





Computational Representation of Image Schemas in FrameNet

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Presentation Roadmap

- Background
 - Image schemas
 - Grammatical constructions
- Research questions
- Test case
 - Brazilian Portuguese Inceptive Aspectual Cxn.
- Further challenges
 - Mass Quantification Cxn.





Image Schemas

- Recurring dynamic pattern of human perceptual interactions and motor programs, which gives coherence and structure to our experience in the world (Johnson, 1987)
- Directly meaningful, highly schematic and internally structured (Hampe, 2005)
- Play a central role in the study of grammatical constructions in the sense that content words that develop grammatical functions in constructions tend to preserve them (Sweetser, 1988, 1990)





Grammatical Constructions

- Form and meaning pairings
- Rules that license "new" linguistic signs based on other linguistic signs (Fillmore, Lee-Goldman & Romieux, 2012)
- Modeled in FrameNet Constructions in terms of mothers (the whole construction) and daughters (their constituent parts)





Research Questions

- Provided that grammatical constructions may present combinatorial restrictions between their daughter signs...
 - How can we model such combinatorial restrictions in a Constructicon?
 - Can Image Schemas offer some aid in this process?
 - Does such a model parallel what happens in language use?





Test Case

- The Inceptive Aspectual Cxn. in Brazilian Portuguese (Sigiliano, 2013)
 - [V1_{fin} (prep) V2_{inf}]
 - Evokes the Activity_start or Process_start frames
 - The V1 slot can be filled by either canonical or non-canonical aspectual markers
 - Two non-canonical verbs were selected for this experiment: romper 'break' and entrar 'enter'





Test Case

- The Inceptive Aspectual Cxn. in Brazilian Portuguese (Sigiliano, 2013)
 - Maria rompeu a chorar
 Maria break.PAST.3SG to cry.INF
 Maria burst into tears.
 - Pedro entrou a reclamar
 Pedro enter.PAST.#SG to complain
 Pedro started complaining.





Collocations in the Aspectual Cx

V1	Schema	V2 Semantic Types	Frame
romper 'break'	Removal_of_ restraint	Emotion (17 / 65.4%)	Make_noise (???)
		Action (5 / 19.2%)	Intentionally_act/affect
		Motion (3 / 11.5%)	Self_motion
		Speaking (1 / 3.9%)	Communication
entrar 'enter'	Into	Action (36 / 58.1%)	Intentionally_act/affect
		Speaking (11 / 17.8%)	Communication
		Motion (7 / 11.3%	Self_motion
		Emotion (3 / 4.8%)	Make_noise (???)
		Perception (2 / 3.2%)	Perception
		State (1 / 1.6%)	State
		Desiring (1 / 1.6%)	Desiring
		Believing (1/	Opinion

Semantic types of V2 occuring in Aspectual Cxn. with V1 *romper* and *entrar* in current Portuguese







Aspectual Cxn. with V1 entrar from the 15th to the 20th centuries







Aspectual Cxn. with V1 romper from the 15th to the 20th centuries





The Model

- Relying on the connections between frames and schemas, the model searches for the shortest path between the Image Schema still present in the grammaticalized V1 and the frame evoked by V2
- Different kinds of connections represent different distance values
 - Perspective: 0.1
 - Inheritance: 0.2
 - Subframe & Using: 0.3





The Model

- The Shortest Path tool:
 - ✓ Source Schema = V1
 - ✓ Goal Schema = V2
 - ✓ Inheritance:
 - ✓ Using:
 - ✓ Distance = 0.7

Shortest Path
Source Schema Goal Schema Removal_of_restraint Goal Schema Enviar
Path
Distância = 0,7 Removal_of_restraint I Force_application Intentionally_act Intentionally_affect





The Hypothesis

- If the semantics of Aspectual Auxiliaries maintains the connection to Image Schemas (Sweetser, 1988, 1990), it could be possible to explain collocation restrictions between V1 and V2 by measuring how close the source Image Schema is from the traget frame.
- High frequency V1-V2 collocations should present shorter distances
- Low frequency V1-V2 collocations should present longer distances





The Results

V1	Schema	V2 Semantic Types	Frame	Dist.
romper 'break'	Removal_of_ restraint	Emotion (17 / 65.4%)	Make_noise (???)	1.4
		Action (5 / 19.2%)	Intentionally_act/affect	0.7/.5
		Motion (3 / 11.5%)	Self_motion	0.7
		Speaking (1 / 3.9%)	Communication	0.9
entrar 'enter'	Into	Action (36 / 58.1%)	Intentionally_act/affect	0.7/.9
		Speaking (11 / 17.8%)	Communication	1.2
		Motion (7 / 11.3%	Self_motion	0.5
		Emotion (3 / 4.8%)	Make_noise (???)	1.5
		Perception (2 / 3.2%)	Perception	1.2
		State (1 / 1.6%)	State	1.0
		Desiring (1 / 1.6%)	Desiring	1.6
		Believing (1 / 1.6%)	Opinion	1.6

Semantic types of V2 occuring in Aspectual Cxn. with V1 *romper* and *entrar* in current Portuguese





Discussion

- Questions:
 - Is Make_noise a good representation for verbs like crying, screaming and so on?
 - Are the distances proposed for each relation balanced properly?
 - Shouldn't we include metaphor as a link in our model?
 - ACTION IS MOTION
 - EMOTIONS ARE LIQUIDS IN A CONTAINER





More questions?