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SEMIOTACTICS AS A VAN WIJNGAARDEN GRAMMAR

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1. There are two classes of theories of Universal Grammar:

(1) Formalist theories, such as the widespread varieties of generative grammar. These theories start from the assumption that certain strings of linguistic forms are grammatical while other strings are ungrammatical. A grammar of this type produces grammatical strings and does not produce ungrammatical ones. All theories of this class fail in the same respect: they do not account for the meaning of the strings.

(2) Semiotactic theories, which describe the meaning of a string in terms of the meanings of its constituent forms and their interrelations. The only elaborate formalized theory of this class presently available is the one advanced by C.L. Ebeling (*Syntax and Semantics*, Leiden: Brill, 1978). I shall discuss some of its mathematical properties here.

In order to simplify the notation, I shall eliminate Ebeling's symbolization by substituting the following abbreviations:

ap	=	apposition
ck	=	close knitting
co	=	complementation
cr	=	contents of receptacle
dg	=	double gradation
do	=	domination
ds	=	downward stratification
gr	=	gradation
li	=	(oriented) limitation
ne	=	nexus
pa	=	part of whole
rp	=	reciprocal parallelism
sb	=	semantic sentence boundary
tg	=	temporal gradation
tl	=	temporal limitation
ul	=	unordered limitation
us	=	upward stratification

A	=	abstraction
C	=	category
N	=	nexus
P	=	independent meaning
Q	=	dependent meaning
R	=	semantic relation
S | T	=	situation
V	=	complementary valence
X | Y	=	pro-seme
Z	=	sentence

Furthermore, A′ is the converse of abstraction (A′ A P = P) and C′ stands for a complementary category of C. The category of a meaning is the set of meanings which can occupy the same position; it is determined by its derivational history.

A preliminary reformulation of Ebeling's syntax (pp. 412-3) as a system of generative rules yields the following model:

Z → Z sb Z | P
P → Y do N | T do N | T do P | P R Q | P do V R Q | P rp V | A P | P(C)
N → Q ne Q
Q → Y R P | P
Y → Y R P | X
T → T R Q | S
V → A′ P | P(C′)
R → R2 X do | pa X do | R2 | dg | cr | tl | ul | us | ds | co
R2 → ck | gr | tg | li | ap
C → C1 | C2 | C3 | ...
P(Ci) → *a* | *b* | *c* | ...
nonterminal symbols: C, N, P, Q, R, T, V, Y, Z.
terminal symbols: A, S, X, *a*, *b*, *c*, ...

The language which this E-grammar defines is a subset of the language generated by the simplified E-grammar which results from an elimination of the difference between P, Q, and Z:

Z → Z R Z | Y do Z | Z do V R Z | Z rp V | A Z | Z(C)
Y → Y R Z | X
V → A′ Z | Z(C′)
R → ck | gr | dg | cr | tg | tl | li | pa | ul | us | ds | ap | co | ne | sb
C → C1 | C2 | C3 | ...
Z(Ci) → *a* | *b* | *c* | ...
nonterminal symbols: C, R, V, Y, Z.
terminal symbols: A, X, *a*, *b*, *c*, ...

2. A Van Wijngaarden grammar W = ((E, F, B), (G, H, Z), (K, M)) consists of the following components (cf. *Acta Informatica* 5/1-3, 1975):

(1) A set of terminal symbols E, a set of nonterminal symbols F, and a pair of brackets B for the demarcation of hypernotions. I shall use “ ” in the latter function.
(2) A set of hypernotions G, which is a set of strings of symbols from F and K enclosed in “ ”, a set of hyperrules H rewriting elements of G as strings of symbols from E and G, and a zero hypernotion Z.

(3) A set of auxiliary symbols K which has no element in common with F, and a set of metarules M rewriting elements of K as strings of symbols from F and K. Informally, a W-grammar is determined by a specification of H and M.

I shall now tentatively reformulate the simplified E-grammar proffered above as a W-grammar. For the sake of clarity, I substitute Z(C) for "ZC" etc., where the parentheses indicate that the enclosed element is a member of K.

Hyperrules:
Z → Z(C)
Z(C) → Z(C) R Z(CR) | Y do Z(C) | Z(C) do V(ZC) R Z(CR) | Z(C) rp V(ZC) |
A Z(C) | Z(Ci)
Y → Y R Z(C) | X
V(A Z(C)) → Z(C)
V(Z(Ci)) → Z(Ci′)
R → r1 | r2 | r3 | ...
Z(Ci) → *a* | *b* | *c* | ...

Metarule: C → C1 | C2 | C3 | ...

3. More generally, a semiotactic grammar can be viewed as a W-like grammar where the hyperrules generate constructions and the metarules select categories (Ebeling's "semantic formalizer"), complemented by a set of morpheme structure rules assigning linguistic forms to meanings (Ebeling's "encoder"), a set of pronunciation rules assigning sound strings to linguistic forms, and a set of interpretation rules assigning projections of portions of the world to meanings.