Lgcs 106, Semantics. Class Grammar. 3 Mar 2010.

1. Current Grammar

(i) *Inventory of denotations*. Let D be the set of all individuals that exist in the real world. Possible denotations are: Elements of D; Elements of {0,1}; Subsets of D; Subsets of DxD; Subsets of $\{A \mid A \subseteq D\}$; Subsets of $\{\langle A,B\rangle \mid A,B \subseteq D\}$; $\cap$, $\cup$, '.

(ii) *Lexicon*

N_{pn}: $[\![\textit{Emery}]\!]^s$ = Emery or $[\![\textit{Emery}]\!]^s = \{A \mid \text{Emery} \in A\}$…

V: $[\![\textit{smile}]\!]^s = \{x \mid \text{smile}(x)(s)\}$, be_1 (vacuous)

V_t: $[\![\textit{save}]\!]^s = \{\langle x,y\rangle \mid \text{save}(x)(y)(s)\}$, …

A: $[\![\textit{nice}]\!]^s = \{x \mid \text{nice}(x)(s)\}$, …

A_t: $[\![\textit{fond}]\!]^s = \{\langle x,y\rangle \mid \text{fond}(x)(y)(s)\}$, …

N: $[\![\textit{cat}]\!]^s = \{x \mid \text{cat}(x)(s)\}$, …

N_t: $[\![\textit{fan}]\!]^s = \{\langle x,y\rangle \mid \text{fan}(x)(y)(s)\}$, …

P: $[\![\textit{around}]\!]^s = \{x \mid \text{around}(x)(s)\}$, …

P_t: $[\![\textit{near}]\!]^s = \{\langle x,y\rangle \mid \text{near}(x)(y)(s)\}$, …

Conj: $[\![\textit{and}]\!]^s = \cap$, $[\![\textit{or}]\!]^s = \cup$

Neg: $[\![\textit{not}]\!]^s = {}'$

T: be_2 (We will neglect for now the semantic contribution of the T node.)

D: a_1 (vacuous)

$[\![\textit{some}]\!]^s = \{\langle A,B\rangle \mid A \cap B \neq \emptyset\}$; $[\![\textit{no}]\!]^s = \{\langle A,B\rangle \mid A \cap B = \emptyset\}$;

$[\![\textit{every}]\!]^s = \{\langle A,B\rangle \mid A \subseteq B\}$; $[\![\textit{two}]\!]^s = \{\langle A,B\rangle \mid |A \cap B| \geq 2\}$;

$[\![\textit{a}]\!]^s = \{\langle A,B\rangle \mid |A \cap B| \geq 1\}$; $[\![\textit{one}]\!]^s = \{\langle A,B\rangle \mid |A \cap B| \geq 1\}$.

(iii) *Syntactic rules*

S → DP (T) VP	DP → D NP	NP → N_{pn}
NP → N	NP → N_t PP	NP → AP NP
NP → NP PP	VP → V ({DP/AP/PP})	*VP → V_t DP
AP → A	AP → A_t PP	PP → P
*PP → P_t DP	XP → Neg XP, X ∈ {V, A, P, D}	
XP → XP Conj XP, X ∈ {N, V, A, P, D}		

(iv) *Semantic rules of composition*

For any situation *s*,

(a) If α has the form $[_S$ DP (T) VP$]$, $[\![\alpha]\!]^s = 1$ iff $[\![VP]\!]^s \in [\![DP]\!]^s$ }.

(b) If α is a non-branching node whose daughter node is β, then $[\![\alpha]\!]^s = [\![\beta]\!]^s$.

(c) If α is a terminal node, then $[\![\alpha]\!]^s$ is specified in the lexicon.

(d) If α has the form $[_{XP1}\ XP_2\ \text{Conj}\ XP_3\ ]$, $[\![\alpha]\!]^s = [\![XP_2]\!]^s\ [\![\text{Conj}]\!]^s\ [\![XP_3]\!]^s$.

(e) If α has the form $[_{XP1}\ \text{Neg}\ XP_2]$, $[\![\alpha]\!]^s = [\![XP_2]\!]^s\ [\![\text{Neg}]\!]^s$.

(f) If α has the form $[_{YP}\ Y_t\ ZP]$, $[\![\alpha]\!]^s = \{x \mid \langle x, [\![ZP_2]\!]^s\rangle \in [\![Y_t]\!]^s\}$.

(g) If α has the form $[_{YP/ZP}\ YP\ ZP]$, $[\![\alpha]\!]^s = [\![YP]\!]^s \cap [\![ZP]\!]^s$.

(h) If α has the form $[_{DP}\ D\ NP]$, $[\![\alpha]\!]^s = \{A \mid \langle [\![NP]\!]^s, A\rangle \in [\![D]\!]^s\}$.

(i) If α has the form $[_{YP}\ Y_t\ ZP]$, $[\![\alpha]\!]^s = \{x \mid \{y \mid \langle x,y\rangle \in [\![Y_t]\!]^s\} \in [\![ZP]\!]^s\}$.

2. Practice

(1) No ship near Hawaii sank.
(2) Every discussion of Max was surprising.
(3) Alexis and a professor are working.
(4) Alexis visited every planet.

(5) Every girl visited every planet.
(6) Some professor gave no exam.
(7) Every student near Evan or Liz greeted Karen.

For any s, $\llbracket(1)\rrbracket^s = 1$ iff

$\llbracket VP\rrbracket^s \in \llbracket DP_1\rrbracket^s$	(a)
$\llbracket VP\rrbracket^s \in \{A \mid <\llbracket NP_1\rrbracket^s, A> \in \llbracket D_1\rrbracket^s\}$	(h)
$<\llbracket NP_1\rrbracket^s, \llbracket VP\rrbracket^s> \in \llbracket D_1\rrbracket^s$	$\in$
$<\llbracket NP_1\rrbracket^s, \llbracket VP\rrbracket^s> \in \llbracket \textit{no}\rrbracket^s$	(b)
$\llbracket NP_1\rrbracket^s \cap \llbracket VP\rrbracket^s = \emptyset$	(c), $\in$
$\llbracket NP_2\rrbracket^s \cap \llbracket PP\rrbracket^s \cap \llbracket VP\rrbracket^s = \emptyset$	(d)
$\llbracket \textit{ship}\rrbracket^s \cap \llbracket PP\rrbracket^s \cap \llbracket \textit{sank}\rrbracket^s = \emptyset$	(b)x5
$\llbracket \textit{ship}\rrbracket^s \cap \{x \mid <x, \llbracket DP_2\rrbracket^s> \in \llbracket P\rrbracket^s\} \cap \llbracket \textit{sank}\rrbracket^s = \emptyset$	(f)
$\llbracket \textit{ship}\rrbracket^s \cap \{x \mid <x, \text{Hawaii}> \in \llbracket \textit{near}\rrbracket^s\} \cap \llbracket \textit{sank}\rrbracket^s = \emptyset$	(b)x4
$\llbracket \textit{ship}\rrbracket^s \cap \{x \mid \text{near}(x)(\text{Hawaii})(s)\} \cap \llbracket \textit{sank}\rrbracket^s = \emptyset$	(c), $\in$
$\{x \mid \text{ship}(x)(s)\} \cap \{x \mid \text{near}(x)(\text{Hawaii})(s)\} \cap \{x \mid \text{sank}(x)(s)\} = \emptyset$	(c)x2

For any s, $\llbracket(2)\rrbracket^s = 1$ iff

$\llbracket VP\rrbracket^s \in \llbracket DP_1\rrbracket^s$	(a)
$\llbracket VP\rrbracket^s \in \{A \mid <\llbracket NP\rrbracket^s, A> \in \llbracket D_1\rrbracket^s\}$	(h)
$<\llbracket NP\rrbracket^s, \llbracket VP\rrbracket^s> \in \llbracket D_1\rrbracket^s$	$\in$
$<\llbracket NP\rrbracket^s, \llbracket VP\rrbracket^s> \in \llbracket \textit{every}\rrbracket^s$	(b)
$\llbracket NP\rrbracket^s \subseteq \llbracket VP\rrbracket^s$	(c), $\in$
$\{x \mid <\text{x}, \llbracket DP_2\rrbracket^s> \in \llbracket N_t\rrbracket^s\} \subseteq \llbracket VP\rrbracket^s$	(f)
$\{x \mid <\text{x}, \text{Max}> \in \llbracket \textit{discussion}\rrbracket^s\} \subseteq \llbracket VP\rrbracket^s$	(b)x4, (c)
$\{x \mid \text{discussion(x)(Max)(s)}\} \subseteq \llbracket VP\rrbracket^s$	(c), $\in$
$\{x \mid \text{discussion(x)(Max)(s)}\} \subseteq \{x \mid \text{surprising}(x)(s)\}$	(b)x3,(c)

For any s, $\llbracket(4)\rrbracket^s = 1$ iff

$\llbracket VP\rrbracket^s \in \llbracket DP_1\rrbracket^s$	(a)
$\llbracket VP\rrbracket^s \in \{A \mid \text{Alexis} \in A\}$	(c)
$\text{Alexis} \in \llbracket VP\rrbracket^s$	$\in$
$\text{Alexis} \in \{x \mid \{y \mid <x, y> \in \llbracket V\rrbracket^s\} \in \llbracket DP_2\rrbracket^s\}$	(i)
$\{y \mid <\text{Alexis}, y> \in \llbracket V\rrbracket^s\} \in \llbracket DP_2\rrbracket^s$	$\in$
$\{y \mid <\text{Alexis}, y> \in \llbracket \textit{visit}\rrbracket^s\} \in \llbracket DP_2\rrbracket^s$	(b)
$\{y \mid \text{visit(Alexis)}(y)\} \in \llbracket DP_2\rrbracket^s$	(c), $\in$
$\{y \mid \text{visit(Alexis)}(y)\} \in \{A \mid <\llbracket NP\rrbracket^s, A> \in \llbracket D\rrbracket^s\}$	(h)
$\{y \mid \text{visit(Alexis)}(y)\} \in \{A \mid <\llbracket NP\rrbracket^s, A> \in \llbracket \textit{every}\rrbracket^s\}$	(b)
$\{y \mid \text{visit(Alexis)}(y)\} \in \{A \mid \llbracket NP\rrbracket^s \subseteq A\}$	(c), $\in$
$\llbracket NP\rrbracket^s \subseteq \{y \mid \text{visit(Alexis)}(y)(s)\}$	$\in$
$\{x \mid \text{planet}(x)(s)\} \subseteq \{y \mid \text{visit(Alexis)}(y)(s)\}$	(b)x2,(c)