Proposing the Multi-layered Semantic Frame Analysis of Text

Kow Kuroda and Hitoshi Isahara
National Institute of Information and Communications Technology, Japan

Designed to develop (mainly Japanese) databases of "word senses in contexts" to fullfil the need to describe the "ecology" of words and their senses
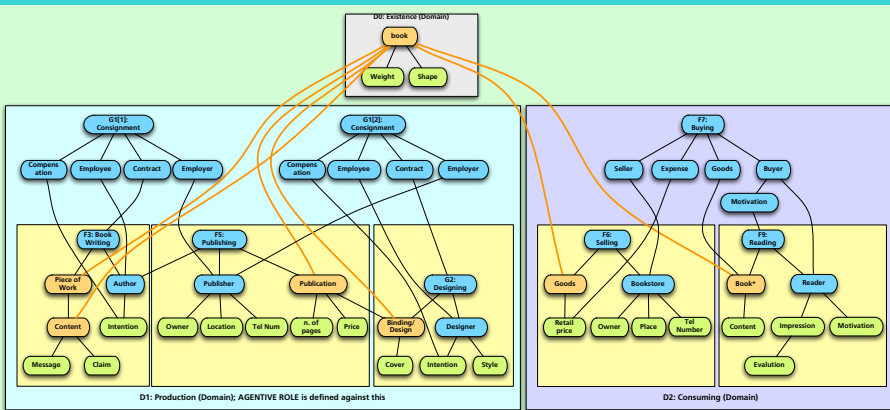
Supports a "preprocess" that needs to be done before defining entries for any useful (generative) lexicon

Each word is linked to as many situational/ semantic roles as needed, based on the Berkeley FrameNet approach to word sense representation/disambiguation.

Semantic roles in our sense are neither "thematic roles" in the sense of Generaive Grammar nor "deep cases" in the sense of Case Grammar; Rather, they are part of a "cognitive models," or situations, granting that a situation is an organization of situational roles rather than entities.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Frame ID	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13
2	F-to-F relations	elaborates F2; constitutes F3		constitutes F5; presumes F4		presupposes F3	presupposes F4; constitutes F5; presumes F7	presupposes F6; elaborates F9		presupposes F5	presupposes F9	Presidential Government in the U.S.	constittues F3,F5	Reporting
3	Frame	Title Giving	Name Giving	Writing	Authoring	Publishing	Selling	Purchasing	Consuming	Reading	Having Fun		Disclosure	Reporter
4	*													Reporter
5	*					Purpose		GOVERNOR	GOVERNOR	Means				Report[start 1,end]
6	*							Purpose	Means	GOVERNOR				
7	*								Purpose	Purpose	GOVERNOR			
8	*					Retailer	Seller	Seller	Provider3					
9	*					Customer	Customer	Purchaser	Consumer	Reader	Enjoyer			
10	*	Title Giver[secondary]	Name Giver[2]		Supporter	Publisher	Provider		Provider2					
11	*	Title Giver[primary]	Name Giver[1]	Writer	Author	Supporter?			Provider1				Revealer	
12	*			Purpose1							Domain=Topic		GOVERNOR	
13	A	Work	Object	Book	Work[+Piece]	Publication	Goods	Goods	Commodity	Book	Fun Source			Report[start 2,end]
14	book													
15	titled	GOVERNOR	GOVERNOR	Book.attribute	Work.attribute	Publication.attribute	Goods.attributes	Goods.attributes	Commodity.attribtute	Book.attribute	Fun Source.attribute			
16		MARKER[1,2]	MARKER[1,2]											
17	The	Title	Name										Secrets: EVOKER	
18	Inside													
19	White										Presidential Office: EVOKER		Target	
20	House													
21	*	MARKER[2,2]	MARKER[2,2]											
22	will					EXTENDER2	EXTENDER2							
23	go					EXTENDER1	EXTENDER1							
24	on			Purpose2		GOVERNOR[+composite]	GOVERNOR[+composite]						Means	
25	sale													
26	in					MARKER	MARKER							
27	the					Place	Place							
28	U.S.													
29	on					MARKER	MARKER							
30	January					Time: Date	Time: Date							
31	14													
32	.													

MSFA of *A book titled "The Inside White House" will go on sale in the U.S. on January 14.*

Domain Effect Arising from Frame Clustering

Frames specify units of human situational understanding, thereby defining cognitive structures that lead to semantic field effects.

Certain frames "cluster" together, thereby constituting a "domain" like Production, Consumption. Typically, clustering is caused by Purpose/Means coupling.

Frame enumeration in MSFA needs not to be exhaustive, as far as it specifies information necessary to construct a Hierarchical Frame Network Analysis (HFNA) below.

A Hierachical Frame Network Containing Ontological Hierarchies

HFNA is supposed to specify *what people actually "understand"* when they hear (or read) a sentence. HFNA is a fuller specification of human understanding than MSFA. MSFA serves as a preprocess for the construction of a HFNA of a given setence.

Theoretically, HNFA implements a PDP-style computation:
1) Words evoke, or "activates" frames that they are components of.
2) Evoked frames activate other frames (partially indicated), typically by such associative relations as elaboration, preparation, realization, motivation, presupposition (some of them are pecified as Frame-to-Frame relations in MSFA).
3) Lateral inhibition among activated frames (not indicated *per se*) leads to convergence.

Ontological hierarchies like "Book IS-A Goods IS-A Product IS-A Artifact IS-A Physical Entity" are a derivative of hierarchical frame network.

Frame-evoking elements (evokers) are typically words or morphemes, but they need not be so. Certain kinds of frame-evocation are distributed in nature. This is true especially for "collocations" and "styles."