Y/WXDY construction.)
- (13) Bill belched his way out of the restaurant.
   ≈ 'Bill left the restaurant while belching.'
   (The way-construction.)

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#### Construction Grammar



- CONSTRUCTION GRAMMAR (CXG) takes these data as evidence that pairings of form and meaning of *any* size should be taken as the basic building blocks of grammar these it calls **constructions**.
- ➤ A bigger focus on what is stored vs. what is computed: the human language faculty stores not only generalisations abstracted from the data, but also specific episodic memories of language use.
- ▶ But CxG is the name for a general style of theorising, rather than for a particular theory or formal framework.

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# Implementing CxG



- Some frameworks designed with constructional aims from the get go:
  - ► BERKELEY CONSTRUCTION GRAMMAR (Fillmore 1985, 1988; Kay & Fillmore 1999)
  - EMBODIED CONSTRUCTION GRAMMAR (Bergen & Chang 2005)
  - FLUID CONSTRUCTION GRAMMAR (Steels 2011; Steels & van Trijp 2011)
  - SIGN-BASED CONSTRUCTION GRAMMAR (Sag 2010; Boas & Sag 2012; Michaelis 2015)
  - ► COGNITIVE CONSTRUCTION GRAMMAR (Lakoff 1987; Goldberg 1995, 2006)
  - RADICAL CONSTRUCTION GRAMMAR (Croft 2001)

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# Implementing CxG



- Others 'accidentally' constructional:
  - ► (TREE-ADJOINING GRAMMAR)
    (Lichte & Kallmeyer 2017)
  - ► HEAD-DRIVEN PHRASE STRUCTURE GRAMMAR (Müller 2021)

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#### Tenets of CxG



- Despite their variety, all approaches share certain assumptions:
- WYSIWYG: Linguistic descriptions are surface oriented
- PARALLEL-REPRESENTATION: All levels of linguistic analysis (form and meaning) are present in parallel
- EDL: Linguistic description has an 'extended domain of locality'
  - 3.1 CXS-ALL-THE-WAY-DOWN: no morphology/syntax distinction

- HIERARCHY: Linguistic knowledge is structured, and organised in a hierarchical fashion
- CROSS-LX-VARIETY: An emphasis on cross-linguistic variety, 'unusual' constructions, subtle connections of form and meaning
- 6. USAGE-BASED: Knowledge of language is based on usage

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## LFG as a CxG



► This talk: aim to show that Lexical Functional Grammar (LFG) can also be a suitable formalism for implementing CxG ideas.

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# Lexical Functional Grammar

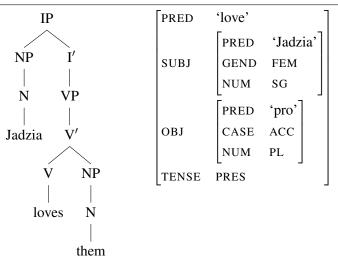
# LFG background



- Constraint-based/declarative (i.e. non-transformational)
- Emerged from work in the late 1970s on the perceived psychological implausibility of mainstream transformational grammar.
- Focus on mathematical explicitness vital for computational implementation and (therefore?) seen as important for psychological plausibility.

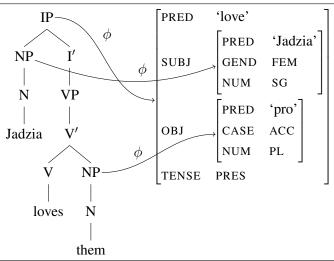
# C-structure and f-structure





# C-structure and f-structure





#### C-structure



- C-structure is loosely based on X-bar theory, but makes a number of simplifying assumptions:
  - All right-hand elements of phrase-structure rules are optional, so there can be headless phrases (VPs without Vs, IPs without Is, etc.).
  - Some categories are NON-PROJECTING (Toivonen 2003): e.g. a P is a P that does not project a phrase.
  - 3. We assume there is always a rule  $XP \to X$ , for any category X, which omits extraneous bar levels (this is part of a general principle called ECONOMY OF EXPRESSION).
- In addition, no phonologically empty elements are assumed.

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#### C-structure



#### **✓** WYSIWYG

This makes LFG c-structures very surface-oriented, thus adhering to the first tenet of CxG.

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# C-structure to f-structure mapping



- Formally, an LFG grammar is a context-free grammar where the phrase-structure rules bear annotations that describe how f-structure is projected from the c-structure.
- Annotations are written using the following abbreviations:
  - (14) a. \* = the current node (the node bearing the annotation)
    - b.  $\hat{*}$  := the current node's mother
  - (15) a.  $\downarrow := \phi(*)$  (the f-structure of the current node)
    - b.  $\uparrow := \phi(\hat{*})$  (the f-structure of the current node's mother)
- For instance, we can indicate that a node and its mother share the same f-structure:

$$(16) \qquad \mathsf{NP} \to \mathsf{N} \\ \uparrow = \downarrow$$

# C-structure to f-structure mapping



► We can indicate that a phrase bears some particular grammatical function by using paths through f-structure in our annotations:

(17) IP 
$$\rightarrow$$
 NP I'  $(\uparrow SUBJ) = \downarrow \uparrow = \downarrow$ 

(18) 
$$V' \rightarrow V \qquad NP$$

$$\uparrow = \downarrow \quad (\uparrow OBJ) = \downarrow$$

#### Lexical entries



Lexical entries in LFG are formally just phrase-structure rules:

(19) 
$$N \rightarrow Jadzia$$
  
 $(\uparrow PRED) = 'Jadzia'$   
 $(\uparrow NUM) = SG$   
 $(\uparrow GEND) = FEM$ 

▶ But they are usually written in a different format, shown in (20):

(20) Jadzia N (
$$\uparrow$$
 PRED) = 'Jadzia' ( $\uparrow$  NUM) = SG ( $\uparrow$  GEND) = FEM

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### Non-local constraints



Annotations can refer to non-local pieces of f-structure:

(21) a. seem V (
$$\uparrow$$
 PRED) = 'seem'  
( $\uparrow$  SUBJ) = ( $\uparrow$  XCOMP SUBJ)

b. Alex seemed to laugh.

(22) 
$$CP \rightarrow XP$$
  $C'$   $(\uparrow FOCUS) = \downarrow \qquad \uparrow = \downarrow$   $(\uparrow FOCUS) = (\uparrow COMP^* GF)$ 

### Non-local constraints



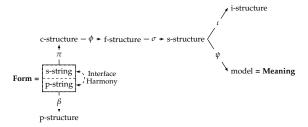
#### **√**EDL

LFG functional descriptions can refer to arbitrarily distant f-structures, thus adhering to the third tenet of CxG.

# The parallel projection architecture



- As well as c- and f-structure, LFG has developed several other levels of representation for different dimensions of linguistic analysis.
- These exist in a parallel, mutually-constraining architecture (i.e. there is no derivation).



▶ Annotations can describe any level of the architecture, e.g.  $\downarrow_{\sigma\iota}$ 

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# The parallel projection architecture



#### ✓ PARALLEL-REPRESENTATION

In principle, all dimensions of linguistic information are described simultaneously and in parallel, thus giving us the second CxG tenet.

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# **Templates**



► (TEMPLATES) are named functional descriptions.

(23) loves 
$$V$$
 ( $\uparrow$  PRED) = 'love' ( $\uparrow$  SUBJ PERS) = 3 ( $\uparrow$  SUBJ NUM) = SG

(24) 3SG-SUBJECT := 
$$(\uparrow SUBJ PERS) = 3$$
  $(\uparrow SUBJ NUM) = SG$ 

(25) loves 
$$V$$
 ( $\uparrow$  PRED) = 'love' @3SG-SUBJECT

# Template hierarchies



Templates can be nested, thus creating an implicit hierarchy:

(26) a. 3-SUBJECT := 
$$(\uparrow \text{SUBJ PERS}) = 3$$

# Template hierarchies



#### **√**HIERARCHY

This provides a means, at least in principle, of organising linguistic knowledge in a hierarchy, as per CxG's fourth tenet.

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# Constructions all the way down?



- LFG arguably embodies all four of the tenets of CxG.
- ▶ **But:** LFG also adheres to the principle of LEXICAL INTEGRITY, whereby syntax and morphology are strictly separated, and the morphological structure of words is invisible to the syntax so no CXS-ALL-THE-WAY-DOWN.

### Bresnan & Mchombo (1995: 181)

"words are built out of different structural elements and by different principles of composition than syntactic phrases"

VS.

### Goldberg (1995: 7)

"no strict division is assumed between the lexicon and syntax"

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# Lexical Integrity



#### Principle of Lexical Integrity (Anderson 1992: 84)

The syntax neither manipulates nor has access to the internal structure of words.

- (29) a. John liked the play, and Mary, the movie. (gapping of *liked* permitted)
  - b. \*John liked the play, and Mary dis- it. (gapping of -liked not permitted) (Simpson 1991: 51)

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# Lexical Integrity



- (30) a. How complete are your results?
  - b. \*[How complete]-ness do you admire?

#### Yet:

- (31) a. What degree of completeness do you admire?
  - b. How complete a record do you admire?

(Williams 2007: 354)

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# Constructions all the way down



- CxG rejects the 'firewall' between syntax and morphology: "it's constructions all the way down" (Goldberg 2006: 18)
- ► Rather, the meaningful contrast is between more or less (SCHEMATIC) constructions:
  - ▶ The more schematic a construction, the more 'syntactic' it is.
    - e.g. the English resultative construction [NP V NP AP] (as in Clarissa smashed the doors open).
  - The less schematic (the more substantive) a construction, the more 'lexical' it is.
    - e.g. the word dog, which specifies its phonological form (/dbg/), but also e.g. the agentive suffix -er.

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# Incompatible assumptions – who's right?



- ► Clearly, if CXS-ALL-THE-WAY-DOWN is an important tenet of CxG, LFG cannot be a suitable formalism for CxG, since it rejects it.
- But questions about the organisation of the grammar are ultimately empirical ones, and so at least one of the two approaches must be wrong: is there such a cleavage between syntax and morphology or not?

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# Evidence against LI



- In contrast to the evidence we saw above, there are also apparently clear violations of LI:
  - Morphology syntax:
  - (32) a. His general [ok-with-less-than-we-should-aim-for]-ness makes him an undesirable candidate.
    - b. He [I-don't-care]-d his way out of the room.
    - Syntax morphology:
  - (33) a. [pre- and even to some extent post]-war (economics)
    - b. [pro- as opposed to anti]-war
    - c. [hypo- but not hyper]-glycaemic
    - d. [mono- and tri]-syllabic
    - e. [pro- and en]-clitics
    - f. [socio- and politico]-economic

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# Although ...



- (34) a. \*[un- or re]-tie
  - b. \*[in- or ex]-port
  - c. \*[ex- and se]-cretions
- (35) a. \*fear-[some and -less]
  - b. \*thought-[ful and -less]
  - c. \*interest-[ed and -ing]
  - ▶ But of course if LI is supposed to be a principle of the grammar, there should be **no** unexplained exceptions . . .

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#### Whither LI?



#### Lieber & Scalise (2007: 3)

"we know that morphology and syntax interact, and that this interaction is not a one way affair: morphology sees syntax and syntax sees morphology. Nevertheless this two way interaction is highly constrained"

A weakened form of LI?

#### Cappelle (to appear: 204)

"Any randomly selected stretch of discourse is likely to prove that morphologically complex words stay together as undivided units and that they tend not to include any above-word-level components"

I I as a 'default'?

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#### Pre-theoretical LI?



- Part of the problem is that what counts or doesn't count as an LI violation will depend on other theoretical commitments.
- Somewhat hopeless therefore to sift through the world's languages looking for constructions which may or may not constitute LI violations.
- ► Nevertheless, there are some higher-level facts that seem to plead for a contrast between morphology and syntax.

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### Free word order ≠ free morpheme order



- (36) mil-es coqu-um laud-at. (Latin) soldier-NOM cook-ACC praise-3SG.PRES.INDIC 'The soldier praises the cook.'
- (37)a. miles laudat coquum. (38)mil-es cogu-um laud-at. a. b. miles coquum laudat. b. \*es-mil coqu-um laud-at \*mil-es um-coqu laud-at. laudat miles coquum. C. \*mil-es cogu-um at-laud. d laudat coquum miles. coquum miles laudat. e. etc.

- Discontinuous constituents possible; discontinuous words not:
  - (39) a. coquum laudat miles bonum b. \*coqu- laudat miles -um

coquum laudat miles.

f.

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# Computational complexity



- ► Morphology = almost entirely finite-state.
- **Syntax** = almost entirely context-free.

Asudeh et al. (2013: 5)

"If morphology has the full power of syntax, why are there no clear morphological equivalents of unbounded or nested dependencies? [...] Similarly, why do we fail to find reduplication in the syntax, if there is no important formal distinction between morphology and syntax?"

Not just that the morphological system is less powerful than the syntactic one, but that they are in fact disjoint.

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# Lexical Integrity again



We ought to remain sceptical of any framework that seeks to totally deny any difference between morphology and syntax therefore.

#### Goldberg (1995: 7)

"In Construction Grammar, no strict division is assumed between the lexicon and syntax.

[...]

It is not the case, however, that in rejecting a strict division, Construction Grammar denies the existence of any distinctly morphological or syntactic constraints (or constructions)"

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# Two types of sign



# Violating LI in a specific and limited way



Lieber & Scalise (2007: 18)

"the interaction between word formation and syntax goes both ways, but [...] nevertheless it is quite restricted"

Words and phrases are distinct, but also share a supertype: they can therefore be treated as the same or different depending on need.

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#### LI in LFG



▶ LFG's notion of LI is less than strict, being limited to c-structure:

#### (41) Lexical integrity:

Morphologically complete words are leaves of the c-structure tree, and each leaf corresponds to one and only one c-structure node. (Bresnan et al. 2016: 92)

 "Morphology competes with syntax" – what is expressed analytically in one language can be expressed synthetically in another

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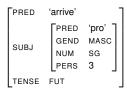
# Morphology competes with syntax

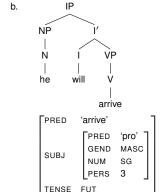


(42) Il arriver-a. (French)

He arrive-3sg.FUT

'He will arrive'





### LI still too strong



- Even this limited notion of LI will rule out the prefix-coordination or using phrases as derivational bases, so LFG needs to loosen its version of LI even further.
- Some awareness of this already, illustrated by the existence of "sub-lexical" phrase-structure rules, the use of non-projecting categories to model compounding in the syntax, etc.
- Framework of L<sub>R</sub>FG being developed here (Rochester/Carleton) has the potential to tackle these challenges.

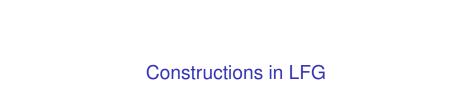
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# Summing up: nobody wins



- The abolition of the distinction between word and phrase or morphology and syntax implied by a strict reading of CXS-ALL-THE-WAY-DOWN is not a necessary (or indeed empirically justified) tenet of CxG.
- At the same time, the absolute separation of the two implied by a strict reading of LI is not a necessary (or indeed empirically justified) tenet of LFG either.

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### Glue Semantics



Semantic contributions in LFG = meaning constructors:

(44) a. **chrisjen** : 
$$e_{\uparrow}$$
 b.  $\lambda x. grin(x)$  :  $e_{(\uparrow SUBJ)} \rightarrow t_{\uparrow}$ 

(45) 
$$g\begin{bmatrix} PRED & 'grin' \\ SUBJ & c[PRED & 'Chrisjen'] \end{bmatrix}$$

- (46) a. **chrisjen** :  $e_c$  b.  $\lambda x. \mathbf{grin}(x)$  :  $e_c \multimap t_g$
- (47)  $\frac{\text{chrisjen}: e_c \quad \lambda x.\text{grin}(x): e_c \multimap t_g}{\text{grin}(\text{chrisjen}): t_g}$

# Argument structure constructions



Neo-Davidsonian event semantics; instead of

(48) 
$$\lambda x.$$
**sneeze** $(x): e_{(\uparrow SUBJ)} \multimap t_{\uparrow}$ 

we have

(49) 
$$\lambda x.\lambda e.\mathsf{sneeze}(e) \land \mathsf{agent}(e,x) : e_{(\uparrow \mathsf{SUBJ})} \multimap v_{\uparrow} \multimap t_{\uparrow}$$

Now factor out the lexically-specific information:

- (50) a.  $\lambda e$ .sneeze(e):  $v_{\uparrow} \rightarrow t_{\uparrow}$ 
  - b.  $\lambda P.\lambda x.\lambda e.P(e) \wedge \mathbf{agent}(e,x)$ :  $(v_{\uparrow} \multimap t_{\uparrow}) \multimap e_{(\uparrow SUBJ)} \multimap v_{\uparrow} \multimap t_{\uparrow}$
- (51) AGENT-FRAME := (50b)

# Argument structure constructions



- Same lexical content can combine with other argument structure frames:
  - (52) Arnold sneezed the napkin off the table.
  - (53) Caused-Motion-Frame :=  $\lambda P.\lambda x.\lambda y.\lambda Q.\lambda e.P(e) \land agent(e,x) \land theme(e,y) \land goal(e,Q)$  :  $(v_{\uparrow} \multimap t_{\uparrow}) \multimap e_{(\uparrow \circ \mathsf{BL})} \multimap e_{(\uparrow \circ \mathsf{BL})} \multimap t_{(\uparrow \circ \mathsf{BL})} \multimap v_{\uparrow} \multimap t_{\uparrow}$

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# Argument structure constructions



These templates can be associated with the verb in the lexicon:

Or with a particular phrasal configuration:

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### Formal idioms



- The same technique can be employed for all manner of constructions where additional meaning is required: it can be added by individual words or by phrase-structure configurations.
- Asudeh et al. (2013) examine traversal constructions in English, Swedish, and Dutch:
  - (57) a. Sarah elbowed her way through the crowd.
    - b. Sarah whistled her way across the room.
  - (58) a. Sarah armbågade sig genom mängden. (Swedish)

    Sarah elbowed SELF through crowd.DEF

    ≈'Sarah elbowed her way through the crowd.'
    - b. Han ljög sig ut ur armén.
       he lied SELF out of army.DEF
       ≈'He lied his way out of the army.'

1 Dec 2022 LFG as a CxG 49/68

### Formal idioms



(59) way N (
$$\uparrow$$
 PRED) = 'way'  $\lambda x.$ way( $x$ ) :  $e_{\uparrow} \multimap t_{\uparrow}$  (@ENGLISH-WAY)

- This is the regular entry for way, with an optional extra meaning added.
- The meaning of way survives into the construction; useful because it can be modified:
- (60) a. As ambassador, Chesterfield negotiated [Britain's way] into the Treaty of Vienna in 1731.
  - In these last twenty years Richard Strauss has flamed
     [his meteoric way] into our ken and out of it.

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### Formal idioms



(61) 
$$V' \rightarrow V$$
 NP PP
$$\uparrow = \downarrow \qquad (\uparrow OBJ) = \downarrow \qquad (\uparrow OBL) = \downarrow$$

$$(\downarrow PRONTYPE) = SIMPLEX-REFL$$

$$\boxed{@SWEDISH-DMC}$$

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# Ignoring meanings



- One thing these constructions have in common is that they add or realign meanings, but do not remove them.
- But plenty of constructions seem to override or ignore the literal meanings of the words involved.
  - (62) a. What are your children doing in my garden?
    - b. What do you think your name is doing in my book?
    - c. I wonder what the salesman will say this house is doing without a kitchen.
    - d. What's a nice girl like you doing in a place like this?

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# Ignoring meanings



- The most obvious way to handle constructions like this in LFG is to make use of special versions of what and doing, perhaps along with special phrasal meaning.
- ▶ But this flies in the face of CxG dogma: now the construction is distributed through the lexicon (and grammar) rather than being represented in one place.

1 Dec 2022 LFG as a CxG 53/68

### Substantive idioms



- (63) a. Don't worry; we still have our **ace in the hole**. (ace in the hole ≈ '(hidden) resource or advantage')
  - b. Chrisjen likes to be kept in the loop.
     (in the loop ≈ 'informed (about a particular matter)')
  - c. Pull yourself together, man! We're not giving up that easily! (pull oneself together ≈ 'calm down/compose oneself')
  - d. These new import regulations really take the biscuit.
     (take the biscuit ≈ 'be especially egregious/shocking/annoying')
  - e. If you **let the cat out of the bag** too early there will be trouble. (*let the cat out of the bag* ≈ 'reveal the secret')

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### Substantive idioms



- Literal meanings of the words involved simply do not appear in the overall meaning.
- No contextually salient cats or bags involved in letting the cat out of the bag.
- All parts need to appear for idiomatic meaning to come off:
  - (64) a. #Have you told him the cat yet?
    - b.?#When will the album artwork be let out of the bag?

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### Substantive idioms



- In LFG, the only place where phonological content is associated with meaning is in the lexicon, and the lexicon contains only words.
- So while we can happily associate meaning with abstract phrasal configurations, and so capture the more schematic, formal idioms, there is no adequate way to represent *multiword* expressions.

1 Dec 2022 LFG as a CxG 56/68

# Words with spaces



- We can try denying that such things exist: since words are where pairings of phonological form and meaning are witnessed, let's say that substantive idioms are words.
- This is probably the right approach for certain very fixed expressions:
  - (65) a. all the same Cf. (66) a. although b. by the by b. nonetheld
    - b. nonetheless c. in short c. notwithstand
    - d. no can do

c. notwithstanding

(67) all\_the\_same Adv (↑ PRED) = 'all-the-same' etc.

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#### **Problems**



(68) Inflection:

That takes/took/has taken/will take the biscuit.

- (69) Syntactic manipulation:
  - a. They finally [spilled the beans]. (spill the beans  $\approx$  'reveal the secret(s)')
  - b. [The beans] were finally [spilled]. (passivisation)
  - I really want to see [the beans] he [spills] under oath. (relativisation)
  - d. But [which particular beans] did he [spill]? (wh-fronting)

1 Dec 2022 LFG as a CxG 58/68

#### **Problems**



#### (70) Modification

- a. Musicians keep composing songs 'til they [kick the proverbial bucket].
   (kick the bucket ≈ 'die')
- b. Britney Spears [...] [came apart at the mental seams]. (come apart at the seams  $\approx$  'to be in a very bad state; to fall to pieces')
- Maybe by writing this book I'll offend a few people or [touch a few nerves].
   (touch a nerve ≈ 'annoy/upset someone by referring to a sensitive topic')
- d. Tom won't [pull family strings] to get himself out of debt.
   (pull strings ≈ 'exploit connections')

1 Dec 2022 LFG as a CxG 59/68

# Lexical ambiguity approaches



- If words are all we have to work with, then we are forced to adopt a Lexical Ambiguity (LA) approach: idioms are made up of special versions of the words that contain them.
- ► E.g. *spill* and *beans* are ambiguous: as well as their literal meanings, they can also mean 'reveal' and 'secrets'.
- This makes sense of the data above: the parts behave like normal words because they are.

1 Dec 2022 LFG as a CxG 60/68

#### Issues for LA



- How do we constrain the idiom parts so that they don't appear alone?
  - (71) #Have you heard the beans?
- Empirical motivation disappears when it comes to non-decomposable idioms, e.g. kick the bucket, ace in the hole, etc.
- ► Fails to capture the most significant fact about idioms: their status as 'things' substantive idioms are instead conspiracies of single words; mere grammatical epiphenomena.

1 Dec 2022 LFG as a CxG 61/68

### Constructional LFG



- LFG does not have an extended domain of locality at c-structure
   only parasitically via other structures.
- Functional descriptions include information about all levels of the parallel projection architecture except c-structure.
- This causes analytical problems when it comes to substantive idioms, but also seems formally inelegant: why should c-structure be treated differently from other levels of representation?

1 Dec 2022 LFG as a CxG 62/68

# Describing c-structure



- Since LFG is based on a context-free grammar, the only descriptions of c-structure permitted are phrase-structure rules, which only describe trees of depth 1.
- Can we give descriptions of larger stretches of the tree?

(72) N: set of nodes, L: set of category labels

 $\mathcal{M}: N \rightarrow N$  (the mother relation)

 $\prec \subseteq N \times N$  (the linear precedence relation)

 $\lambda : N \to L$  (the labelling function)

 $(73) \qquad \mathcal{M}(\mathcal{M}(*))$ 

1 Dec 2022 LFG as a CxG 63/68

#### **Problems**



- Such an approach is formally incoherent given the standard LFG setup.
- The functional description is obtained by inspecting the CFG-parsed c-structure tree: such a description therefore cannot constrain the c-structure, since it assumes there already is a valid c-structure.
- Instead, we need to abandon the CFG-base of LFG and move to something more expressive – specifically, a tree-adjoining grammar (TAG).

1 Dec 2022 LFG as a CxG 64/68

# Nothing to lose



- There is no real advantage to limiting LFG c-structure to a CFG: the formalism as a whole is already considerably more powerful.
  - Even at its most constrained, it is still more powerful than a TAG, being equivalent to a Linear Context-Free Rewriting System (LCFRS) see Wedekind & Kaplan (2020).
- By moving to a more expressive tree formalism, LFG can fully embrace the CxG tenet of EDL, since now it can express non-local dependencies at all levels of representation.

### Constructional LFG

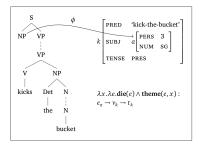


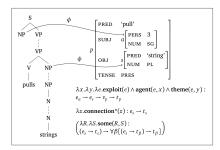
- Findlay (2019: ch. 5) uses a description-based TAG, such that lexical entries contain information about the maximal functional projection of their head: e.g. verbs specify the configuration of their arguments.
- In such a view, lexical entries are just descriptions (of all levels of representation), and parsing is just finding the minimal model which satisfies all of the descriptions associated with each part of the sentence.
- Substantive idioms now pose no problem, since they can be given their own representations in the lexicon: descriptions can span arbitrarily large stretches of structure, so can encompass multiple words without issue.

1 Dec 2022 LFG as a CxG 66/68

# Examples







1 Dec 2022 LFG as a CxG 67/68

#### Conclusion



- LFG already embodies a number of CxG tenets.
- The real obstacle to treating LFG as a formalisation of CxG is not Lexical Integrity (which needs looking at anew from both directions), but LFG's inability to handle substantive idioms.
- If we augment the CFG base of LFG with something more powerful, we obtain a natural means of representing substantive idioms.
- Combined with the existing capabilities of LFG to express surface-oriented, parallel representations of all levels of linguistic struture, this makes LFG a fully-fledged Construction Grammar.

1 Dec 2022 LFG as a CxG 68/68

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