# Multi-word Expressions in HPSG

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# Overview for the week

- Day One
  - Brief introduction to Head-driven Phrase Structure Grammar
  - Implementation in the English Resource Grammar (ERG)
  - Meaning representation in Minimal Recursion Semantics
- Day Two
  - Classification of Multi-word Expressions (MWEs)
  - Implementation of MWEs in the ERG
  - Strengths and weaknesses of the approach
- Day Three
  - Case study of one class of MWEs: idioms with possessives
  - Interactions with other linguistic phenomena and processing
  - Disambiguation challenges
- Day Four
  - Lab session using the ERG to identify and analyse MWEs

# Properties of Multi-word Expressions

- Syntactically flexible/rigid
- Syntactically normal/idiosyncratic
- Semantically transparent/semi-transparent/opaque

# Inflexible Multi-word Expressions

- Words with spaces

  No variation: *ad hoc, in spite of, by and large, in short*

  **in shorter, in very short*

- Semi-fixed expressions

  Inflectional morphology

  – *kicked the bucket, shot the breeze, parts of speech*

  Reflexive pronoun variants

  – *kick oneself/herself/ourselves/...* (to regret)

  Syntactic inflexibility

  – **the breeze was shot, *shot the big breeze, *shot a breeze*

# Flexible Multi-word Expressions

- Head plus dependent

  Verb-particle constructions: *look X up, call X up, phone X up*

  but **telephone X up*

  Determinerless PPs: *on top, at eye/ground level*

  but **on very top, *at level*

  Light verbs: *take a bath, give a lecture*

  but **do a bath, *make a lecture*

- Idioms: *keep tabs on X, take note of X*

- Proper names:

  *International Business Machines, Macy's Inc.*

  *the San Francisco 49ers*

# Words with spaces in the ERG lexicon

*One should avoid ad hoc solutions.*

```
ad_hoc_a1 := aj_-_i_le &
 [ ORTH < "ad", "hoc" >,
   SEMPRED "_ad+hoc_a_1_rel" ].
```

*They were by and large just starting to understand.*

```
by_and_large_adv1 := av_-_i-vp_le &
 [ ORTH < "by", "and", "large" >,
   SEMPRED "_by+and+large_a_1_rel" ].
```

# Inflexible idioms in the ERG lexicon

*That politician finally kicked the bucket.*

```
kick_v1_i := v_np_sg-idm_le &
  [ ORTH < "kick" >,
    SEMPRED "_kick_v_i_rel" ].
```

```
bucket_n1 := n_-_c_le &
  [ ORTH < "bucket" >,
    SEMPRED "_bucket_n_1_rel" ].
```

```
kick+the+bucket := v_np_idiom_mtr &
   [ INPUT.RELS < [ PRED "_kick_v_i_rel" ],
                  [ PRED "_bucket_n_1_rel" ] > ].
```

# Verb-particle constructions

- Usually intransitive or transitive verbs
- Transitives usually allow reordering of NP and particle

  So not [V + PP] but rather [V + P + NP] or [V + NP + P]
- Transitives also allow passives, both verbal and adjectival
- Semantics can be transparent or opaque

# Some more verb-particle constructions

- Verb + Particle + PP

  *get away with X, keep up with X, make up for X.*

- Verb + Particle + Clause, with expletive *it* subject

  *It turns out that he needs a ride.*

- Verb + Particle + Clause, with normal subject

  *We pointed out that he needs a ride.*

- Verb + Particle + PP + Clause

  *We pointed out to her that he needs a ride.*

- Verb + Particle + Infinitival-VP

  *She turned out to be a genius.*

- Verb + Particle + VP-ing

  *We kept on making the same mistake.*

- Verb + Particle + PredPhrase

  *He ended up richer than you.*

# One more frequent verb-particle construction

- Verb + NP + Particle + PP

  *We boiled the discussion down to two basic ideas.*

  *She made the check out to her brother.*

  *The wall was made up of old bricks.*

  *You should trade in your old phone for a new one.*

# Verb + Particle in the ERG lexicon

*We need to look that answer up.*

```
look_up_v1 := v_p-np_le &
 [ ORTH < "look" >,
   SEMPRED "_look_v_up_rel",
   COMPKEY _up_p_sel_rel ].
```

```
up_prtcl := p_np_ptcl_le &
 [ ORTH < "up" >,
   SEMPRED _up_p_sel_rel ].
```

```
NP_particle_lr := lex_rule &
 [ DTR [ SYNSEM generic_NP_particle_verb ],
   SYNSEM generic_particle_NP_verb,
   ALTS.NPPART + ].
```

# Verb + Particle + PP

*They made up for their earlier mistakes.*

```
make_up_for_v1 := v_p-pp_le &
  [ ORTH < "make" >,
    SEMPRED "_make_v_up-for_rel",
    COMPKEY _up_p_sel_rel,
    OCOMPKEY _for_p_rel ].
```

# Inflexible order for Verb + Particle

*We will see you around.*
**We will see around you.*

*They should do the problem over.*
**They should do over the problem.*

```
do_over_v1 := v_np-p_le &
 [ ORTH < "do" >,
   SEMPRED "_do_v_over_rel" ,
   COMPKEY _over_p_sel_rel ].
```

```
v_np-p_le := main_verb &
  [ SYNSEM np_particle_noalt_verb,
    ALTS.NPPART - ].
```

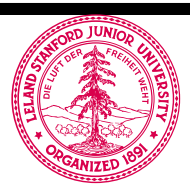
# Determinerless PPs in the ERG

*That book should really be on top (of the stack).*
**Top of a tall building is usually a windy place.*

```
top_i_n1 := n_pp_c-brno-of_le &
 [ ORTH < "top" >,
   SEMPRED "_top_n_1_rel" ].
```

```
on+top := detless_pp_idiom_mtr &
  [ INPUT.RELS < [ PRED _on_p_rel ],
                 [ PRED "_top_n_1_rel" ],
                 [ PRED idiom_q_i_rel ] > ].
```

```
detlesspp_np_phrase := generic_bare_np_phrase &
  [ ARGS < [ SYNSEM.MINOR bare_nom_rel ] >,
    C-CONT.RELS < [ PRED idiom_q_i_rel ] > ].
```



# Varieties of Detless PPs

- No modification

  *on top, *on extreme top, *on bookcase top*

- Optional modification with adjective

  *in (sharp) contrast, in (full) view*

- Optional modification with compound

  *in (lock) step, on (summer) holiday*

  **in equal step, *on long holiday*

- Obligatory modification with adjective

  *at close range*

  **at range*

- Obligatory modification with compound

  *at eye level, at ground level, at sea level*

  **at level*

# Lexical types for Detless PPs in the ERG

```
n_-_c-brno_le : No modification
n_-_c-brj*_le : Optional adjective modification
n_-_c-brj_le : Obligatory adjective modification
n_-_c-brn*_le : Optional compound modification
n_-_c-brn_le : Obligatory compound modification
```

# Types of idioms in the ERG

- V + bare-N + PP

  *give rise to, make way for, take note of*

- V + bare-N

  *hit bottom, play catch, take place*

- Light-V + Adjective

  *make sure (of X), make light of X, make good on X*

- V + NP + XP

  *keep X company, keep X a secret, call X quits*

- V + NP

  *kick the bucket, suck eggs*

- N + P + bare-N

  *point of view, sleight of hand*

- V + NP + P + XP

  *take X for granted, take X completely for granted*

# Idiom rules in the ERG

*That comment gave rise to a big argument.*

```
give+rise+to := v_nbar_pp_idiom_mtr &
  [ INPUT.RELS < [ PRED "_give_v_to-i_rel" ],
                 [ PRED "_rise_n_i_rel" ] > ].
```

*Several meetings took place quietly.*

```
take+place := v_nbar_idiom_mtr &
  [ INPUT.RELS < [ PRED "_take_v_of-i_rel" ],
                 [ PRED "_place_n_i_rel" ] > ].
```

*We shouldn't make light of his problems.*

```
make+light := v_light_adj_idiom_mtr &
  [ INPUT.RELS < [ PRED "_make_v_i_rel" ],
                 [ PRED "_light_a_of_rel" ] > ].
```

# More idiom rules in the ERG

*Someone needs to keep him company while he's ill.*

```
keep+company := v_np_xp_idiom_mtr &
  [ INPUT.RELS < [ PRED "_keep_v_i_rel" ],
                 [ PRED "_company_n_of_rel" ] > ].
```

*That politician finally kicked the bucket.*

```
kick+the+bucket := v_np_idiom_mtr &
  [ INPUT.RELS < [ PRED "_kick_v_i_rel" ],
                 [ PRED "_the_q_rel" ],
                 [ PRED "_bucket_n_1_rel" ] > ].
```

# More idiom rules in the ERG

*I was sympathetic to that point of view.*

```
point+of+view := noun_detless_pp_idiom_mtr &
  [ INPUT.RELS < [ PRED "_point_n_of_rel" ],
                 [ PRED "_view_n_of_rel" ],
                 [ PRED idiom_q_i_rel ] > ].
```

```
point_n3 := n_pp_c-ns-obl_le &
 [ ORTH < "point" >,
   SEMPRED "_point_n_of_rel",
   COMPKEY _of_p_sel_rel ].
```

# Some syntactically odd MWEs

- *We often take him for granted.*
- *we took ahold of the handle.*
- *She is the buyer of last resort.*

# Weaknesses of this approach to MWEs

- Manual effort is required to define lexicon and idiom constraints
- Post-parse filtering on MRS can lead to higher parsing costs
- Some MWE-specific syntactic rules are required (e.g. bare-NP)

# Strengths of this approach to MWEs

- Strong limits on overgeneration of interpretation and variation
- Less redundancy in the lexicon and grammar
- Good interaction with syntactic machinery
- No principled obstacle to cross-clausal idioms

  *Kim resents many tabs we kept on him.*