Linking LFG to tiered models of processing

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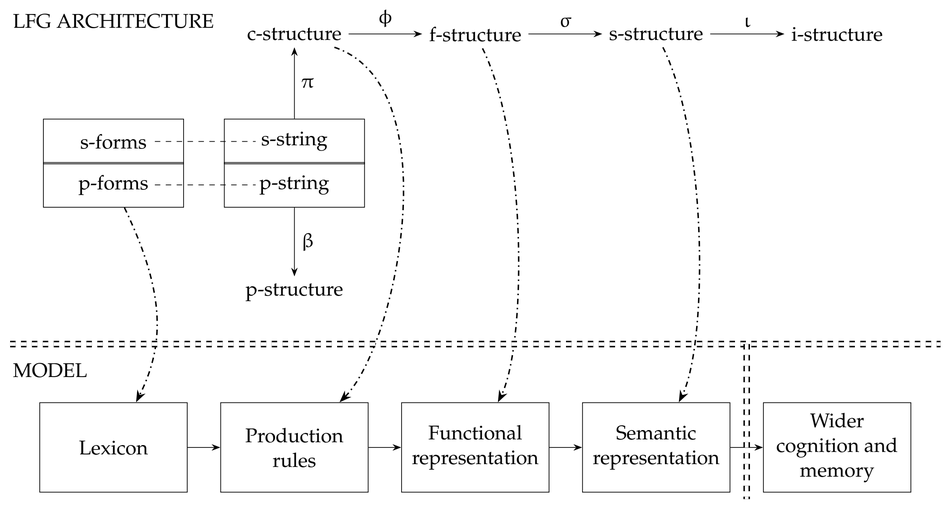
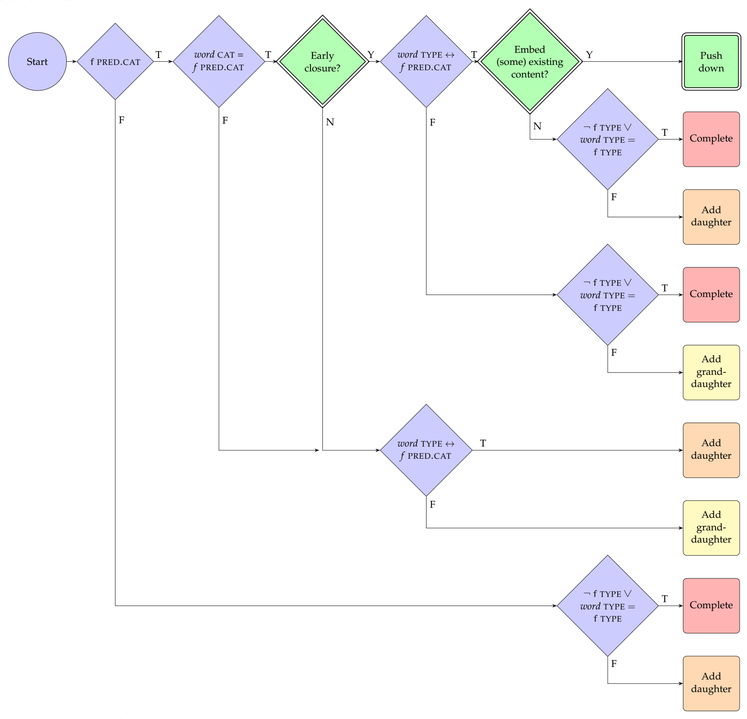
Recent models [1,2] propose multiple simultaneous tiers of language processing. New information is encoded rapidly and passed on: the *Now-or-Never* bottleneck. A tiered model of LFG in the ACT-R cognitive environment [3] allows us to explore the role of grammar.

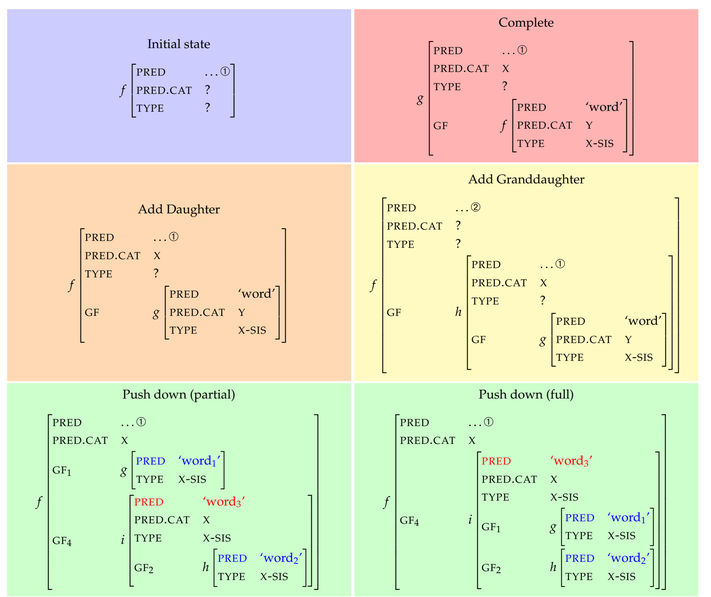


Building and retrieving a mental representation of c-structure is costly, but models of Korean and English show that c-structure information can be captured in a representation of f-structure if:

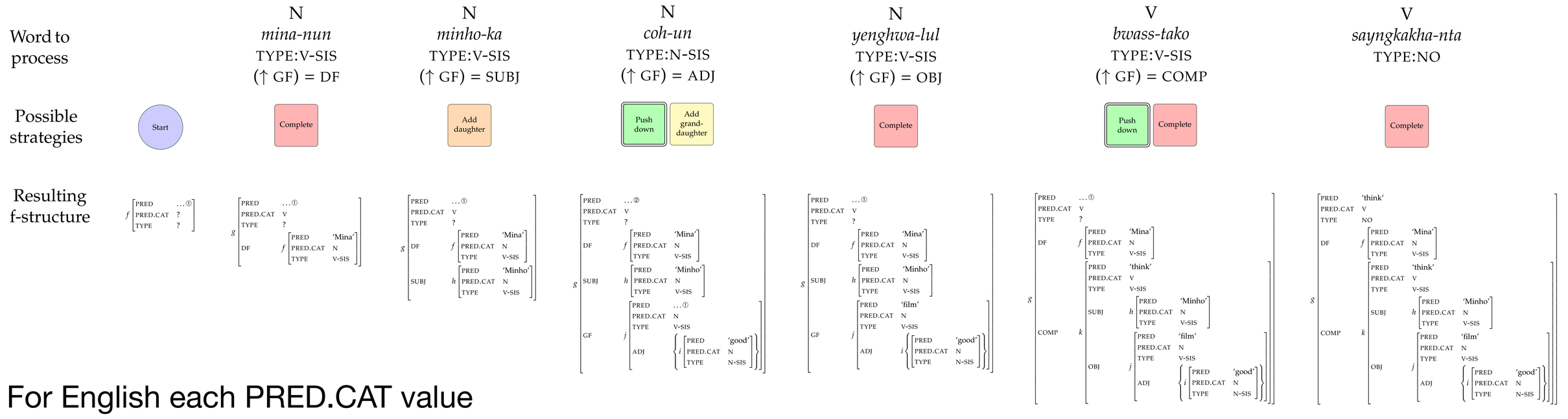
- lexical specifications and procedural knowledge constrain the ordering of attributes that can receive new information;
- features TYPE and PRED.CAT are available

For Korean, new structure is added if motivated by a new word or to allow structural constraints to be satisfied. New structure is added in relation to the innermost unfilled PRED value. In processing example (1) using the strategies and selection algorithm shown, there are two choice points. At *coh-un* 'good-COMP' the Add grand-daughter strategy is used, whereas at *bwass-tako* 'saw-QUOT', Push down is used.

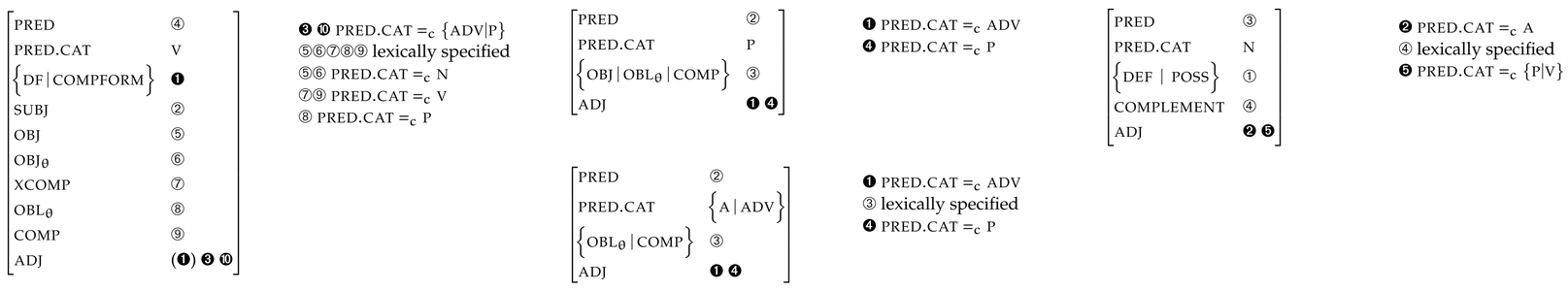




(1) *mina-nun minho-ka coh-un yenghwa-lul bwass-tako sayngkakha-nta*
Mina-DF Minho-SBJ good-COMP film-OBJ saw-QUOT think-PRES.PLAIN
"As for Mina, she thinks that Minho saw a good film."



For English each PRED.CAT value is associated with ordering constraints on adding daughter f-structures, and GF may constrain the PRED.CAT value of the f-structure assigned to them. *See handout for details and example.*

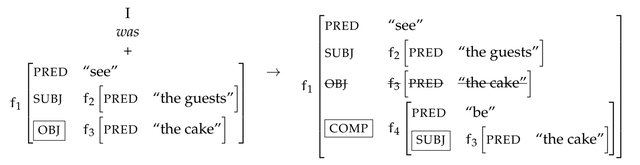


The *Now-or-Never* bottleneck [1] requires that ambiguities are managed immediately, which may require a reanalysis of the structure later on. Empirically, some reanalyses are easier than others. In the model,

- the ends of GF paths are easier to change than intermediate links
- sometimes GFs can be reassigned: does this support feature-based rather than atomic representation of GFs?

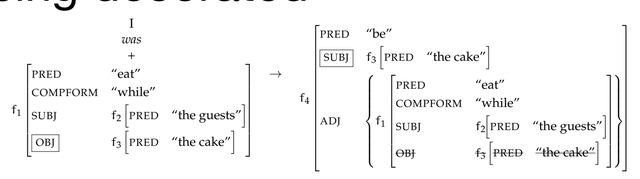
The guests saw *the cake* **was** still being decorated

- CONTAIN relationships maintained
- OBJ > COMP reassignment no problem



While the guests ate *the cake* **was** still being decorated

- CONTAIN relationships disrupted



References: [1] Christiansen, M.H. and Chater, N. (2016). The now-or-never bottleneck: a fundamental constraint on language. *Behavioral and Brain Sciences,* 39:1-19; [2] Kuperberg, G.R. and Jaeger, T.F. (2016). What do we mean by prediction in language? *Language, Cognition and Neuroscience,* 31(1):32-59; [3] Anderson, J.R. (2007) *How can the human mind occur in the physical universe?* Oxford: Oxford University Press.

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