An English fragment

COGS 532, Spring 2023

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1 The formalism

We define the components of our formalism.

Definition 1.1 (Vocabulary)**.** The vocabulary of the grammar formalism consists of the following sets:

i. a set of attribute symbols A;

ii. a set of basic value symbols V^b;

iii. a set of decorations $D = \{u, x\}$;

iv. the set of value symbols $V = \{v \mid v \in V^b \text{ or } v = {}^{\delta} v' \text{ for some } v' \in V^b \text{ and } \delta \in D\}$

v. a set of variables X;

Definition 1.2 (Feature map)**.** A feature map of a grammar, designated μ, is a function from A to $\mathscr{P}(V)$.[1] It maps each attribute symbol to the set of possible values it can take.

Definition 1.3 (Feature structures)**.** A possible feature structure defined in a grammar is some set

$$\{a : v \mid a \in A' \text{ and } v \in \mu(a)\} \text{ for some } A' \subseteq A$$

Note that Definition 1.3 guarantees that a feature structure can set a value for an attribute at most once. Also, it rules out nested feature structures, where the value of an attribute is also a feature structure.

Definition 1.4 (Merge)**.** The operation Merge takes as input two feature structures F_1 and F_2 and returns a feature structure F_3. The result is computed through the following steps:

i. For each feature $a : v$ in F_1, if you find a feature ${}^{u}\mathrm{a} : v$ in F_2 delete the latter, and vice versa.

ii. For each feature $a : v$ in F_1, if you find a feature ${}^{x}\mathrm{a} : v$ in F_2 delete both features, and vice versa.

iii. If there are no conflicts in feature structures, merge them into a single feature structure.

2 Notational conventions

Convention 2.1. An attribute value pair $a : v$ is shortened to a^v.

Convention 2.2. When obvious, we omit the attribute. E.g. we write N instead of $\mathrm{Cat}^{\mathrm{N}}$.

[1] $\mathscr{P}$ stands for the power set function.

3 Features

Attribute	Value	Description
Cat	N, V, D, Adj, C, …	category
Cmp	0, 1, 2, 3	Number of missing complements
Spc	+, −	Specified or not
ϕ 0, 1	Person, number	

4 Lexicon

Lexicon 4.1 (nominal)**.**

book	:=	[N, ^{u}V]	(1)
book	:=	[N, ^{u}Fin^{+}]	(2)
blue	:=	[^{u}N]	(3)
the	:=	[D, ^{x}N]	(4)
a	:=	[D, ^{x}N]	(5)
John	:=	[D, ^{u}V]	(6)
John	:=	[D, ^{u}Fin^{+}]	(7)

Lexicon 4.2 (verbal)**.**

sleep	:=	[V]	(1)
love	:=	[V, ^{x}D]	(2)
			(3)

Lexicon 4.3 (functional)**.**

−s	:=	[Fin^{+}, ^{x}V, ^{x}D]	(1)
to	:=	[Fin^{-}, ^{x}V]	(2)
			(3)

(1) Mary loves John.