Language and Knowledge:
Against Modularity, Atomism, and Generativism as a Viable Basis for a Theory of Language and Mind

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"The person who has mastered any human language has developed a **system of knowledge that is rich and complex**." (Chomsky, 1988, Language and Problems of Knowledge, p. 131)

“If you want to know what seems to **refute** the strong minimalist thesis, the answer is **just about everything you can think of or pick at random from a corpus of material**. That is **not particularly interesting** because it is the **normal situation in the sciences**, even the most advanced.” … “it is the experiments that matter, and the well-designed ones, the **ones that fit into a sensible theory**.“ (Chomsky, 2002, An interview on minimalism, p. 127-8)

Old linguistics

1. Language is a combination of a large lexicon and a small set of rules
2. Language is organized in autonomous hierarchical levels with universal values
3. There is a strong (modular) division between form and meaning
4. Lexical items divide between those with meaning and those without meaning
5. Categorization must comply with laws of symbolic logic
6. Meaning is largely referential and/or truth-conditional
7. Most language is literal and figurative language is either parasitic or ornamental

New linguistics

1. All language units are constructions that determine conditions of integration
2. Language is a structured "inventory" of language-specific constructions
3. A language unit's formal properties are a part of its meaning
4. All units of language have meaning that follows the same principles (schematic or rich)
5. Basic-level and prototype effects inherent in categorization
6. Meaning is constructed in complex, dynamic conceptual frames (embodied in human experience)
7. No distinction between literal and figurative language is necessary

Road to modularity

"It seems that the mind carries out **precise computational operations**, using mental representations of a specific form, to arrive at **precise conclusions** about factual matters of no little complexity, **without conscious thought or deliberation**. The principles that determine the nature of the mental representations and the operations that apply to them form a central part of our **biologically determined nature**. They constitute the **human language faculty**, which one might regard as an '**organ of the mind/brain**'.“ (ibid.)

1. **What is knowledge of language?** Answer: language is a computational system, a **rule system** of some sort. Knowledge of language is knowledge of this rule system.
2. **How is language acquired?** Answer: the initial state of the language faculty determines possible rules and modes of interaction. Language is acquired by a **process of selection of a rule system of an appropriate sort on the basis of direct evidence**. Experience yields an inventory of rules, through the language-acquisition device of the language faculty.
3. **How is language used?** Answer: the use of language is **rule-governed behavior**. Rules form mental representations, which enter into our speaking and understanding. A sentence is parse and understood by a systematic search through the rule system of the language in question.

(Chomsky, On the nature, use and acquisition of language, 1987, p. 22)

- Language is an infinite set of sentences acceptable to an ‘ideal’ native speaker/listener
- Sentences are generated by operation of a (small) finite set of rules on a (larger) finite set of lexical items
  - S → NP_{Subj} VP (John sings)
  - VP → V_{Fin} NP_{Obj} (sings a song)
  - NP → Det_{Indef} N_{Sg} (a song)
- The surface level of sentences is a result of transformations being performed on a deeper level (‘kernel sentences’)
  - Peter hit John. → John was hit by Peter.
  - NP_{Ag} V_{Act} NP_{Pat} → NP_{Pat} to be V-en by NP_{Ag}

- Syntactic (combinatoric) properties of language are too complex to be acquired by children simply based on analysis of available linguistic input
- Similarities across languages lead to postulating a universal grammar which specifies the principles; individual languages simply provide the parameters
- Syntax is a modular part of language interacting with a similarly generative semantic and phonological modules
- Language is a modular part of human cognition (“organ of the mind/brain”)

- John$_i$ is too clever to *PRO*$_i$ catch Peter$_j$.
- John$_i$ is too clever to *PRO*$_j$ catch t_i.
- *John is too clever to caught.
- ?John$_i$ is too clever to catch him$_i$.

- John je příliš chytrý na to, aby ho chytili. [John is too smart for them to catch him.]
- Johna je příliš těžké chytit. [It‘s too hard to catch John.]

"Words and rules give rise to the vast expressive power of language, allowing us to share the fruits of the vast creative power of thought." (p. 287) (Pinker, 1999, Words and rules)

Consequences and travelling companions of modular generativism

- Atomism (Generative rules require categories without internal structure; Noun, Verb)
- Phonology/Morphology/Syntax/Semantics/ Pragmatics – separate modules
- Competence / Performace are strictly differentiated
- Grammars need to contain restrictions to generate all sentences and no non-sentences
- Semantic compositionality is required as a parallel to syntactic compositionality
- Introducing new objects such as *trace*
    - John$_i$ expects to see him$_j$.
    - I wonder who John$_i$ expects to see him$_i$.
    - I wonder who$_i$ John expects to see t_i.

Challenges to modularity

[Generative approaches to the ‘science‘ of language meant] “accepting the impossibility of saying almost **everything that might be interesting**, anything normal people might want or need to know about language.“ (Robin Tolmach Lakoff, 2000, Language War)

From Eric Lipton and David Johnston at the New York Times: "The Justice Department **has begun** an internal investigation into whether a former senior adviser to Attorney General Alberto R. Gonzales improperly tried to **fill vacancies** for career prosecutors at the agency with Republicans loyal to the Bush administration, department officials said Wednesday. The inquiry focuses on whether the former adviser**, Monica Goodling,** sought to determine the political affiliations of job applicants before they were hired as prosecutors -- potentially a violation of civil service laws and a break with a tradition of nonpartisanship in the career ranks at the Justice Department."

STRICKLAND: Barbara, would you like to **kind of** update us on anything, any thoughts that might be on your mind?

You're the next person, Barbara. **Surprise**.

(Laughter)

KAPINUS: I wasn't expecting that.

VOICE: But **she'll** make something up.

(Laughter)

KAPINUS: Yes. No, I really don't think that there is anything main.

Are you going to talk about the Technical Committee phone call, David, in terms of an update? Or do you want me to start it?

MANDEL: Good. If Steve wants to.

- ***Quotation***
- Evaluation
- **Question types**
- **Parentheticals**
- Hedges
- Naming
- **Relativization**
- Mode
- ***Tense / Aspect / Mode***
- ***Spelling***
- Typography
- **Phrase structure**
- Topic/focus articulation (given/new)
- Ambiguity
- Cohesion (***anaphora***, ***coordination***, ***disjunction***, connectivity)
- Coherence
- Genre/Register/Style (Elegant variation)
- ***Tense / Time***
- Real-world knowledge
- Turn taking
- Repetition
- Grammaticality / conventionality

[the **cognitive revolution**] was “an all-out effort to establish **meaning as the central concept of psychology** […]. It was not a revolution against behaviorism with the aim of transforming behaviorism into a better way of pursuing psychology by **adding a little mentalism** to it. […] Its aim was to discover and to describe formally the **meanings that human beings created out of their encounters with the world**, and then to propose hypotheses about what meaning-making processes were implicated. It focused upon the symbolic activities that human beings employed in constructing and in making sense not only of the world, but of themselves. Its aim was to prompt psychology to **join forces with its sister interpretive disciplines** in the humanities and in the social sciences.” [but with the introduction of the computational metaphor] “emphasis began shifting from “meaning” to “information,” from the construction of meaning to the processing of information. […] Information is indifferent with respect to meaning.”

(Jerome Bruner, Acts of Meaning, 1990)

- Doesn’t describe almost anything of interest to the study of language other than the identification of “grammatical” sentences
- Relies on unreliable idealized speakers for judgments of grammaticality
- Only describes adequately a subset of the combinatoric properties of language
- UG structures suspiciously close to shapes specific to written English
- Very restricted notion of (generative) creativity
- Assumes isomorphism between linguistic system and structures in the mind/brain
- Doesn’t differentiate between description, notation and modeling
- Standard Theory → Government/Binding → Minimalism contains no new findings about language only refining formalism
- Insist on the ‘scientific’ nature of linguistics with a very limiting prescriptive notion of science

- At no time **did he** leave the building.
- *At no time **he left** the building.

- With no hat on, **he went** out into the cold.
- *With no hat on **did he** go out into the cold.

- With no amount of help **could I move** the piano.
- *With no amount of help, **I could move** the piano.

- For no reason, **Harry would beat** his wife,
- For no reason **would Harry beat** his wife,

- What$_i$ did John eat t_i and Bill drink t_i?
- *What did John eat pizza and Bill drink?
- *What did John eat and Bill drink beer?
- What did Harry go to the store and buy?
- Sam is not the sort of guy you can just sit there and listen to.
- I went to the toy store, bought, came home, wrapped up, and put under the Christmas tree one of the nicest little laser death-ray kits I've ever seen.

“The Chomskyan Commitment is a commitment as to the form of the answer: it must be in a symbol-manipulation system (which cannot make use of general cognition, meaning, or communicative function). The Cognitive Commitment makes no commitment as to the form of an answer; it is just a commitment to engage in scientific research, to study language as an implicit part of human cognition.” (George Lakoff, 1991, Cognitive Versus Generative Linguistics)

Research in the so-called social sciences has made no contribution whatsoever to our understanding of linguistic competence beyond the trivial.

(John Collins, web page introducing the following quote from Chomsky, http://www.uea.ac.uk/~j108/lingpol.htm)

"[T]he existence of a discipline called "sociolinguistics" remains for me **an obscure matter**... [It] is, I suppose, a discipline that seeks to apply principles of sociology to the study of language; but I suspect that it can draw little from sociology, and I wonder whether it is likely to contribute much to it... You can also collect butterflies and make many observations. If you like butterflies, that's fine; but **such work must not be confounded with research, which is concerned to discover explanatory principles of some depth and fails if it does not do so**."

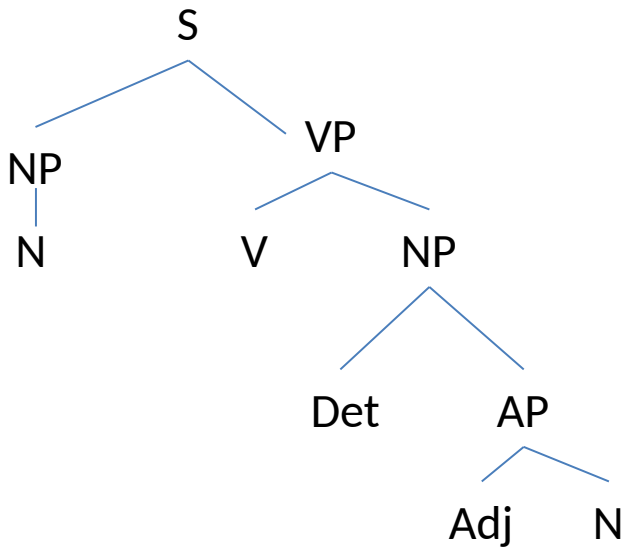
Noam Chomsky, *Language and Responsibility* (1979)

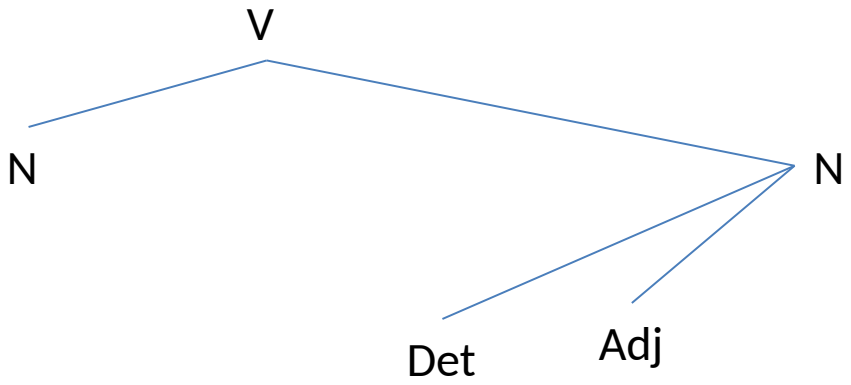
Utility of linguistic description

- Parsers/Taggers [NLP]
- Machine translation [NLP]
- Speech recognition (Text-to-speech) [NLP]
- Pedagogic grammars
- Teaching methodology
- Normative (prescriptive) documents (lexicography)
- Speech therapy
- Compilation of corpora
- National identity
- Discourse analysis
- Truth about nature of language

Variability of linguistic description

Johnny brought the blue book.





Johnny brought the blue book

Johnny brought the blue book

Det/N Det\NP/N NP\S/VP Det/AP A\AP/N Det\NP/AP

0 Johnny brought the blue book

- grammars (TGG, GB, Minimalism, TAG, LFG, GPSG, HPSG, FGD, Optimality Theory, Categorial Grammars, Unification Approaches, Systemic-Functional Grammar, Relational Grammar, Word Grammar, Construction Grammars)
- constituent vs. dependency analysis
- typical examples
  (John loves Mary. vs. Go there!)
- corpus based vs. native speaker informed vs. introspective
- description vs. notation vs. modeling

Isomorphism assumption


THE
TOOTHPASTE
DISASTER

- "Without some objective measure of structure in the world (which may be impossible to obtain), **suggesting that a mental model is like the world relies too heavily on intuition about exactly what structure is meant**." (Jones, 1995)
- "human level intelligence is too complex and little understood to be correctly decomposed into the right subpieces at the moment and that **even if we knew the subpieces we still wouldn't know the right interfaces between them**. Furthermore, we will never understand how to decompose human level intelligence until we've had **a lot of practice with simpler level intelligences**." (Brooks, 1991: 139)

"there are a **number of areas of language which fit uneasily, if at all, into a Generalized description of the grammar of a language**. These are areas such as **idioms and names** which **clearly have a patterning of their own but which can be handled within a Generalized description only as exceptions or 'leftovers', because this patterning is frequently different in kind from that seen when the traditional perspective of the verb-centered clause is taken**. For such areas a **local grammar** is needed. Local grammars do not need to squeeze the description into ill-adapted General categories but use a **categorization and terminology that is developed specifically for each area**. The **loss in Generalizability** is compensated for by the gains in qualities such as **accuracy, transparency, and cumulative coverage**." (Hunston and Thomson, 2000: 74)

Pseudo-modular effects in language and mind

- overregularization (U-shaped language acquisition) – went *goed went
- aphasias
- creolization
- second-language acquisition interference
- sound laws
- areal convergence phenomena
- generative propositional theories
- multilingual societies/diglossia
- code-switching

Alternatives to modularity: Cognitivism and construction grammar

“The Cognitive Commitment […] forces one to be **responsive to empirical results from cognitive and developmental psychology, cognitive anthropology, neurobiology, etc. Examples include results that indicate the existence of basic-level categories and conceptual prototypes** (cf. Lakoff, 1987); results about the nature of color perception and categorization from psychology, anthropology, and neurobiology; results from psychology linking convention mental imagery and language […]

[…] **changes what is meant by ‘empirical linguistics’.** The reason is that it gives **different meaning to the notion ‘generalization’**. Generalizations are statements about categories. But what a ‘category’ is is in itself very much at issue.” (George Lakoff, 1991, Cognitive Versus Generative Linguistics)

“To adopt a constructional approach is to undertake a commitment in principle **to account for the entirety of each language**. This means that the relatively **general patterns** of the language, such as the one licensing the ordering of a finite auxiliary verb before its subject in English […], and the more **idiomatic patterns**[…] stand on an **equal footing as data for which the grammar must provide an account**. “ Fillmore and Kay, 1999, Grammatical Constructions and Linguistic Generalizations: the *What's X doing Y?* Construction

LET ALONE F (X A Y let alone B)

'I doubt you could get FRED to eat squid, let alone LOUISE.'

New knowledge
(Frame-based cognition)

“If I ever saw an amputee getting hanged, I’d probably just start calling out letters.” (http://captainpinhead.wordpress.com/2006/10/01/demetri-martin-quotes)

“‘Sort of’ is such a harmless thing to say. Sort of. It’s just a filler. Sort of - it doesn’t really mean anything. But after certain things, sort of means everything. Like after ‘I love you’ or ‘You’re going to live’ or ‘It’s a boy.’” (http://captainpinhead.wordpress.com/2006/10/01/demetri-martin-quotes)

“This music is like Phillip Glass meets Van Halen.”

King of France is like square circle

“The Normans conquered Britain.” → *“The Browns conquered Britain.” → “The Beatles conquered America.”

“He sneezed the napkin off the table.” vs. *“He looked the napkin off the table.”

“I love this” vs. “I’m loving this”

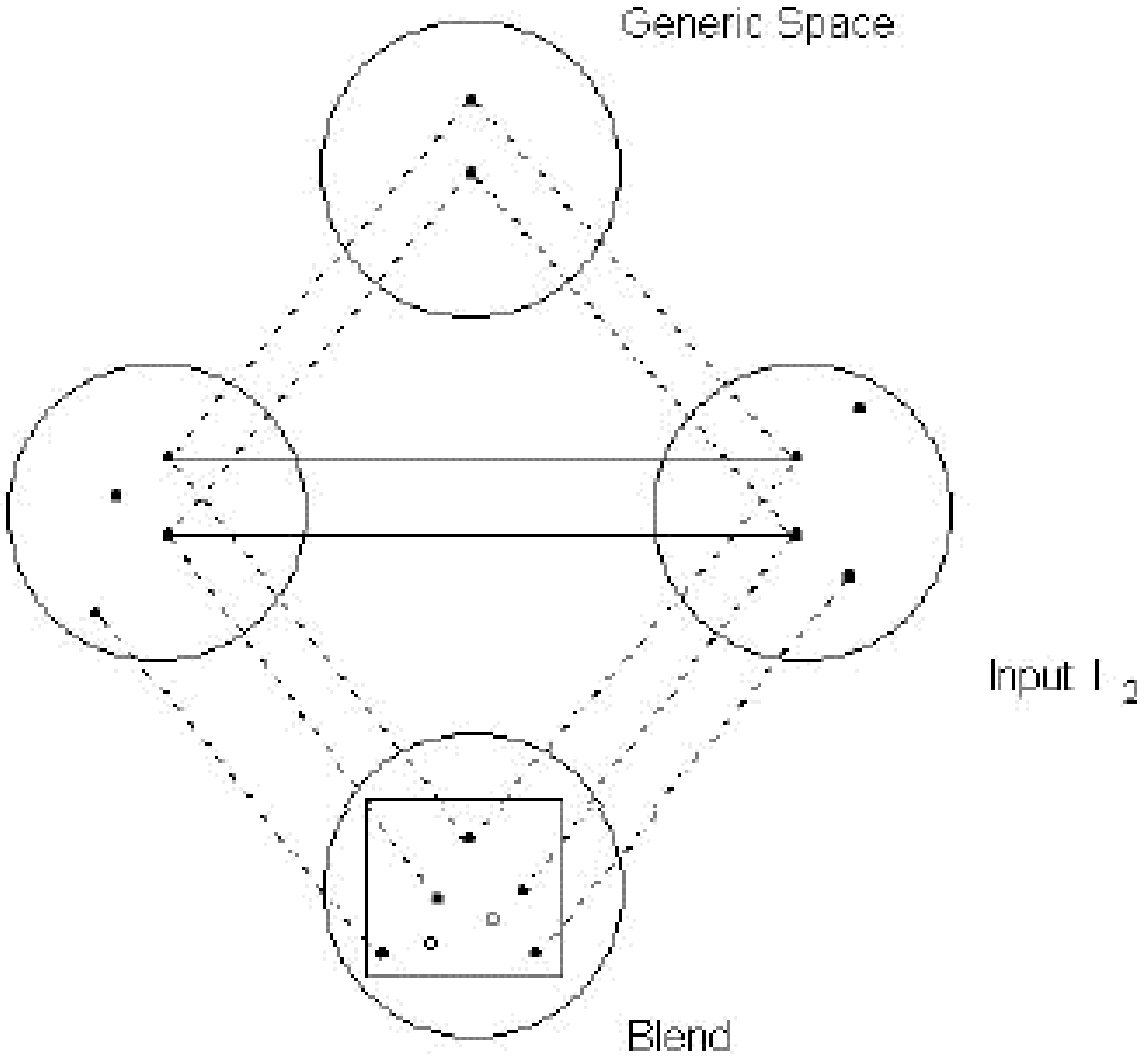
- All knowledge is organized in structured **conceptual frames** with taxonomic relationships
- Frames are structured by 4 principles (Lakoff, 1987):
  - Propositional structures
  - Image schematic structures
  - Metaphorical mappings
  - Metonymic mappings

Frame structure examples

- Image schemas
- Image
- Scripts, scenarios
- Folk theories, stories
- Salient examples, paragons
- Roles and relationships
- Categories and hierarchies

Blending (Conceptual integration)

constrained, partial mapping between mental spaces (online frames) generating a new space with both inherited and emergent properties



schematic/partial

constrained

conventionalizable

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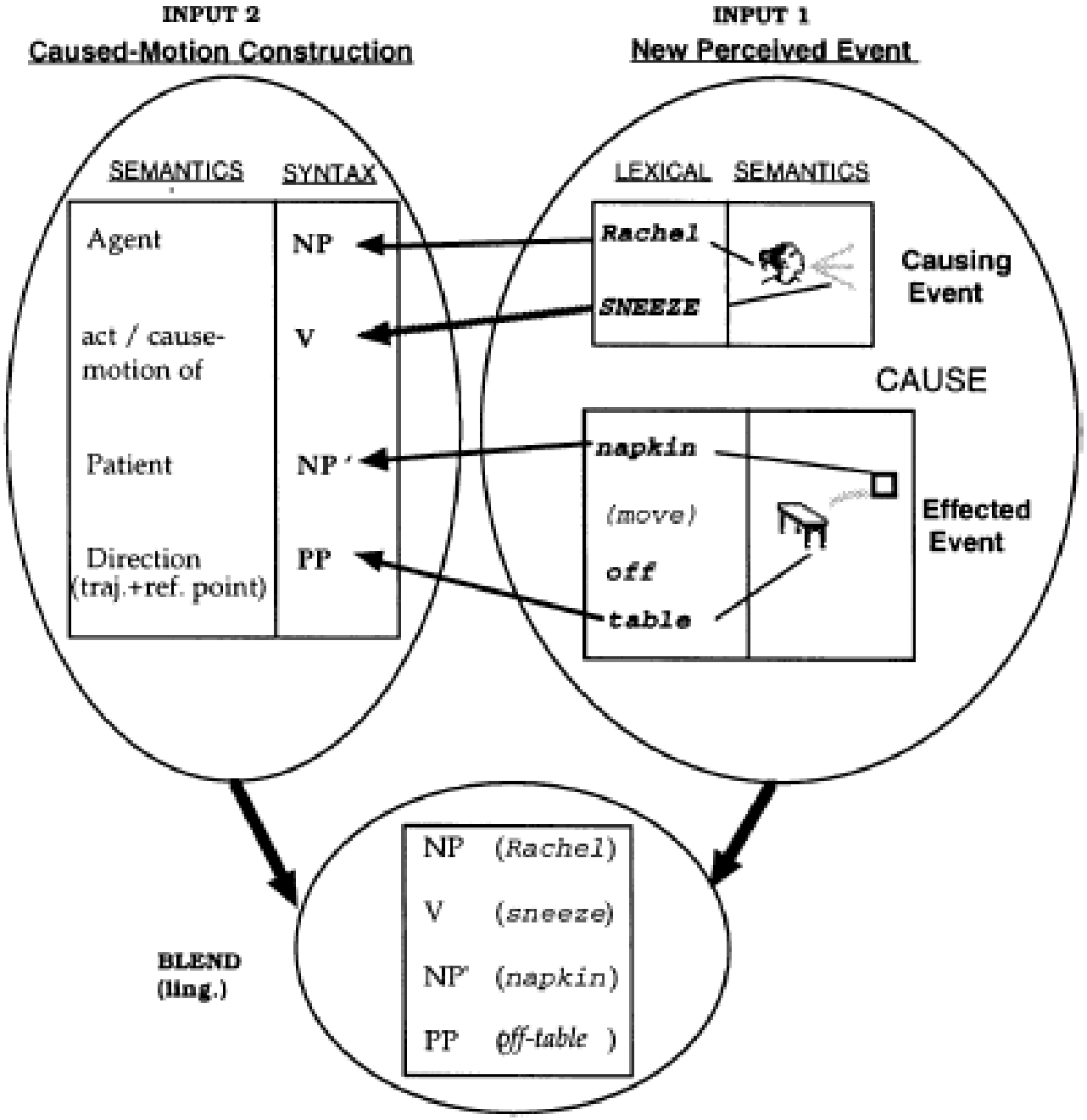
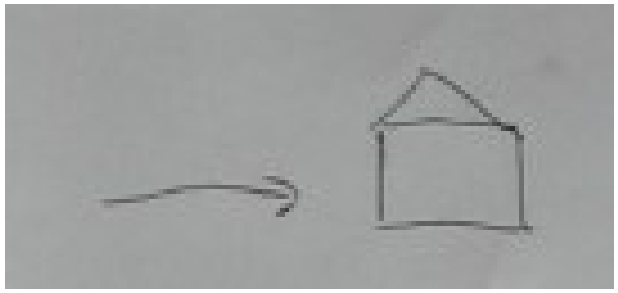
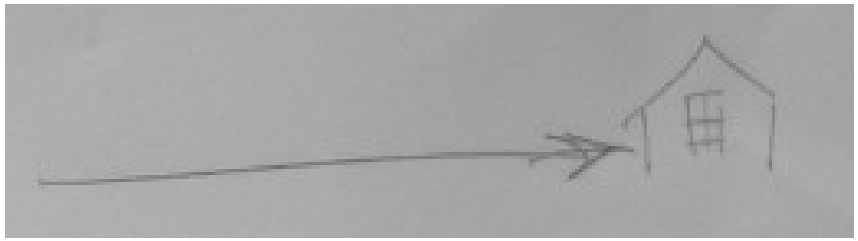
opportunistic

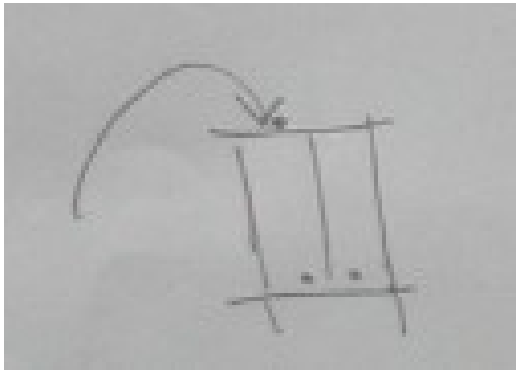
individual

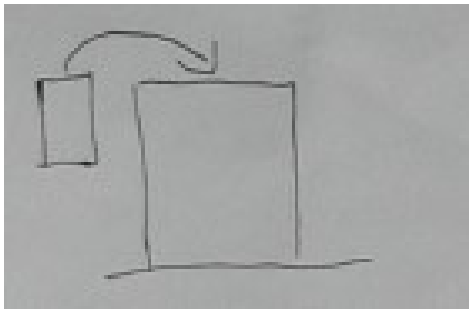


'Rachel sneezed the napkin off the table'



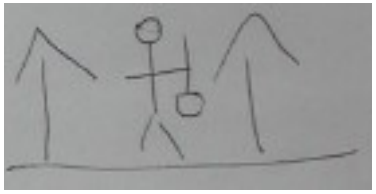








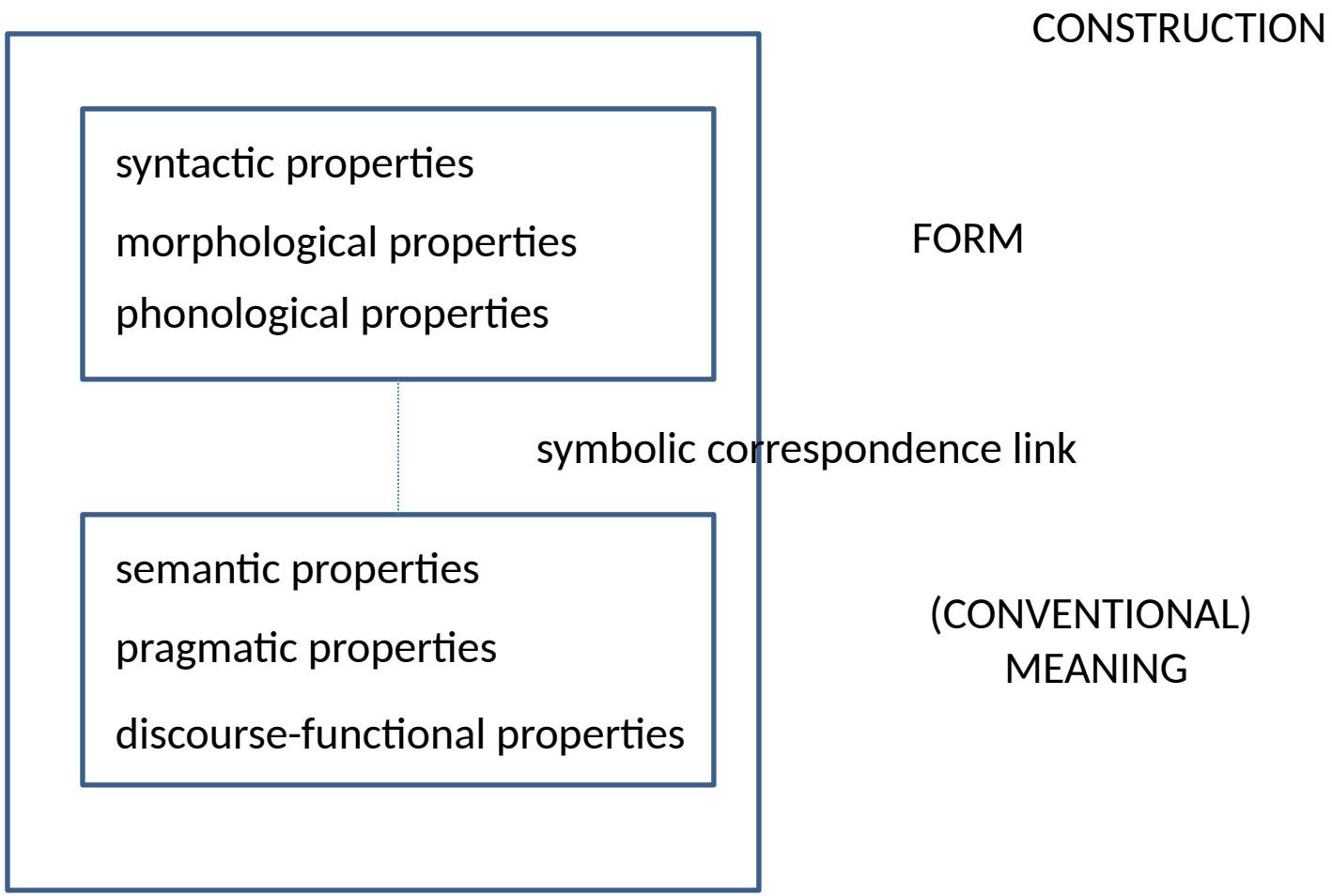




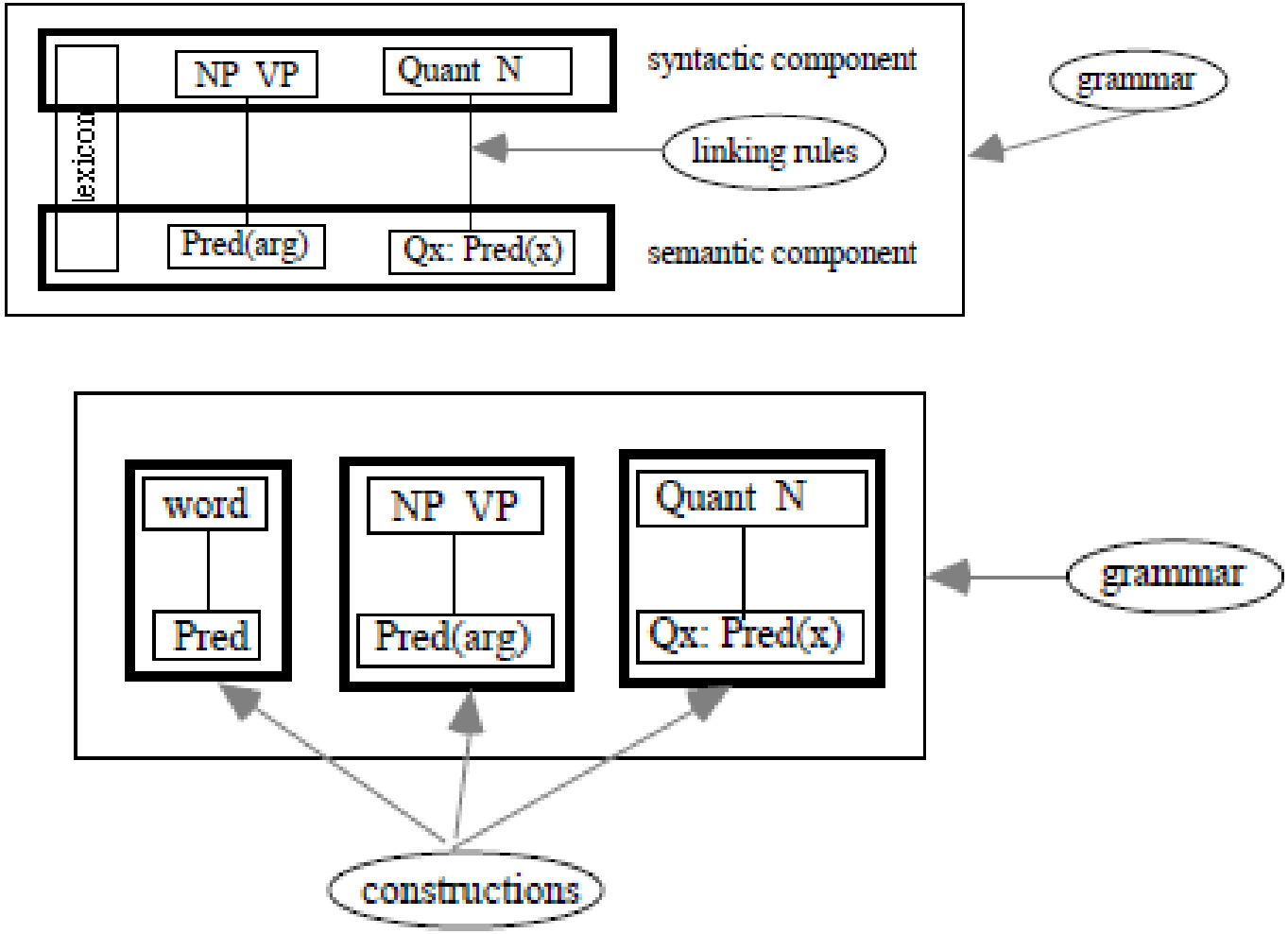
Non-modular sentence structure
Construction grammar

- Central hypotheses (Croft & Cruse, 2004, Cognitive Linguistics)
  - language is not an autonomous cognitive faculty
  - grammar is conceptualization
  - knowledge of language emerges from language use (so called, usage-based approach)
- Supporting hypotheses
  - Lexicon-syntax continuum
  - Syntax-semantics unity
  - Semantics includes pragmatics
- Basic principles
  - schemas vs. rules
  - elaboration, profiling, active zones, etc. vs. transformations
- Language: *Structured inventory of (language specific) constructions*

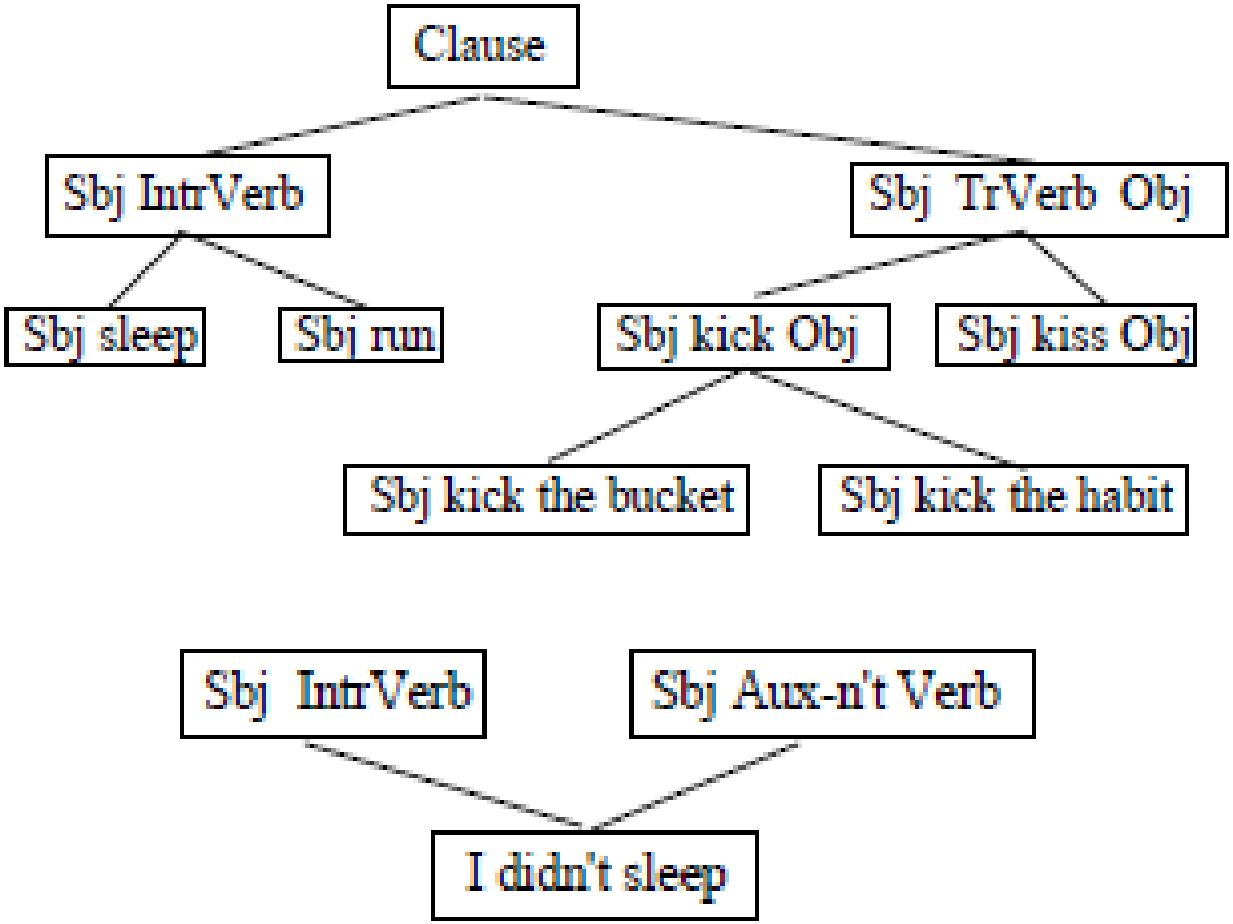
Structure representation



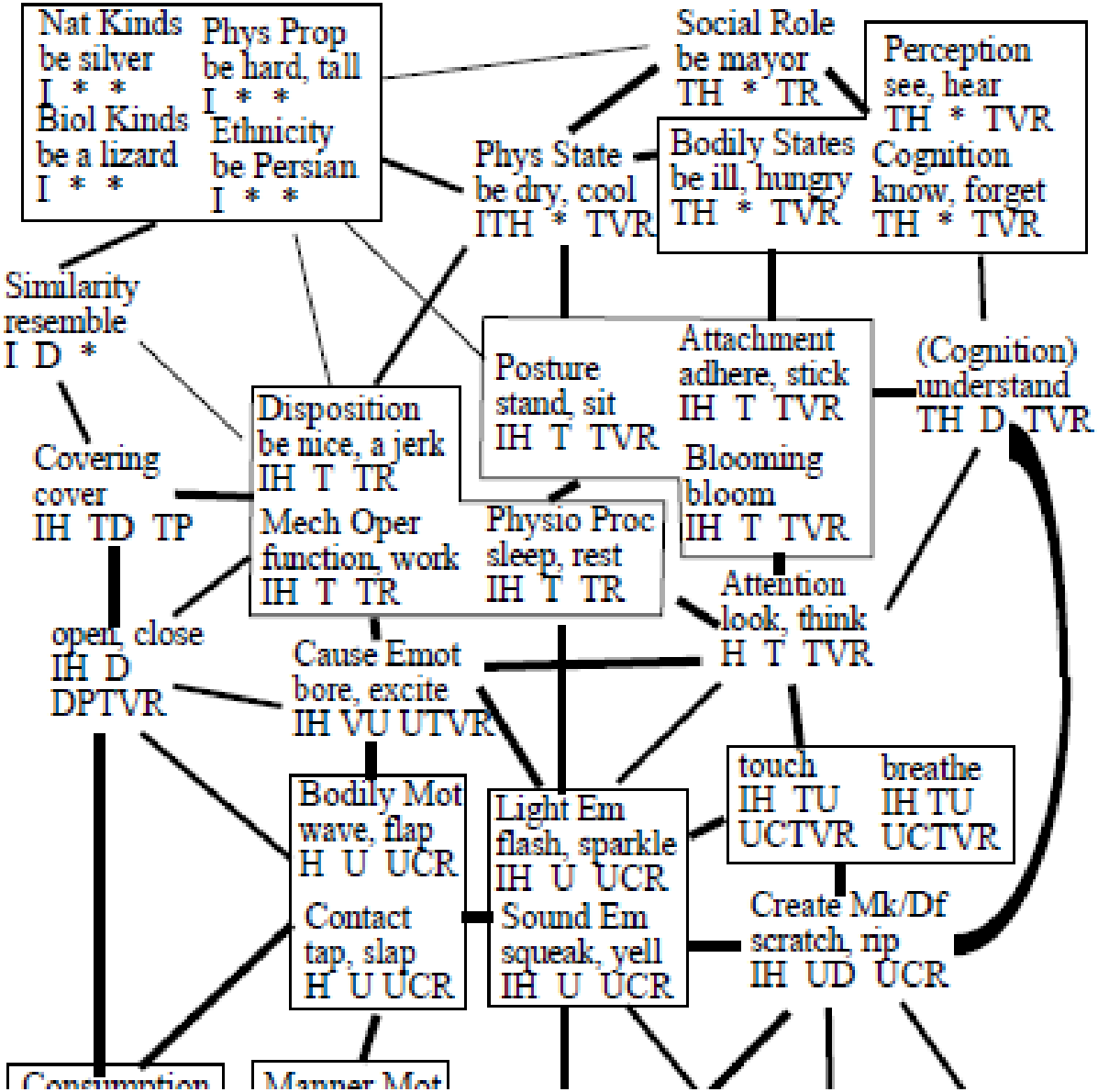
Representation compared

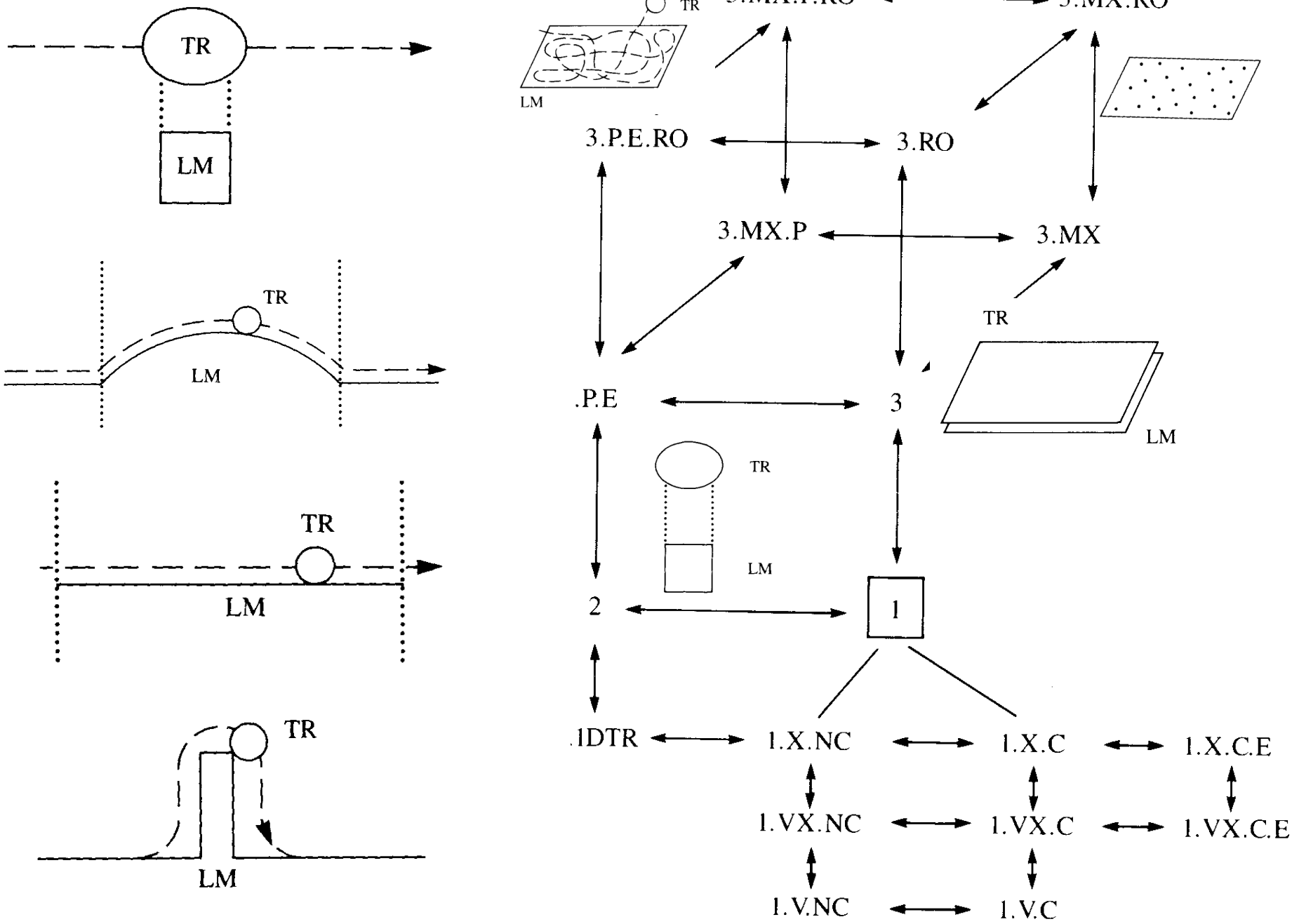


Organization and use of grammatical knowledge



1. Conceptual Space for Verbal Aspect for Selected English Predicates

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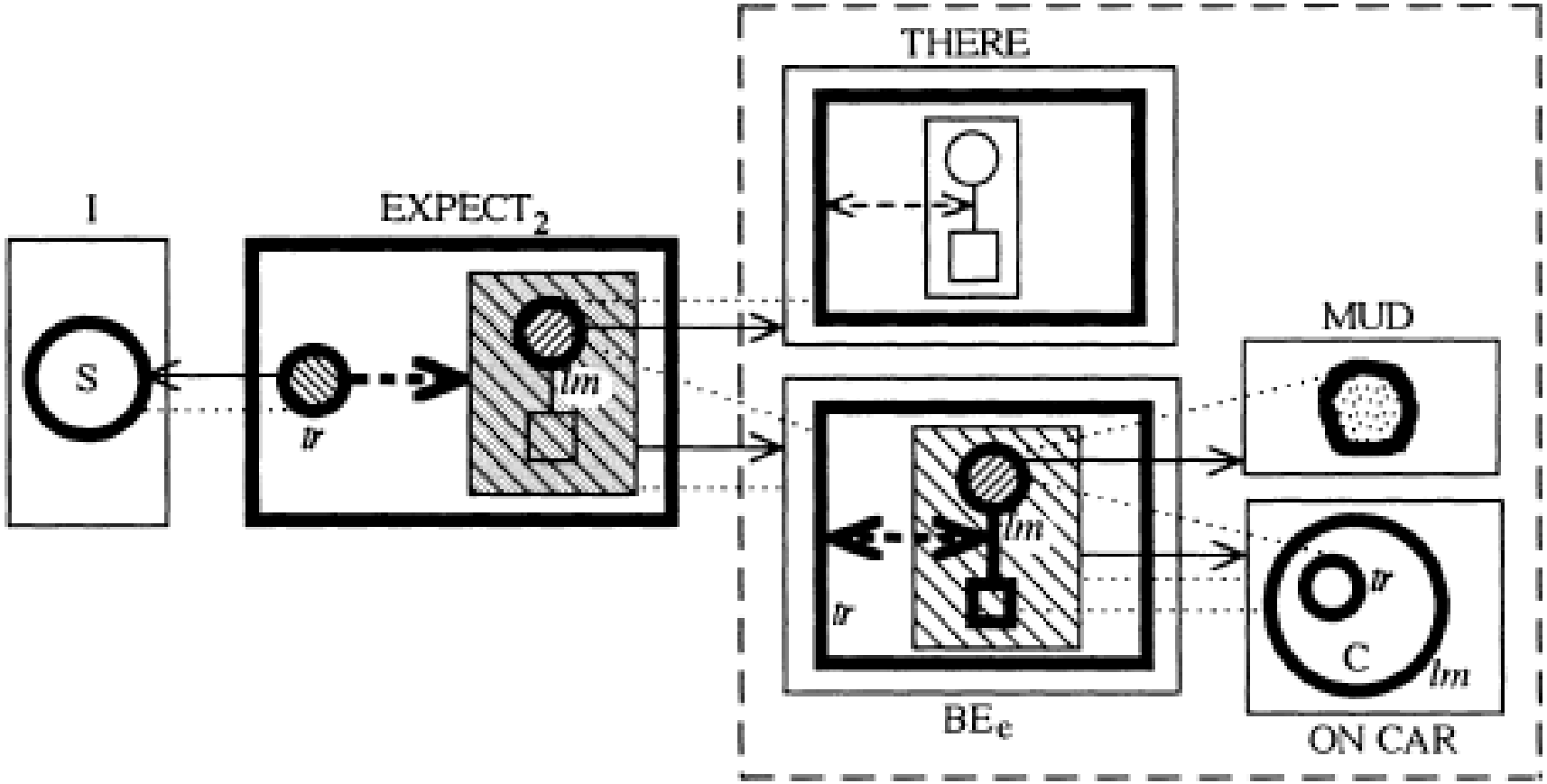
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THERE
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C
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BEe
ON CAR

‘Pragmatic’ content of constructions

a. #This house was built.
b. This house was built last year.

a. #a built house
b. a recently built house

Some other alternatives to organization of linguistic strutures

- local grammars (Google ‘define’ feature)
- stochastic effects
  - bootstrapping
  - Zipf’s law
- connectionism / neural nets
- fractal linguistics
  - levels of magnification
  - self-similarity
  - self-organization
- surface patterns of discourse repetition
- text colonies

ARGH...

Visualize

...ARRRRRRRRRRRRRRRRRRRRRRRRRRGH

3,670,000	512,000	421,000	131,000	**53,000**	**22,500**	**12,000**	**9,640**	**612**	2,720	**678**	1,460	**569**	1,090	**857**	**737**	**831**	1,830	**1,290**	**1,370**	**1,430**	**1,030**	1,170	703	**584**
704,000	55,800	13,300	2,270	711	920	410	342	79	213	203	45	99	40	81	30	21	22	33	6	10	9	22	13	7
615,000	41,400	24,200	956	739	853	564	238	167	85	83	51	72	31		52	26	4	8	6				9	
328,000	14,700	**9,950**	**520**	884	5,740	453	612	394	67	95	12	75	46	24	21	3				6		5	7	3
106,000	593	594	9,890	817	829	609	221	155	74	28	45	45	13	14		42		7		5		10		
53,300	817	1,330	851	722	335	382	172	150	98	156	23	7	12	22	41	10	4	19			4	7		
39,200	1,870	889	541	772	605	384	306	300	117	68	63	426		3	2			9	31	36				
22,300	797	1,420	912	814	339	457	590	209	271	187	55	13	14	6	4	25					5	4		
17,700	570	1,760	779	520	258	387	171	221	127	166	105		17	51	18	10	7	3	3	12	5			
15,700	460	742	994	317	226	188	159	148	113	41	28	51	27	45	48	8	7	4					14	
11,100	418	771	784	297	244	299	207	146	85	105	22	35	80	250		83	44	4	35		5			
873	644	464	361	207	118	1,230	486	78	125	65	91	45	18	49	24	11	10		16	6		6		
9,140	236	447	308	209	65	111	114	87	19	28	15	32	30	10	62		8	4			6		4	2
625	91	161	179	139	59	96	70	94	29	29	19	14	9	12	25	17	3	37	31					
531	278	186	225	23,200	119	51	49	3,730	55	28	32	71	7	18	24			93	6	2				
528	116	1,880	218	161	39	56	82	27	18	12	37	68	15		21		14		11	3	3	7		22
3,630	87	65	976	29	61	58	30	20	50	18	40	20	40	14	28		7		12	7	3	171		
2,210	32	43	159	94	99	88	101	48	23		12	64	116	14	19	9	2	6	2	14				
2,310	89	43	105	31	85	13	52	8	16	16	33	10	6		4	16		16	21	9	6			3
1,400	25	142	103	36	50	3,920	7	15	23		10		11	19	5		8	3	6	38		38		
1,320	49	159	26	27		34	27		11	15	9	52	8		7	6	5	27	9		57	39		
1,070	15	41	42	5	31	881	36	20	2	30	18	14	6		9	17		6	10				6	19
1,720	22	37	211	12	30	12	13	15	41	8	9	8	5		7		16							6
714	55	9	48	973	24	19	7			23	3	46	11		7	10	6							
720	9	13	15	20	2	1,320	4		13	4		3			8	32	7	2						

AAAAAAAAAAAAAAAAAAAAAAAAAARGH...

...AAAAAAAAAAAAAAAAAAAAAAAAARRRRRRRRRRRRRRRRRRRRRRRRRRGH

Cognitivist alternative to universal grammar

Universals (cognitive and biological)

- prototype-based categorization with basic-level hierarchies
- schematization
- conceptual integration (seeing something[s] as something)
- body relative orientation (up/down)
- container schemas
- causative schemas
- iconicity / markedness / emphasis
- space / time / mode / aspect
- physiological universals (smile, blood pressure, limits of vision, etc.)
- anthropological universals (social scripts and scenarios, folk theories, ritualization, social structure, us/them, gender divisions, taboo, etc.)

Ditransivity, the Czech *učit*, and the single θ-role

ENGLISH

teach SB$_{(dat)}$ STH$_{(acc)}$ / teach STH $_{(acc)}$ to SB $_{(dat)}$

*He taught Peter Czech. He taught Czech to Peter. He taught Peter. He taught Czech. *He taught to Peter.*

CZECH

učit NĚK**OHO**$_{(acc)}$ NĚČ**EMU**$_{(dat)}$ / učit NĚK**OHO**$_{(acc)}$ NĚ**CO**$_{(acc)}$

*Učil Petr**a*** $_{(acc)}$ *češtin**ě*** $_{(dat)}$ */ Učil Petr**a*** $_{(acc)}$ *češtin**u*** $_{(acc)}$

*Učil Petr**a*** $_{(acc)}$ */ *Učil Petr**ovi*** $_{(dat)}$

*Učil češtin**u*** $_{(acc)}$*/ ?*Učil češtin**ě*** $_{(dat)}$.

Učil se $_{(acc)}$ *češtin**u*** $_{(acc)}$*/ Učil se* $_{(acc)}$ *češtin**ě*** $_{(dat)}$

Negation of modals across languages:

ENGLISH

must vs. must not = reversed force

may vs. may not = negated permission

can vs. cannot = negated ability

CZECH

muset vs. nemuset = removed force / obstacle (don’t have to)

smět vs. nesmět = negated permission (must not)

moct vs. nemoct = negated ability

Cognitivist alternative to language acquisition

"*language has appeared special and unassimilable to broader psychological phenomena* mainly because linguists have insisted on analyzing it in an inappropriate and highly unnatural fashion; **once the many layers of artifact are removed**, language starts to look **much more natural and learnable** in terms of what we know about other facets of human cognitive ability." (Langacker, 1987, Foundations of Cognitive Grammar, p. 13)

- Can Johnny play with us?
- *Can Johnny with us play?
- *Can play Johnny with us?

- Can OBJ ACT?

- Can the man whose daughter kicked Johnny in the shins the day before we saw that awful movie about unicorns bring his errant child to play with us today, please?

“What color -- What color blanket -- What color mop -- What color glass … Not the yellow blanket --- The white … It't not black -- It's yellow … Not yellow -- Red … Put on a blanker -- White blanket -- And yellow blanket -- Where's yellow blanket … Yellow light … There is the light -- Where is the light -- Here is the light.”

“Big and little -- Little Bobby -- Little Nancy -- Big Nancy”

“Anthony take the -- Take the book … This is the -- This is the -- Book… That's a -- That's a -- That's a kitty -- That a Fifi here … Mommy get some --- Mommy get some -- Soap.”

Weir, 1962, Language in the crib

- Primary unit of acquisition is utterance
- Children acquire constructions in the same way they acquire vocabulary – as usage-based schemas
- The process of acquisition is the building and structuring of language as an inventory; repetition with minor variation is a significant factor; old structures motivate new structures
- Early categorizations are different from adult abstractions (mental/linguistic representations)
- Children play an active role in language acquisition through extraction of schemas and active experimentation (language in the crib)

Alternative readings in linguistics and language analysis

Introductory

Baker, 1992, In other words: A coursebook of translation

Aitchison, 2001, Language change

Croft and Cruse, 2004, Cognitive linguistics

Cognitivist approaches

Lakoff, 1987, Women, fire, and dangerous things: What categories reveal about the mind

Langacker, 1987/1990, Foundations of Cognitive Grammar (Vol 1&2)

Talmy, 2000, Toward a cognitive semantics

Croft, 2001, Radical construction grammar

Fauconnier and Turner, 2002, The way we think

Alternatives to cognitivism

Halliday and Hasan, 1976, Cohesion in English

Chafe (ed.), 1980, Pear stories

Goffman, 1984, Forms of talk

Lamb, 1999, Pathways of the brain

Givón, 2001, Syntax: An introduction

Labov, 2001, Principles of linguistic change, Vol. 2

The Gospel according to Chomsky

In the beginning was Bloomfield. And his theory was without form, and structuralist; and darkness was upon the face of Chomsky.

And Chomsky said: Let there be transformations, and there were transformations. And Chomsky saw the transformations, that they were good; and Chomsky divided the surface from the deep structure. And that was the start of generative grammars.

And Chomsky made three great lights. And the greatest light was explanatory adequacy; and the lesser lights were descriptive adequacy, and observational adequacy. And Chomsky set them into the firmament of the 'Aspects' meta-theory, and he said: Let all other grammars be judged by them.

Chomsky said: Let MIT bring forth grammarians and grammars yielding trees after my kind, and the trees yielding sentences after their kind. And Chomsky blessed them, and said: Be infinitely recursive, and multiply. And Chomsky saw that they were good.

http://www.xs4all.nl/~ace/Literaria/Txt-Chomsky.html