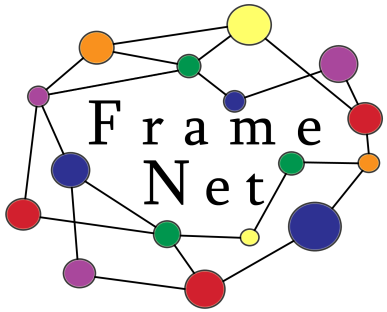

Background to FrameNet

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INTERNATIONAL
COMPUTER SCIENCE
INSTITUTE

Road Map

- FrameNet
- Frames
  - Frame Elements
  - Lexical Units
- FrameNet Annotation
  - Lexicographic Annotation
  - "Full-Text" Annotation
- Frame-to-Frame Relations
- FrameNet: New Developments

Road Map

- ✓ FrameNet
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- FrameNet: New Developments

Charles J. Filllmore (aka OFL)

1929-2014

What is FrameNet?

- A unique knowledge base with information on the mapping of meaning to form through the theory of Frame Semantics (Fillmore 1975, 1985, Fillmore and Atkins 1986, Fillmore and Baker 2010, Fillmore 2012, Fontenelle 2003, Petruck 1996)
- A resource that provides rich semantics for the core English vocabulary based on manually annotated corpus evidence, including valence descriptions for each item analyzed

What's "in" FrameNet?

- ~ 1,200 semantic frames (including FEs)
- ~ 13,500 lexical units
- > 202,000 manually annotated examples
- > 1,800 frame-to-frame relations constituting a hierarchy of semantic frames

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What's a Frame?

A Semantic Frame is a script-like structure of inferences, linked by linguistic convention to the meanings of linguistic units - here, lexical items - constituting a schematic representation of a situation, object, event, or relation providing the background structure against which words are understood. Each frame identifies a set of frame elements – participants in the frame.

Semantic Frames in FrameNet

- Situation: Being_attached, Being_necessary, Being_strong, Being_wet, etc.
- Event: Apply_heat, Borrowing, Catching_fire, Cooking_creation, Hiring, Replacing, etc.
- Object: Buildings, Containers, Intoxicants, Offenses, People_by_origin, etc .
- Relations: Locative_relation, Spacial_co-location, Interior_profile_relation, Similarity, etc.

What's "in" a Frame?

- Frame Definition

  a prose description of a situation involving various participants and other conceptual roles, each of which constitutes a frame element

- Frame Elements (FEs):

  semantic roles as the basic unit of a frame, defined specifically to each frame

- Lexical Units (LUs):

  pairing of a lemma and a frame, i.e. "word" in one of its senses; LU evokes a frame

Apply_heat: Definition

A Cook applies heat to Food, where the Temperature_setting of the heat and Duration of application may be specified. A Heating_instrument, generally indicated by a locative phrase, may also be expressed. Some cooking methods involve the use of a Medium (e.g. milk or water) by which heat is transferred to the Food.

This frame focuses on the process of handling the ingredients, rather than the end result (See Cooking_creation).

Apply_heat: Frame Elements

Cook

Food

Temperature_setting

Duration

Heating_instrument

Medium

Lila **FRIED** the eggs in a copper pan.

Frame Elements: Coreness

- Core: uniquely defines a frame

  `Commerce`: BUYER, SELLER, MONEY, GOODS

- Peripheral: for aspects of events in general

  e.g. TIME, PLACE, MANNER

- Extrathematic: situate an event against the backdrop of another state of affairs; conceptually do not belong to the frame in which they occur
  - e.g. ITERATION, RECIPIENT

    Sue **BAKED** the cookies [twice $_{\text{ITERATION}}$].

    Sue **BAKED** the cookies [for me $_{\text{RECIPIENT}}$].

Frame Elements

Triple of Information

Frame Element

- semantic role

Grammatical Function

- External, Object, Dependent

Phrase Type

- full range of PTs for language

Apply_heat: Lexical Units

bake.v, baking.n barbecue.v, blanch.v, boil.v, braise.v, braising.n, broil.v, brown.v, char.v, coddle.v, cook.v, deep fry.v, fry.v, frying.n, grill.v, microwave.v, parboil.v, plank.v, poach.v, roast.v, saute.v, scald.v, scorch.v, sear.v, searing.n, simmer.v, singe.v, steam.v, steep.v, stew.v, toast.v

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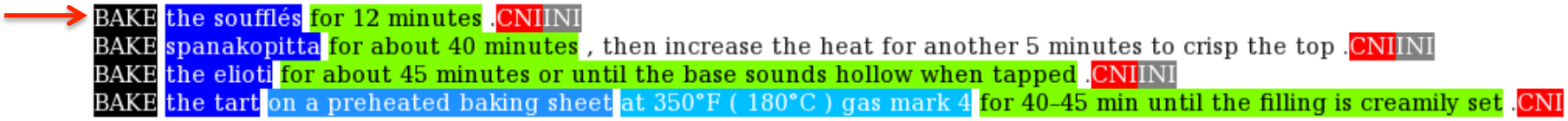
Lexicographic Annotation

- What?
  - Dependents of one **TARGET** per example sentence
    - constituents that instantiate Frame Elements (semantic roles), including prepositions
  - Null Instantiated Core FEs
- Why?
  - show **TARGET** word (= LU) use in language
  - determine valence description of each **TARGET**
  - account for non-instantiated FEs
  - FN began as a computational lexicography project

Null Instantiation

- Constructional Null Instantiation (CNI)
  - construction licenses omission
    - imperative, agentless passive
- Definite Null Instantiation (DNI)
  - lexically specific, understood from discourse, knowledge of missing material required for determining referent
    - Frank **RETALIATED** after the bar incident. OFFENDER **DNI**
- Indefinite Null Instantiation (INI)
  - lexically specific, intransitive use of transitive verbs (e.g. eat, drink, sew, bake), knowledge of category of missing material, even if not mentioned in previous discourse or context

Lexicographic Annotation:
Apply_heat.bake.v



COOK CNI

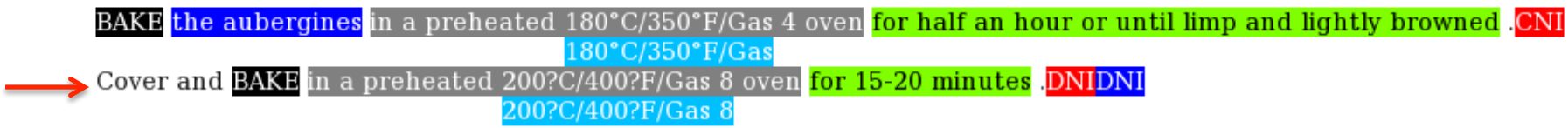
HEATING_INSTRUMENT INI

FE: **BAKE** [the souffle $_{\text{FOOD}}$] [for 12 minutes $_{\text{DURATION}}$]

GF: Object Dep

PT: NP PP_{for}

Second Layer Annotation: `Apply_heat`.bake.v



Cover and **BAKE** [in a preheated 200°C/400°F/Gas 8 oven $_{\text{HEATING\_INSTRUMENT}}$] for 15-20 minutes.

[200°C/400°F/Gas 8 $_{\text{TEMPERATURE\_SETTING}}$]

Lexicographic Annotation Results: `Apply_heat`.bake.v

Number Annotated	Patterns				
1 TOTAL	Container	Cook	Duration	Food	
(1)	PP[in] Dep	CNI --	PP[for] Dep	NP Ext	
1 TOTAL	Container	Cook	Duration	Food	Temperature_setting
(1)	PP[on] Dep	CNI --	PP[for] Dep	NP Obj	PP[at] Dep
5 TOTAL	Cook	Duration	Food	Heating_instrument	
(2)	CNI --	PP[for] Dep	CNI --	INI --	
(3)	CNI --	PP[for] Dep	NP Obj	INI --	
3 TOTAL	Cook	Duration	Food	Heating_instrument	Temperature_setting
(1)	CNI --	PP[for] Dep	CNI --	INI --	PP[at] Dep
(1)	CNI --	PP[for] Dep	NP Obj	PP[in] Dep	2nd --
(1)	DNI --	PP[for] Dep	DNI --	PP[in] Dep	2nd --
1 TOTAL	Cook	Food	Heating_instrument		
(1)	CNI --	NP Obj	INI --		
1 TOTAL	Cook	Food	Heating_instrument	Manner	
(1)	CNI --	NP Obj	PP[in] Dep	AVP Dep	
1 TOTAL	Duration	Heating_instrument	Temperature_setting		
(1)	PP[for] Dep	PP[in] Dep	2nd --		

Cooking_creation: Definition

A Cook creates a Produced_food from (raw) Ingredients. The Heating_Instrument and/or the Container may also be specified. This frame describes food and meal preparation.

Cooking_creation: Frame Elements

Cook

Produced_food

Ingredients

Heating_Instrument

Container

Sam **MADE** vegetable soup for dinner last night.

Cooking_creation: Lexical Units

bake.v, baking.n, concoct.v, cook up.v, cooking_up.n, cook.n, cooking.n, cook.v, make.v, put together.v, whip up.v,

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Lexicographic Annotation:
Cooking_creation.bake.v

429-s20-lcoll-bread
1. The bread would then be slipped in , the oven door sealed , and when the oven cooled , the bread would be BAKED .CNI

429-s20-rcoll-bread
1. It is also illegal in Norway for a bakery to BAKE bread on a Saturday or Sunday .
2. Almost all the food is grown at camp ; they BAKE their own bread and the food is not only 100% nutritious but very delicious .
3. Rosalind BAKES her own bread and croissants and will prepare an evening meal with advance notice .
4. And she BAKED some bread with the millet flour that she had brought from her own garden .

429-s20-rcoll-cake
1. Some larger stores sell special tins of all the numbers so you can BAKE a cake in the shape of your child 's age .
2. Believing in economy , Miss Lodsworth had already BAKED rock and fairy cakes and spread hundreds of sandwiches with crusts still on with Marmite and plum jam which was cheaper than strawberry .

429-s20-rcoll-minute

429-s20-rcoll-oven

550-s20-np-np
1. And she would BAKE a chocolate mousse torte .
2. And for tomorrow 's Sunday dinner , she was going to roast a leg of mutton and BAKE an apple pie .
3. I BAKED some currant buns for you . "
4. The wife of Senator Arlen Specter even BAKED Ali a double chocolate-mousse pie .

570-s20-np-ppfor
1. Louise had BAKED a pie for him and was bringing a new pair of sheets from the airing cupboard .

620-s20-np-ppother

650-s20-np-pother

660-s20-trans-simple

670-s20-pass-by

680-s20-pass
1. In Spain , breads flavoured with cinnamon and dried fruit are BAKED at Easter , and some contain hard-boiled eggs , according to Elizabeth Luard 's European Festival Food .CNI
2. A special birthday cake was BAKED to mark the occasion , which was held in Graham School .CNI

Lexicographic Annotation Results: Cooking_creation.bake.v

Number Annotated	Patterns			
1 TOTAL	Container	Cook	Produced_food	
(1)	PP[in] Dep	NP Ext	NP Obj	
2 TOTAL	Cook	Ingredients	Produced_food	
(1)	NP Ext	PP[with] Dep	CNI --	
(1)	NP Ext	PP[with] Dep	NP Obj	
1 TOTAL	Cook	Place	Produced_food	Time
(1)	CNI --	PP[in] Dep	NP Ext	PP[at] Dep
12 TOTAL	Cook	Produced_food		
(2)	CNI --	NP Ext		
(1)	CNI --	NP Obj		
(1)	DNI --	DNI --		
(1)	DNI --	NP Obj		
(7)	NP Ext	NP Obj		
2 TOTAL	Cook	Produced_food	Purpose	
(1)	CNI --	NP Ext	VPto Dep	
(1)	DNI --	NP Obj	PP[for] Dep	
3 TOTAL	Cook	Produced_food	Recipient	
(1)	NP Ext	NP Dep	NP Obj	
(2)	NP Ext	NP Obj	PP[for] Dep	
1 TOTAL	Cook	Produced_food	Time	
(1)	NP Ext	NP Obj	PP[on] Dep	

Lexicographic Annotation Results: Cooking_creation: bake.v

[Cook The wife of Senator Arlen Specter] even *BAKED*^{Target} [Recipient Ali] [Produced_food a double chocolate-mousse pie] .
[Cook I] *BAKED*^{Target} [Produced_food some currant buns] [Recipient for you] . "
[Cook Louise] had *BAKED*^{Target} [Produced_food a pie] [Recipient for him] and was bringing a new pair of sheets from the airing cupboard .

FE:	[I $_{COOK}$] **BAKED**	[some currant buns $_{PRODUCED\_FOOD}$]	[for you $_{RECIPIENT}$].
GF:	External	Object	Dependent
PT:	NP	NP	PP_{for}

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Full-Text Annotation

- What is full-text annotation?
  - annotation with respect to every frame evoking element in a text
  - multiple layers of lexicographic annotation
- Why did FN *add* full-text annotation?
  - demonstrate the contribution of Frame Semantics to text understanding
  - client/user considerations

Full-Text Annotation

39. A series of DISASTROUS_Catastrophe DECISIONS_Deciding at the BEGINNING_Temporal_subregion of the 20th CENTURY_Calendric_unit BEGAN_Activity_start to SOUND_Make_noise a DEATH_Death knell for the Ottoman EMPIRE_Political_locales . The Turks LOST_Finish_competition a SHORT_Duration_description WAR_Hostile_encounter with Italy , and were FORCED_Causation to RELINQUISH_Surrendering_possession the Dodecanese ISLANDS_Natural_features to the ITALIANS_People_by_origin . Greece took this opportunity to absorb the ISLANDS_Natural_features of the NORTHERN_Part_orientational and EASTERN_Part_orientational Aegean and to add Macedonia to its mainland TERRITORIES_Political_locales .

40. FOLLOWING_Relative_time this DEBACLE_Catastrophe , the OTTOMANS_People_by_origin then allied themselves to Germany in the World WAR_Hostile_encounter I , LOSING_Earnings_and_losses MORE_Increment TERRITORY_Political_locales with the DEFEAT_Beat_opponent of the GERMANS_People_by_origin in that WAR_Hostile_encounter . Greece was HANDED_Giving a STRIP_Shapes of land along the WESTERN_Part_orientational COAST_Relational_natural_features of Asia Minor , which for over 2,000 YEARS_Measure_duration had HAD_Possession a substantial GREEK_Origin POPULATION_Aggregate . Greece moved in to ADMINISTER_Leadership the land , but a NEW_Age INFLUENCE_Objective_influence UPSET_Preventing any GRAND_Dimension dreams of MAKING_Cause_change this REGION_Locale a PART_Part_whole of greater Greece .

41. IN_Temporal_collocation 1923 , Turkey broke away from the TIRED_Biological_urge OTTOMAN_People_by_origin RULERS_Leadership , and Kemal Ataturk ROSE_Motion_directional to POWER_Leadership on a WAVE_Quantified_mass of POPULAR_Desirability support . He PROMISED_Commitment a MODERN_Stage_of_progress STATE_Leadership for his PEOPLE_People , but as the situation BECAME_Becoming volatile , civil STRIFE_Hostile_encounter BROKE_Process_start OUT_Process_start IN_Interior_profile_relation TURKISH_Origin CITIES_Political_locales , and those CONSIDERED_Categorization GREEK_People_by_origin were VICTIMS_Undergoing of THREATS_Commitment and violence . Many HAD_Required_event to LEAVE_Departing their birthplaces , FLEEING_Fleeing TO_Goal Lesvos , Chios , and Samos , the Greek-ruled ISLANDS_Natural_features just OFFSHORE_Locative_relation . THOUSANDS_Quantified_mass of PEOPLE_People ARRIVED_Arriving with little MORE_Increment than the CLOTHES_Clothing they WORE_Wearing , PUTTING_Placing great strain on the resources of the ISLANDS_Natural_features . FINALLY_Time_vector , Greece was OUSTED_Removing from its NEW_Age TERRITORY_Political_locales IN_Interior_profile_relation Asia Minor , which BECAME_Becoming PART_Part_whole of the NEW_Age TURKISH_Origin STATE_Political_locales .

42. Greece ATTEMPTED_Attempt to STAY_State_continue out of World WAR_Hostile_encounter II , but Mussolini SAW_Categorization Greece as an IDEAL_Usefulness addition to his ITALIAN_Origin EMPIRE_Political_locales . His FORCES_Military made a series of ATTACKS_Attack from their BASES_Locale_by_use IN_Interior_profile_relation the Dodecanese ISLANDS_Natural_features , INCLUDING_Inclusion sinking a GREEK_Origin NAVAL_Military VESSEL_Vehicle IN_Interior_profile_relation the HARBOR_Locale_by_use of Tinos TOWN_Political_locales , but they only SUCCEEDED_Success_or_failure in STRENGTHENING_Cause_change_of_strength the resolve of the POPULATION_Aggregate AGAINST_Taking_sides them . LATER_Time_vector the GERMANS_People_by_origin CAME_Arriving in FORCE_Military and occupied MANY_Quantified_mass of the ISLANDS_Natural_features .

43. AFTER_Time_vector the WAR_Hostile_encounter , IN_Temporal_collocation 1949 , the Dodecanese ISLANDS_Natural_features FINALLY_Time_vector BECAME_Becoming PART_Part_whole of the GREEK_Origin NATION_Political_locales . But the COUNTRY_Political_locales was politically FRAGMENTED_Cause_to_fragment , with ARGUMENTS_Quarreling between monarchists and republicans , right and left , and tension escalated into civil WAR_Hostile_encounter . The STRUGGLE_Hostile_encounter bypassed most of the ISLANDS_Natural_features , ALTHOUGH_Concessive THERE_Existence WAS_Existence fierce FIGHTING_Hostile_encounter ON_Spatial_contact Samos . Even AFTER_Time_vector the FIGHTING_Hostile_encounter STOPPED_Process_stop MORE_Increment than a DECADE_Calendric_unit LATER_Time_vector , the COUNTRY_Political_locales was not stable .

44. At the same time , the massive GROWTH_Change_position_on_a_scale in air and ROAD_Roadways transport SAW_Causation shipping DECLINE_Change_position_on_a_scale in IMPORTANCE_Importance . The Aegean ISLANDS_Natural_features , which for CENTURIES_Measure_duration had been IMPORTANT_Importance PORTS_Locale_by_use on the trading ROUTES_Roadways , BECAME_Becoming the BACKWATERS_Isolated_places of this NEW_Age TRANSPORT_Bringing NETWORK_Network and the ECONOMIES_Economy of SEVERAL_Quantified_mass ISLANDS_Natural_features came close to collapse .

45. IN_Temporal_collocation 1967 , the MILITARY_Military took the reins of POWER_Leadership IN_Interior_profile_relation Athens , and UNTIL_Time_vector 1974 , the `` Colonels '' held sway with a repressive and brutal REGIME_Leadership . MANY_Quantified_mass GREEK_People_by_origin islanders CHOSE_Choosing to LEAVE_Departing rather than live in POVERTY_Wealthiness and TERROR_Fear , and MANY_Quantified_mass MADE_Intentionally_create NEW_Age HOMES_Buildings IN_Interior_profile_relation the United States and Australia . The EXPANSION_Expansion of air TRAVEL_Travel BEGAN_Activity_start the AGE_Calendric_unit of mass TOURISM_Touring , and Greece along with the Aegean ISLANDS_Natural_features BECAME_Becoming EXCITING_Stimulus_focus destinations for NORTHERN_Part_orientational Europeans ESCAPING_Avoiding their DAMP_Being_wet , COOL_Temperature SUMMERS_Calendric_unit .

Full-Text Annotation

39. *A* series *of* DISASTROUS$_{\text{Catastrophe}}$ DECISIONS$_{\text{Deciding}}$ *at the* BEGINNING$_{\text{Temporal_subregion}}$ *of the* 20th CENTURY$_{\text{Calendric_unit}}$ BEGAN$_{\text{Activity_start}}$ *to* SOUND$_{\text{Make_noise}}$ *a* DEATH$_{\text{Death}}$ *knell for the Ottoman* EMPIRE$_{\text{Political_locales}}$ *. The* Turks LOST$_{\text{Finish_competition}}$ *a* SHORT$_{\text{Duration_description}}$ WAR$_{\text{Hostile_encounter}}$ *with Italy , and* were FORCED$_{\text{Causation}}$ *to* RELINQUISH$_{\text{Surrendering_possession}}$ *the Dodecanese* ISLANDS$_{\text{Natural_features}}$ *to the* ITALIANS$_{\text{People_by_origin}}$ *. Greece* took *this* opportunity *to* absorb *the* ISLANDS$_{\text{Natural_features}}$ *of the* NORTHERN$_{\text{Part_orientational}}$ *and* EASTERN$_{\text{Part_orientational}}$ *Aegean and to* add *Macedonia to its* mainland TERRITORIES$_{\text{Political_locales}}$ *.*

40. FOLLOWING$_{\text{Relative_time}}$ *this* DEBACLE$_{\text{Catastrophe}}$ *, the* OTTOMANS$_{\text{People_by_origin}}$ *then* allied *themselves to Germany in the World* WAR$_{\text{Hostile_encounter}}$ *I ,* LOSING$_{\text{Earnings_and_losses}}$ MORE$_{\text{Increment}}$ TERRITORY$_{\text{Political_locales}}$ *with the* DEFEAT$_{\text{Beat_opponent}}$ *of the* GERMANS$_{\text{People_by_origin}}$ *in that* WAR$_{\text{Hostile_encounter}}$ *. Greece was* HANDED$_{\text{Giving}}$ *a* STRIP$_{\text{Shapes}}$ *of land along the* WESTERN$_{\text{Part_orientational}}$ COAST$_{\text{Relational_natural_features}}$ *of Asia Minor , which for over 2,000* YEARS$_{\text{Measure_duration}}$ *had* HAD$_{\text{Possession}}$ *a* substantial GREEK$_{\text{Origin}}$ POPULATION$_{\text{Aggregate}}$ *. Greece* moved *in to* ADMINISTER$_{\text{Leadership}}$ *the land , but a* NEW$_{\text{Age}}$ INFLUENCE$_{\text{Objective_influence}}$ UPSET$_{\text{Preventing}}$ *any* GRAND$_{\text{Dimension}}$ dreams *of* MAKING$_{\text{Cause_change}}$ *this* REGION$_{\text{Locale}}$ *a* PART$_{\text{Part_whole}}$ *of* greater *Greece* .

TARGET

Named Entity

Italics

FrameNet annotation provided

Handled by named entity recognizer

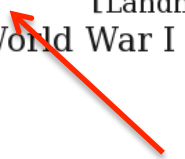
No annotation provided

Full-Text Annotation

40. FOLLOWING$_{\text{Relative_time}}$ *this* DEBACLE$_{\text{Catastrophe}}$ *,* *the* OTTOMANS$_{\text{People_by_origin}}$ *then* allied *themselves to* *Germany* *in the World* WAR$_{\text{Hostile_encounter}}$ *I ,* LOSING$_{\text{Earnings_and_losses}}$ MORE$_{\text{Increment}}$ TERRITORY$_{\text{Political_locales}}$ *with the* DEFEAT$_{\text{Beat_opponent}}$ *of the* GERMANS$_{\text{People_by_origin}}$ *in that* WAR$_{\text{Hostile_encounter}}$. *Greece* *was* HANDED$_{\text{Giving}}$ *a* STRIP$_{\text{Shapes}}$ *of land along the* WESTERN$_{\text{Part_orientational}}$ COAST$_{\text{Relational_natural_features}}$ *of* *Asia Minor* *, which for over 2,000* YEARS$_{\text{Measure_duration}}$ *had* HAD$_{\text{Possession}}$ *a* substantial GREEK$_{\text{Origin}}$ POPULATION$_{\text{Aggregate}}$. *Greece* moved *in to* ADMINISTER$_{\text{Leadership}}$ *the land , but a* NEW$_{\text{Age}}$ INFLUENCE$_{\text{Objective_influence}}$ UPSET$_{\text{Preventing}}$ *any* GRAND$_{\text{Dimension}}$ dreams *of* MAKING$_{\text{Cause_change}}$ *this* REGION$_{\text{Locale}}$ *a* PART$_{\text{Part_whole}}$ *of* greater *Greece* .

Clear Sentences Turn Colors On

[X] *FOLLOWING*$^{\text{Target}}$ [$_{\text{Landmark_occasion}}$this debacle] , [$_{\text{Focal_occasion}}$the Ottomans then allied themselves to Germany in the World War I , losing more territory with the defeat of the Germans in that war] .



Full-Text Annotation

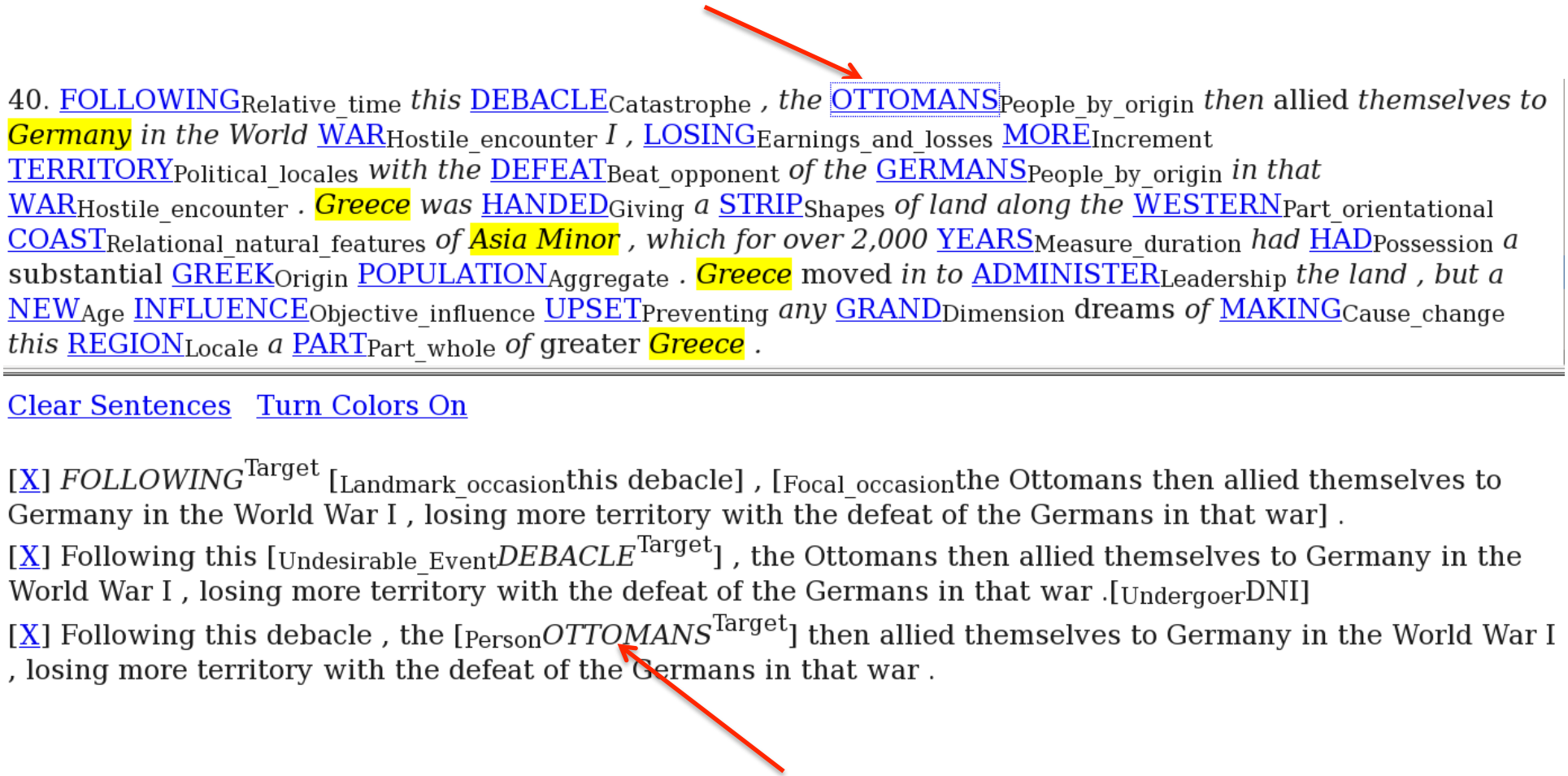
40. FOLLOWING$_{\text{Relative_time}}$ *this* DEBACLE$_{\text{Catastrophe}}$ *, the* OTTOMANS$_{\text{People_by_origin}}$ *then* allied *themselves to Germany in the World* WAR$_{\text{Hostile_encounter}}$ *I ,* LOSING$_{\text{Earnings_and_losses}}$ MORE$_{\text{Increment}}$ TERRITORY$_{\text{Political_locales}}$ *with the* DEFEAT$_{\text{Beat_opponent}}$ *of the* GERMANS$_{\text{People_by_origin}}$ *in that* WAR$_{\text{Hostile_encounter}}$ *. Greece was* HANDED$_{\text{Giving}}$ *a* STRIP$_{\text{Shapes}}$ *of land along the* WESTERN$_{\text{Part_orientational}}$ COAST$_{\text{Relational_natural_features}}$ *of Asia Minor , which for over 2,000* YEARS$_{\text{Measure_duration}}$ *had* HAD$_{\text{Possession}}$ *a* substantial GREEK$_{\text{Origin}}$ POPULATION$_{\text{Aggregate}}$ *. Greece* moved *in to* ADMINISTER$_{\text{Leadership}}$ *the land , but a* NEW$_{\text{Age}}$ INFLUENCE$_{\text{Objective_influence}}$ UPSET$_{\text{Preventing}}$ *any* GRAND$_{\text{Dimension}}$ dreams *of* MAKING$_{\text{Cause_change}}$ *this* REGION$_{\text{Locale}}$ *a* PART$_{\text{Part_whole}}$ *of* greater *Greece* .

Clear Sentences Turn Colors On

[X] *FOLLOWING*$^{\text{Target}}$ [$_{\text{Landmark_occasion}}$this debacle] , [$_{\text{Focal_occasion}}$the Ottomans then allied themselves to Germany in the World War I , losing more territory with the defeat of the Germans in that war] .

[X] Following this [$_{\text{Undesirable\_Event}}$*DEBACLE*$^{\text{Target}}$] , the Ottomans then allied themselves to Germany in the World War I , losing more territory with the defeat of the Germans in that war .[$_{\text{Undergoer}}$DNI]

Full-Text Annotation



40. FOLLOWING$_{\text{Relative_time}}$ *this* DEBACLE$_{\text{Catastrophe}}$ *, the* OTTOMANS$_{\text{People_by_origin}}$ *then* allied *themselves to Germany in the World* WAR$_{\text{Hostile_encounter}}$ *I ,* LOSING$_{\text{Earnings_and_losses}}$ MORE$_{\text{Increment}}$ TERRITORY$_{\text{Political_locales}}$ *with the* DEFEAT$_{\text{Beat_opponent}}$ *of the* GERMANS$_{\text{People_by_origin}}$ *in that* WAR$_{\text{Hostile_encounter}}$ *. Greece was* HANDED$_{\text{Giving}}$ *a* STRIP$_{\text{Shapes}}$ *of land along the* WESTERN$_{\text{Part_orientational}}$ COAST$_{\text{Relational_natural_features}}$ *of Asia Minor , which for over 2,000* YEARS$_{\text{Measure_duration}}$ *had* HAD$_{\text{Possession}}$ *a* substantial GREEK$_{\text{Origin}}$ POPULATION$_{\text{Aggregate}}$ *. Greece* moved *in to* ADMINISTER$_{\text{Leadership}}$ *the land , but a* NEW$_{\text{Age}}$ INFLUENCE$_{\text{Objective_influence}}$ UPSET$_{\text{Preventing}}$ *any* GRAND$_{\text{Dimension}}$ dreams *of* MAKING$_{\text{Cause_change}}$ *this* REGION$_{\text{Locale}}$ *a* PART$_{\text{Part_whole}}$ *of* greater *Greece* .

Clear Sentences Turn Colors On

[X] *FOLLOWING*$^{\text{Target}}$ [$_{\text{Landmark_occasion}}$this debacle] , [$_{\text{Focal_occasion}}$the Ottomans then allied themselves to Germany in the World War I , losing more territory with the defeat of the Germans in that war] .

[X] Following this [$_{\text{Undesirable\_Event}}$*DEBACLE*$^{\text{Target}}$] , the Ottomans then allied themselves to Germany in the World War I , losing more territory with the defeat of the Germans in that war .[$_{\text{Undergoer}}$DNI]

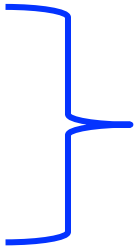
[X] Following this debacle , the [$_{\text{Person}}$*OTTOMANS*$^{\text{Target}}$] then allied themselves to Germany in the World War I , losing more territory with the defeat of the Germans in that war .

Road Map

- FrameNet
- Frames
  - Frame Elements
  - Lexical Units
- FrameNet Annotation
  - Lexicographic Annotation
  - "Full-Text" Annotation
- ✓ Frame-to-Frame Relations

Frame-to-Frame Relations in FN

- Inheritance
- Using
- Subframes
- Precedes
- Perspective_on
- See also
- Inchoative_of
- Causative_of



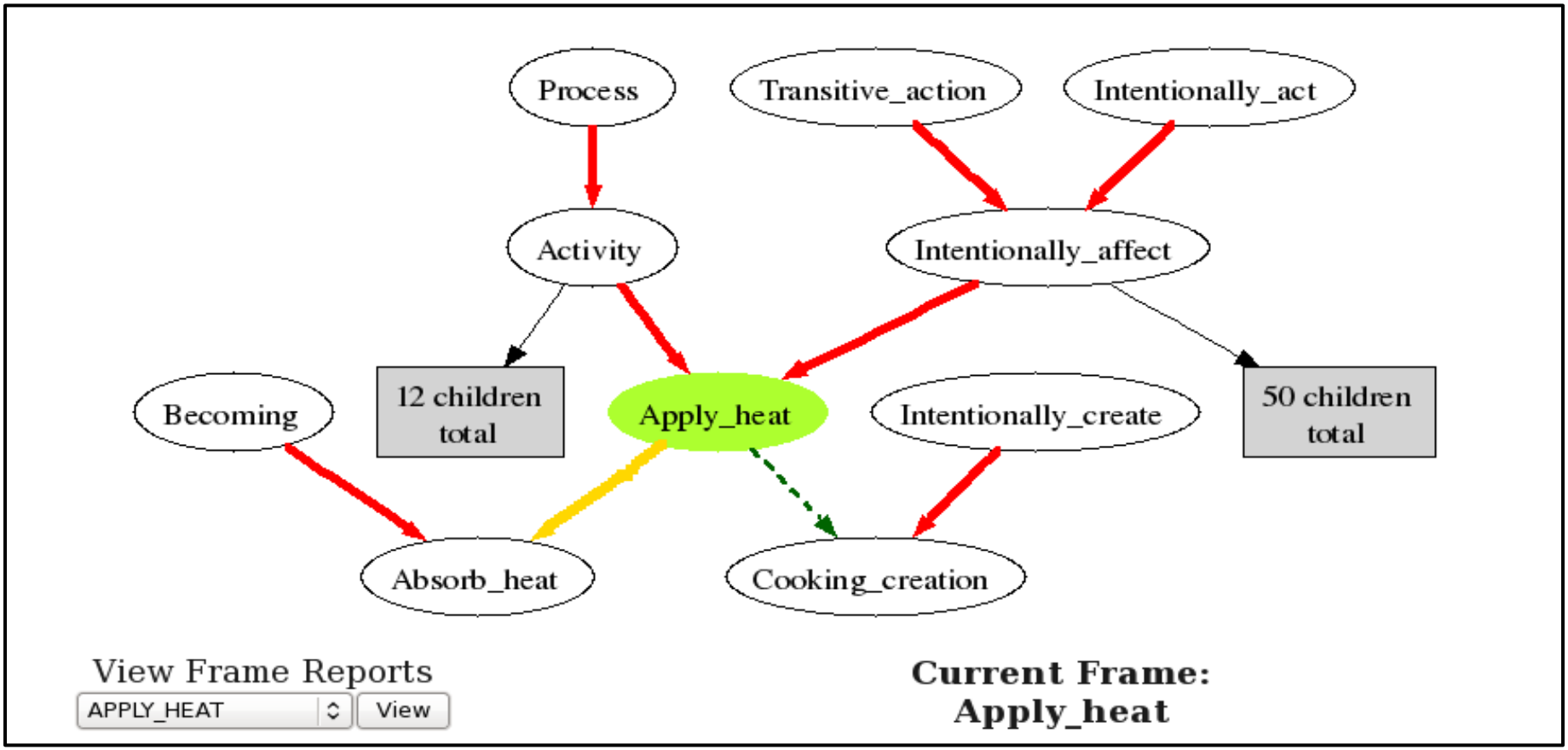
regular lexical relations

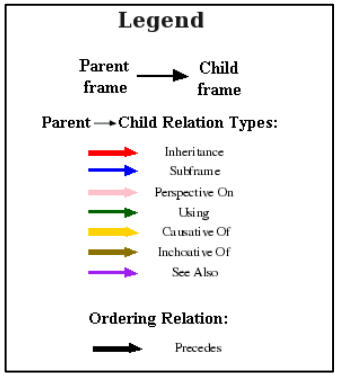
Inheritance

- Relationship between a more general frame, the parent frame, and a more specific one, the child
- Child frame elaborates parent frame
- Corresponding entities, FE, frame relation, and semantic characteristics, in both child and parent
- Child frame entity is the same as or more specific than in parent frame

`Apply_heat` ***inherits*** `Intentionally_affect`

FrameGrapher



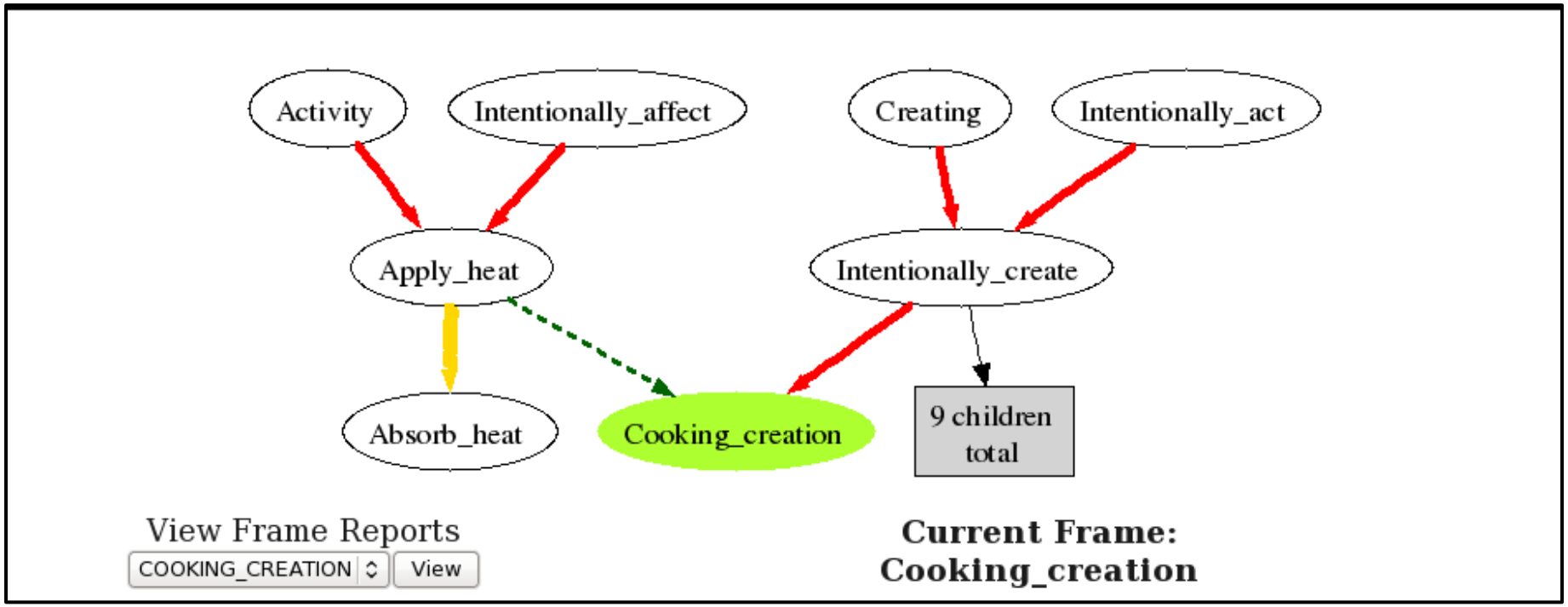


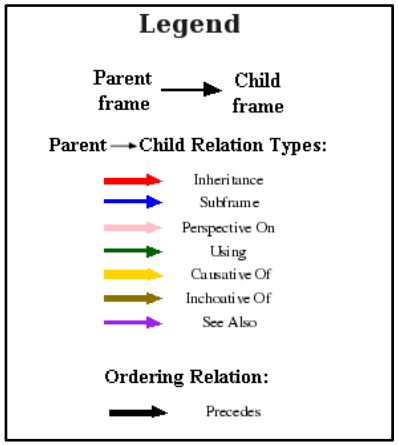
Using (weak inheritance)

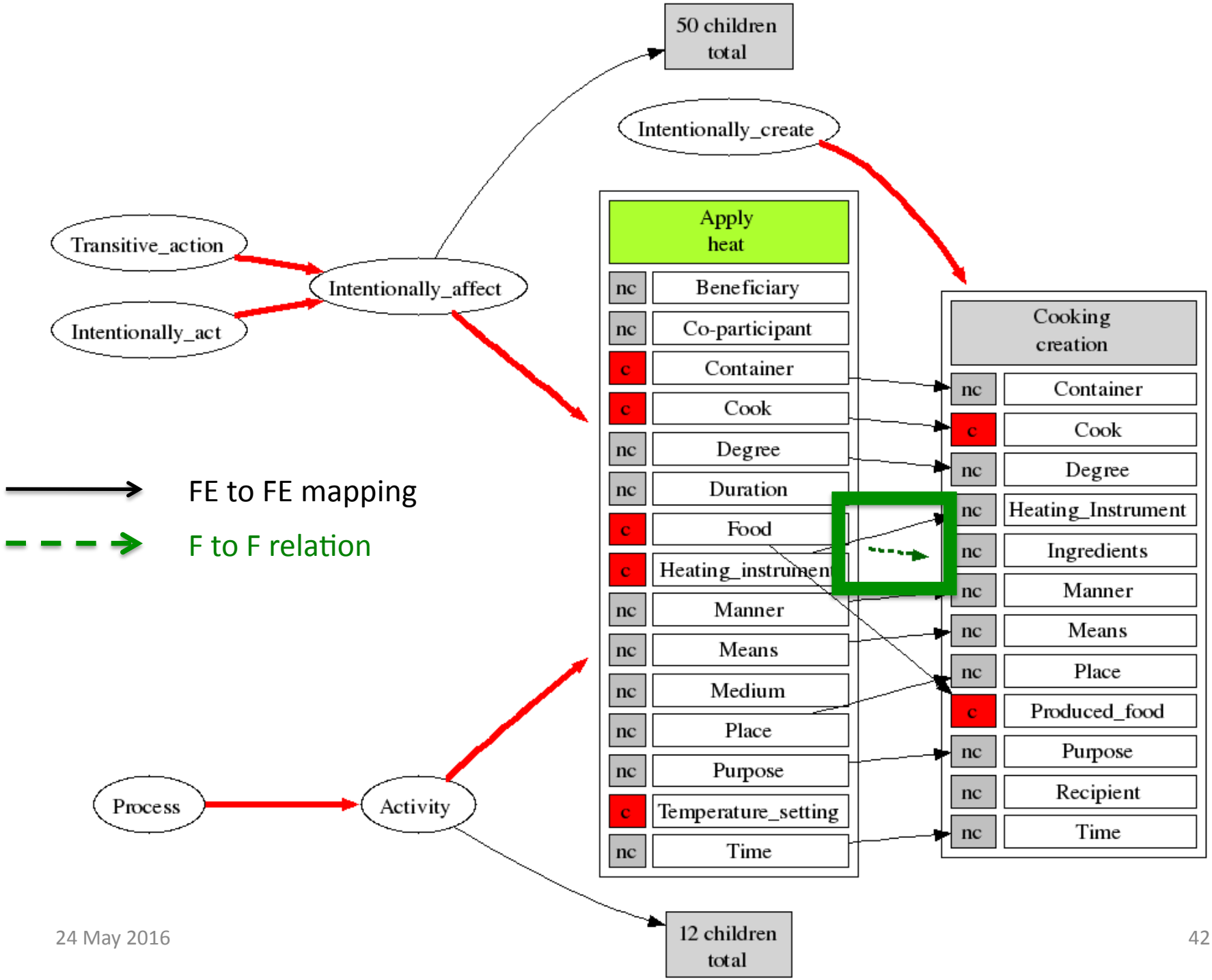
- …a relationship between a more general frame (*parent*) and a more specific frame (*child*) in which only *some* of the FEs in the parent frame have a corresponding entity in the child frame; if correspondences exist, they are more specific.

  `Cooking_creation` ***uses*** `Apply_heat`

FrameGrapher






50 children total
Intentionally_create
Transitive_action
Intentionally_affect
Intentionally_act
Apply heat
nc Beneficiary
nc Co-participant
c Container
c Cook
nc Degree
nc Duration
c Food
c Heating_instrument
nc Manner
nc Means
nc Medium
nc Place
nc Purpose
c Temperature_setting
nc Time
Cooking creation
nc Container
c Cook
nc Degree
nc Heating_Instrument
nc Ingredients
nc Manner
nc Means
nc Place
c Produced_food
nc Purpose
nc Recipient
nc Time
FE to FE mapping
F to F relation
Process
Activity
12 children total

Subframes

- …a relationship that characterizes the different (typically, ordered) parts of a complex event in terms of the sequences of states of affairs and transitions between them, each of which can itself be described as a frame.

`Getting_a_job` is a subframe of `Employee_scenario`

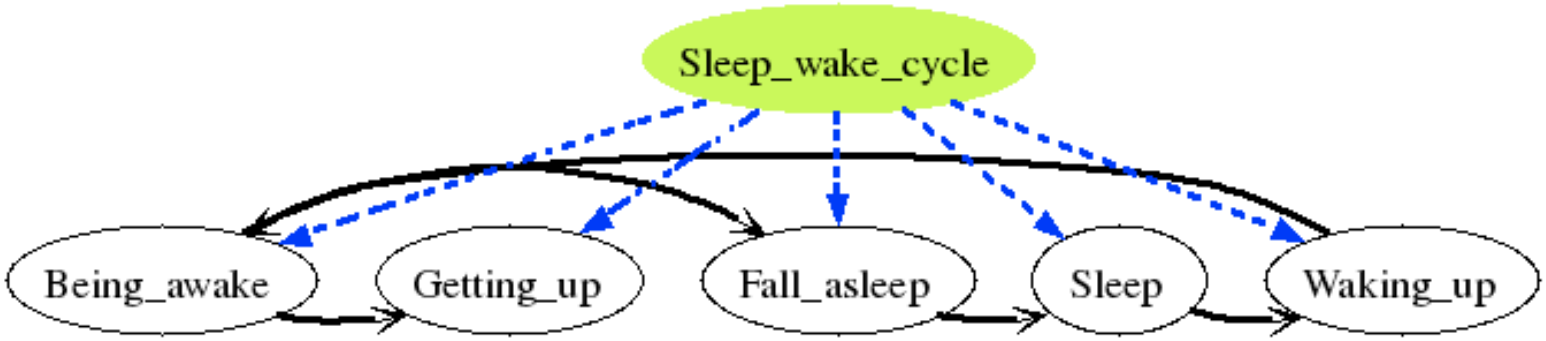
`Hiring` is a subframe of `Employer_scenario`

Precedes

...captures the temporal ordering of subevents within a complex event. The relation holds between component subframes of a single complex frame, and provides additional information to the set of Subframe relations

`Being_awake` **precedes** `Falling_asleep`

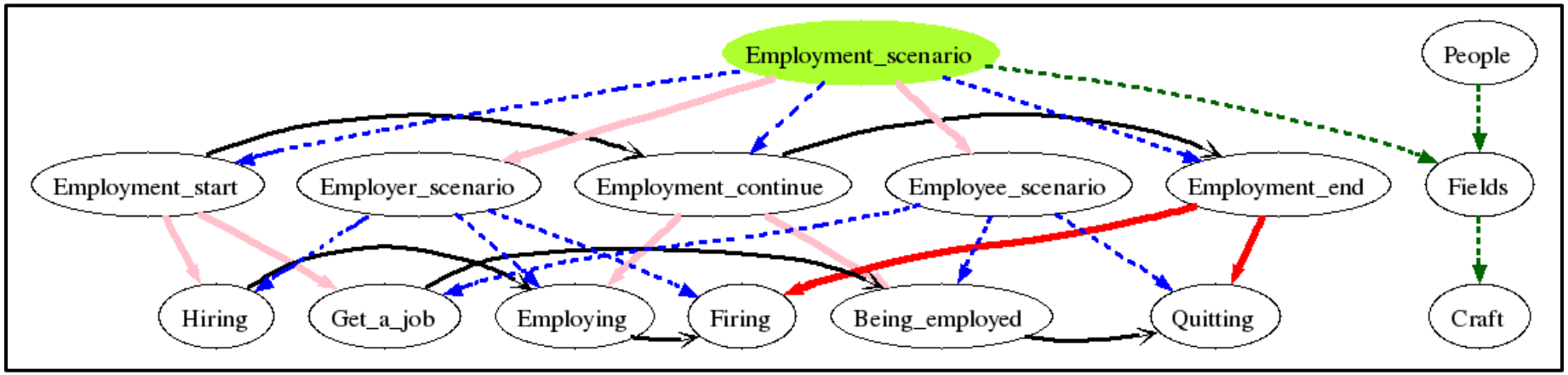
Subframes and Precedes

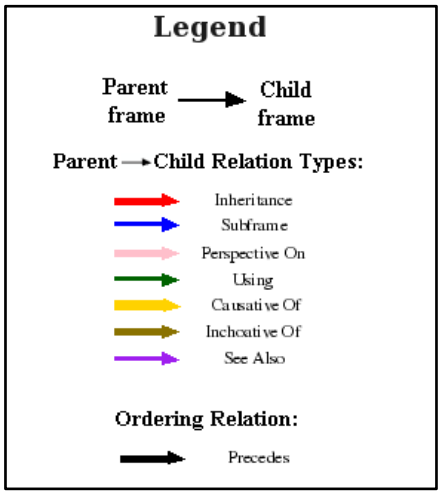


Subframes

Precedes

FrameGrapher





Road Map

- FrameNet
- Frames
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  - Lexical Units
- FrameNet Annotation
  - Lexicographic Annotation
  - "Full-Text" Annotation
- Frame-to-Frame Relations
- ✓ FrameNet: New Developments

FrameNet: New Developments

- ✓ Annotation of Support Verbs
- Collections of (New) Frames
  - Spatial Relations
  - Force Dynamics

Annotation Conventions

- Support Constructions
  - Support Verbs
    - Plain Support Verbs
      - make a decision, take a nap, have a fit
    - Lexical Functions (Mel'čuk 1996)
      - say a prayer, submit to interrogation, break a promise
  - Support Prepositions

Intersecting Criteria

- Bleached Semantically
  - take a test vs. take the book (home)
  - make a decision vs. make a cake
- Idiomaticity
  - hit the hay vs. hit the ball
  - hit the sack vs. fold the sack
- FE Providing
  - He attempted a robbery
  - He prevented the robbery

Representing Support Verbs

	Bleached		Not Bleached	
	+FE	-FE	+FE	-FE
+Idiomatic	Support		Support	
-Idiomatic	Copula or Controller	Copula	Controller	Governor

FrameNet: New Developments

- Annotation of Support Verbs
- Collections of (New) Frames
  - ✓Spatial Relations
  - Force Dynamics

Beyond Language: Spatial Relations

- Challenges statistical NLP
- Largely stopwords
- Prepositions often just dropped in NLP tasks
- Frequent preposition/case errors in MT

Beyond Language: Spatial Relations

- Entangled with cognitive models
- Prepositions famously untranslatable
- Cognitive Effects:
  - Verb framed (Spanish): *entered the cave drifting*
  - Satellite framed (English): *drifted into the cave*
  - Spanish speakers don't remember manner of motion (Slobin)

FrameNet's Approach to Spatial Relations

- Incorporate cognitive research (Talmy, Slobin, Langacker)
- Create frames for image schemas
- LUs in frames that Inherit Locative_relation, also Use image schemas
- Semantic types for non-relational features
- LUs marked with multiple semantic types

FrameNet's Goal

To build models of mental spaces and the mappings between them that are computationally tractable.

Inherit from Locative_relation

- Abounding_with
- Adjacency
- Containing
- Directional_locative_relation
- Distributed_position
- Expected_location_of_person
- Goal
- Gradable_proximity
- Interior_profile_relation
- Location_on_path
- Non-gradable_proximity
- Spatial_co-location
- Spatial_contact
- Within_distance

Spatial Relation Frames: Spatial Contact

Definition: A Figure is located in contact with a Ground. With some words that evoke this frame, the Figure is also asserted to be fully or partially supported by the Ground (*on),* while in others a support relation is either denied or unspecified *(against).* Also, some LUs assert a direction in which to find the Figure from the Ground (*atop*).

Frame Elements

Figure: The Figure is perceived as located relative to a certain Ground location. The Figure can be an entity or an event.

Ground: The Ground serves as a basis for describing the location of the Figure.

Figures: The Figures are items that mutually serve to identify the location of the other items.

Spatial Relation Frames: Spatial Contact

Lexical Units:

against.prep, atop.prep, contact.n, contact.v, off.prep, on top (of).prep, on.prep, tangent.a, touch.v, touching.a, upon.prep

Example Annotation:

He packed his tribe with their guns **AGAINST** the brothers.

The cat is **ON** the mat.

The wire bristles **CONTACT** only the joint area.

...in the small squares which lie **TANGENT** to the central square.

FrameNet: New Developments

- Annotation of Support Verbs
- Collections of (New) Frames
  - Spatial Relations
  - ✓ Force Dynamics

Force Dynamics: New Frames

- Level_of_force_exertion
- Level_of_force_resistance
- Dynamism

Level_of_force_exertion

- Definition: A Force, Action, or Exerter is capable of exerting a force at a level that the target specifies.
- Frame Elements:

  Force: The Force that can or does exert a force of the level that the target specifies.

  Action: The Action that can or does exert a force of the level that the target specifies

  Exerter: The Exerter that can or does exert a force of the level that the target specifies.

Level_of_force_exertion

Lexical Units:

dynamic.a, dynamism.n, energetic.a, energy.n, intense.a, intensity.n, laziness.n, lazy.a, lethargic.a, lethargy.n, sluggish.a, sluggishness.n, stamina.n, vibrant.a, vigor.n, vigorous.a

Example Annotation:

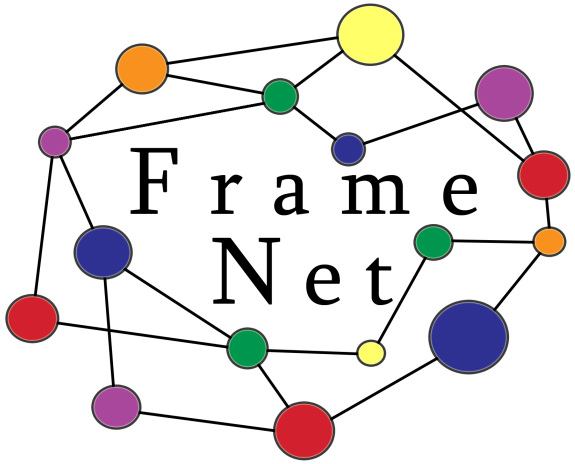
A **POWERFUL** force tore off the tree's branches.

Spartacus dealt the Roman soldier a **MIGHTY** blow.

Eugenie loved the sea and was a **STRONG** swimmer.

Force Dynamic Frames: See also!

Level_of_force_exertion, differs from Level_of_force_resistance in that it describes the level of force exertion instead of the level of resistance, and in that it includes three categories of Core FEs available (FORCE, ACTION, EXERTER). Level_of_force_resistance only has two Core FEs (RESISTING_ENTITY, OPPOSING_FORCE). Of its FEs, OPPOSING_FORCE specifies the thing that the main entity resists to the level desginated in the target. Its parallel in Level_of_force_exertion is implied, but backgrounded so much so that it rarely appears as explicit lexical material; hence, no analogous Core FE exists. Level_of_force_exertion differs from Dynamism in individual-level cases. Level_of_force_exertion targets/LUs express the FE's capability, while Dynamism targets/LUs express the FE's tendency.



Thanks!

http://framenet.icsi.berkeley.edu

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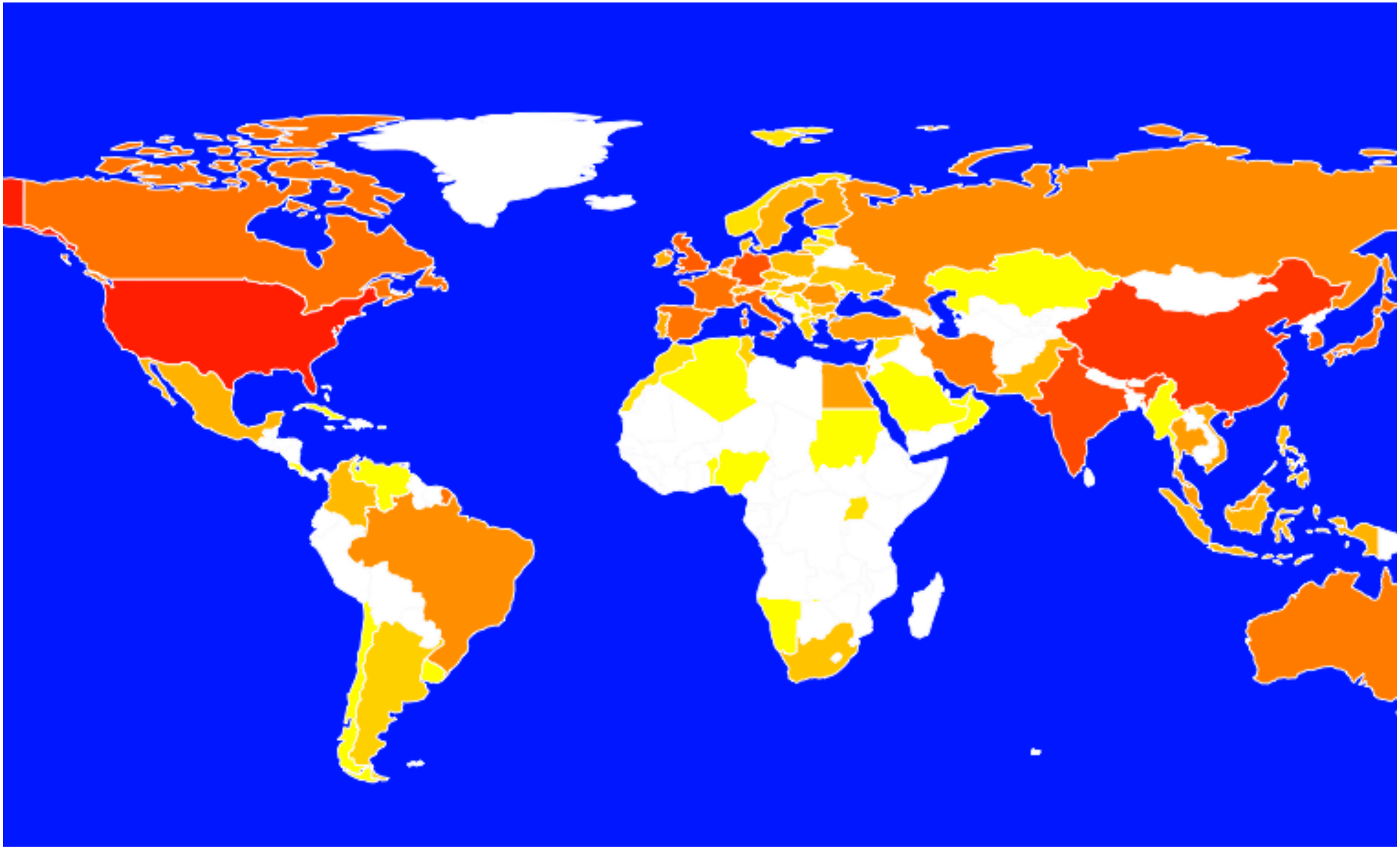
FrameNets in "Other" Languages

A Quick Introduction

Collin Baker
Multilingual FrameNet Tutorial
LREC 2016,
Portorož, Slovenia



ICSI FrameNet Users by Country

FrameNets in Other Languages

Name	Institution	Leading figure
Spanish FN	UA Barcelona	Carlos Subirats
SALSA	Saarland U	Manfred Pinkal
Japanese FN*	Keio U, Tokyo U	Kyoko Ohara
Chinese FN	Shanxi U, Taiyuan	Liu Kaiying, Li Ru
Swedish FN*	U Gothenburg	Lars Borin
FN Brasil	UF de Juiz de Fora	Tiago Torrent
French FN*	multiple	Marie Candito
Hebrew FN	Ben Gurion U	Michael Elhaddad
Korean FN	KAIST	Key-Sun Choi
Arabic FN	UAE U	Andrew Gargett

Spanish FrameNet

(Subirats 2009)

- Created a new balanced corpus, mainly New World Spanish, and their own POS tagger, large tagset

- Manual annotation, frame by frame lexicographic annotation, following Berkeley closely,

- Generally English frames were OK, some differences e.g. verbs of motion (verb framed vs. satellite framed)

http://sfn.uab.es

FrameNet Brasil

- PIs: Maria Margarida Martins Salomão and Tiago Timponi Torrent (Salomão *et al.* 2013)
- At Universidade Federal de Juiz de Fora, Minas Gerais, Brazil
- Projects:
  - Building FrameNet for Brazilian Portuguese
  - Copa (2014) website for Soccer World Cup with frames/LU in EN, ES & BrPT
  - m.knob (2016) FN mobile app & website for Summer Olympics
  - Creating constructicon for Brazilian Portuguese

http://www.ufjf.br/framenetbr-eng/

LU counts by project

Chinese FN	3,947
FN Brasil (BPT)	251
FN Brasil (Copa)	1,125
Japanese FN	3,392
SALSA (DE)	1,826
Spanish FN	1,269
Swedish FN	33,183
ICSI FN	13,235

Counts by POS

	Spanish	Swedish	Japanese	English
N	272	24,736	2,043	5,348
V	856	5,398	908	5,080
Adj	99	3,229	133	2,320
Adv	16	201	89	201
Other	26	216	221	420
Tot LUs	1,269	33,780	3,394	13,189
Anno.s	10k	13k?	73k	`200K

Variations in approaches

- Lexicographic vs. corpus-based annotation
- General coverage vs. specialized domain
- Manual vs. automatic
    - Projection from English lexicon
    - Projection from English annotation with translation
    - ASRL in English, in target lang.
- Relation to existing lexical resources

Manual Annotation

- Spanish FN: created own balanced corpus, mainly New World Spanish, own NLP tools, annotation tools adapted from ICSI FN to Spanish, frame-by-frame lexicographic annotation.

- SALSA (Burchart *et al.* 2006): Used existing parsed corpus, contracted for new annotation tool based on parse trees. Created many partial frames as needed.

Other FN Building Methods

- Projection from English FN
    - (S. Padó 2007 Ph.D. thesis, Padó and Lapata 2009) Cross-lingual annotation projection
    - Swedish (R. Johansson & Nugues 2005)
- Starting from a corpus
    - SALSA, Korean FN
- Based on existing lexical resource
    - Swedish FN (Borin *et al.* 2010), Korean FN
- For special domains
    - Kictionary (Schmidt 2008), World cup

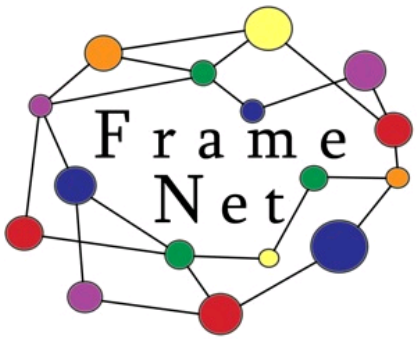
Japanese FrameNet

Kyoko Hirose Ohara
Keio University
ohara@hc.st.keio.ac.jp

24th May, 2016
Tutorial on "Multilingual FrameNet:
Linguistic Insights, Computational Challenges, and Applications"
LREC2016
Portorož, Slovenia

1. Overview of JFN

- Balanced & representative corpus of Modern Written Japanese
  - General Coverage
- Manual annotation
  - Desktop
- Lexicographic Annotation > Full Text Annotation > Constructicon Building
- JFN frames imported from FN (Release 1.3)
  - The “Expand” approach
  - Coverage OK, Some differences in contents



JFN Aims & Research Questions

- Aims
  - **Practical implementation** of **Frame Semantics** and **Construction Grammar**
  - Creating a **prototype of an on-line Japanese linguistic resource** following FrameNet methodology and practice
- Research Questions
  - To what extent is the frame-semantic approach suitable for analyzing the Japanese lexicon?
  - To what extent are the existing English-driven semantic frames applicable to characterizing Japanese lexical units?

No new Japanese-unique frames have been created

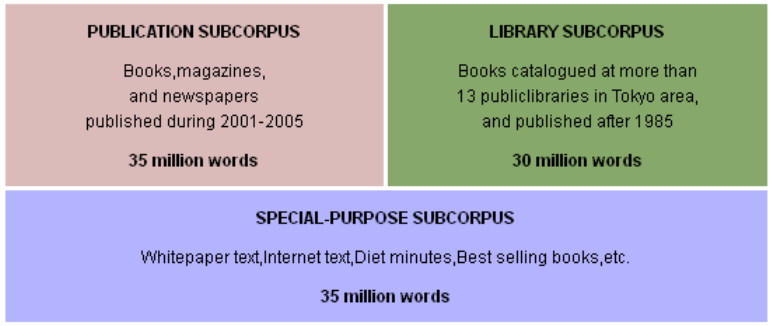
Current Projects

- JFN Data Release
  - Scheduled in March 2017
  - Grant-in-Aid for Scientific Research
    - 2013-2017
  - Full Text Annotation
- Constructicon Building
  - Grant-in-Aid for Scientific Research
    - 2015-2018

- JFN Web Application Tool (JFNWAT)
- New Data Model
  - Kabbach & Ohara 2015

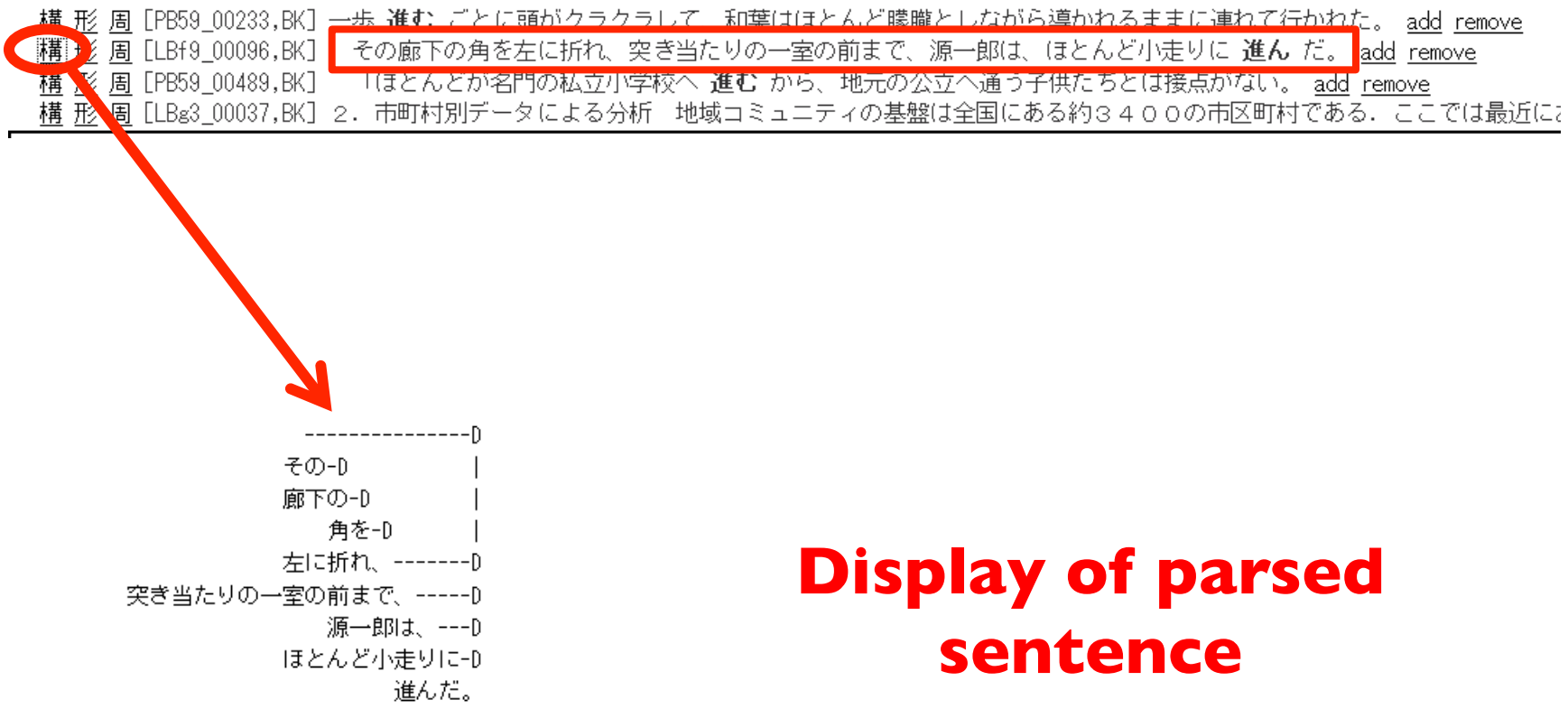
2. JFN Infrastructures and Processes

- Balanced Corpus of Contemporary Written Japanese (BCCWJ)
  - National Institute for Japanese Language and Linguistics (NINJAL)
  - the first available balanced and representative corpus of Modern Written Japanese (2011, 2015)
  - Copyright-free
  - Contains 143-milllion words of texts taken from:
    - Magazines, Newspapers, Government white papers, Books, Congress proceedings, Internet, and Textbooks



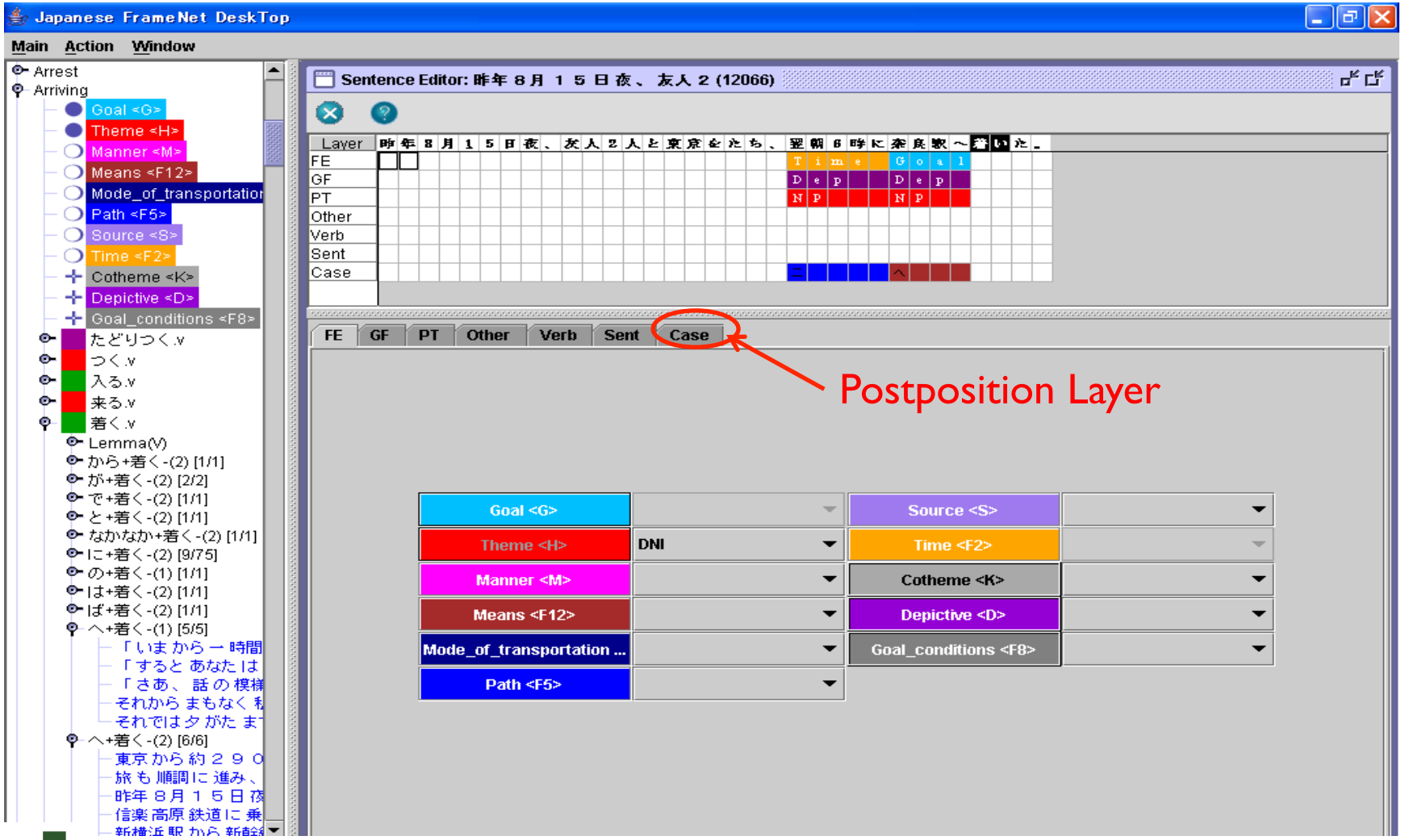
Structure of the BCCWJ

Input: JFN-KWIC
JFN Concordancer Program

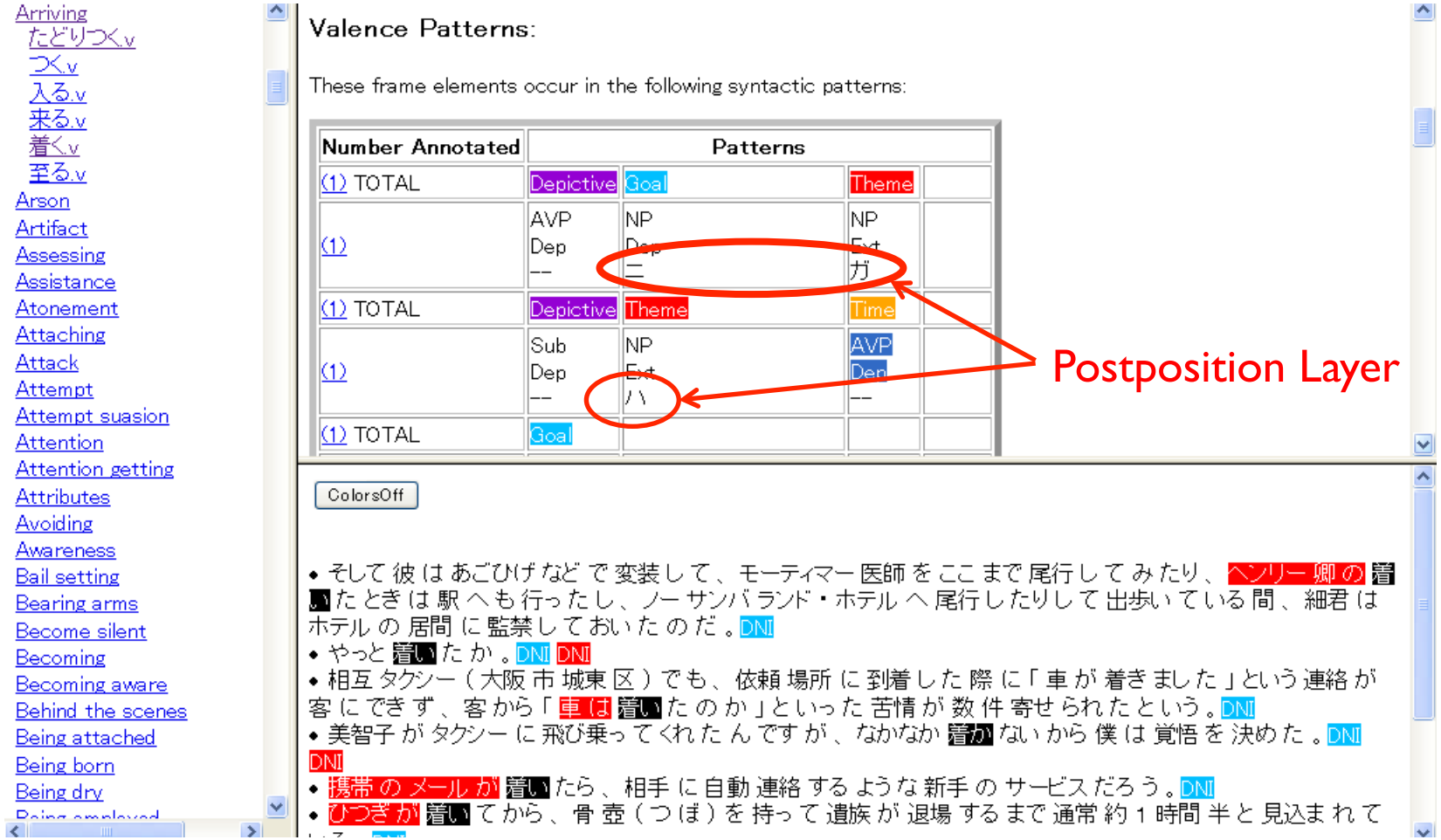


Display of parsed sentence

Annotation: JFNDesktop



Output:
Lexical Entry Report



Output:
Full Text Annotation

全文テキストアノテーション

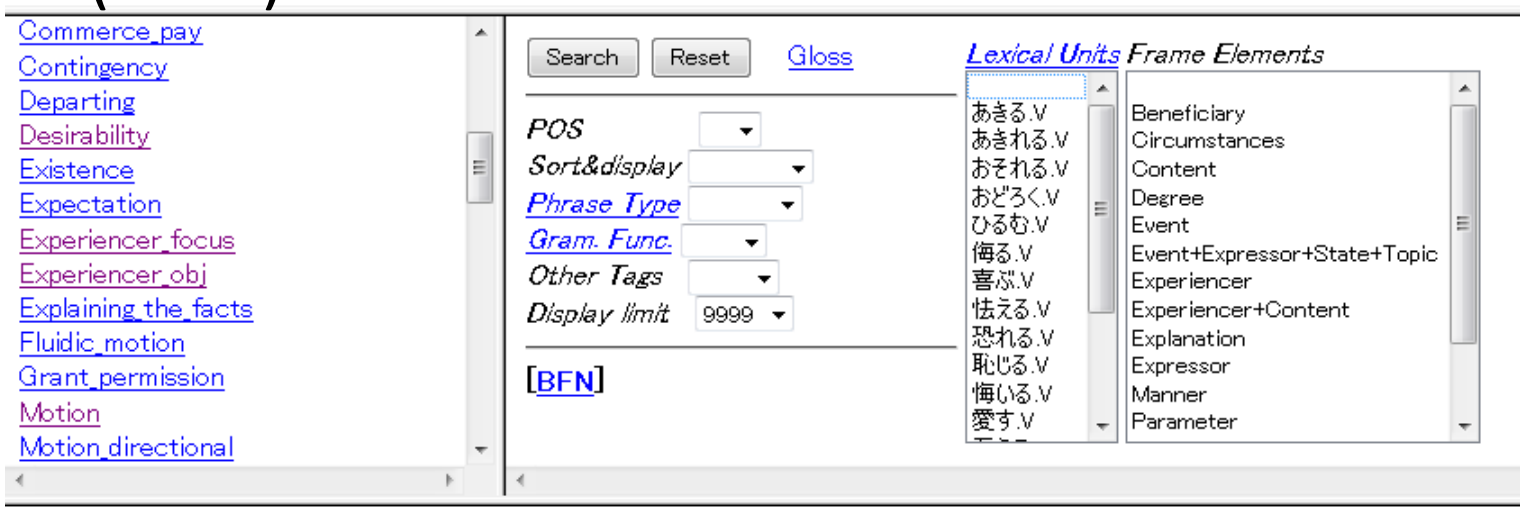
[PB56_00002.txt]

1. 6、パイロット People_by_vocation 最たる 仕事 Being_obligated は 資格 Documents 維持 Activity_ongoing 「その2」 次 Relative_time に 操縦 Operate_vehicle 関係 Relation の ライセンス Documents だが、これも 管制 Control 機関 Organization と 交信 Communication する 航空 Operate_vehicle 級 Rank 無線 Communication_means 通信 People_by_vocation 士の ライセンス Documents と、操縦 Operate_vehicle そのものの ライセンス Documents とに 分かれる Becoming_separated。
2. ここで 操縦 Operate_vehicle そのものの ライセンス Documents に 話 Communication を 絞っ Place_weight_on て 進める Activity_ongoing と、パイロット People_by_vocation は 訓練 Education_teaching, Education_teaching 生と なっ Becoming たその 日 Calendric_unit から、約 Relational_quantity 三十 時間 Measure_duration の 飛行 Operate_vehicle 時間 Measure_duration でようやくソロ(単独。) 飛行 Operate_vehicle が できる Capability ようになる。
3. その後、自家用 操縦 People_by_vocation, Operate_vehicle 士 免許 Documents、事業 Businesses 用 Purpose 操縦 People_by_vocation, Operate_vehicle 士 免許 Documents、一切 Completeness 外 Part_inner_outer を 見る Perception_active ことなく 計器 Gizmo のみで 飛ぶ Operate_vehicle ことが できる Capability 計器 Gizmo 飛行 Operate_vehicle 証明 Documents、双発以上の エンジン Vehicle_subpart を 持つ Possession 飛行機を 操縦 Operate_vehicle できる Capability 陸上 Operate_vehicle 多発機などの 基本 Being_necessary 的な 免許 Documents を 約 Relational_quantity 四 年間 Measure_duration、飛行 Operate_vehicle 時間 Measure_duration にして 約 Relational_quantity 三百数十 時間 Measure_duration をかけて 取得 Getting する。
4. ここで 言う Communication 「陸上 Vehicle 多発機」とは、海上 Relational_natural_features や 湖面 Relational_natural_features で 離着陸 Motion できる Capability 水上 Vehicle 機に対して、通常 Typicality の 滑走 Motion, Locale_by_use 路 Roadways を 使用 Using して 離着陸 Motion する飛行機を 指す Referring_by_name 用語 Simple_name と 理解 Grasp していただきたい。
5. しかし 航空 Operate_vehicle 法 Law では、これら自家用 操縦 People_by_vocation 士、事業 Businesses 用 Purpose 操縦 People_by_vocation 士、計器 Gizmo 飛行 Operate_vehicle 証明 Documents、陸上多発の ライセンス Documents だけでは、まだ 最大 Extreme_value 離陸 Motion 重量 Dimension が五千七百キログラム(五、七トン。)未満の飛行機しか 操縦 Operate_vehicle でき Capability ない。
6. 「最大 Extreme_value 離陸 Motion 重量 Dimension が五千七百キログラム」の飛行機とは…? それは具体的に、十数人乗りの飛行機を イメージ Awareness していただくといいだろう。
7. 一方、定期 Frequency 航空 Motion で 使用 Using している 機材 Supply は、数十名乗りの飛行機から 最大 Extreme_value 五百六十八席の ジャンボ Vehicle ジェット(最大 Extreme_value 離陸 Motion 重量 Dimension は三十八万キログラム/三百八十トン 前後 Relational_quantity。)まであり、最大 Extreme_value 離陸 Motion 重量 Dimension が五、七トン以上の大きさの飛行機を 操縦 Operate_vehicle するには、これらの ライセンス Documents ではまだまだ 不足 Sufficiency で、それらの飛行機に独自の ライセンス Documents を 取得 Getting しなければならない。
8. 最大 Extreme_value 離陸 Motion 重量 Dimension を基準に個々の飛行機に個々の ライセンス Documents が 要求 Being_necessary される 理由 Reason は、飛行機によって、それぞれの 設計 Coming_up_with 思想や 飛行 Motion 特性が 大きく Degree 異なる Similarity ことによる。

その後、自家用操縦士免許、事業用操縦士免許、一切外を見ることなく Manner 計器のみで Means 飛ぶ ことができる計器飛行証明、双発以上のエンジンを持つ飛行機を操縦できる陸上多発機などの基本的な免許を約四年間、飛行時間にして約三百数十時間をかけて取得する。DNI Driver DNI Vehicle

Output: FrameSQL

Sato (2012)



Experiencer_focus

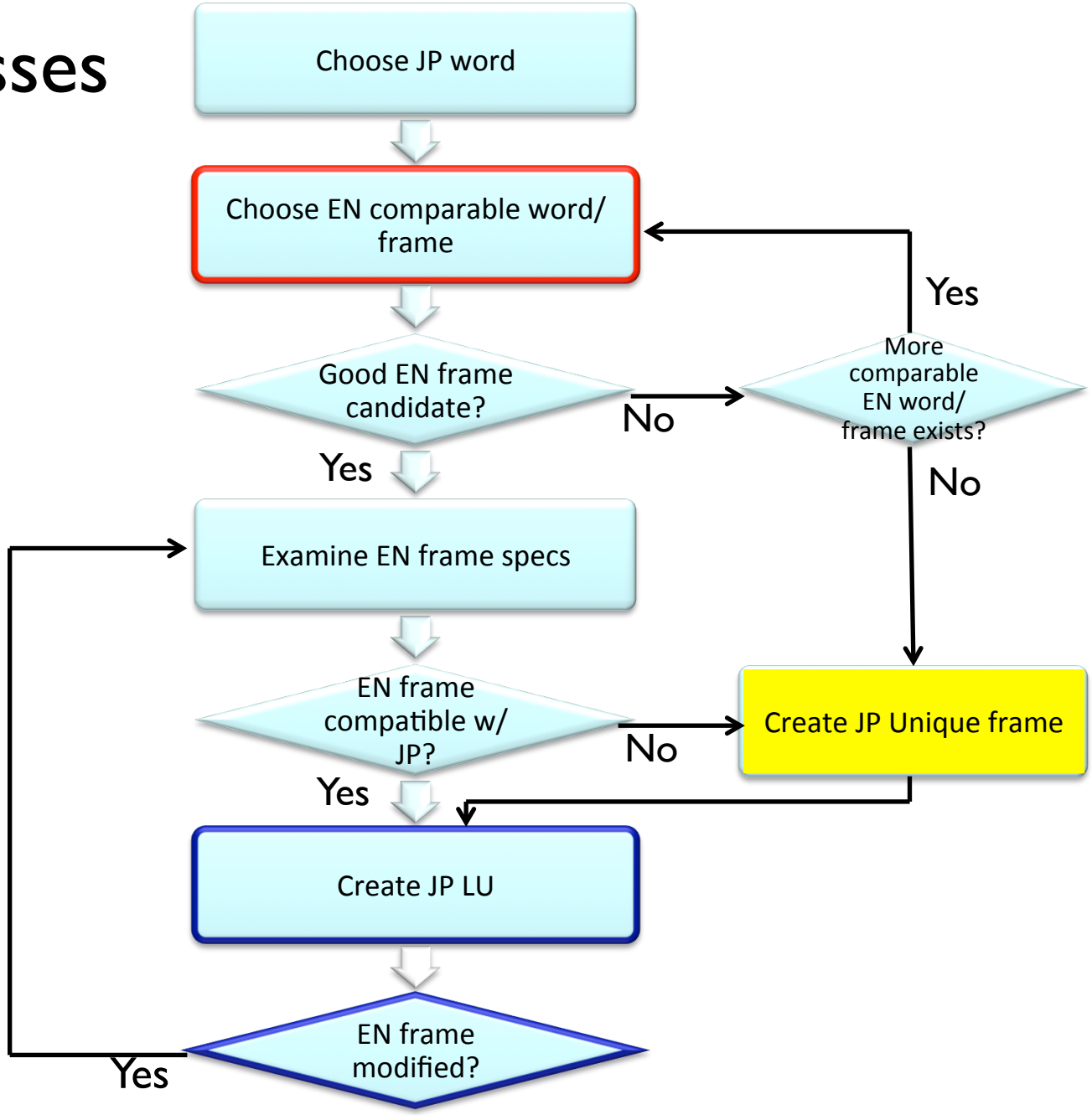
Definition:

The words in this frame describe an Experiencer's emotions with respect to some Content. A Explanation for the emotion m current state of affairs, quite often it refers to a general situation which causes the emotion.

- My ENJOYMENT of the movie was considerably impaired by the seven-foot guy sitting in front of me. [Yahoo!Japan

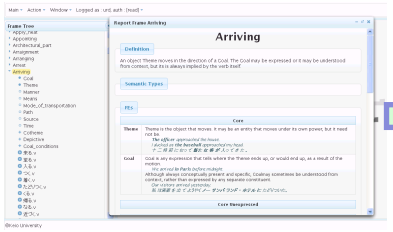
- Smithers takes great PLEASURE in collecting matchboxes. [Yahoo!Japan翻訳 EJ]

JFN Processes



3. Work in Progress:
JFN Web Application Tool (JFNWAT)

KWIC



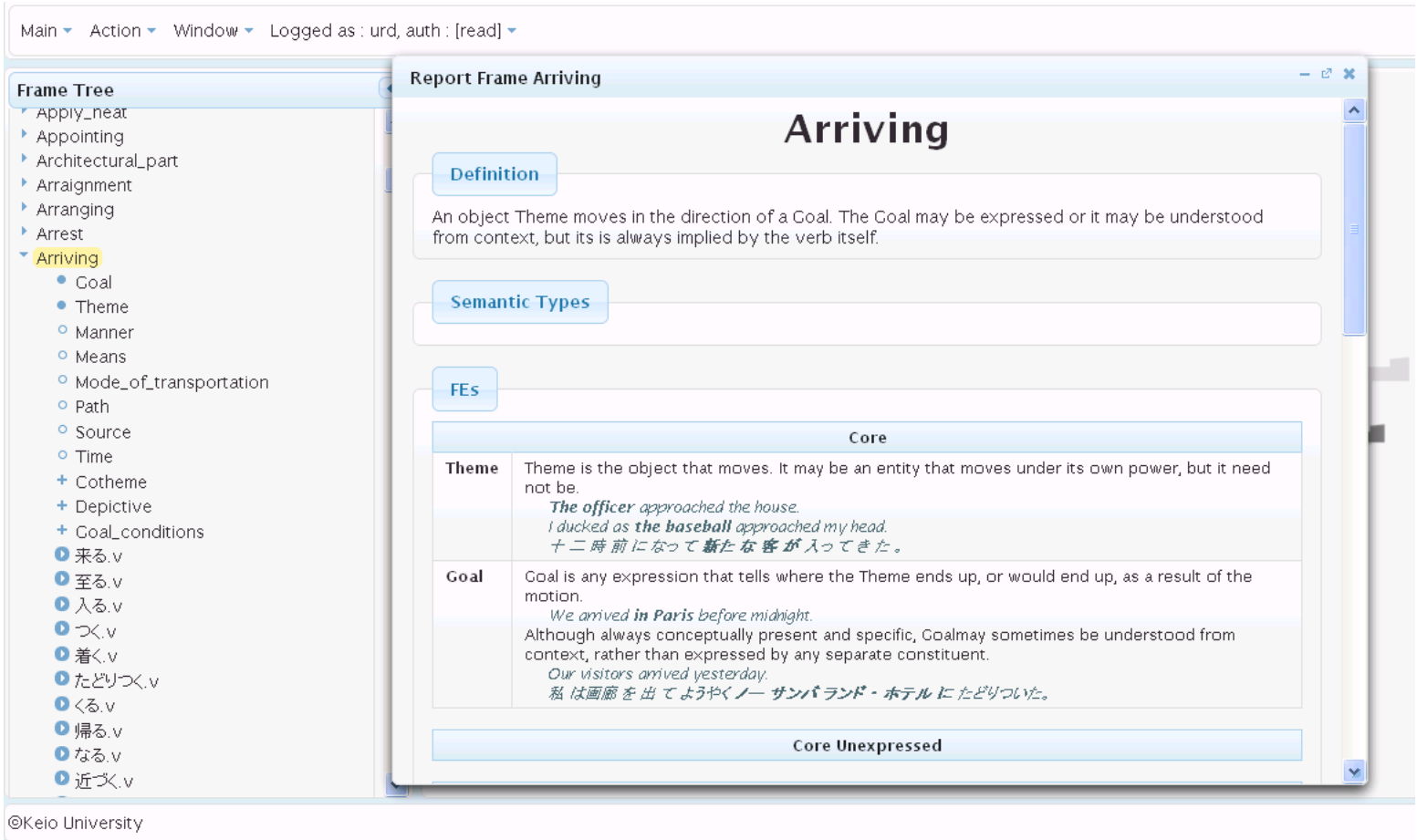
Annotation

Web Report

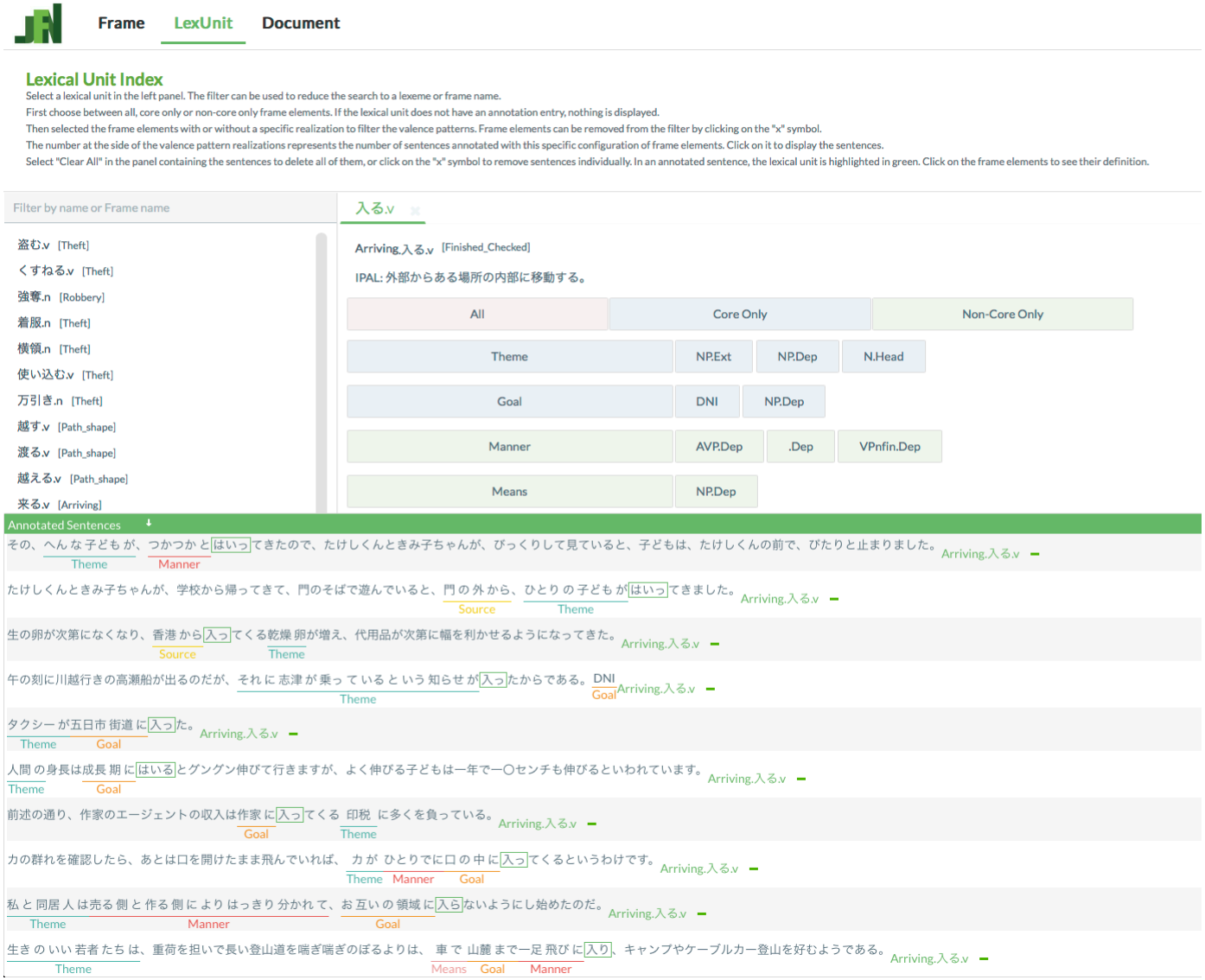
JFNWAT

Input: New JFN-KWIC

Annotation: Web Annotation Tool



Output: New Web Report



Some Applications

- Education/Teaching
- Collaboration with Korean FN

Thank You!

This work was supported in part by:

- Koizumi Foundation at Keio University
- Grant-in-Aid for Scientific Research 2013-2017
- Grant-in-Aid for Scientific Research 2015-2018

URLs

- Japanese FrameNet
  - http://jfn.st.hc.keio.ac.jp/
- JFN data on FrameSQL
  - http://sato.fm.senshu-u.ac.jp/frameSQL/jfn23/notes/index2.html
- Japanese FrameNet on YouTube
  - http://www.youtube.com/watch?v=kfqR9aUcp1c

Feedback from the ASFALDA French FrameNet project

Marie Candito, work in collaboration with
Marianne Djemaa, Philippe Muller, Laure Vieu
and also Pascal Amsili, Benoît Sagot, Lucie Barque, Richard Huyghe,
Gaël de Chalendar, Farah Benamara, Yannick Matthieu

MLFN LREC Tutorial
24 may 2016

Outline

1. the ASFALDA - French FrameNet project
   - Methodology
   - Current status
   - Evaluation
2. Feedback: typical problems

Motivation

- Objective = produce semantically annotated French data
- Why FrameNet ?
  - FrameNet more semantically oriented than e.g. PropBank
  - known to be quite portable across languages (Boas et al., 2009)

Which strategy ?

- We could not target same coverage as Berkeley FrameNet
- $\longrightarrow$ important to choose a development strategy

- Frame-by-frame strategy
  - (e.g. Berkeley FrameNet)
  - $\longrightarrow$ full lexical diversity of a frame

- Lemma-by-lemma strategy
  - e.g. SALSA, Burchardt et al. 2006
  - $\longrightarrow$ coverage of all the senses of a lemma
  - (in a given corpus)

Which strategy ?

- Preliminary study:
  - Difficult to fully understand the exact semantic perimeter of a frame
  - Difficult to master very diverse semantic fields

- $\longrightarrow$ we chose to work domain by domain
  - Objective: full coverage of some chosen notional domains

- Enforced coherence:
  - Close frames are either merged or their difference is made explicit
  - Missing frames for a given domain are created

4 annotated domains

- Commercial transactions
- Cognitive stances : belief, with various degrees of certainty, of a Cognizer for a given content
  - stative, with or without presupposition (to know, to think)
  - inchoative (to realize)
  - causal (to convince)
  - forecast (to predict) etc...
- Causality
  - various POS : because.c, to result.v, consequence.n, due to.prep ...
- Verbal communication (partially annotated only)

Starting resources

- Berkeley FrameNet 1.5 release
- French lexicon obtained by projection from English
  - using bilingual dictionaries (Mouton et al., 2010)
  - projected using paralel corpora (Padò, 2007)
- Two syntactic treebanks (French Treebank and Sequoia Treebank)
  - corpus-oriented annotations: preserve natural probability distributions of senses and syntactic realizations of frame elements
  - syntactico-semantic lexicon can be extracted from annotations

Development

- Selection of frames pertaining to the domains
- In parallel:
  - Adaptation of frames
  - Cleaning/extension of lexicon
- Annotation on corpus
  - Using the Salto tool (Burchardt et al., 2006)
  - Sometimes led to further modification of frames and lexicon

Current status

- Release ... at the end of june 2016 (sorry)

- 98 frames with some annotations
- 872 LUs (= frame / lemma pairs)
- 12874 annotated frame instances
- plus 7116 occurrences marked as “out of domain”

- $\longrightarrow$ can be used to train a framenet parser restricted to the 4 domains
- $\longrightarrow$ syntactico-semantic lexicon re-extracted from the annotated data

Evaluation : Inter-annotator agreement

For the lemma occurrences annotated by 2 independent annotators:

- Fscore for the frame selection
- Fscore for frame elements' exact match / partial match

	Nb of FEE	% of N	% of V	Inter-annotator Fscore		
				Frame	Exact FE	Partial FE
	17667	36	50	85.9	77.2	81.9
Break-down by notional domain						
Commercial	3307	60	40	92.0	73.4	80.4
Causality	7691	30	48	79.2	74.2	80.4
Cog. Stances	7886	28	62	90.6	81.1	86.0
Communic.	2221	23	76	89.6	82.3	87.5
Break-down by POS of the FEE						
V	8834	-	-	87.6	82.8	87.1
N	6234	-	-	86.8	68.3	72.5
other	2509	-	-	77.7	74.6	82.1

Rather high agreement

FE spans: much easier for verbs (cf. SALSA 2.0, Rehbein et al. 2012)

Frame modifications

- 50 frames (only?) not modified from English frames
- 13 new frames: meant to complete a domain
- 37 frames are merges, splits, or slightly modified frames

- $\longrightarrow$ more modification than expected
- (cf. Spanish FrameNet, SALSA reported few modifications)

- Merges resulting from difficulty to clarify frame differences
- Merges in order to limit polysemy
  - example Eventive_cognizer_affecting / Suasion

Feedback

Main difficulties:

- Understanding the exact perimeter of a frame
- Coping with polysemy

Thank you

French FrameNet is coming soon..., check for announcement

Swedish FrameNet++ (SweFN++)

DIMITRIOS KOKKINAKIS,

…on behalf of the Swe-FN++ team

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University of Gothenburg, Sweden
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Overview of SweFN

SweFN++ full-scale lexical resource designed to support Swedish language technology applications. Its goal has been a lexical macro-resource for use as an infrastructural component in Swedish language technology research and in the development of NLP applications and annotated corpora for Swedish.

Objectives:

1. link (reuse, enhance, harmonize) a number of existing free lexical resources into an integrated lexical macro-resource
2. create a full-scale Swedish FN integrated into macro-resource
3. develop methodologies making maximal use of language technology tools and text corpora to minimize human effort required for accomplishing (1) and (2)
4. make all resources and tools developed freely available under open-content/open-source licenses

Transferring FN to SweFN

SweFN follows the Berkeley FrameNet concerning:

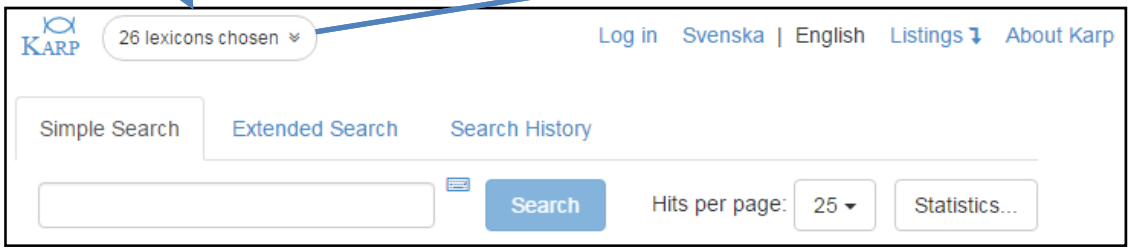
- the names of the frames
- definitions of the core frame elements
- definitions of non-core frame elements
- the semantic relations between the frames.

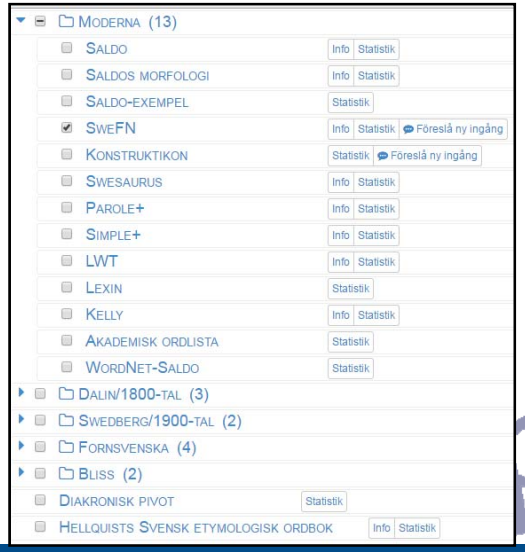
But:

- we have developed our own software, *Karp*
- we have our own interface
- example sentences are picked from the corpus infrastructure *Korp*
- we only annotate for semantic roles/frame elements
- syntactic annotation is available through the Korp corpus infrastructure
- we analyze compounds internally

Swedish FrameNet

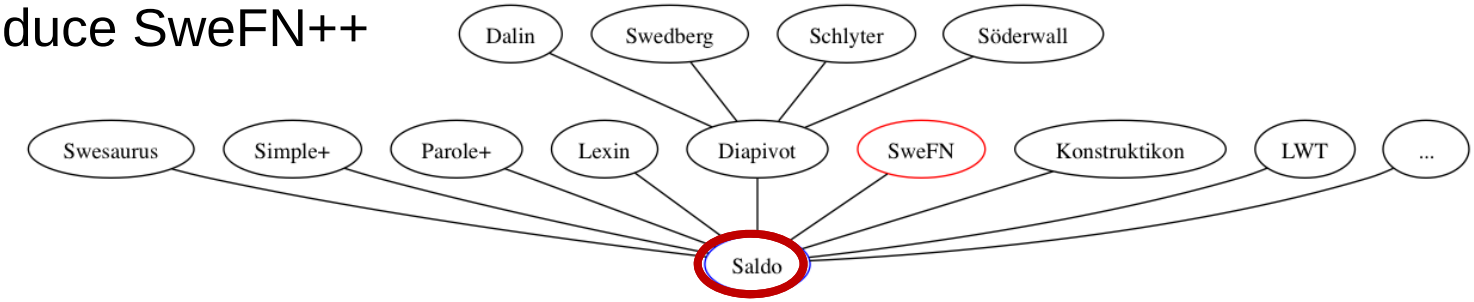
- Swedish FrameNet (SweFN) was developed in a project that the Swedish Research Council funded, 2010–2014 (SweFN++)
- SweFN lexicon is available under a CC-BY license
  - to download (in LMF): <http://spraakbanken.gu.se/eng/resource/swefn>
  - to search the lexicon use KARP (open lexical infrastructure): <http://spraakbanken.gu.se/karp>
    ...and then select SweFN





Swedish FrameNet

- SweFN lives in a wider ecosystem of lexical resources, whose backbone is the SALDO lexicon (builds on Swedish Associative Thesaurus – hierarchical structure), to which all lexical resources are connected; several freely available resources were used to produce SweFN++

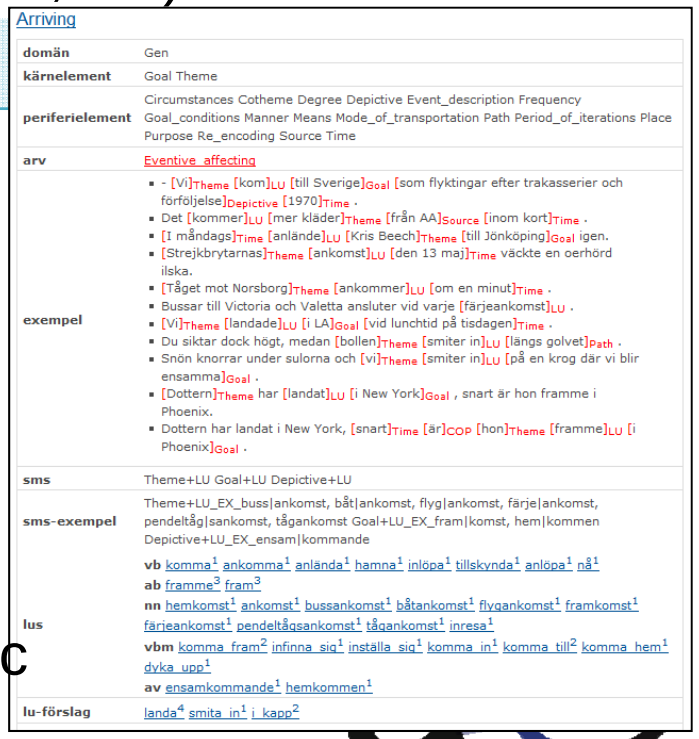


- all resources are integrated into the KARP system (26 lexical resources; >700000 entries) <http://spraakbanken.gu.se/karp> for managing and searching – open lexical infrastructure
- Swedish FN has tried to reuse as many of ICSI frames as possible; greater effort on LUs

Swedish FrameNet

Lexical frames	1,194 (*BFN v1.5:* 1,033)
LUs	38,700 (*BFN v1.5:* 12,714)
Example sentences	9,006 (*BFN v1.5:* 195,590)
New LU suggestions	2,818

Multilinguality and FrameNet duality: language independent frames with language dependent content; concepts are mostly language independent and contain SRs, or FEs, which are also mostly language independent. LUs and annotated sentences are language-specific



Arriving

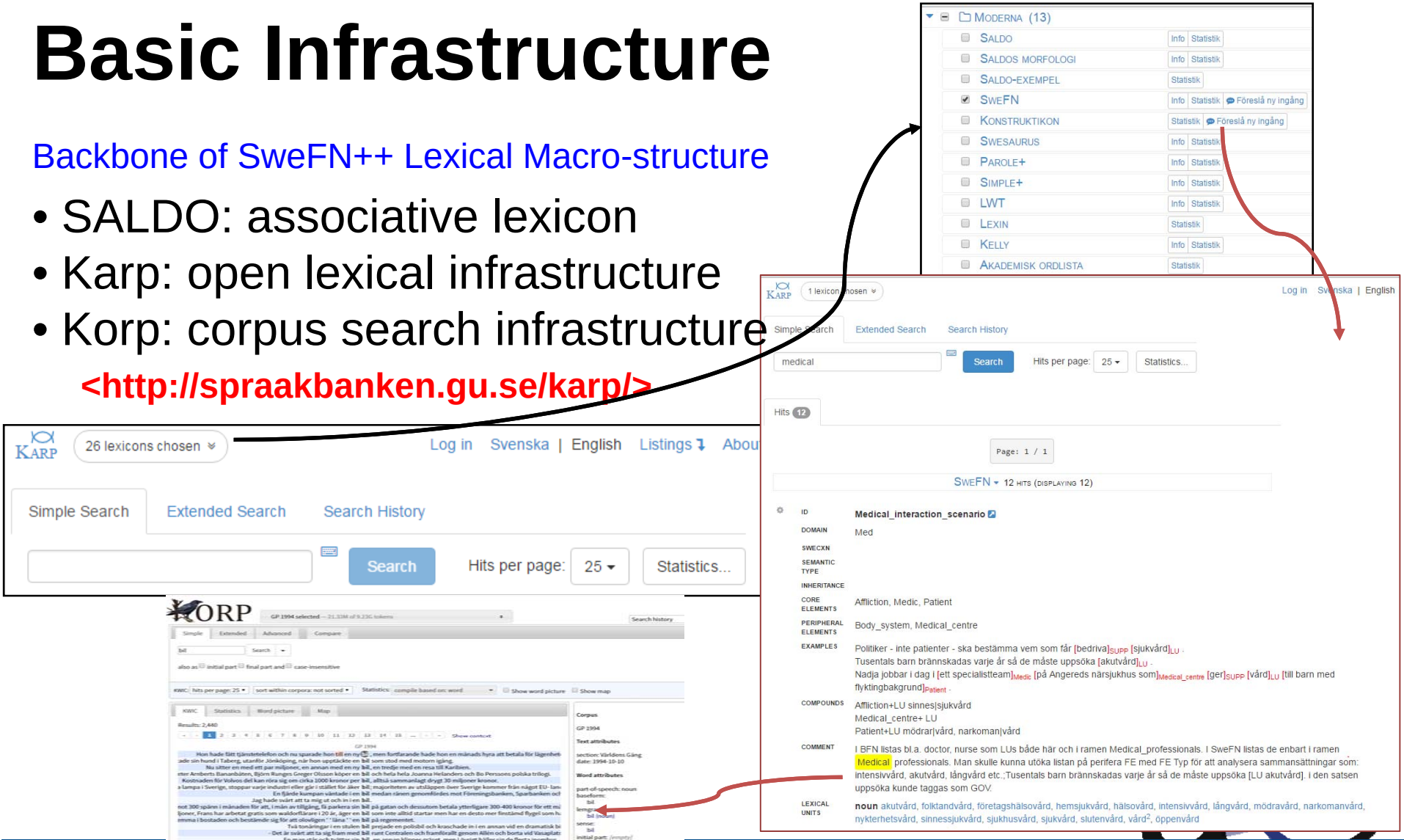
domän	Gen
kärnelement	Goal Theme
periferielement	Circumstances Cotheme Degree Depictive Event_description Frequency Goal_conditions Manner Means Mode_of_transportation Path Period_of_iterations Place Purpose Re_encoding Source Time
arv	Eventive_affecting
exempel	▪ - [Vi]Theme [kom]LU [till Sverige]Goal [som flyktingar efter trakasserier och förföljelse]Depictive [1970]Time . ▪ Det [kommer]LU [mer kläder]Theme [från AA]Source [inom kort]Time . ▪ [I måndags]Time [anlände]LU [Kris Beech]Theme [till Jönköping]Goal igen. ▪ [Strejkbrytarnas]Theme [ankomst]LU [den 13 maj]Time väckte en oerhörd ilska. ▪ [Tåget mot Norsborg]Theme [ankommer]LU [om en minut]Time . ▪ Bussar till Victoria och Valetta ansluter vid varje [färjeankomst]LU . ▪ [Vi]Theme [landade]LU [i LA]Goal [vid lunchtid på tisdagen]Time . ▪ Du siktar dock högt, medan [bollen]Theme [smiter in]LU [längs golvet]Path . ▪ Snön knorrar under sulorna och [vi]Theme [smiter in]LU [på en krog där vi blir ensamma]Goal . ▪ [Dottern]Theme har [landat]LU [i New York]Goal , snart är hon framme i Phoenix. ▪ Dottern har landat i New York, [snart]Time [är]COP [hon]Theme [framme]LU [i Phoenix]Goal .
sms	Theme+LU Goal+LU Depictive+LU
sms-exempel	Theme+LU_EX_buss|ankomst, båt|ankomst, flyg|ankomst, färje|ankomst, pendeltåg|sankomst, tågankomst Goal+LU_EX_fram|komst, hem|kommen Depictive+LU_EX_ensam|kommande
lus	**vb** komma[1] ankomma[1] anlända[1] hamna[1] inlöpa[1] tillskynda[1] anlöpa[1] nå[1] **ab** framme[3] fram[3] **nn** hemkomst[1] ankomst[1] bussankomst[1] båtankomst[1] flygankomst[1] framkomst[1] färjeankomst[1] pendeltågsankomst[1] tågankomst[1] inresa[1] **vbm** komma_fram[2] infinna_sig[1] inställa_sig[1] komma_in[1] komma_till[2] komma_hem[1] dyka_upp[1] **av** ensamkommande[1] hemkommen[1]
lu-förslag	landa[4] smita_in[1] i_kapp[2]

Basic Infrastructure

Backbone of SweFN++ Lexical Macro-structure

- SALDO: associative lexicon
- Karp: open lexical infrastructure
- Korp: corpus search infrastructure

<http://spraakbanken.gu.se/karp/>



Differences

LUs can have different extensions:

mormor: (maternal) grandmother
farmor: (paternal) grandmother
} *Kinship*


Culture specific LUs... e.g.

surströmming: fermented fish
} *Food*


Cultural differences: no juries in Sweden

more general definition fits better than a specific one

Jury_deliberation

Definition:

The Jury discuss the Case and its Charges in order to evaluate the Possible_sentence of the Accused.
The jury DELIBERATED his guilt.

Deliberation

domän	Gen
kärnelement	Case Charges Deliberating_group Possible_sentence
periferielement	Duration Place Time
exempel	▪ [I morgon]Time väntas [domstolen]Deliberating_group [överlägga]LU [vilken dom som skall fällas över den andre huvudanklagade, den 33-årige Imam Samudra]Possible_sentence . ▪ [Domstolen]Deliberating_group [höll]SUPP en [kort]Duration [överläggning]LU .
lus	**vb** överlägga[1] **nn** överläggande[1] överläggning[1]
kommentar	New frame that aims at broadening the FN frame Jury_deliberation for cultural reasons. Many countries, including Sweden, do not utilize juries. The deliberation is carried out by a group of persons selected by specific rules, different in different countries.

Differences

Inflection vs. Lexicon:

- English expresses activity in progress with the progressive form (-ing), not via frame.
  - FN is populated with LUs, not morphemes.
- Swedish expresses activity in progress with lexical expressions. SweFN has a frame for these expressions

Activity_in_progress

domän	Gen
kärnelement	Activity Entity Event
periferielement	Circumstances Depictive Duration Event_description Explanation Manner Means Place Purpose Time
exempel	▪ [Gångbron till en färja kollapsade plötsligt]$_{Event}$ när [passagerarna]$_{Entity}$ [höll på]$_{LU}$ [att gå ombord.]$_{Activity}$ ▪ - Så [jag]$_{Entity}$ [håller på]$_{LU}$ [och lär mig]$_{Activity}$, säger han ödmjukt. ▪ [Det]$_{Event}$ gör att [jag]$_{Entity}$ [i lugn och ro]$_{Manner}$ kan [hålla på]$_{LU}$ [och måla]$_{Activity}$. ▪ [Vi]$_{Agent}$ [håller på]$_{LU}$ [och bygger om och bygger till]$_{Activity}$ och har verkligen att göra. ▪ [Hedeskolan]$_{Entity}$ [håller på]$_{LU}$ [och växer ut till en F-9-skola]$_{Activity}$. ▪ [Man]$_{Entity}$ [är]$_{LU}$ [nu]$_{Time}$ [i färd]$_{LU}$ [med att finna lämpliga rutiner]$_{Activity}$ [för dess användning]$_{Purpose}$. ▪ [Många skolor]$_{Entity}$ [är i färd]$_{LU}$ [med att utarbeta handlingsplaner mot mobbning]$_{Activity}$.
lu-förslag	hålla på[4] vara i färd[1]
kommentar	Ny ram. These LUs do not establish any distinct semantic relations with a frame element in the subject position, called FE Entity, except for the relation of being involved in activities specified by an infinitive phrase that follows.

Differences

Compounds: Swedish writes compounds without a space between the parts; treating the compound's constituents separately is not appropriate. When SALDO lists the compound, SweFN treats it as a LU. The exact treatment of a compound depends on its transparency, or the level of its compositionality:

transparent: hästhov (horse+hoof) – 'horse hoof'

not transparent: hästhov – 'coltsfoot' (the flower)

Observable_body_parts

domän	Med
semantisk typ	Body_part
kärnelement	Possessor
periferielement	Attachment Descriptor Orientational_location Subregion
exempel	▪ [Handen]$_{LU}$ är bruten. ▪ [Armen]$_{LU}$ måste opereras. ▪ [Tusses]$_{Possessor}$ [brutna]$_{Descriptor}$ [arm]$_{LU}$ måste opereras. ▪ I synnerhet [tupparnas]$_{Possessor}$ [stora]$_{Descriptor}$ [kammar]$_{LU}$ var utsatta. ▪ Någonstans längre bort bakom husknutarna ekade klappret från [snabba]$_{Descriptor}$ [[häst]$_{Possessor}$ [hovar]$_{LU}$]$_{LU}$ ...
sms	Descriptor+LU Subregion+LU Possessor+LU
sms-exempel	Descriptor+LU_EX_ring|finger, lill|finger, pek|finger, lång|finger Subregion+LU_EX_under|arm, över|arm Possessor+LU_EX_häst|hov

Plants

domän	Gen
semantisk typ	Vegetal_entity
kärnelement	Plant
periferielement	Age Descriptor Origin Persistent_characteristics Systematics
exempel	▪ [Luktärter]$_{LU}$ och [krasse]$_{LU}$ slingrar ut över grusgångarna. ▪ [Agave]$_{LU}$ (Agave americana) är en [suckulent]$_{Persistent\_characteristics}$ växtart inom [agavesläktet]$_{Systematics}$ och familjen [agaveväxter]$_{Systematics}$. ▪ [Agave americana]$_{LU}$ växer naturligt i [Mexiko]$_{Origin}$ och [södra USA]$_{Origin}$. ▪ [Havre]$_{LU}$ (Avena sativa) är ett [kraftigt]$_{Descriptor}$ och oftast [högväxt]$_{Descriptor}$ [gräs]$_{LU}$, inom släktet [havren]$_{Systematics}$ och familjen [gräs]$_{Systematics}$, med kala strån som kan bli över en meter höga. ▪ Då kommer de första vårtecknen i dikesrenarna och [hästhovarna]$_{LU}$ lyser som solar .

Some Applications

- Semantic Role Labeling
- Natural Language Generation
  - domain of art
- Search Applications
- Education/Teaching
- Information Extraction
  - medical domain: for medical language research, SweFN created several new frames

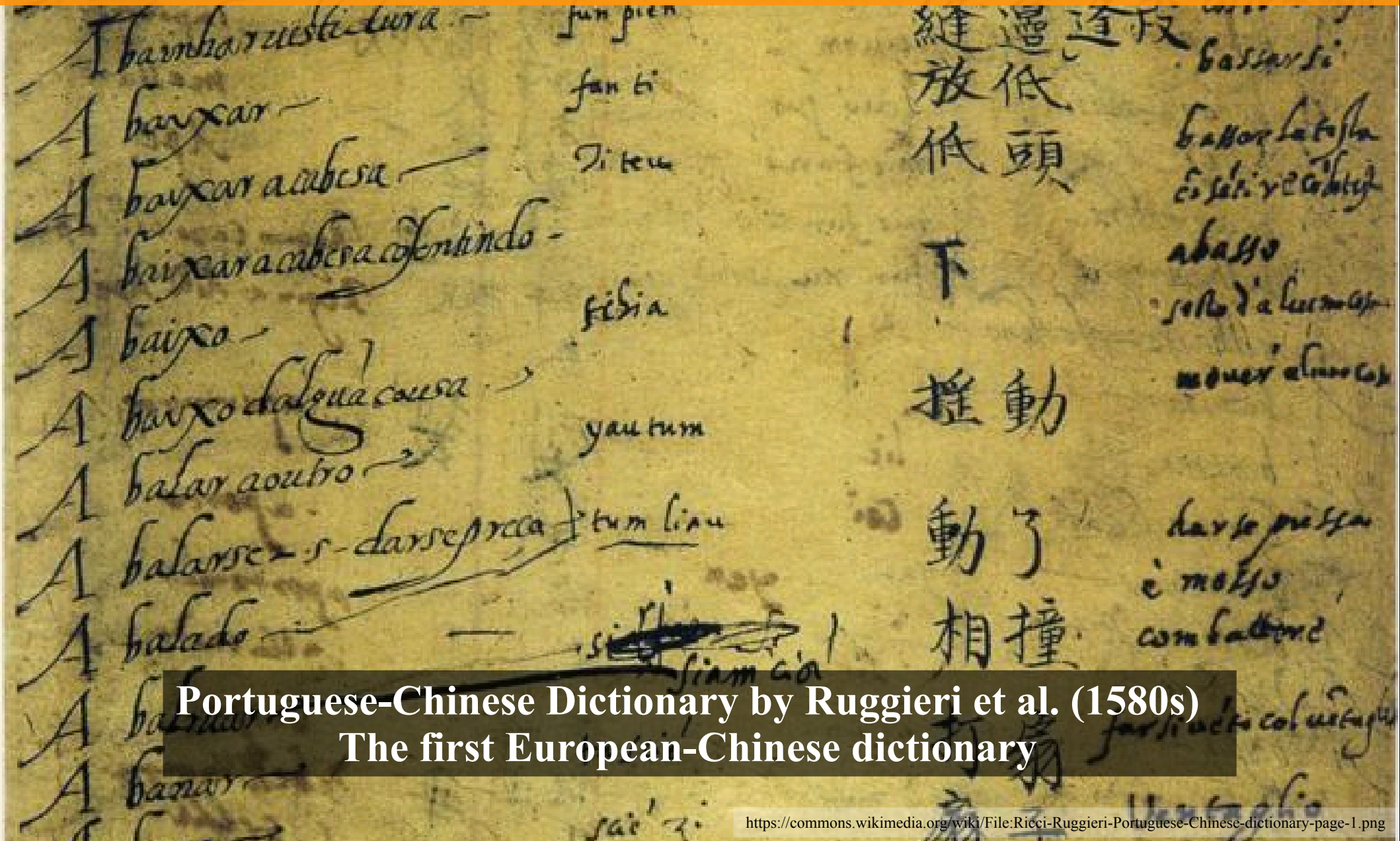
More Information <http://spraakbanken.gu.se/eng/swefn/>

Multilingual FrameNet Tutorial

Alignments

Gerard de Melo
Assistant Professor
Tsinghua University, Beijing
(moving to Rutgers University)
http://gerard.demelo.org

Aligning Lexical Entries



Portuguese-Chinese Dictionary by Ruggieri et al. (1580s)
The first European-Chinese dictionary

https://commons.wikimedia.org/wiki/File:Ricci-Ruggieri-Portuguese-Chinese-dictionary-page-1.png

Contents

- Simple Alignments
- Less Straightforward Connections
- Ecosystem of Resources

Contents

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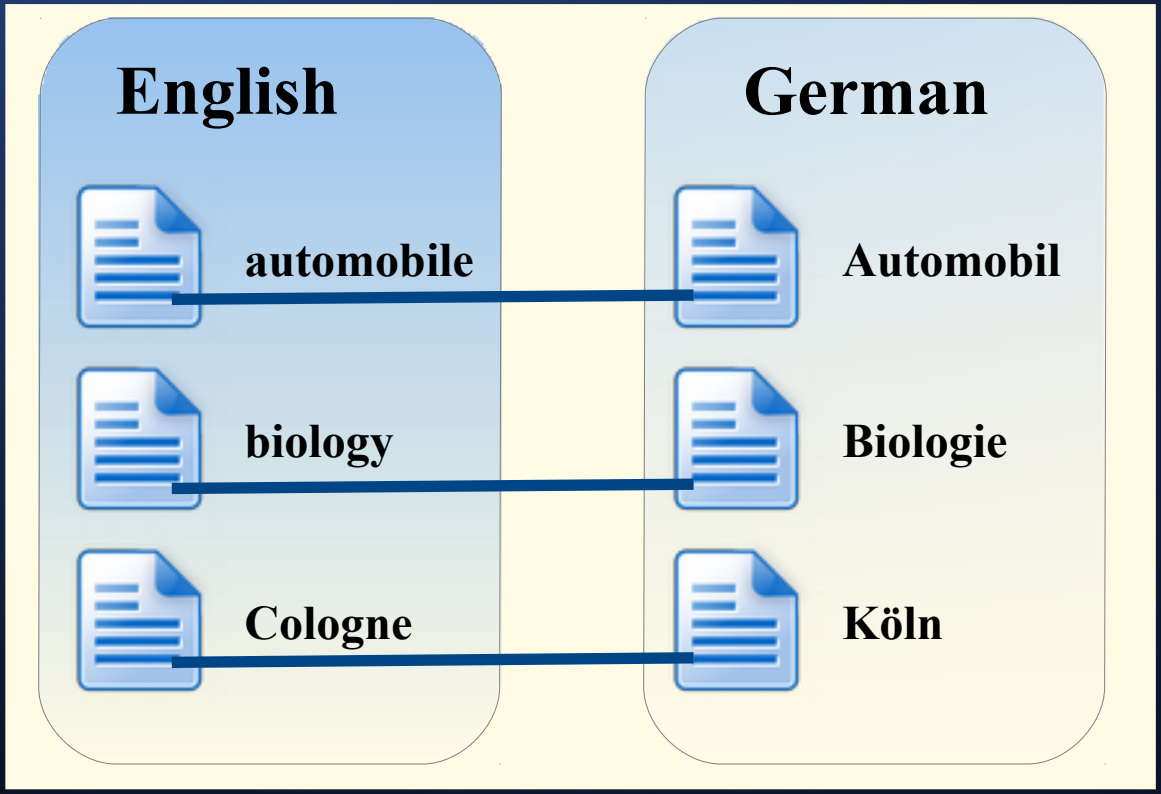
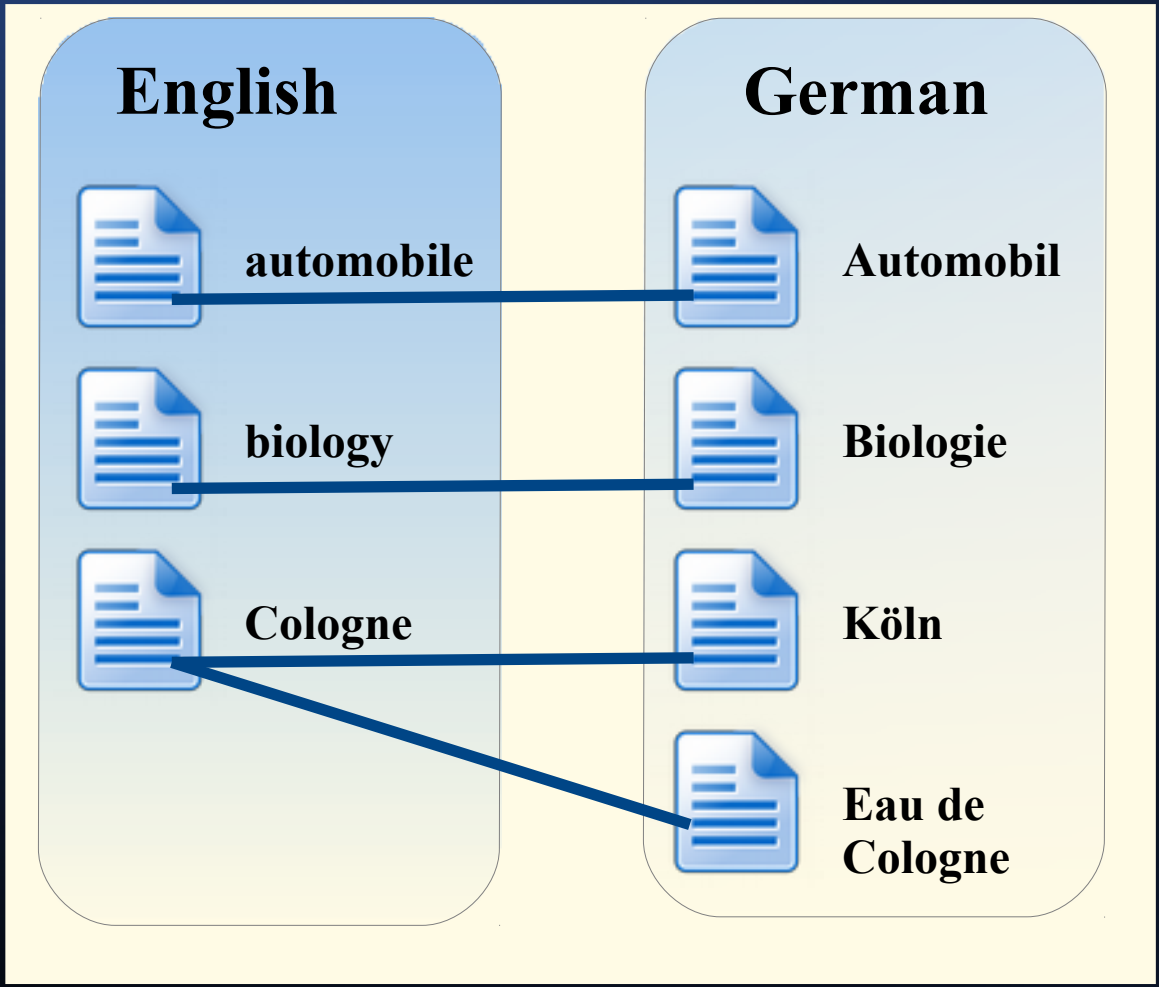
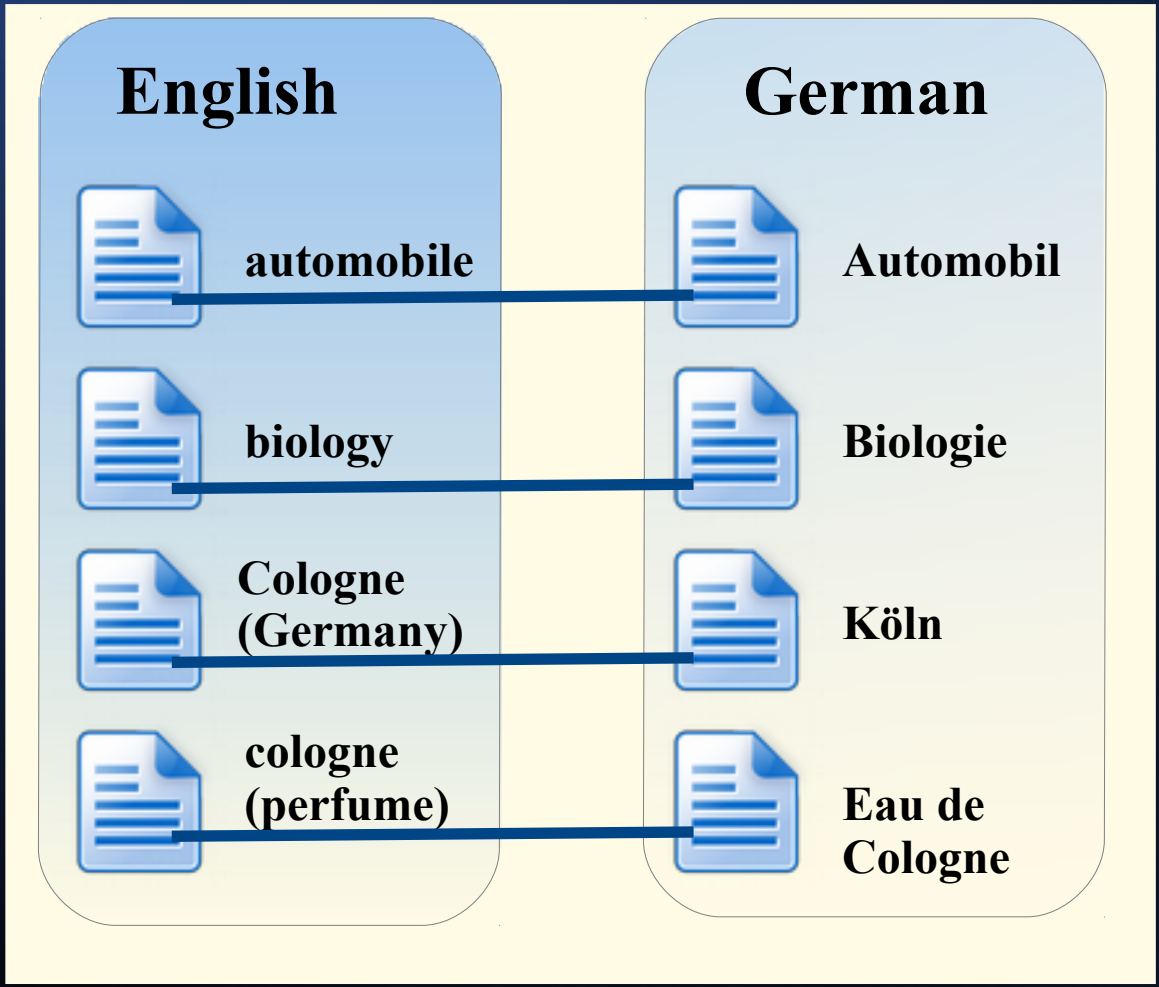
Perfect Alignments?



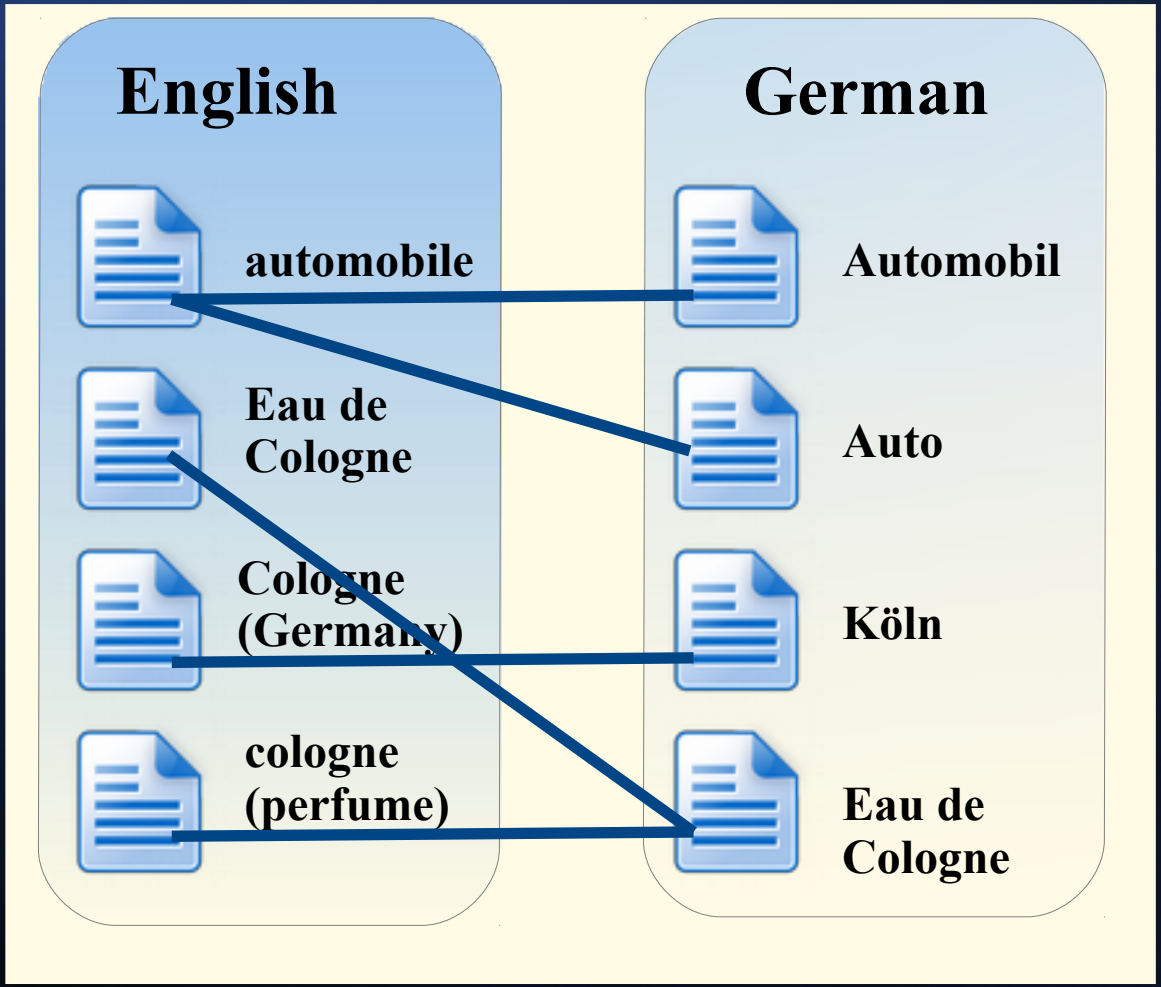
Perfect Alignments?



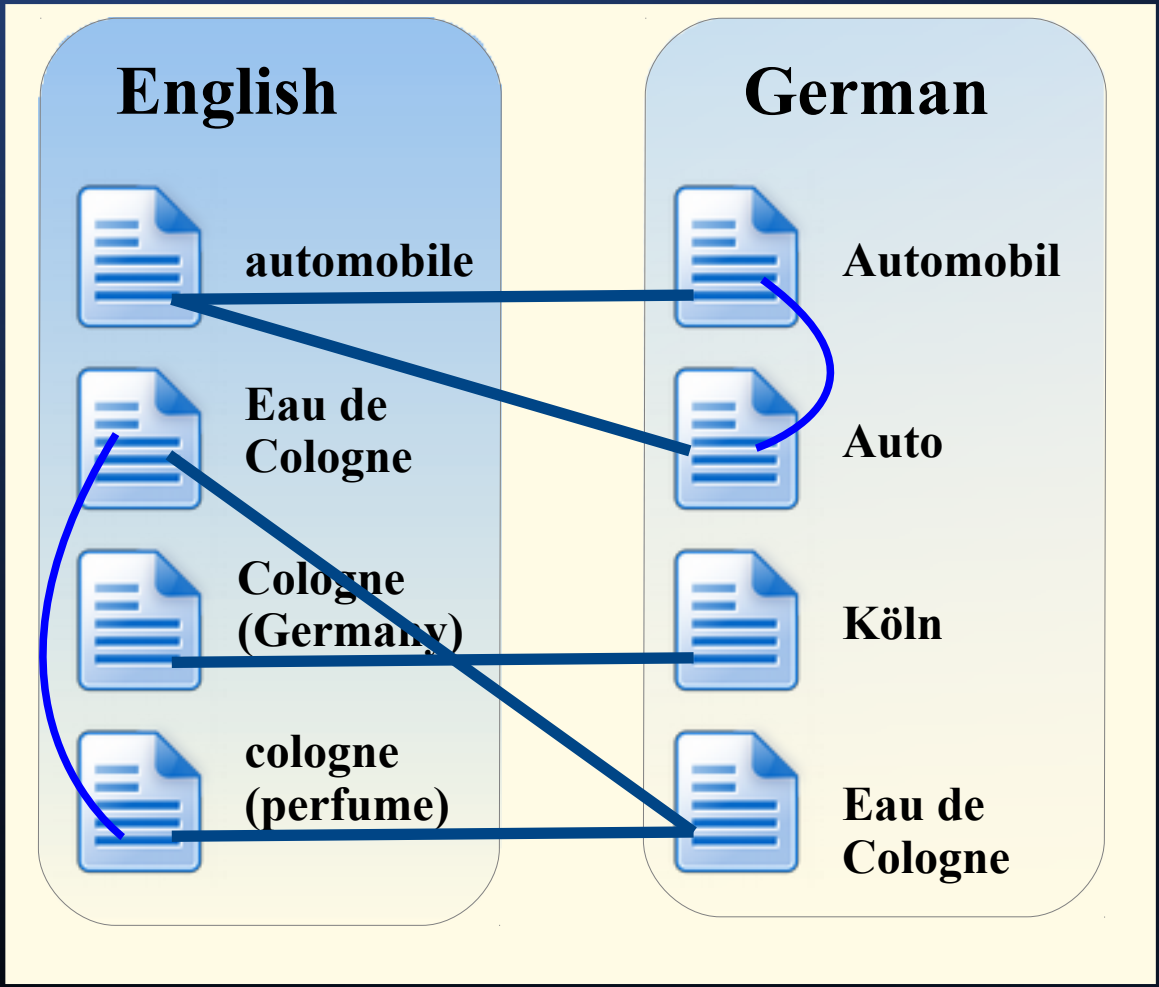
Sense Alignments



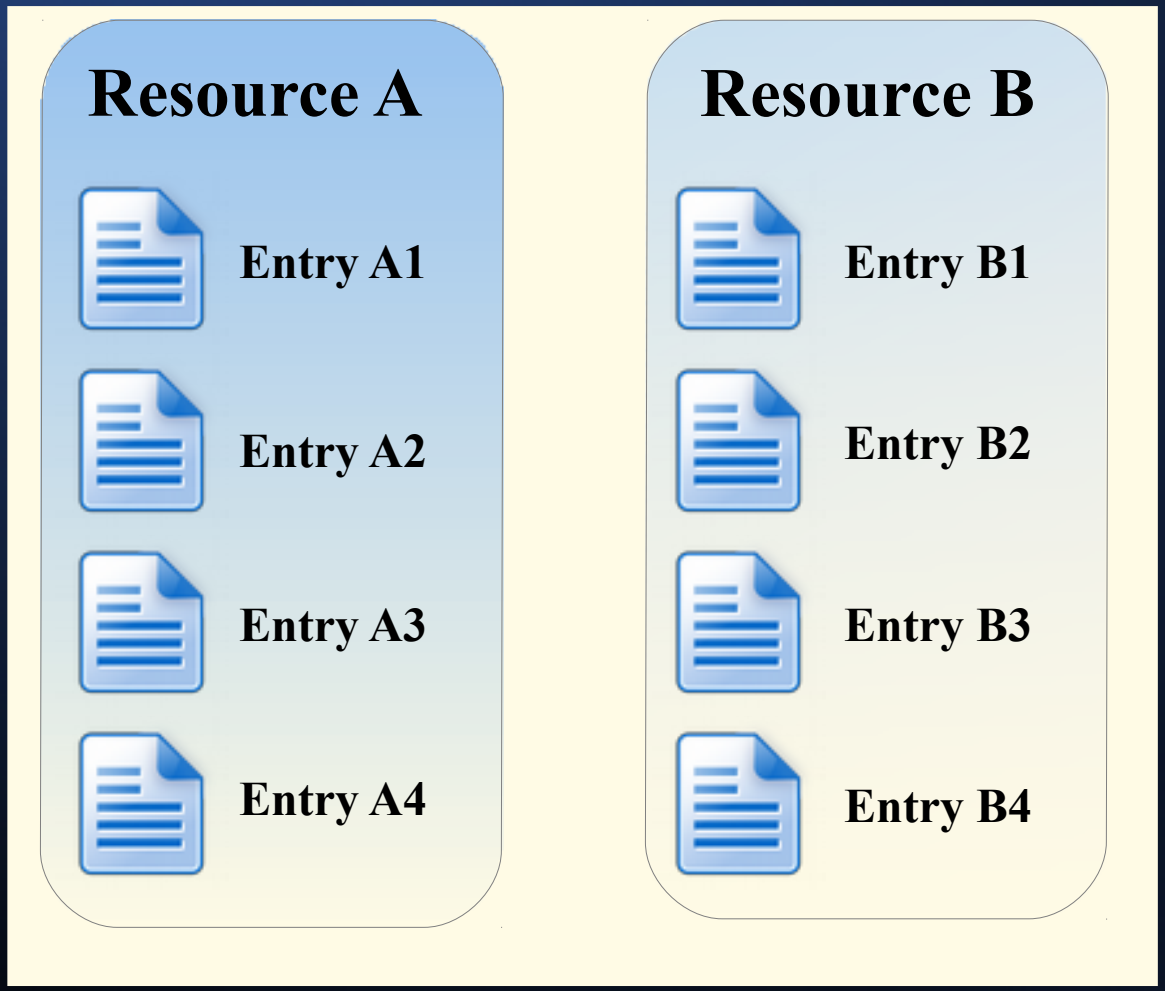
Sense Alignments



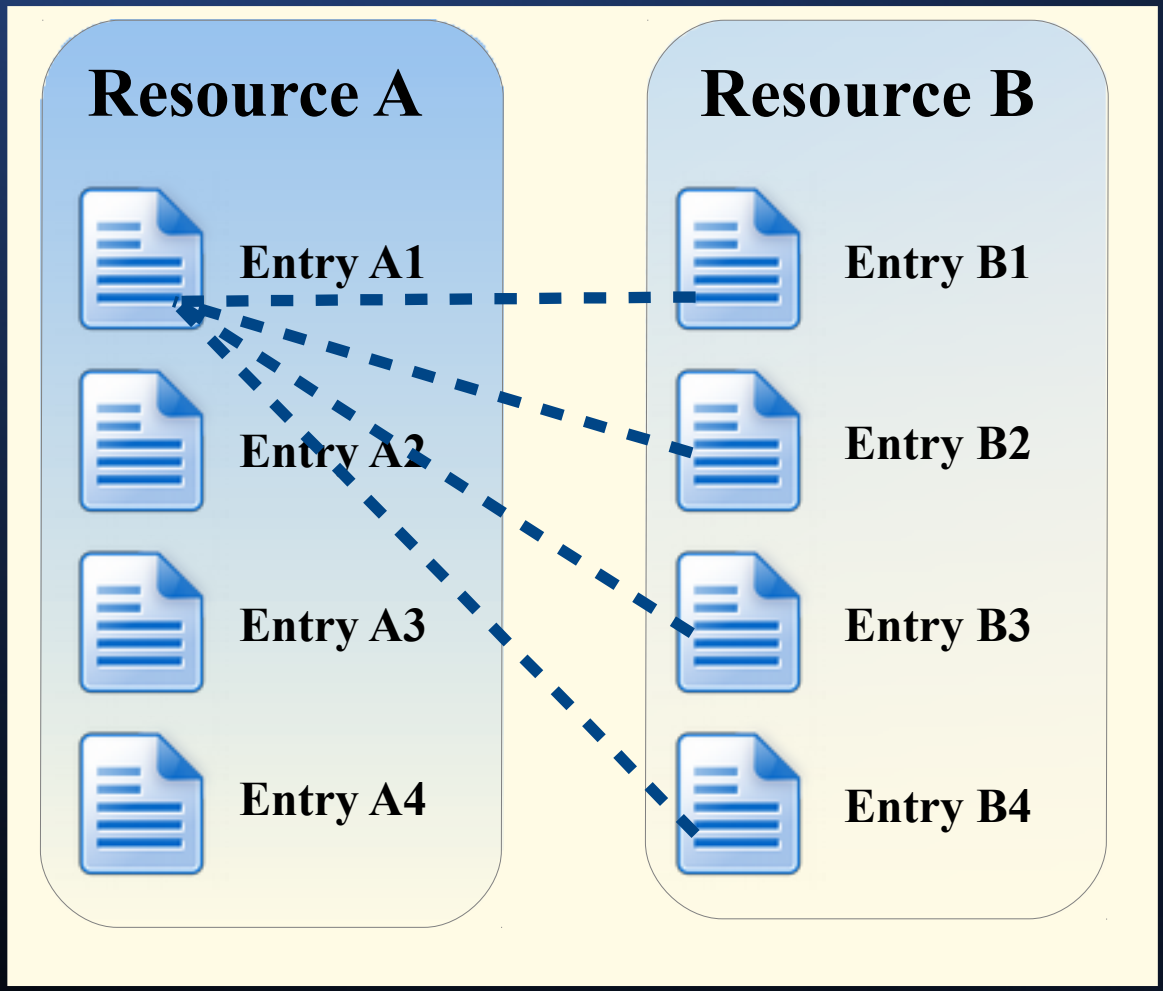
Sense Alignments: Implied Synonyms



Algorithms: Computing Similarity Scores

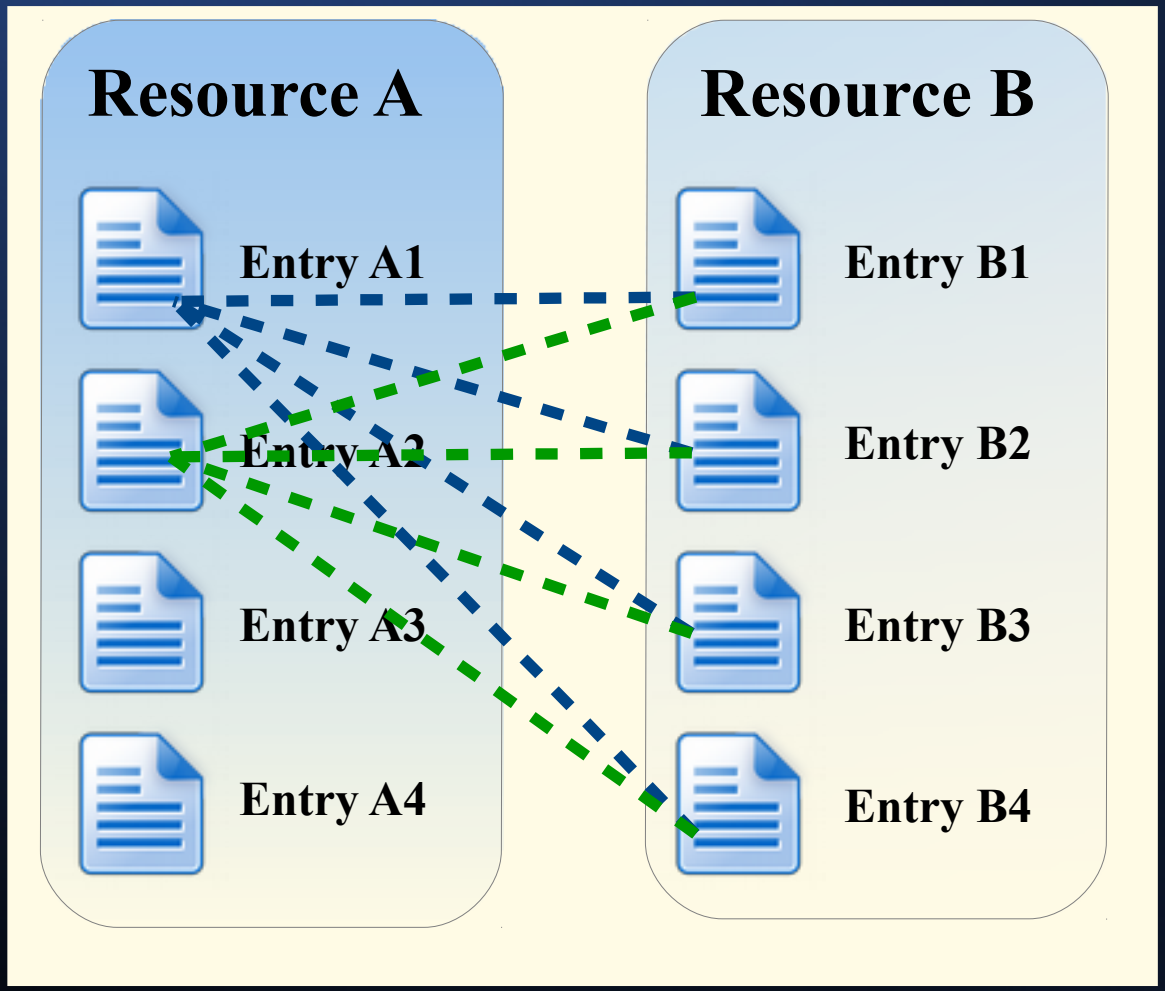


Algorithms: Computing Similarity Scores



Metrics:
Word overlap
Gloss overlap
Etc.

Algorithms: Computing Similarity Scores



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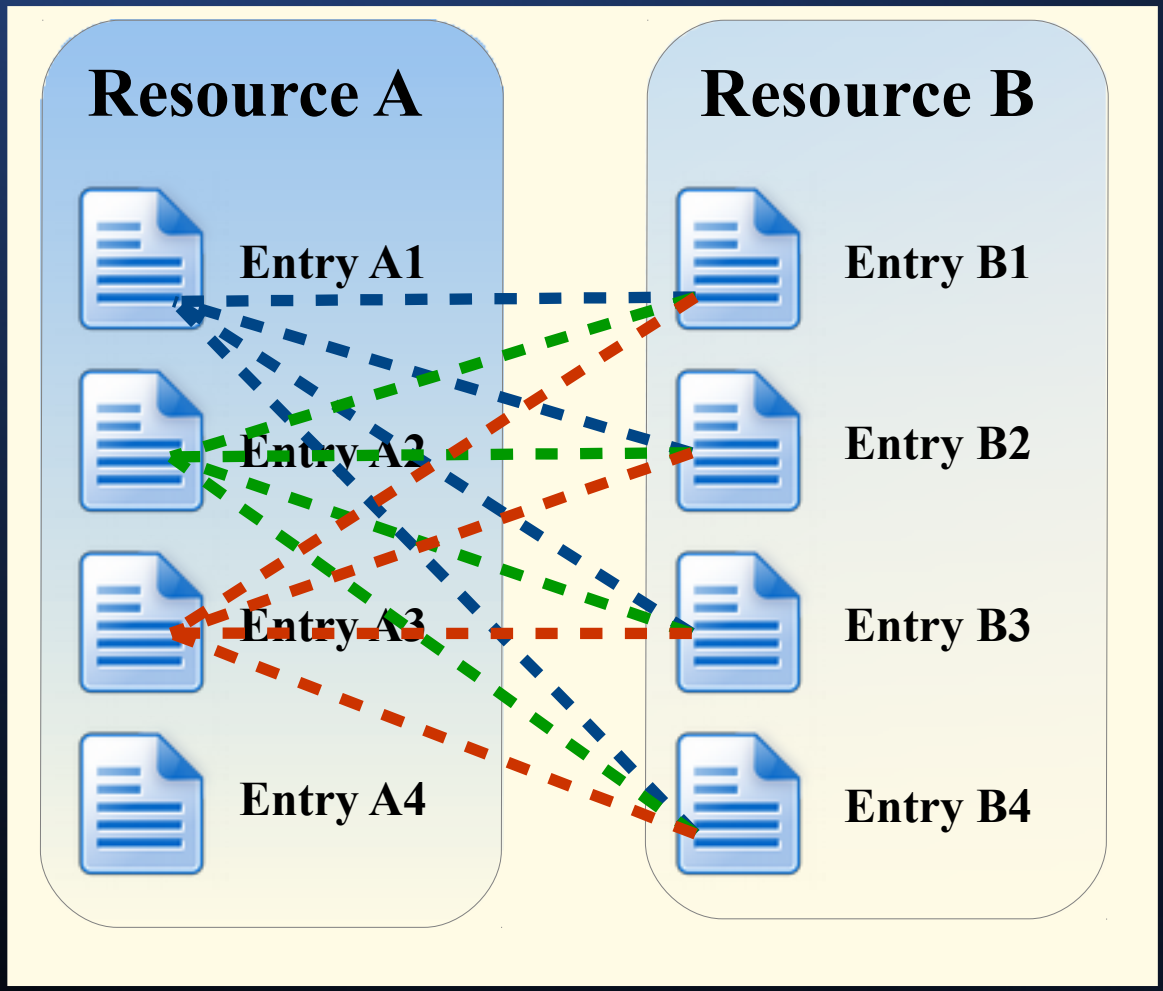

Metrics:
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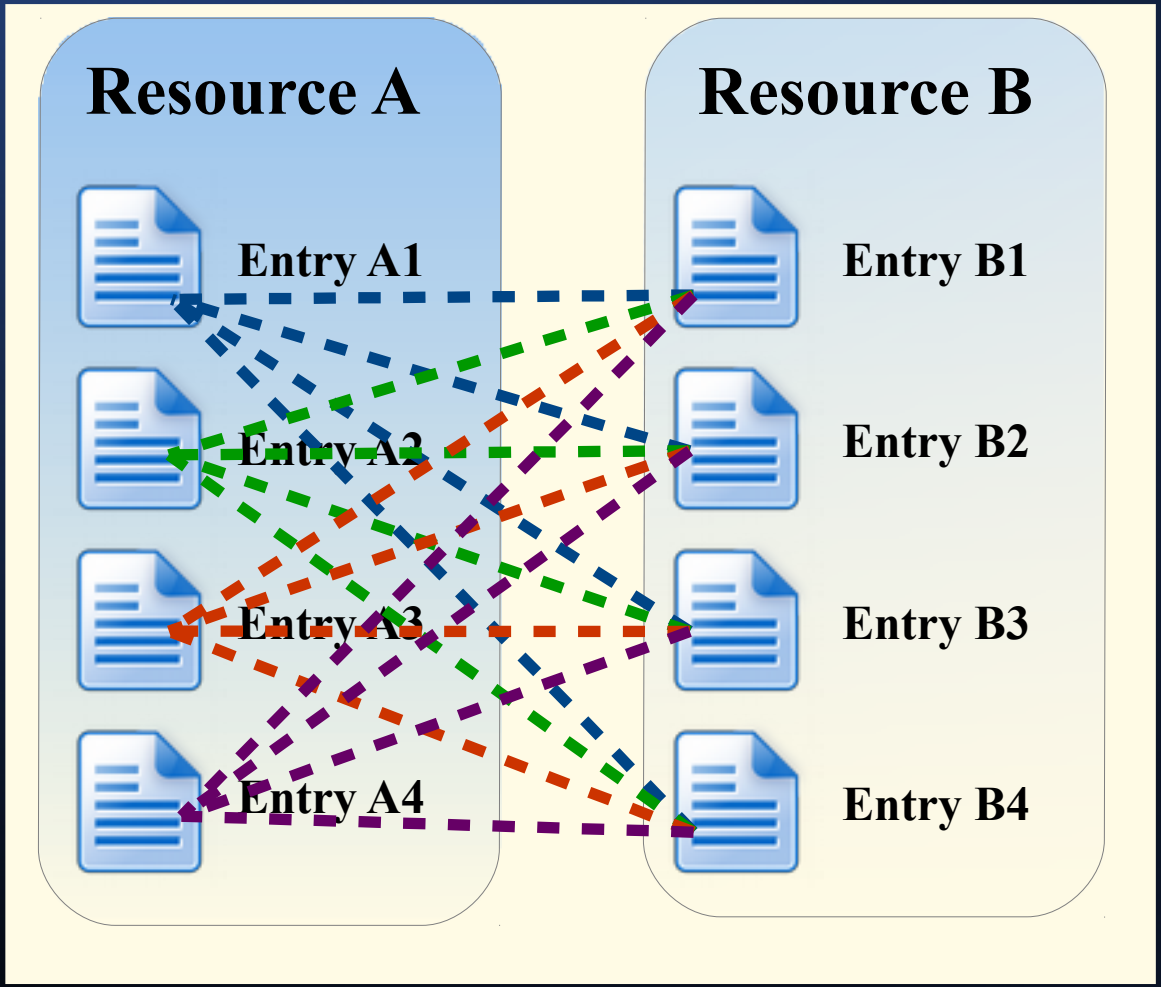
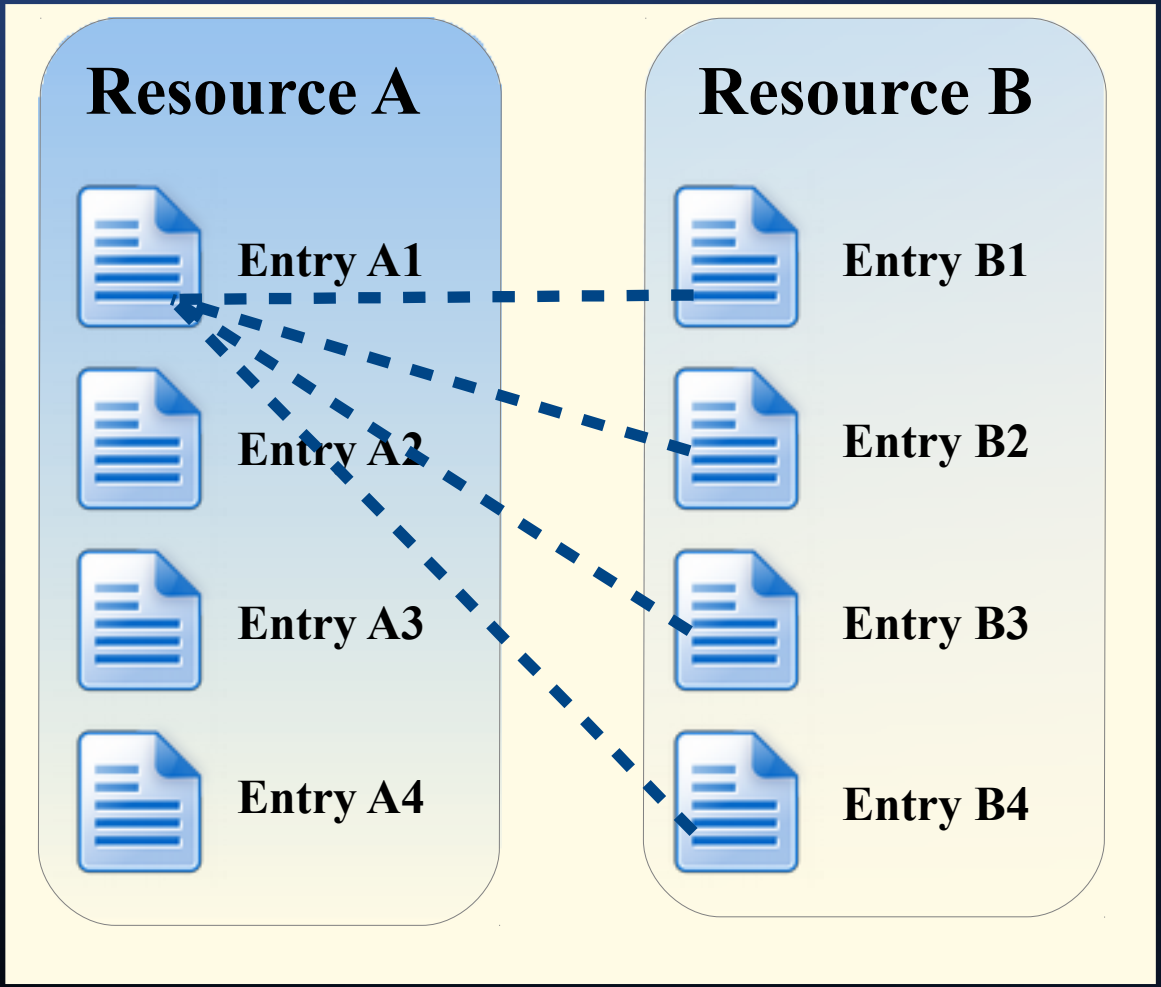
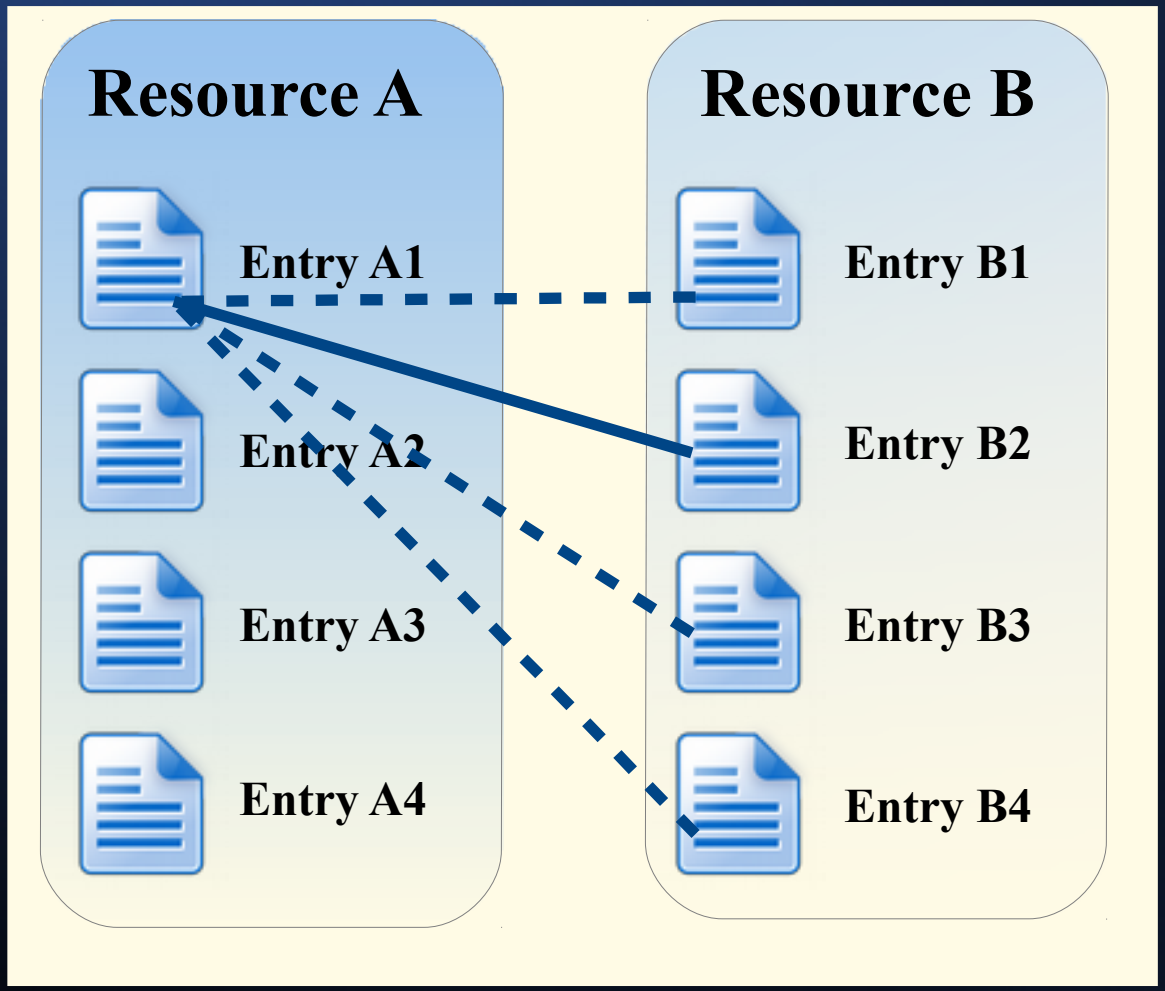


Metrics:
Word overlap
Gloss overlap
Etc.

Algorithms: Choosing Best Alignments

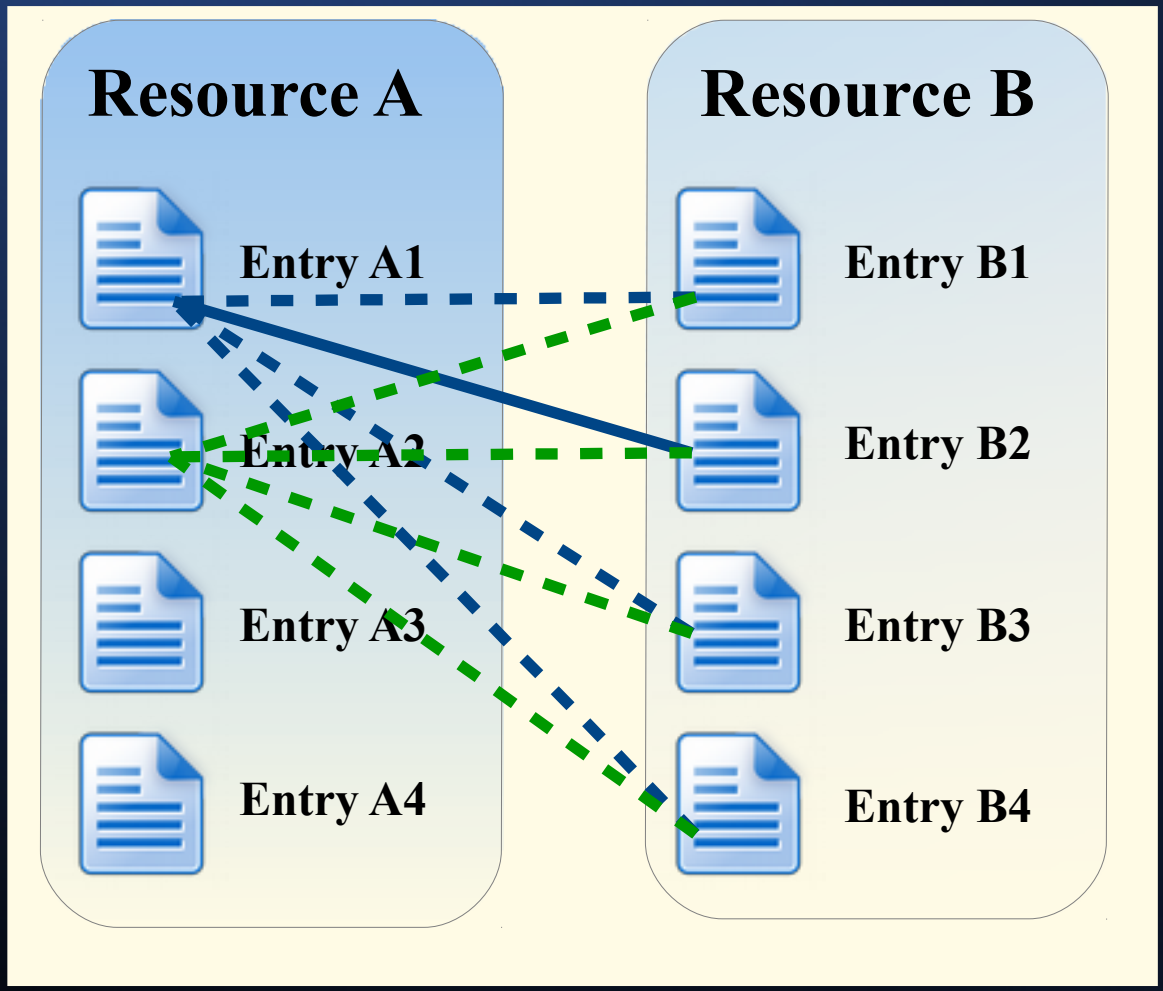


Algorithms: Choosing Best Alignments



Which one has the highest Score?

Algorithms: Choosing Best Alignments



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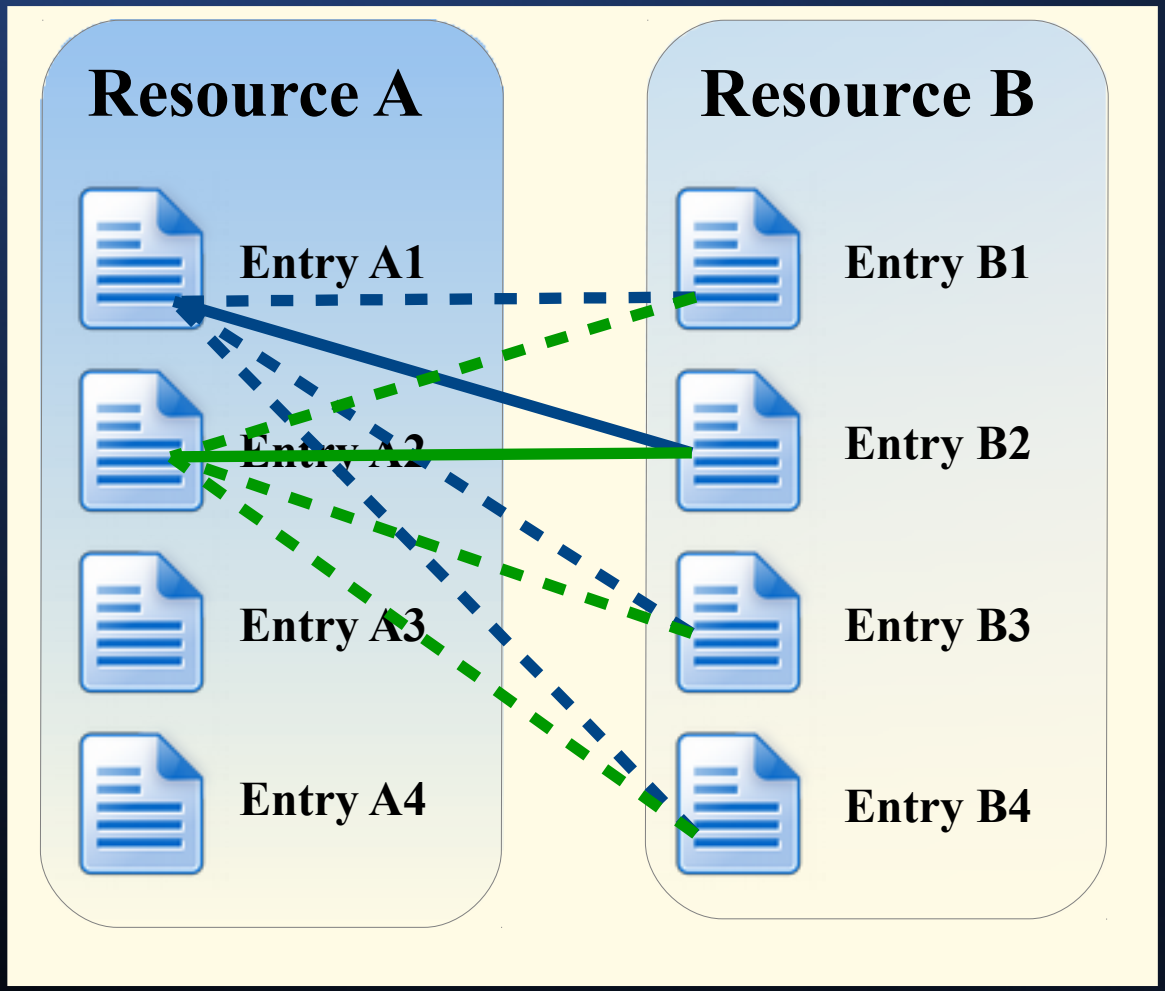
Algorithms: Choosing Best Alignments



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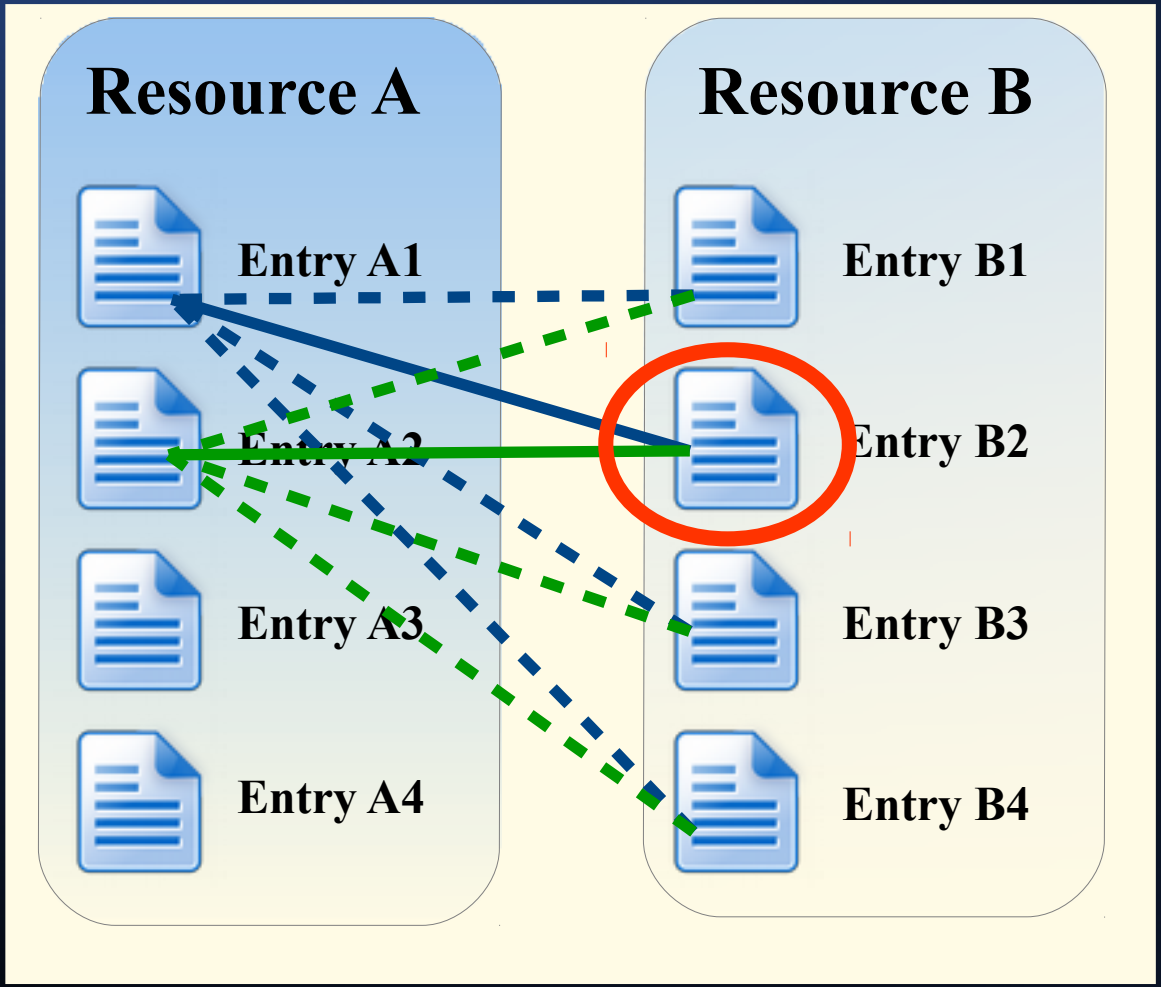
Algorithms: Choosing Best Alignments



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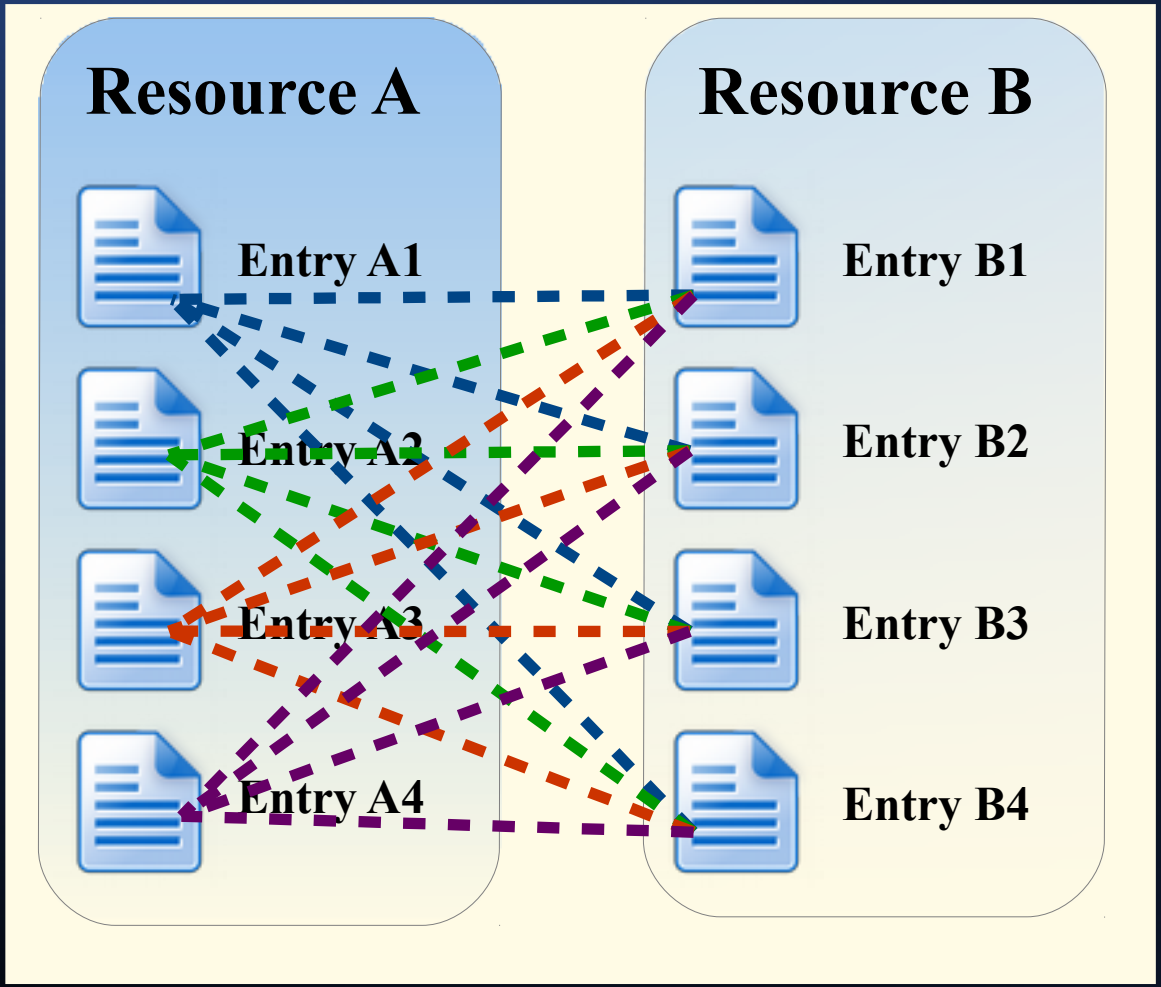
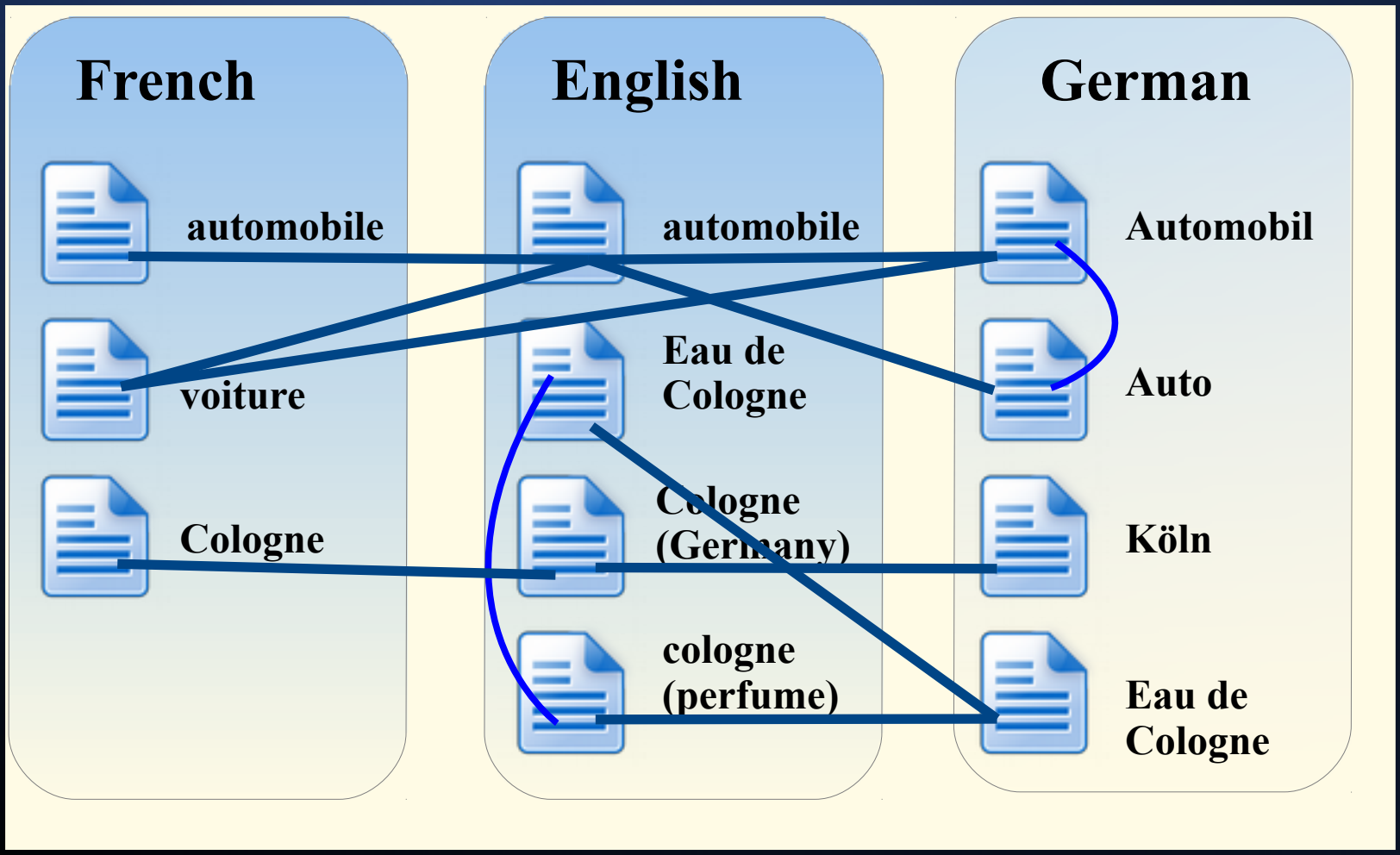


For 1-to-1 Alignment: Maximal Matching as global optimum

e.g. Hungarian Algorithm (Kuhn-Munkres algorithm)

Algorithms: Choosing Best Alignments



For arbitrary alignments: global optimum via algorithms from de Melo (2010, 2012)

Gerard de Melo. Graph-based Methods for Large-Scale Multilingual Knowledge Integration. Universaar 2012. ISBN 978-3-86223-028-0

Separated Concepts (Multilingual Wikipedia)

English concept	German concept (translated)	Explanation
Coffee percolator	French Press	different brewing devices
Baqa-Jatt	Baqa al-Gharbiyye	Baqa-Jatt resulted from merger of Baqa al-Gharbiyye and Jatt
Leucothoe (plant)	Leucothea (Orchamos)	plant vs. figure of Greek mythology
Compulsory education	Right to education	duty vs. right
Franz Kafka's Diaries	Franz Kafka	diaries vs. person

Contents

- Simple Alignments
- Less Straightforward Links
- Ecosystem of Resources

Separated Concepts (Multilingual Wikipedia)

English concept	German concept (translated)	Explanation
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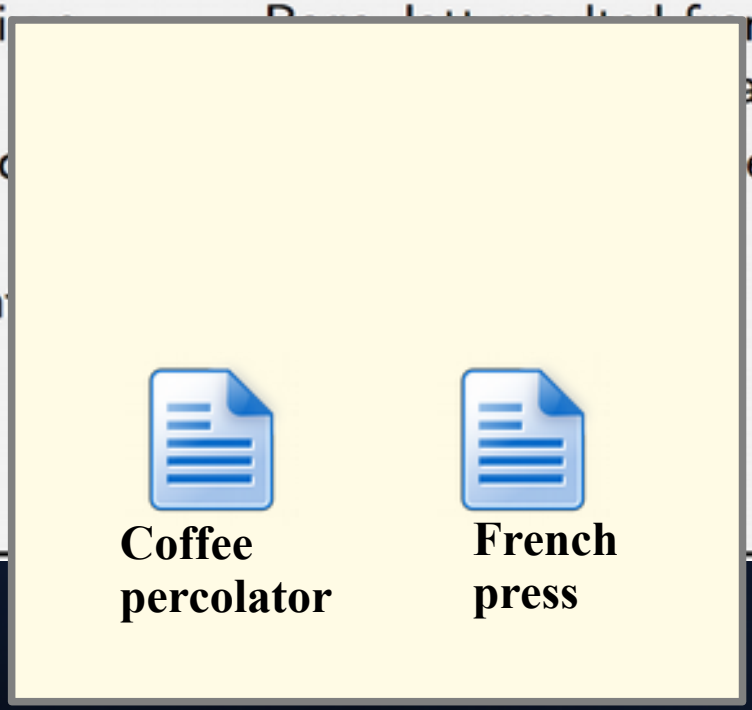
	(Orc	ek
	ıcat	
Diaries		

Model as two separate entries



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Coffee percolator	French Press	different brewing devices
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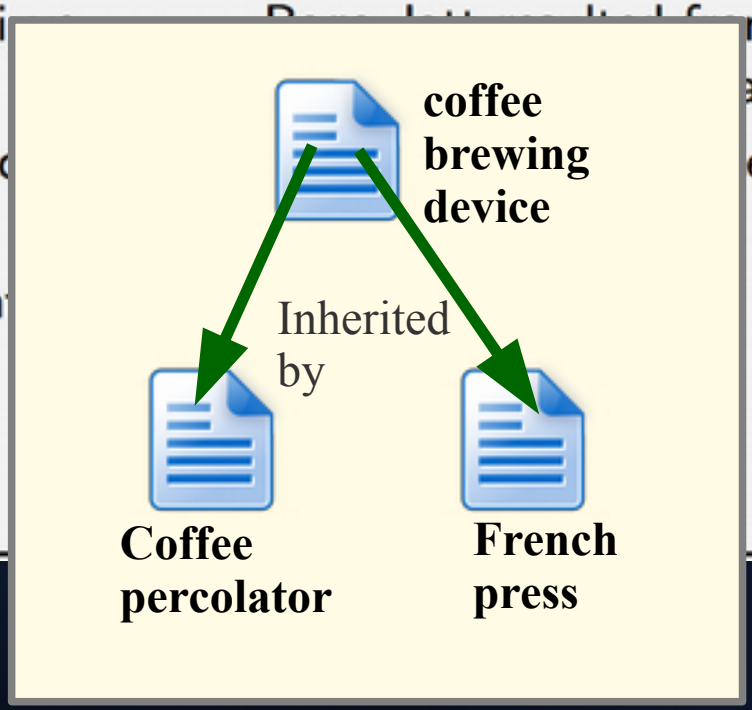
Model as two separate entries

but make their relationship explicit



Granularity

WordNet Search - 3.1
- WordNet home page - Glossary - Help

Word to search for: carry [Search WordNet]

Display Options: (Select option to change) [Change]

Key: "S:" = Show Synset (semantic) relations, "W:" = Show Word (lexical) relations
Display options for sense: (gloss) "an example sentence"

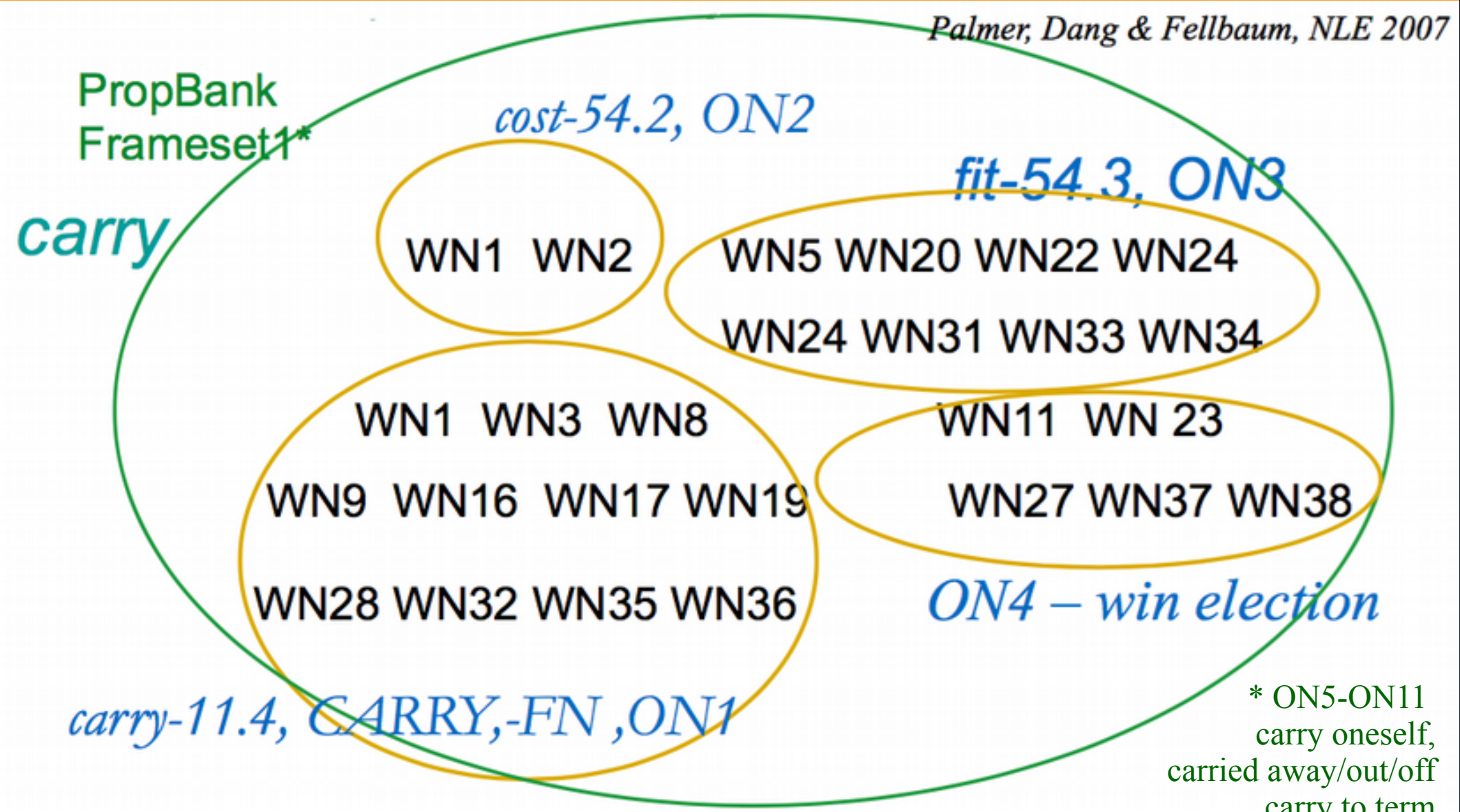
Noun

- S: (n) **carry** (the act of carrying something)

Verb

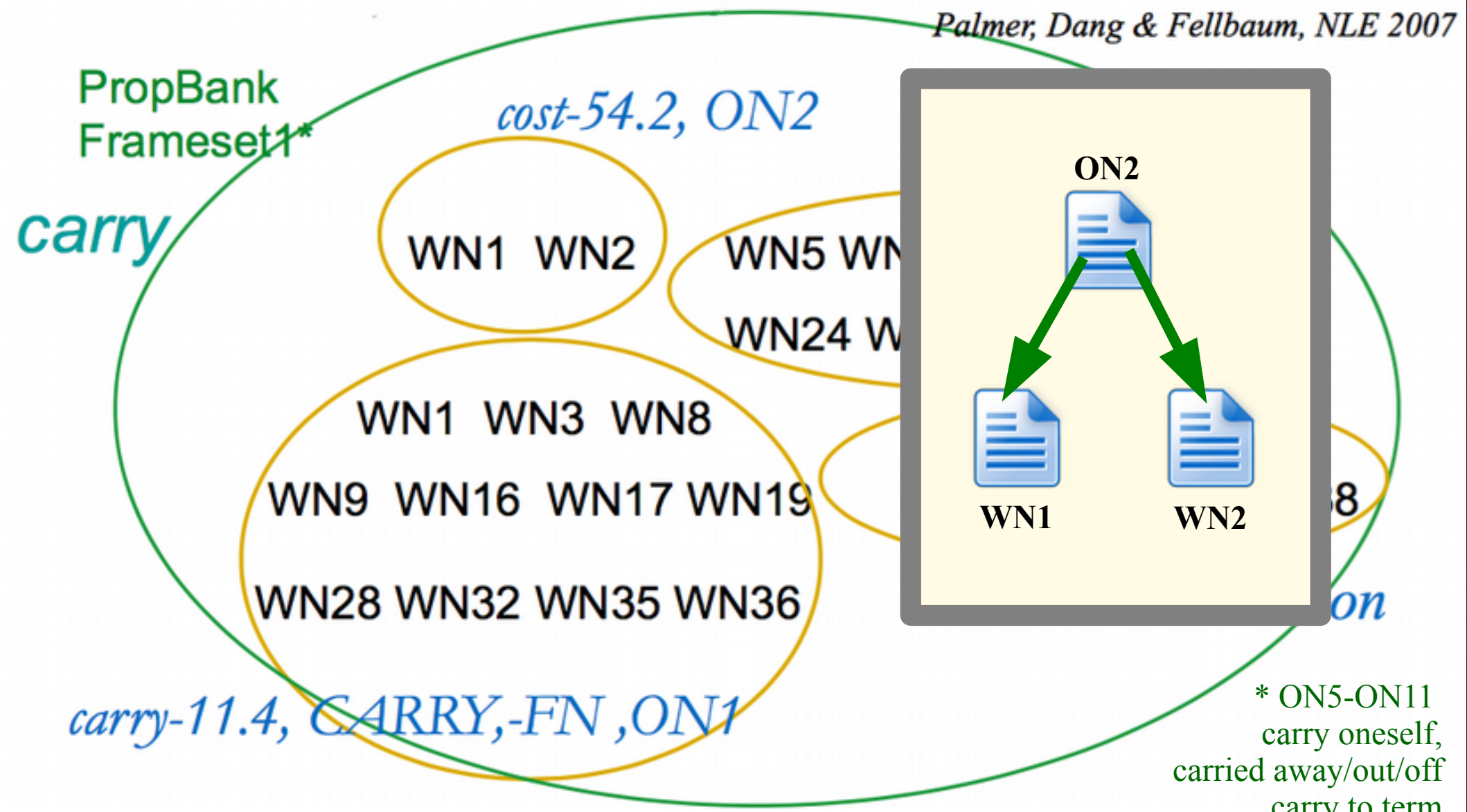
- S: (v) transport, **carry** (move while supporting, either in a vehicle or in one's hands or on one's body) *"You must carry your camping gear"*; *"carry the suitcases to the car"*; *"This train is carrying nuclear waste"*; *"These pipes carry waste water into the river"*
- S: (v) **carry**, pack, take (have with oneself; have on one's person) *"She always takes an umbrella"*; *"I always carry money"*; *"She packs a gun when she goes into the mountains"*
- S: (v) impart, conduct, transmit, convey, **carry**, channel (transmit or serve as the medium for transmission) *"Sound carries well over water"*; *"The airwaves carry the sound"*; *"Many metals conduct heat"*
- S: (v) **carry**, convey, express (serve as a means for expressing something) *"The painting of Mary carries motherly love"*; *"His voice carried a lot of anger"*
- S: (v) **carry** (bear or be able to bear the weight, pressure,or responsibility of) *"His efforts carried the entire project"*; *"How many credits is this student carrying?"*; *"We carry a very large mortgage"*
- S: (v) hold, **carry**, bear (support or hold in a certain manner) *"She holds her head high"*; *"He carried himself upright"*
- S: (v) hold, bear, **carry**, contain (contain or hold; have within) *"The jar carries wine"*; *"The canteen holds fresh water"*; *"This can contains water"*
- S: (v) **carry** (extend to a certain degree) *"carry too far"*; *"She carries her ideas to the extreme"*
- S: (v) **carry**, extend (continue or extend) *"The civil war carried into the neighboring province"*; *"The disease extended into the remote mountain provinces"*
- S: (v) **carry** (be necessarily associated with or result in or involve) *"This crime carries a penalty of five years in prison"*
- S: (v) **carry** (win in an election) *"The senator carried his home state"*
- S: (v) **carry** (include, as on a list) *"How many people are carried on the payroll?"*
- S: (v) behave, acquit, bear, deport, conduct, comport, **carry** (behave in a certain manner) *"She carried herself well"*; *"he bore himself with dignity"*; *"They conducted themselves well during these difficult times"*
- S: (v) stock, **carry**, stockpile (have on hand) *"Do you carry kerosene heaters?"*
- S: (v) **carry**, run (include as the content; broadcast or publicize) *"We ran the ad three times"*; *"This paper carries a restaurant review"*; *"All major networks carried the press conference"*
- S: (v) dribble, **carry** (propel) *"Carry the ball"*; *"dribble the ball"*
- S: (v) **carry** (pass on a communication) *"The news was carried to every village in the province"*
- S: (v) **carry** (have as an inherent or characteristic feature or have as a consequence) *"This new washer carries a two year guarantee"*; *"The loan carries a high interest rate"*; *"this undertaking carries many dangers"*; *"She carries her mother's genes"*; *"These bonds carry warrants"*; *"The restaurant carries an unusual name"*
- S: (v) **carry** (be conveyed over a certain distance) *"Her voice carries very well in this big opera house"*
- S: (v) **carry** (keep up with financial support) *"The Federal Government carried the province for many years"*
- S: (v) **carry** (have or possess something abstract) *"I carry her image in my mind's eye"*; *"I will carry the secret to my grave"*; *"I carry these thoughts in the back of my head"*; *"I carry a lot of life insurance"*
- S: (v) **carry** (be equipped with (a mast or sail)) *"This boat can only carry a small sail"*
- S: (v) **carry**, persuade, sway (win approval or support for) *"Carry all before one"*; *"His speech did not sway the voters"*
- S: (v) **carry** (compensate for a weaker partner or member by one's own performance) *"I resent having to carry her all the time"*
- S: (v) **carry** (take further or advance) *"carry a cause"*
- S: (v) **carry** (have on the surface or on the skin) *"carry scars"*
- S: (v) **carry** (capture after a fight) *"The troops carried the town after a brief fight"*
- S: (v) post, **carry** (transfer (entries) from one account book to another)
- S: (v) **carry** (transfer (a number, cipher, or remainder) to the next column or unit's place before or after, in addition or multiplication) *"put down 5 and carry 2"*
- S: (v) **carry** (pursue a line of scent or be a bearer) *"the dog was taught to fetch and carry"*
- S: (v) **carry** (bear (a crop)) *"this land does not carry olives"*
- S: (v) **carry** (propel or give impetus to) *"The sudden gust of air propelled the ball to the other side of the fence"*
- S: (v) **carry**, hold (drink alcohol without showing ill effects) *"He can hold his liquor"*; *"he had drunk more than he could carry"*
- S: (v) **carry** (be able to feed) *"This land will carry ten cows to the acre"*
- S: (v) **carry** (have a certain range) *"This rifle carries for 3,000 feet"*
- S: (v) **carry** (cover a certain distance or advance beyond) *"The drive carried to the green"*
- S: (v) **carry** (secure the passage or adoption (of bills and motions)) *"The motion carried easily"*
- S: (v) **carry** (be successful in) *"She lost the game but carried the match"*
- S: (v) **carry** (sing or play against other voices or parts) *"He cannot carry a tune"*
- S: (v) have a bun in the oven, bear, **carry**, gestate, expect (be pregnant with) *"She is bearing his child"*; *"The are expecting another child in January"*; *"I am carrying his child"*

Granularity: OntoNotes, PropBank, VerbNet



Source: Martha Palmer (2012)

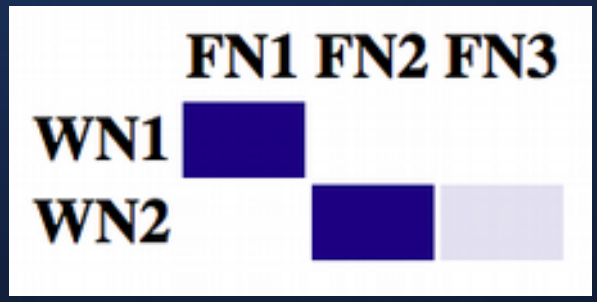
Granularity: OntoNotes, PropBank, VerbNet



Source: Martha Palmer (2012)

Analysis of Alignments

- **Study based on analysis of multiply annotated sentences**
- **Conclusion: 1-to-1 alignments are not always possible**



curious (adjective)

Gerard de Melo, Collin F. Baker, Nancy Ide, Rebecca Passonneau, Christiane Fellbaum (2012) Empirical Comparisons of MASC Word Sense Annotations. Proceedings of LREC 2012.
Data and Further Information: http://icsi.berkeley.edu/~demelo/masc/

Non-Straightforward Alignments

- **Study based on analysis of multiply annotated sentences**
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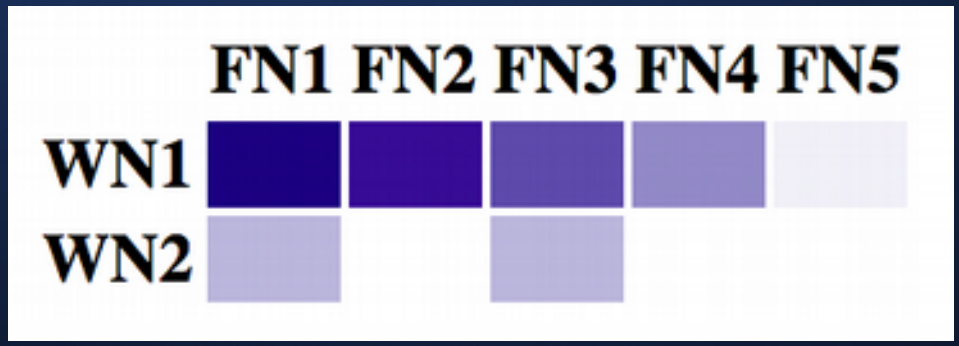


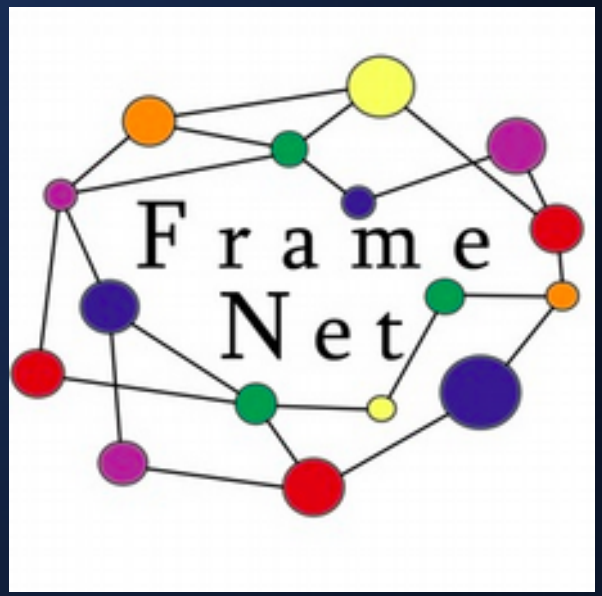
trace (noun)

Gerard de Melo, Collin F. Baker, Nancy Ide, Rebecca Passonneau, Christiane Fellbaum (2012) Empirical Comparisons of MASC Word Sense Annotations. Proceedings of LREC 2012.
Data and Further Information: http://icsi.berkeley.edu/~demelo/masc/

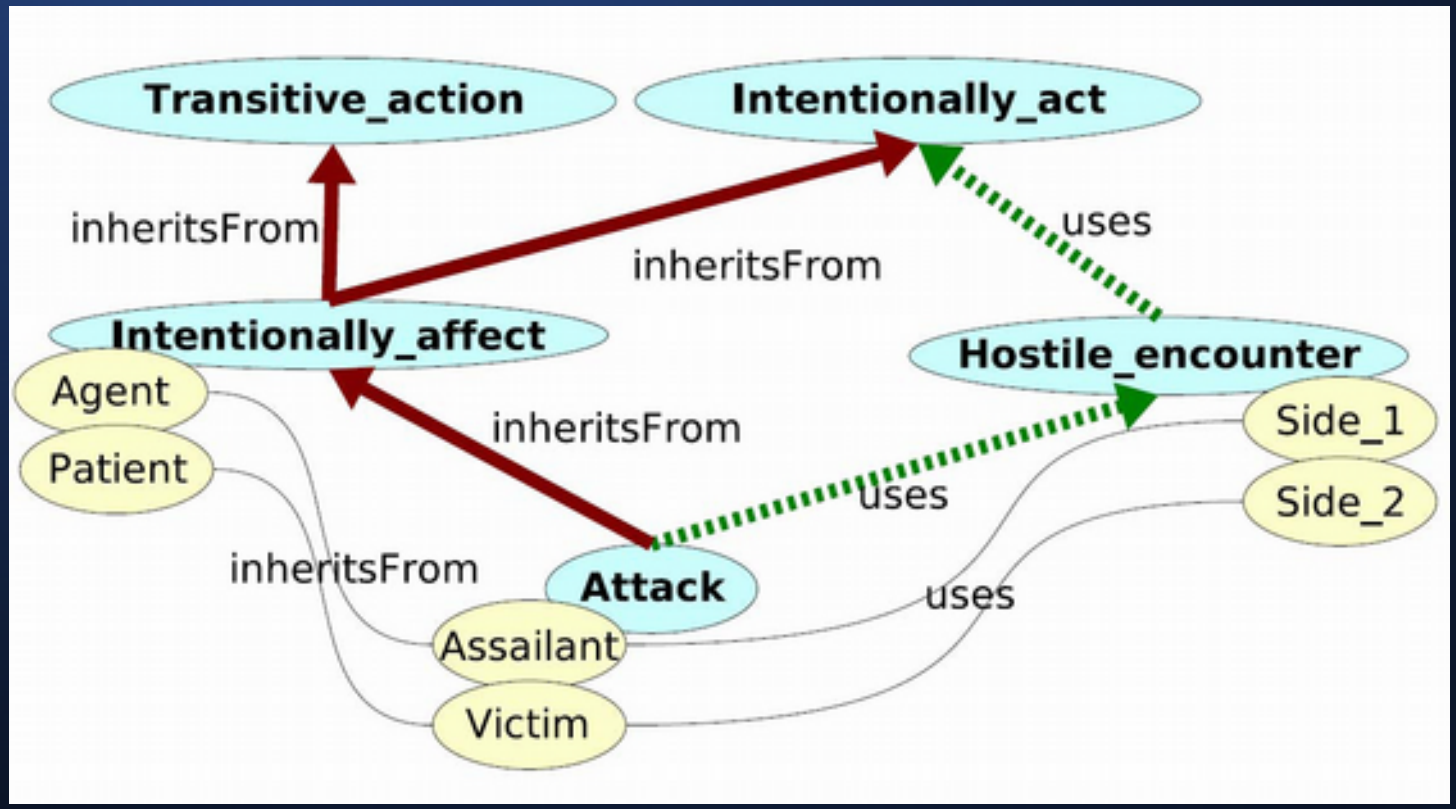
Non-Straightforward Alignments

Solution:

- **Don't necessarily connect via 1-to-1 alignments.**
- **Connect using full range of semantic relations**



Non-Straightforward Alignments



Jan Scheffczyk, Collin F. Baker, Srini Narayanan. Ontology-based reasoning about lexical resources. Proc. OntoLex 2006

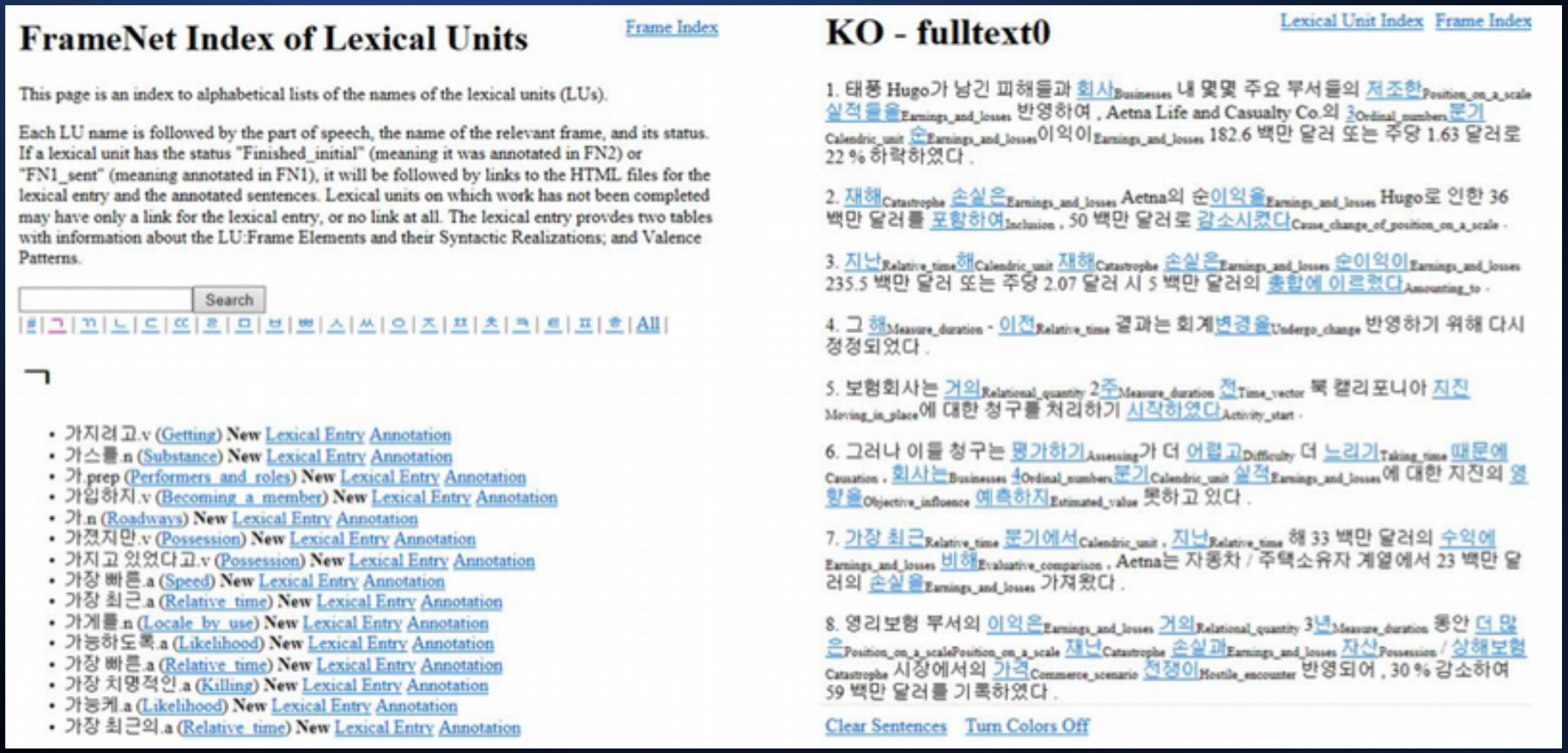
Frame Relations: inheritsFrom, uses (involvement without requiring roles to be instantiated), etc.

Multilingual Alignments

- Some non-English framenet projects re-use Berkeley FrameNet frames
- Non-English LUs can be added to existing English FrameNet frames

Oliver Čulo, Gerard de Melo (2012). Source-Path-Goal: Investigating the Cross-Linguistic Potential of Frame-Semantic Text Analysis. it - Information Technology 54(3).

Multilingual Alignments



FrameNet Index of Lexical Units

Frame Index

This page is an index to alphabetical lists of the names of the lexical units (LUs).

Each LU name is followed by the part of speech, the name of the relevant frame, and its status. If a lexical unit has the status "Finished_initial" (meaning it was annotated in FN2) or "FN1_sent" (meaning annotated in FN1), it will be followed by links to the HTML files for the lexical entry and the annotated sentences. Lexical units on which work has not been completed may have only a link for the lexical entry, or no link at all. The lexical entry provdes two tables with information about the LU:Frame Elements and their Syntactic Realizations; and Valence Patterns.

Search

| ㄱ | ㄲ | ㄴ | ㄷ | ㄸ | ㄹ | ㅁ | ㅂ | ㅃ | ㅅ | ㅆ | ㅇ | ㅈ | ㅉ | ㅊ | ㅋ | ㅌ | ㅍ | ㅎ | All |

ㄱ

- 가지려고.v (Getting) **New** Lexical Entry Annotation
- 가스를.n (Substance) **New** Lexical Entry Annotation
- 가.prep (Performers_and_roles) **New** Lexical Entry Annotation
- 가입하지.v (Becoming_a_member) **New** Lexical Entry Annotation
- 가.n (Roadways) **New** Lexical Entry Annotation
- 가졌지만.v (Possession) **New** Lexical Entry Annotation
- 가지고 있었다고.v (Possession) **New** Lexical Entry Annotation
- 가장 빠른.a (Speed) **New** Lexical Entry Annotation
- 가장 최근.a (Relative_time) **New** Lexical Entry Annotation
- 가계를.n (Locale_by_use) **New** Lexical Entry Annotation
- 가능하도록.a (Likelihood) **New** Lexical Entry Annotation
- 가장 빠른.a (Relative_time) **New** Lexical Entry Annotation
- 가장 치명적인.a (Killing) **New** Lexical Entry Annotation
- 가능케.a (Likelihood) **New** Lexical Entry Annotation
- 가장 최근의.a (Relative_time) **New** Lexical Entry Annotation

KO - fulltext0

Lexical Unit Index Frame Index

1. 태풍 Hugo가 남긴 피해들과 회사Businesses 내 몇몇 주요 부서들의 저조한Position_on_a_scale 실적을을Earnings_and_losses 반영하여 , Aetna Life and Casualty Co.의 3Ordinal_numbers분기Calendric_unit 순Earnings_and_losses이익이Earnings_and_losses 182.6 백만 달러 또는 주당 1.63 달러로 22 % 하락하였다 .

2. 재해Catastrophe 손실은Earnings_and_losses Aetna의 순이익을Earnings_and_losses Hugo로 인한 36 백만 달러를 포함하여Inclusion , 50 백만 달러로 감소시켰다Cause_change_of_position_on_a_scale .

3. 지난Relative_time해Calendric_unit 재해Catastrophe 손실은Earnings_and_losses 순이익이Earnings_and_losses 235.5 백만 달러 또는 주당 2.07 달러 시 5 백만 달러의 총합에 이르렀다Amounting_to .

4. 그 해Measure_duration - 이전Relative_time 결과는 회계변경을Undergo_change 반영하기 위해 다시 정정되었다 .

5. 보험회사는 거의Relational_quantity 2주Measure_duration 전Time_vector 북 캘리포니아 지진Moving_in_place에 대한 청구를 처리하기 시작하였다Activity_start .

6. 그러나 이들 청구는 평가하기Assessing가 더 어렵고Difficulty 더 느리기Taking_time 때문에Causation , 회사는Businesses 4Ordinal_numbers분기Calendric_unit 실적Earnings_and_losses에 대한 지진의 영향을Objective_influence 예측하지Estimated_value 못하고 있다 .

7. 가장 최근Relative_time 분기에서Calendric_unit , 지난Relative_time 해 33 백만 달러의 수익에Earnings_and_losses 비해Evaluative_comparison , Aetna는 자동차 / 주택소유자 계열에서 23 백만 달러의 손실을Earnings_and_losses 가져왔다 .

8. 영리보험 부서의 이익은Earnings_and_losses 거의Relational_quantity 3년Measure_duration 동안 더 많은Position_on_a_scalePosition_on_a_scale 재난Catastrophe 손실과Earnings_and_losses 자산Possession / 상해보험Catastrophe 시장에서의 가격Commerce_scenario 전쟁이Hostile_encounter 반영되어 , 30 % 감소하여 59 백만 달러를 기록하였다 .

Clear Sentences Turn Colors Off

Korean FrameNet by Key-Sun Choi

Multilingual Alignments

Commitment

Lexical Unit Index

Definition:

A Speaker makes a commitment to an Addressee to carry out some future action. This may be an action desirable (as with prometer 'promise') or not desirable (as with amenazar 'threaten') to the Addressee. Some of the words in this frame allow an Addressee to be expressed.

Me PROMETISTE que me harías un regalo. ECNI

Los dirigentes sindicales les AMENAZARON con endurecer las medidas de presión. DNI

FEs:

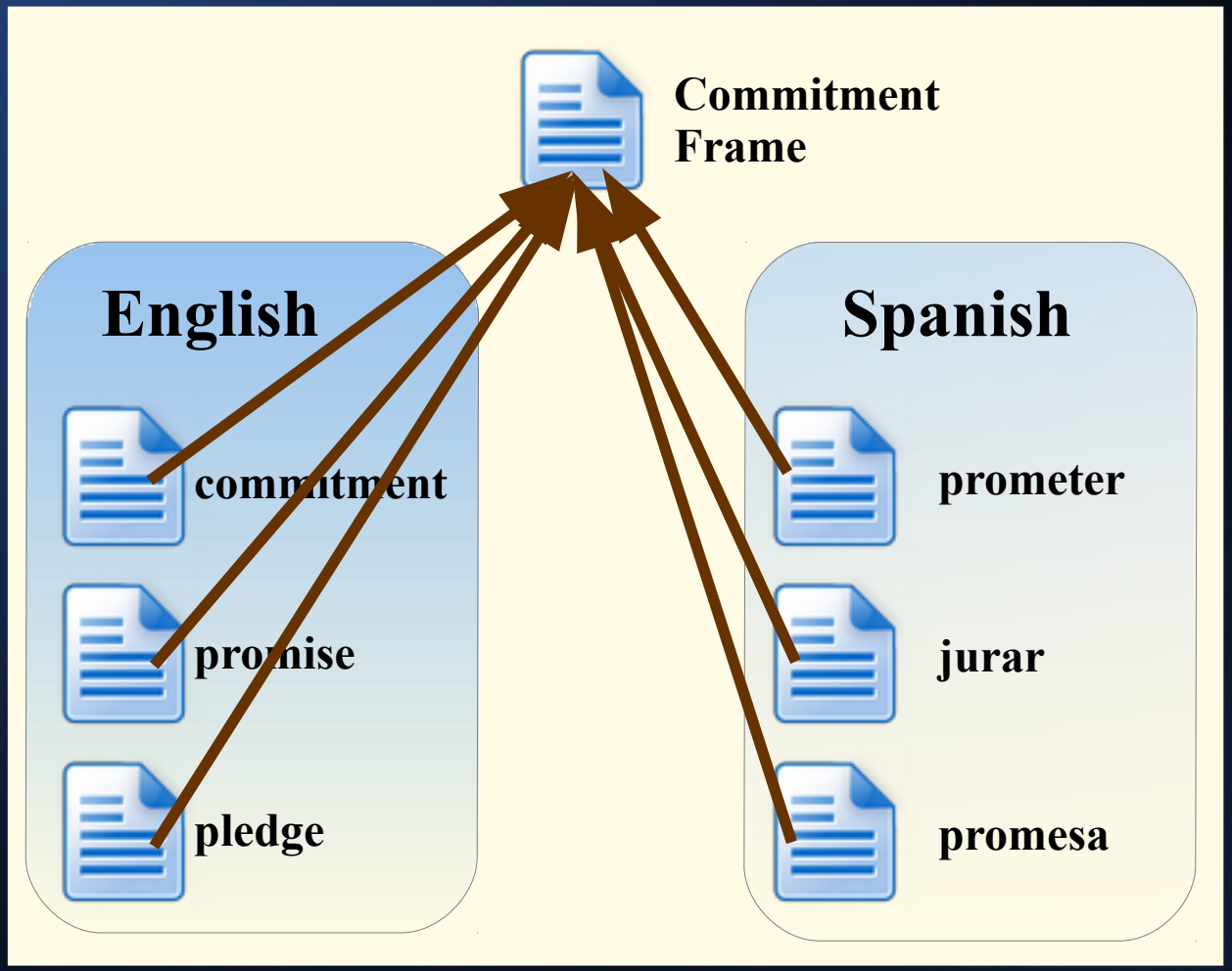
Core:

Addressee [Add] **Semantic Type:** Sentient	The Speaker's commitment can be made to an Addressee. With those words which allow this frame element to be expressed, Addressee usually occurs as an Indirect Object of verbal target or as a PP Complement of nominal targets. Les PROMETIO que les devolvería el dinero que le habian prestado.
Message [Mes] **Semantic Type:** Message	An index expression of the commitment made by the Speaker expresses the frame element Message. Message is expressed as a finite or non-finite clausal Complement or an NP Object. Me PROMETIERON que nos llamarían al llegar. El ejército israelí AMENAZO con disparar contra cualquier vehículo sospechoso. El nuevo presidente *mantuvo* su PROMESA de un referéndum sobre las instituciones europeas.

Spanish FrameNet by Subirats et al.

Multilingual Alignments

- Some non-English framenet projects re-use Berkeley FrameNet frames
- Non-English LUs can be added to existing English FrameNet frames



Oliver Čulo, Gerard de Melo (2012). Source-Path-Goal: Investigating the Cross-Linguistic Potential of Frame-Semantic Text Analysis. it - Information Technology 54(3).

Multilingual Alignments

Motion Frame

Intention FE

Purpose FE

Juan fue a San Francisco a visitar a un amigo para pedirle dinero.
Juan went to San Francisco to visit a friend and ask him for money.

- **In some cases:**
  minor modifications of frames

Multilingual Alignments

Motion Frame

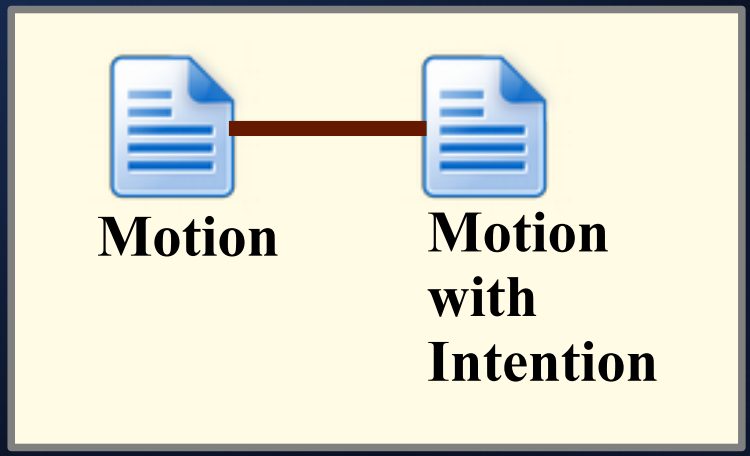
Intention FE

Purpose FE

Juan fue a San Francisco a visitar a un amigo para pedirle dinero.
Juan went to San Francisco to visit a friend and ask him for money.

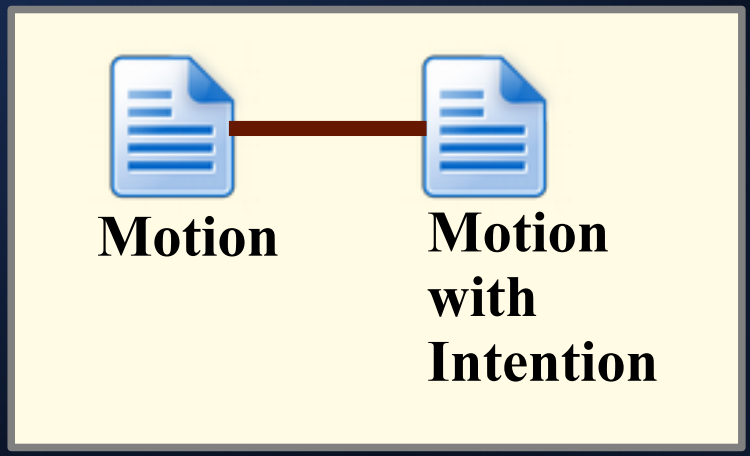
- **In some cases:**
  minor modifications of frames

  (these frames should perhaps be renamed and connected to the original version)



Multilingual Alignments

- Generally can create new frames to cover language-specific phenomena
- Connect these to existing hierarchy via a range of different relations.

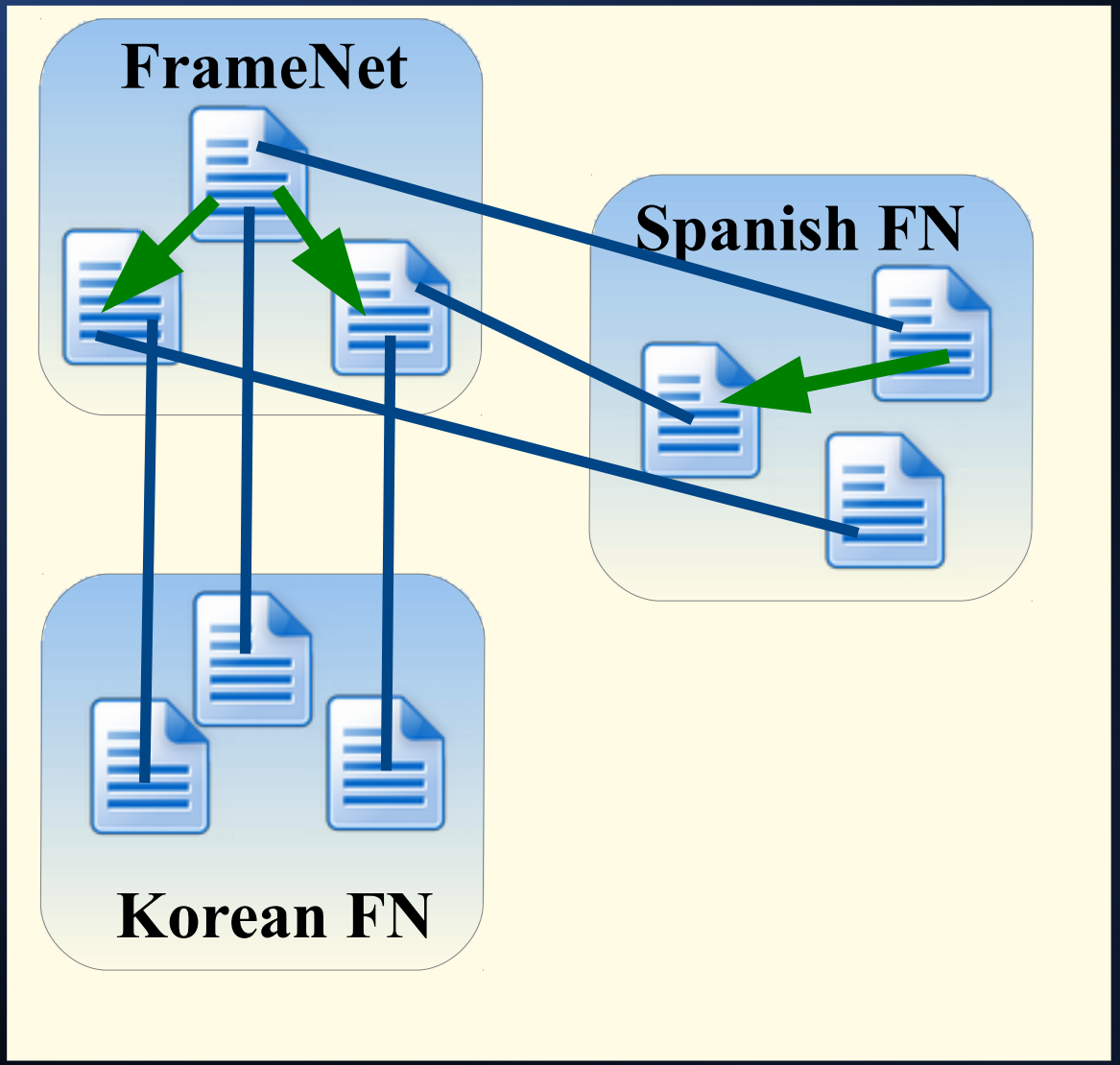


Contents

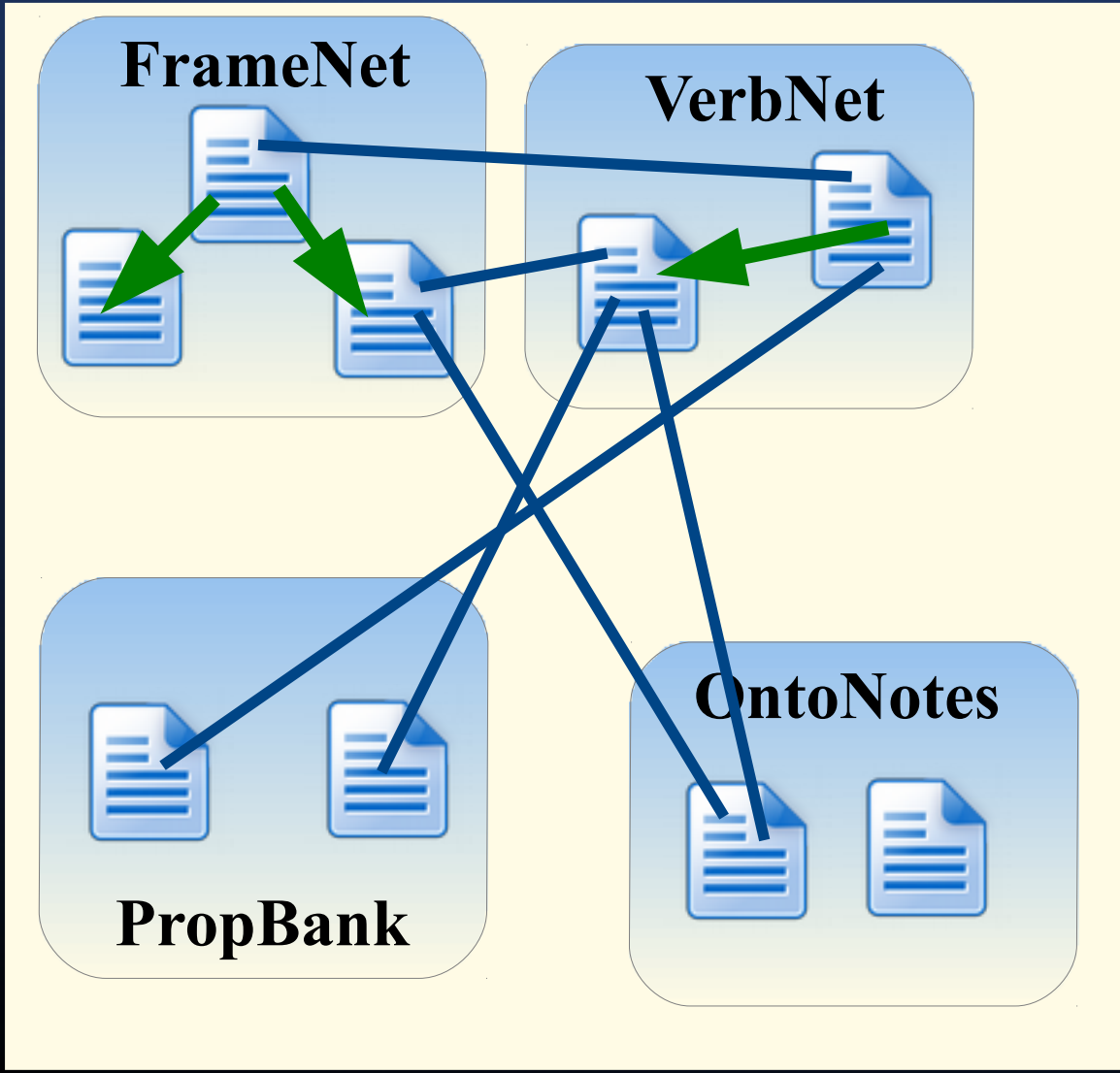
- Simple Alignments
- Less Straightforward Connections
- Ecosystem of Resources

Multilingual FNs

Some multilingual framenets are linked to English FrameNet



SemLink

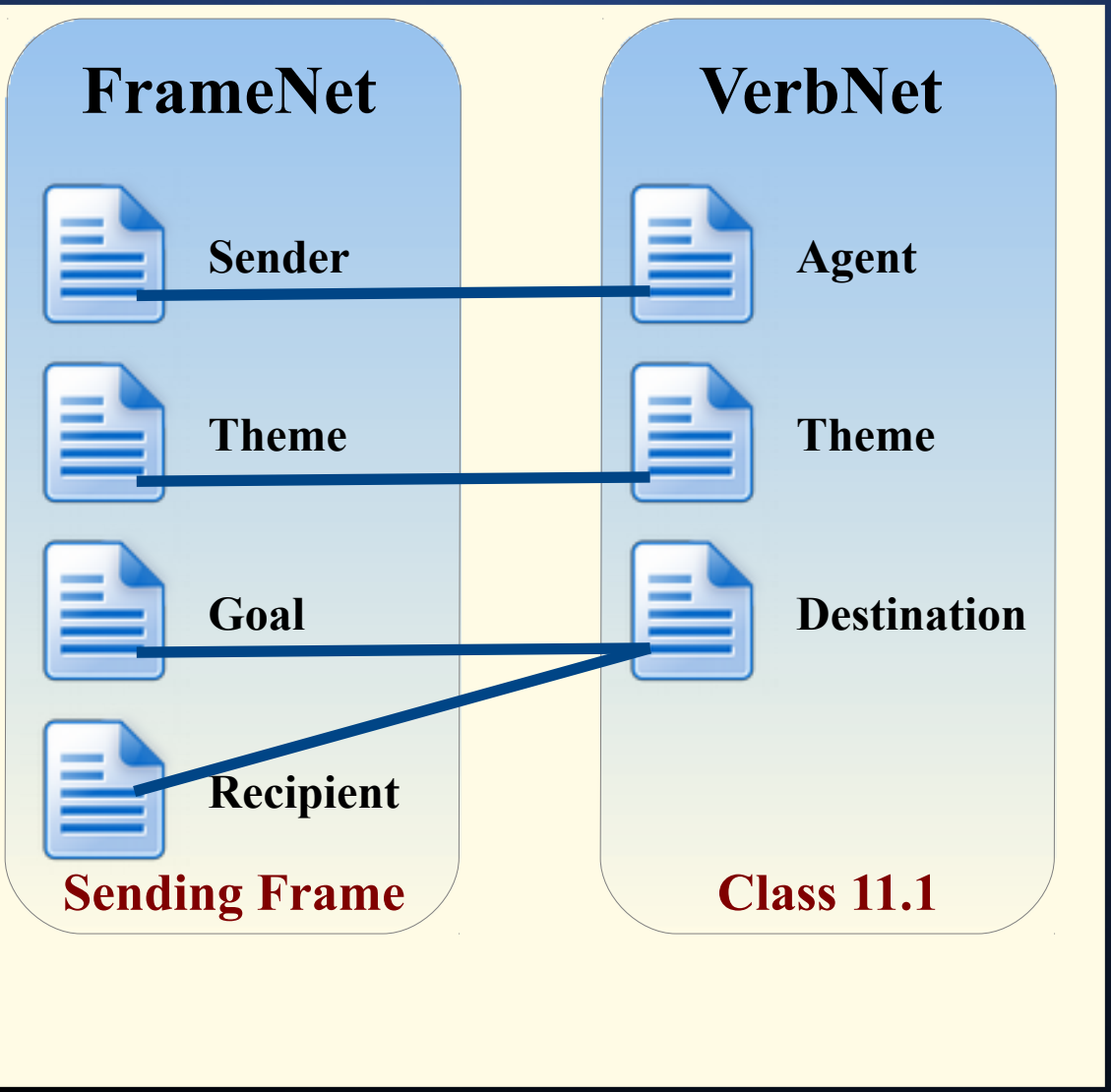


Project led by Martha Palmer

https://verbs.colorado.edu/semlink/

- VerbNet ↔ FrameNet
- PropBank ↔ VerbNet
- VerbNet ↔ OntoNotes

SemLink: Role Alignments

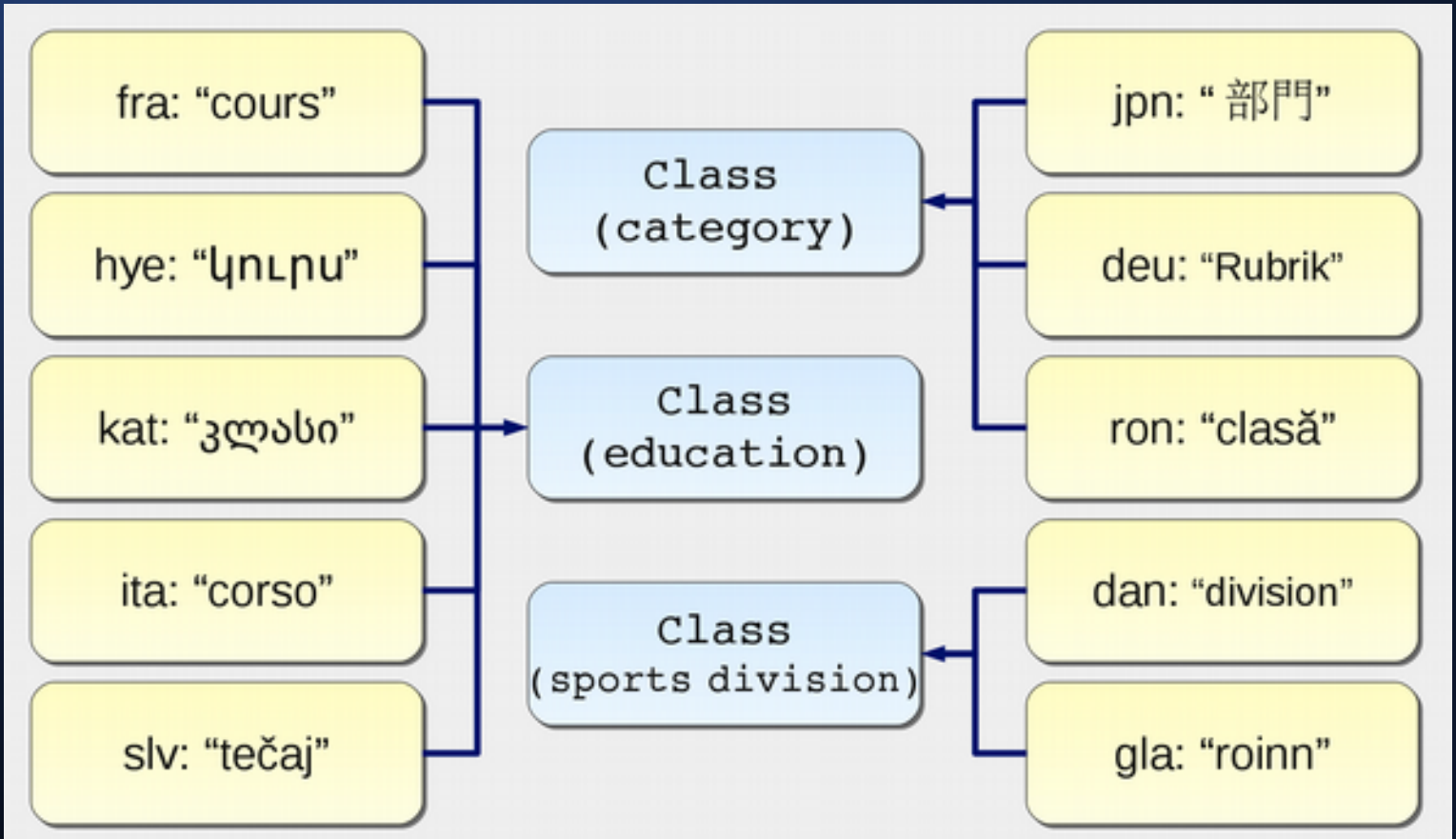


Project led by Martha Palmer
https://verbs.colorado.edu/semlink/

- VerbNet ↔ FrameNet
- PropBank ↔ VerbNet

- VerbNet ↔ WordNet

Multilingual LUs via Universal WordNet (UWN)



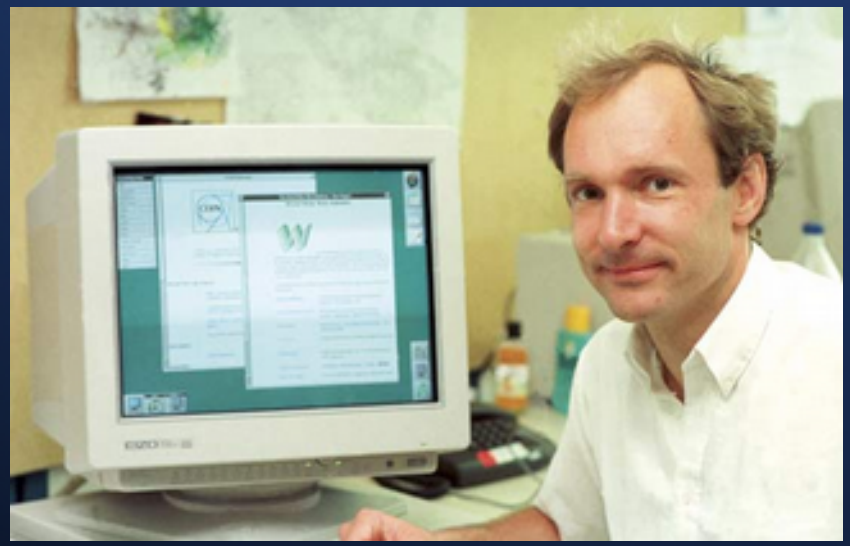
CIKM 2009

ICGL 2008
Best Paper Award

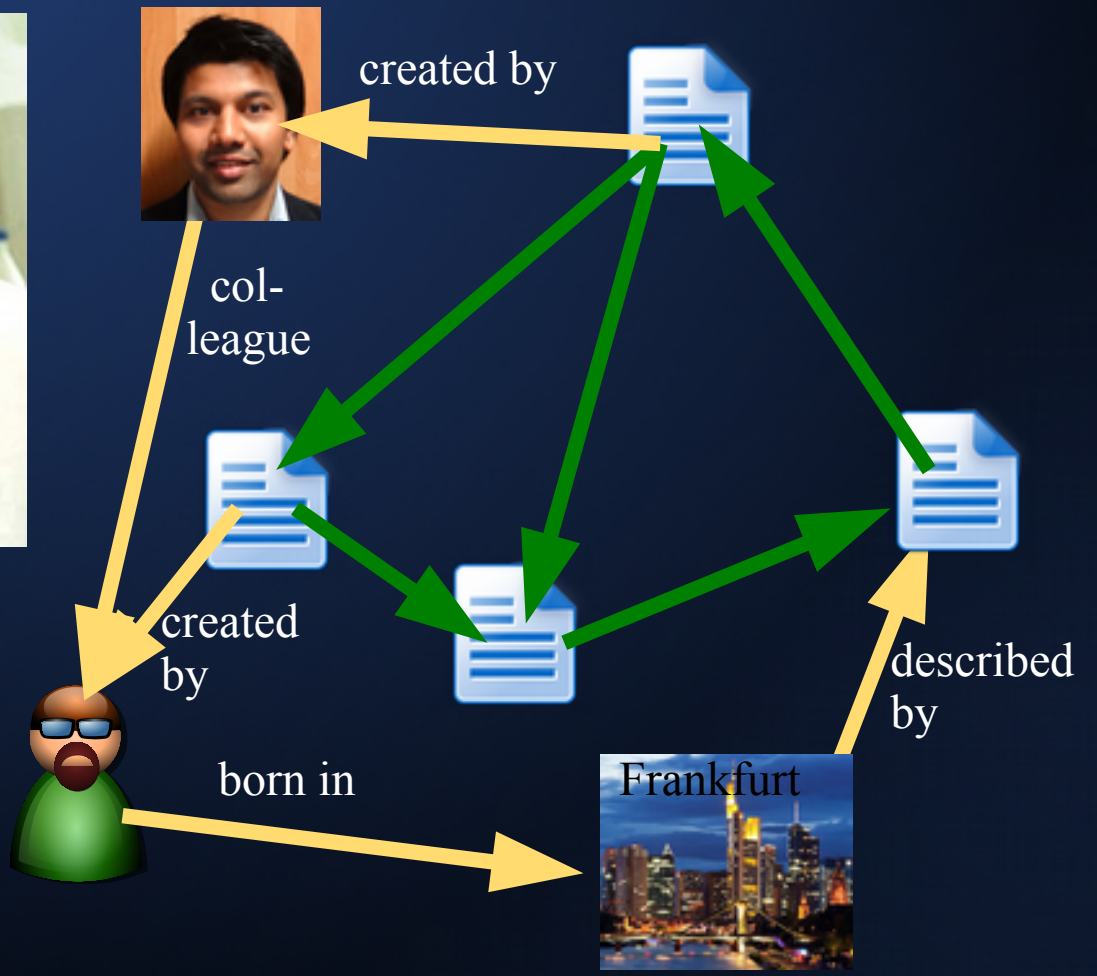
Multilingual LUs via Universal WordNet (UWN)

The Semantic Web

Tim Berners-Lee



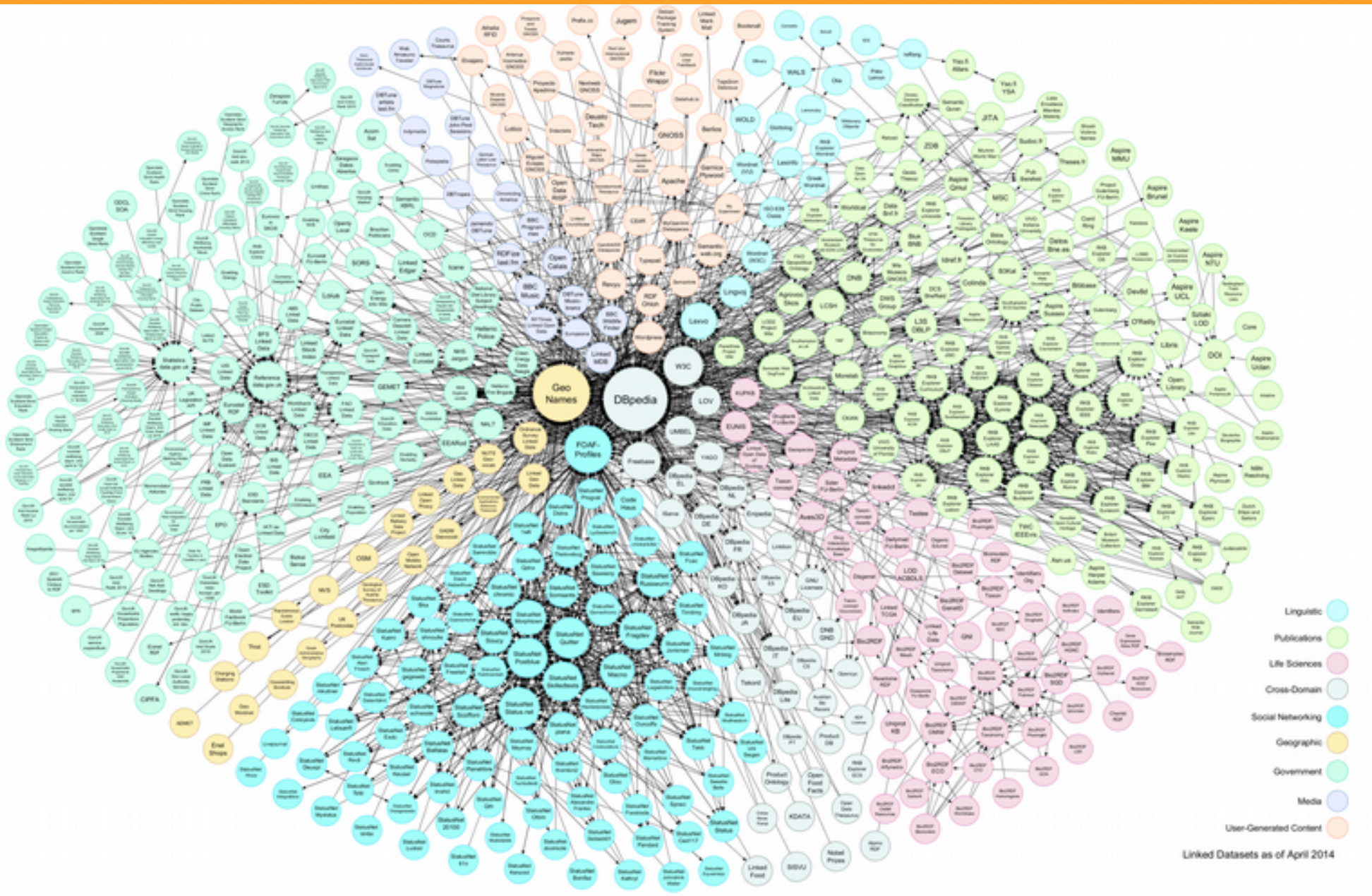
http://geekcom.wordpress.com/2009/03/19/



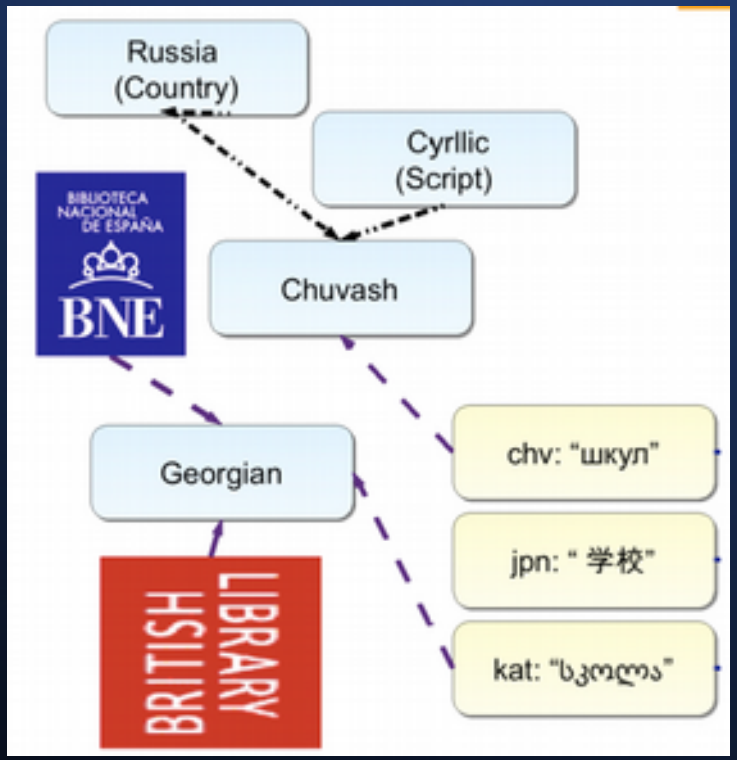
A Web of machine-readable entity-relationship data

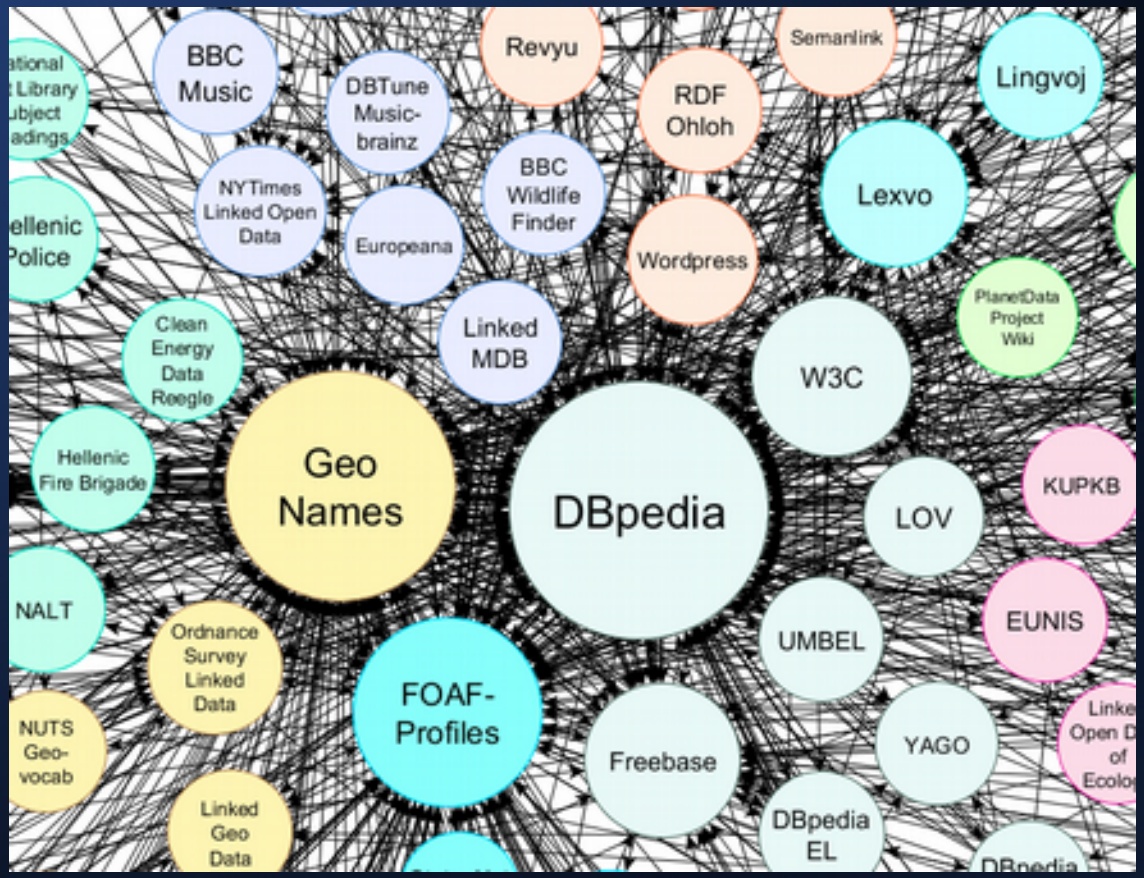
Frankfurt image: https://en.wikipedia.org/wiki/File:Frankfurt_Am_Main-Stadtansicht_von_der_Deutschherrnbruecke_am_fruehen_Abend-20110808.jpg

The Web of Data: Linked Data



The Web of Data: Lexvo.org





Interdisciplinary Work, e.g. in Digital Humanities

Semantic Web Journal 2014

Knowledge on the Semantic Web

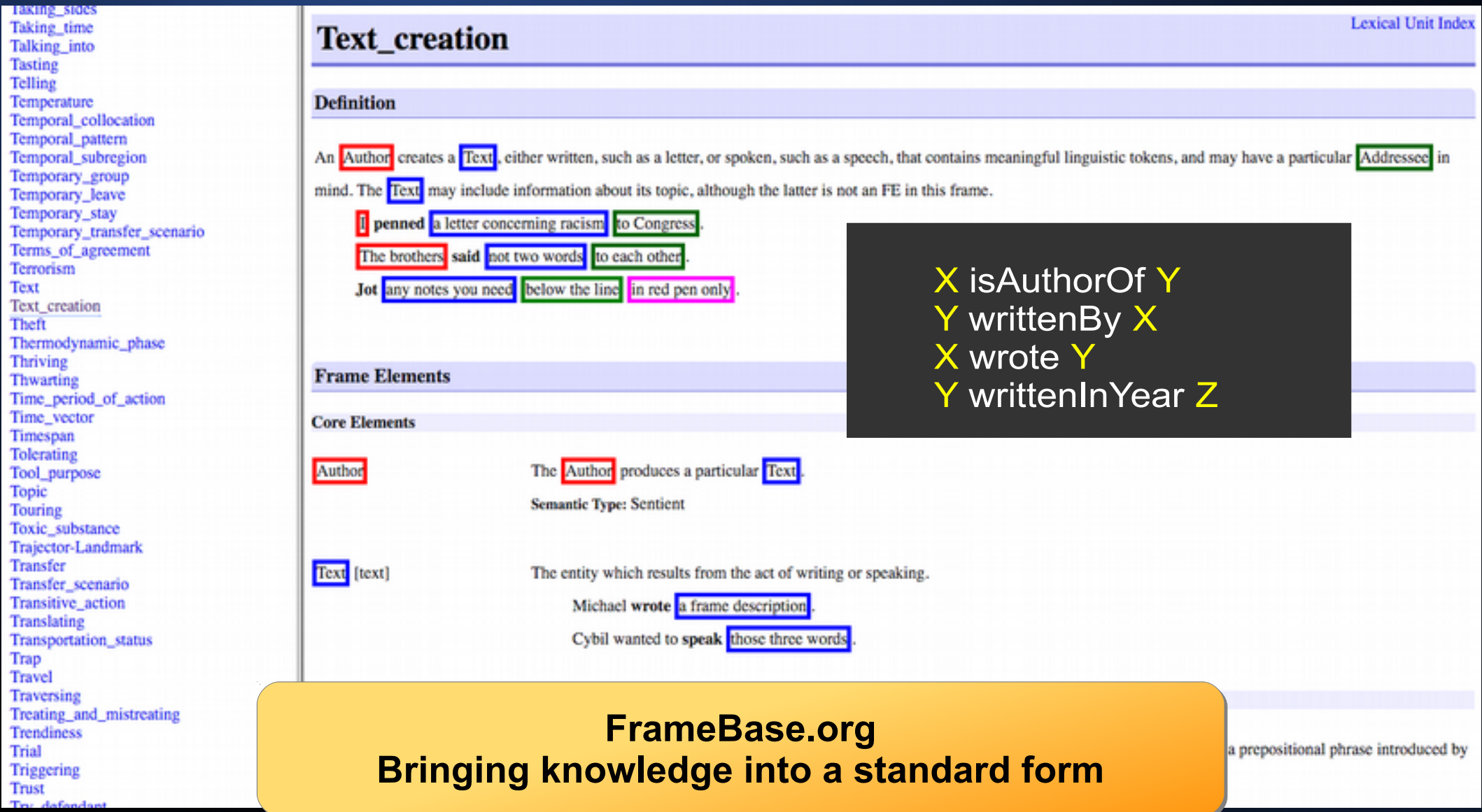
- Pairwise properties around an event (unreified)
  - ✗ From *N* up to *N(N-1)* triples:

```
person1   gotMarriedWith     person2
person1   gotMarriedInPlace     place
person2   gotMarriedInPlace     place
person1   gotMarriedOnDate     time
person2   gotMarriedOnDate     time
person1   ceremonyType    marriageCeremonyType
person2   ceremonyType    marriageCeremonyType
place     holdWeddingOnDate    time
```

  - ✗ Without events, connections are unknown:

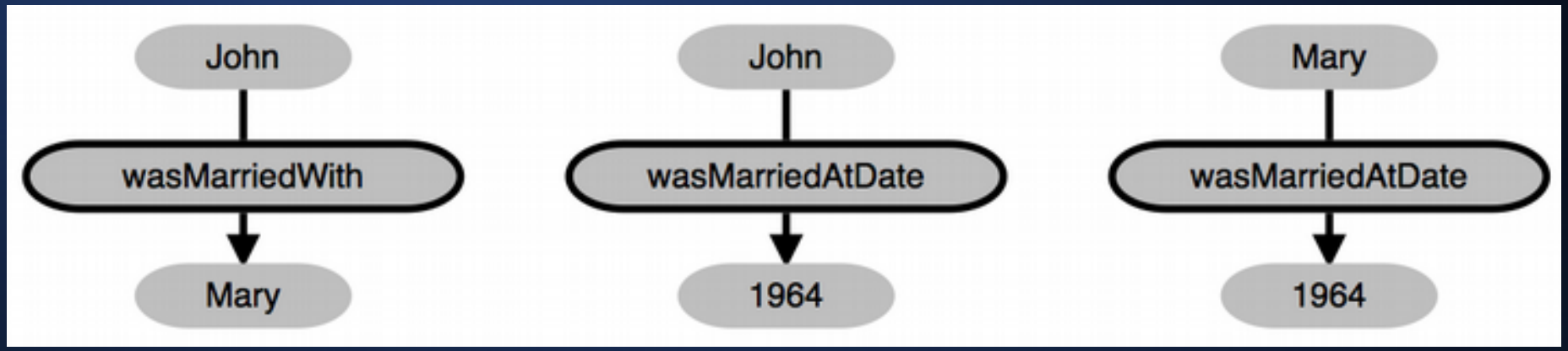
```
Sarkozy   gotMarriedWith    Carla_Bruni
Sarkozy   gotMarriedWith    Cécilia_Attias
Sarkozy   gotMarriedOnDate    2007
Sarkozy   gotMarriedOnDate    1996
```

FrameBase: Aligning Knowledge via FrameNet



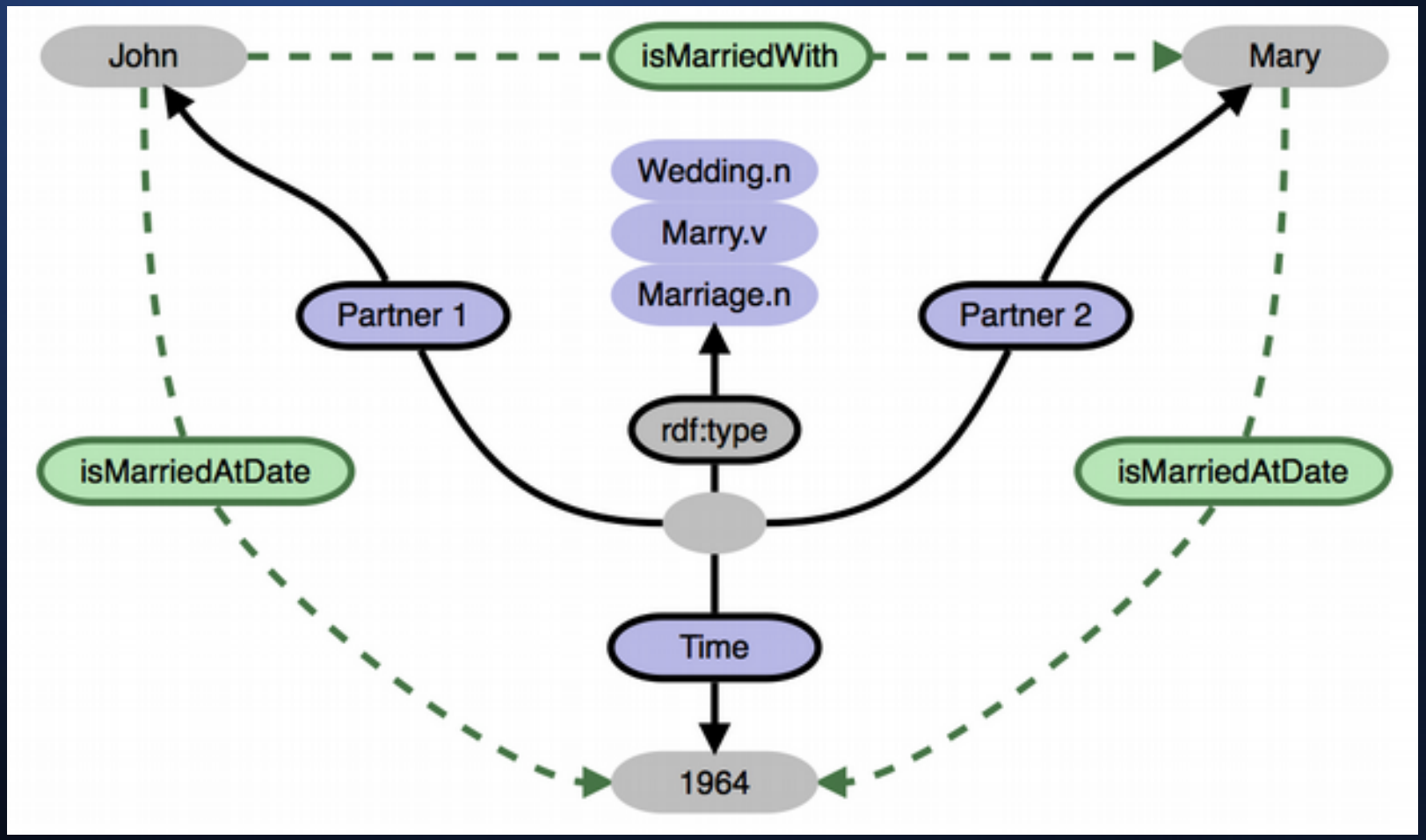
FrameBase.org
Bringing knowledge into a standard form

FrameBase: Aligning Knowledge via FrameNet



FrameBase.org
Bringing knowledge into a standard form

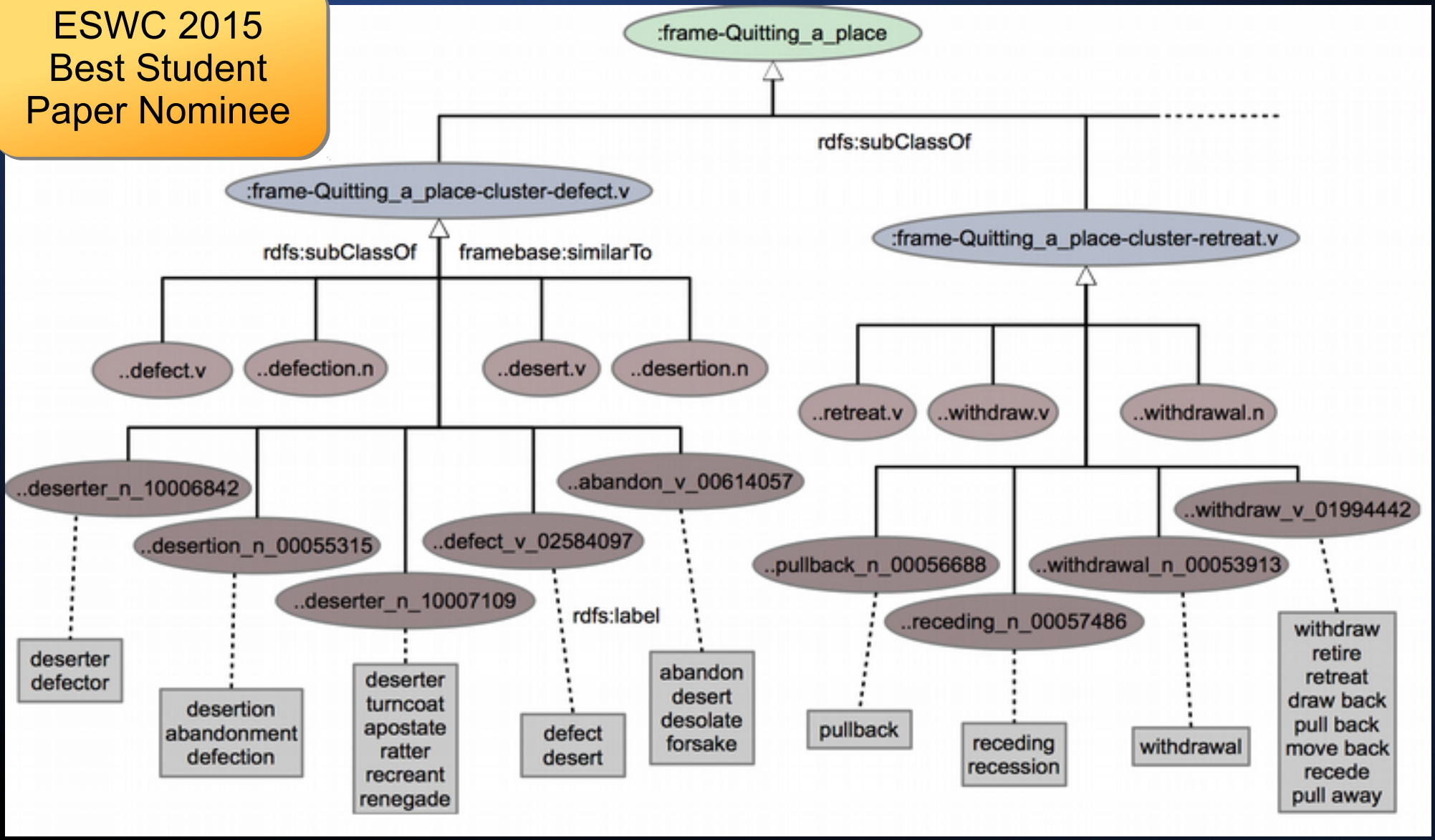
Aligning Knowledge using FrameNet



FrameBase.org
Bringing knowledge into a standard form

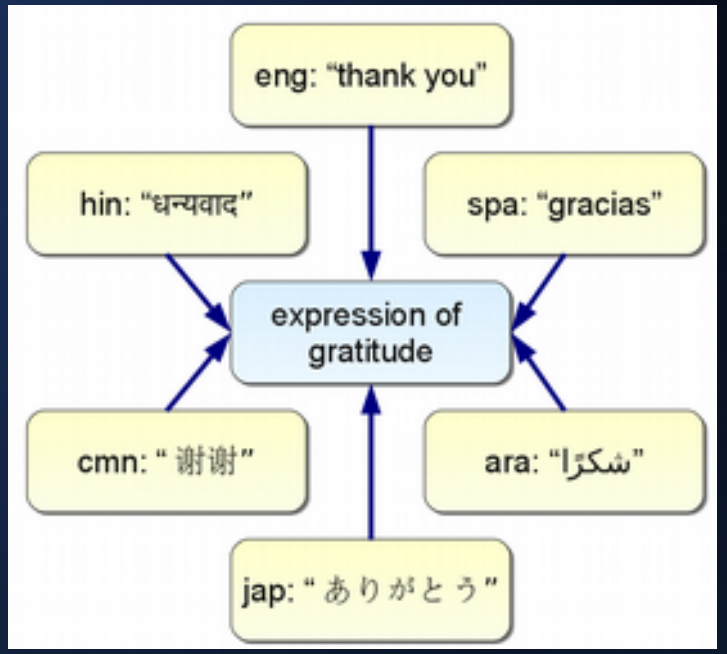
FrameBase: Aligning Knowledge via FrameNet

ESWC 2015
Best Student
Paper Nominee



Summary

- **Alignments are typically not straightforward**
- **Still, multilingual versions of FrameNet can be connected**
  - ► Some frames can be shared
  - ► For others, use connections beyond just 1-to-1 alignments
- **Ecosystem**
  - ► SemLink, WordNet, multilingual wordnets
  - ► Linked Data, FrameBase.org



More Information:

www.demelo.org
gdm@demelo.org

Universality of Frames: A View from Japanese FrameNet

JAPANESE FRAMENET

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Keio University
1858
CALAMVS GLADIO FORTIOR

24th May, 2016
Tutorial on "Multilingual FrameNet:
Linguistic Insights, Computational Challenges, and Applications"
LREC2016
Portorož, Slovenia

Outline

1. Overview
2. Coverage
3. Frame Element level
4. Frame level
5. Types of Frames
6. Summary

1. Overview

1. Universality of Frames?

- The 'Expand' Approach

  – By taking the existing (English-based) frames as a starting point, non-English FrameNets do not have to go through the entire process of frame creation (Boas 2009: 73)

1. 'Optimistic' View

  – New frames may need to be invented where necessary, especially in highly culture-specific domains, but in general the English-derived frames will provide a solid foundation for cross-linguistic work (cf. Goddard 2011: 80-81)

2. ‘Pessimistic’ View

- e.g. Natural Semantic Metalanguage (NSM) approach (Goddard 2011: 81)

3. ‘Cautious’ View

- Applicability of semantic frames as a cross-linguistic metalanguage remains to be tested (Boas 2009: 92)

- To determine the feasibility of a truly independent metalanguage based on semantic frames for connecting multiple FrameNets in different languages is not an easy task (Boas 2009: 93-94)

Preview: Applicability of English-based frames in Japanese FrameNet

- Coverage
  - ✓Depends on POS, but in general OK
- Frame Element level
  - ✓Where FEs are realized in the sentence may be different
- Frame level
  - ✓Frames with **Intransitive** perspective may be needed
- Types of frames
  - ✓**Interactional frames** are also necessary in constructicon building

2. Coverage

2. Coverage

Existing ICSI FN frames

In Full Text Annotation,

– **87 %** of Japanese words in the BCCWJ "Core" Data of the Book genre were covered by ICSI FrameNet frames

– Very few of the "missing" frames are culture-specific

- tatami.n 'straw mat', syoozi.n 'sliding paper', husuma.n 'sliding door'

Japanese words without frame assignment

otukai.n – ‘errand’, *taiken*.n – ‘experience’, *tuukoo*.n – ‘crossing’, *syuppan*.n – ‘publication’,

kami.n – ‘god’, *gangu*.n – ‘toy’, *tan’i*.n – ‘unit’, *wariai*.n – ‘ratio’, *inu*.n – ‘dog’

asobu.v – ‘play’, *muku*.v – ‘face’, *simeru*.v – ‘make up’, ‘take up’,

ki o tukeru.v – ‘be careful’

arai.a – ‘coarse’

Kooiteki.an – ‘favorable’, *toozen*.an – ‘naturally’,

noroma.an – ‘stupid’

sikkari.adv – ‘firmly’, *tatoeba*.adv – ‘for example’,

ippan ni.adv – ‘in general’

dakara.conj – ‘therefore’, *sikasi*.conj – ‘but’, *naraba*.conj – ‘then’,

sunawati.conj – ‘thus’

3. Frame Element level

3. Verb-framed *vs.* Satellite-framed Language Differences

In order to encode a Path of Motion,

- Japanese, Spanish, Hebrew, French: employ **Verbs**
  - <**Verb**-framed language>
    - Many Path of Motion verbs in Japanese
- English, German, Dutch, Russian, Mandarin: employs **Satellites** (prepositions, verb particles)
  - <**Satellite**-framed language> (Talmy 1985, 1991, 2000)

Differences in the two types of languages

⇨ Differences in where FEs are realized in sentence

Traversing frame

A THEME changes location with respect to a salient location, which can be expressed by a SOURCE, PATH, GOAL, AREA, DIRECTION, PATH_SHAPE, or DISTANCE

- Core Frame Elements include:

– THEME: the object which moves

- **Kim** CROSSED through the woods

– PATH: Any description of a trajectory of motion which is neither a SOURCE nor a GOAL

- Luney CROSSED **the garden** to the hut where she slept

– PATH_SHAPE: the configuration formed by the entire PATH of the THEME

- Local trainers TRAVERSED the country. **INI**

Japanese Verbs in `Traversing` frame

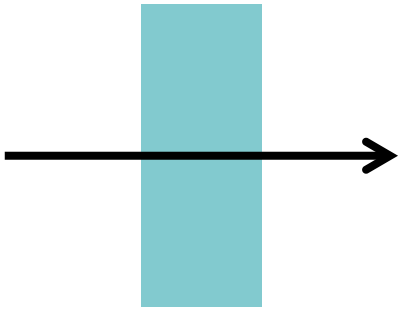
THEME PATH PATH_SHAPE

- *wataru*.v ‘go across, cross’

(1) *karera ga kawa o **wata**-tta*

they NOM river ACC go-across.PAST

‘They [went **across**/crossed] the river.’



(2) *karera ga hasi o **wata**-tta*

they NOM bridge ACC cross.PAST

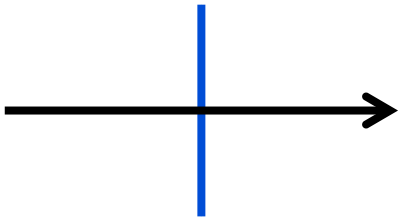
‘They crossed the bridge.’

- *koeru*.v ‘go over, cross’

(3) *karera ga kokkyoo o **koe**-ta*

they NOM border ACC go-over.PAST

‘They [went **over**/crossed] the border.’



J Verbs & E Satellites and Verbs in `Traversing` frame

Japanese

- *wataru*.**v** 'go across, cross': <2-dimensional> PATH_SHAPE
- *koeru*.**v** 'go over, cross': <1-dimensional> PATH_SHAPE

We do NOT need to divide the FE PATH_SHAPE into subcategories

- ✓ Aim of JFN: NOT to describe lexical differences between semantically-related words
- ✓ "'splitting' procedure will lead to ever more sub-categories with ill-defined relationships to each other and to the higher frames and frame elements." (Goddard 2011: 81)

English

- *across.***part**: <2-dimensional> PATH_SHAPE
- *over.***part**: <1-dimensional> PATH_SHAPE
- *cross.v*: UNSPECIFIED for PATH_SHAPE

4. Organization of Frames

4. “Missing” frames due to English preference for transitivity

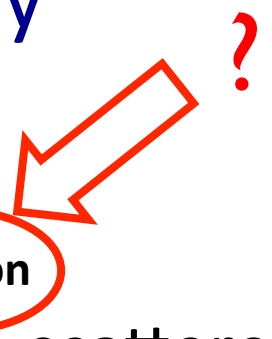
Intransitive-Transitive verb pairs in Japanese:

Intransitive verb is often more basic in Japanese

Transitive verbs are derived by suffixing a causative morpheme

• teru	terasu	kawaku	kawakasu
shine.intr	shine.tr	become.dry	dry.tr
• saku	sakasuuu	odoroku	odokasu
bloom	let.bloom	become.surprised	surprise
• ikiru	ikasu		
live	let.live		
• ugoku	ugokasu		
move.intr	move.tr		

“Missing” frames due to English preference for transitivity

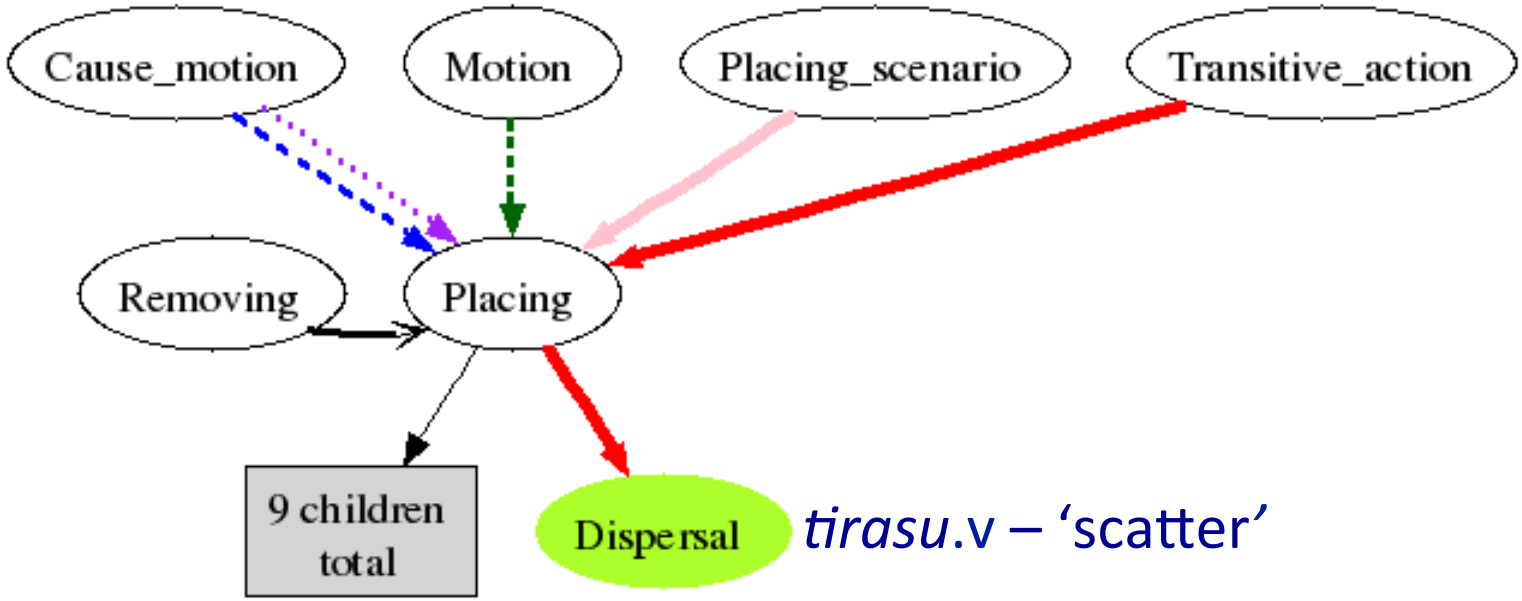


a. *sakura no hanabira ga* ***tiru***
cherry.blossom GEN petals NOM become.scattered
‘Petals of cherry blossoms get scattered.’

b. *sakura no hanabira o* ***tirasu*** Dispersal
cherry.blossom GEN petals ACC scatter
‘(Somebody) scatters petals of cherry blossoms.’

Frame-to-Frame Relations pertaining to `Motion` and `Dispersal` frames

tiru.v –
'become scattered'



tirasu.v – 'scatter'

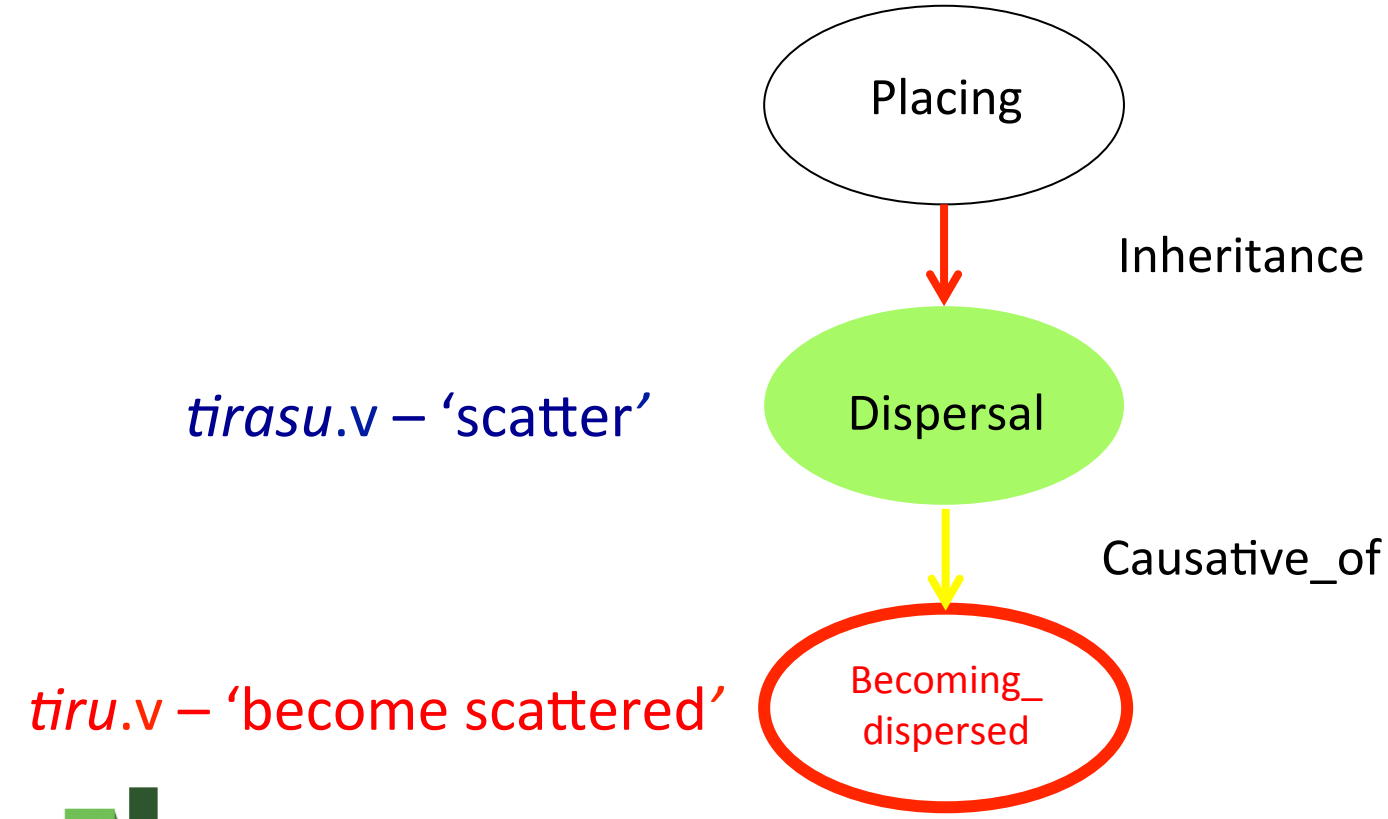
E & J Differences in Overall Frame Organizations

- Many existing FN frames have **transitive** perspective
- Many **Japanese** verbs: **intransitive/inchoative** perspective

- Few cases in which existing FN frames are defined from **intransitive/inchoative** *and* **transitive** perspectives
  - Exception: `Becoming_detached` frame — intransitive/inchoative
    `Being_detached` frame — intransitive/stative
    `Detaching` frame — transitive

    `Fullness` frame — stative
    `Filling` frame — transitive

Solution:
Create Japanese Unique
`Becoming_dispersed` frame

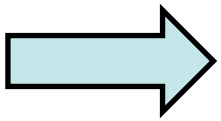


5. Types of Frames

5. Semantic *vs.* Interactional Frames

- Semantic frames
  - "[A] script-like conceptual structure that describes a particular type of situation, object, or event along with its participants and props" (Ruppenhofer et al. 2010)
- Interactional frames
  - "… how we conceptualize what is going on between the speaker and the hearer, or between the author and the reader." (Fillmore 1982:379)

- Propositional vs. Contextual, interpersonal
- Event participants vs. Discourse participants



- We need **both kinds of frames** to characterize meaning structures of constructions.
- Grammatical Constructions may evoke either type.

Cxn evoking Semantic frame

(4) The *Comparative_inequality* construction

- CEs: *Item*, *Standard*, *Base_expression*
- Interpretation

  Evokes the Comparative_inequality frame, which reports inequalities between *Item* and *Standard* as arguments of a plain adjective

- { [*Item kore* (*no hoo*) *ga*]
  this GEN side NOM
  [*Standard are*] [*CEE **yori***] [*Base_expression nagai*]
  that than long
  'This is longer than that.'

Cxn evoking Interactional frame

(5) The *Suspended-Clause* construction

- CE: *Clause*
- Interpretation — The Speaker expects the Hearer to make an inference and to understand his/her situations.
- *sore zya ne.*

  that DAT-TOP SFP

  { [^{Clause}*kir -ase te-morau*] [^{CEE} ***kara***] }

  hang-up CAUS AUX because

  [On the phone] (Lit.) 'That's it. Because I'm gonna hang up. (Don't bother me anymore).

6. Summary

- Coverage
  - Existing English frames cover most Japanese words
  - Depends on POS
- Frame Element level
  - NOT necessary to split FEs into subcategories to deal with differences between **Verb**- & **Satellite**-framed languages
- Frame level
  - Differences between **Intransitive** & **Transitive** perspectives may involve change in overall frame organization and creating new frame-to-frame relations
- Types of frames
  - In Constructicon building, we need **Interactional** frames, in addition to **Semantic** frames

Selected References

- Boas, Hans C. (2009). Semantic frames as interlingual representations. In Boas, Hans C. (ed.), *Multilingual FrameNets in Computational Lexicography: Methods and Applications,* 59-100. Berlin & New York: Mouton de Gruyter.

- Goddard, Cliff. (2011). *Semantic Analysis: A practical Introduction.* Second Edition. Oxford University Press.

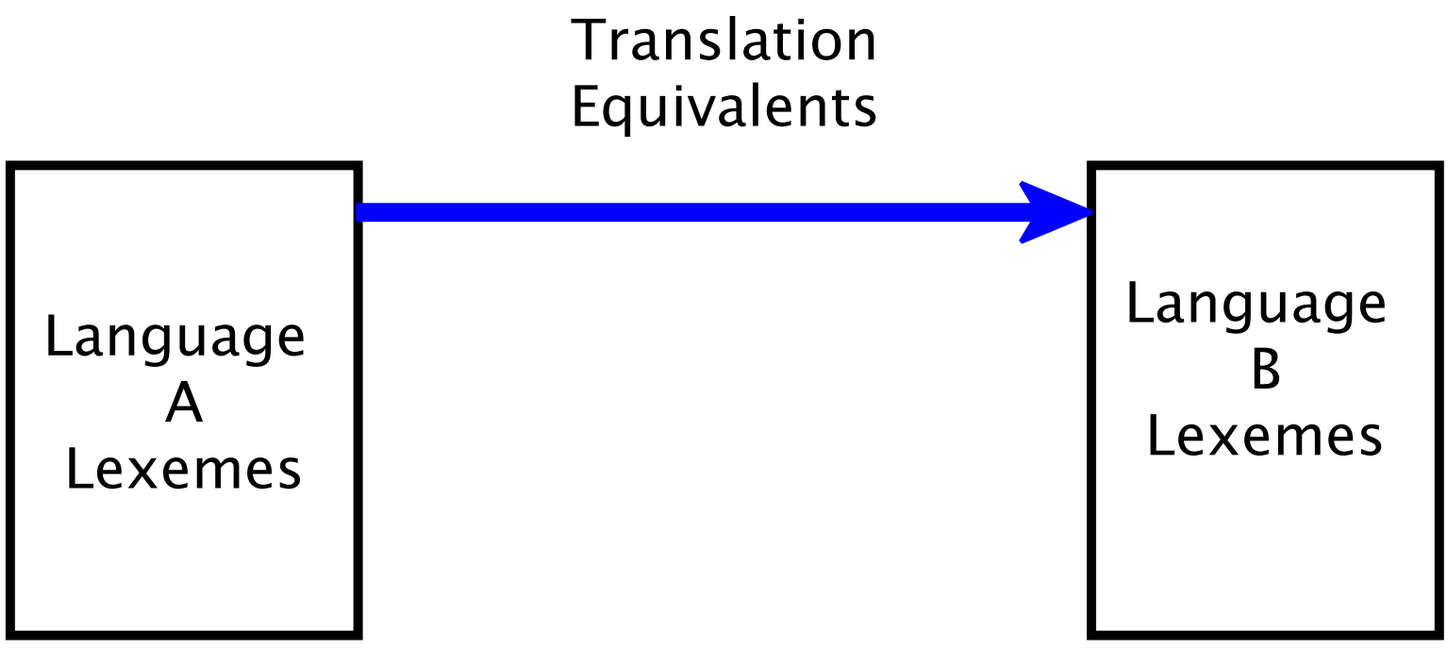
- Ohara, Kyoko Hirose, Seiko Fujii, Toshio Ohori, Ryoko Suzuki, Hiroaki Saito, Shun Ishizaki (2004). "The Japanese FrameNet Project: An introduction." LREC 2004. The Fourth international conference on Language Resources and Evaluation. Proceedings of the Satellite Workshop "Building Lexical Resources from Semantically Annotated Corpora", 9-11. Lisbon, Portugal.

Applications of Multilingual FrameNet

- Using FrameNets to build new FrameNets
- Human and Machine Translation --Collin Baker
- Crosslingual Sentiment Analysis -- Josef Ruppenhofer
- Computer-Assisted Language Learning --Miriam Petruck

Using FrameNets to build new FrameNets

Pathways: Frame Projection



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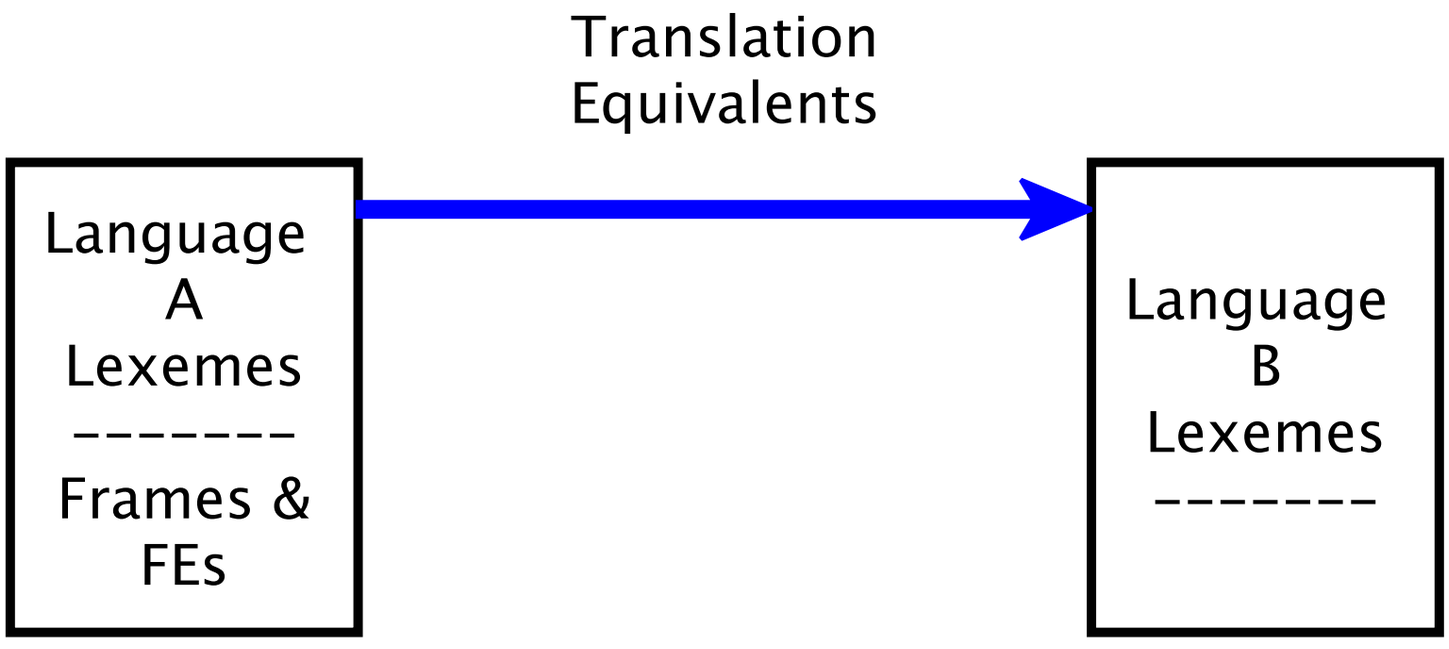
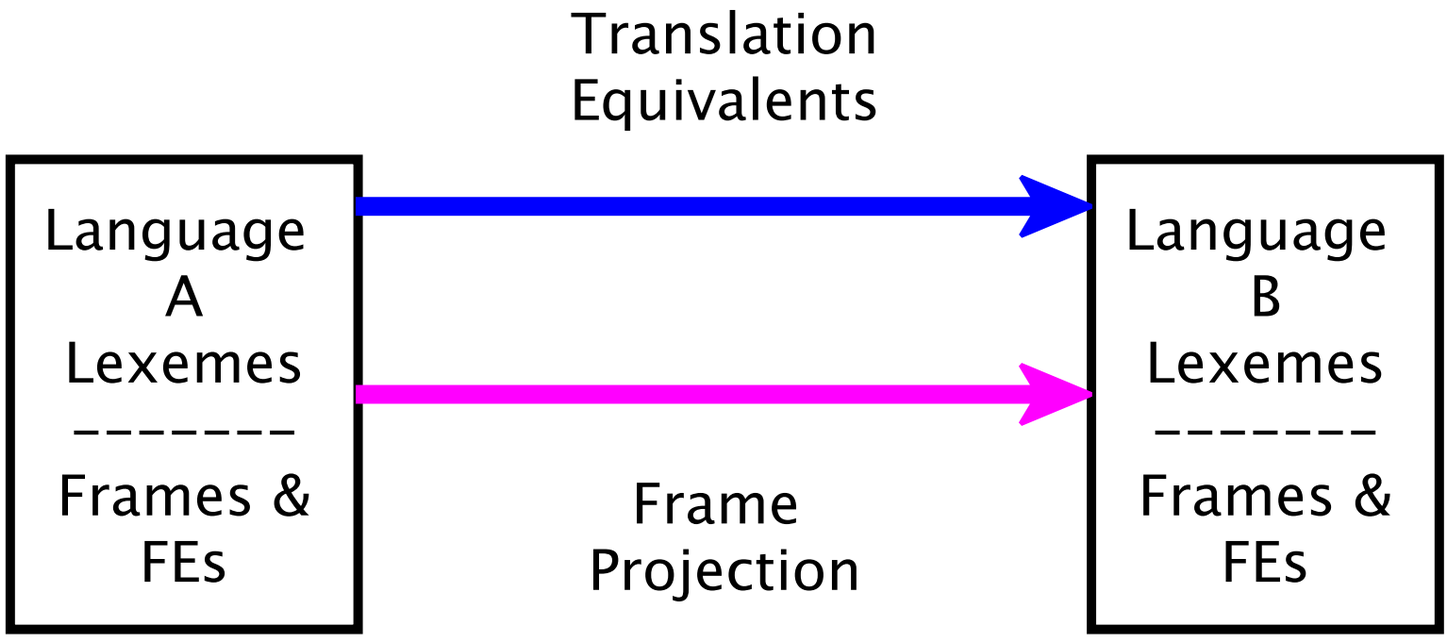
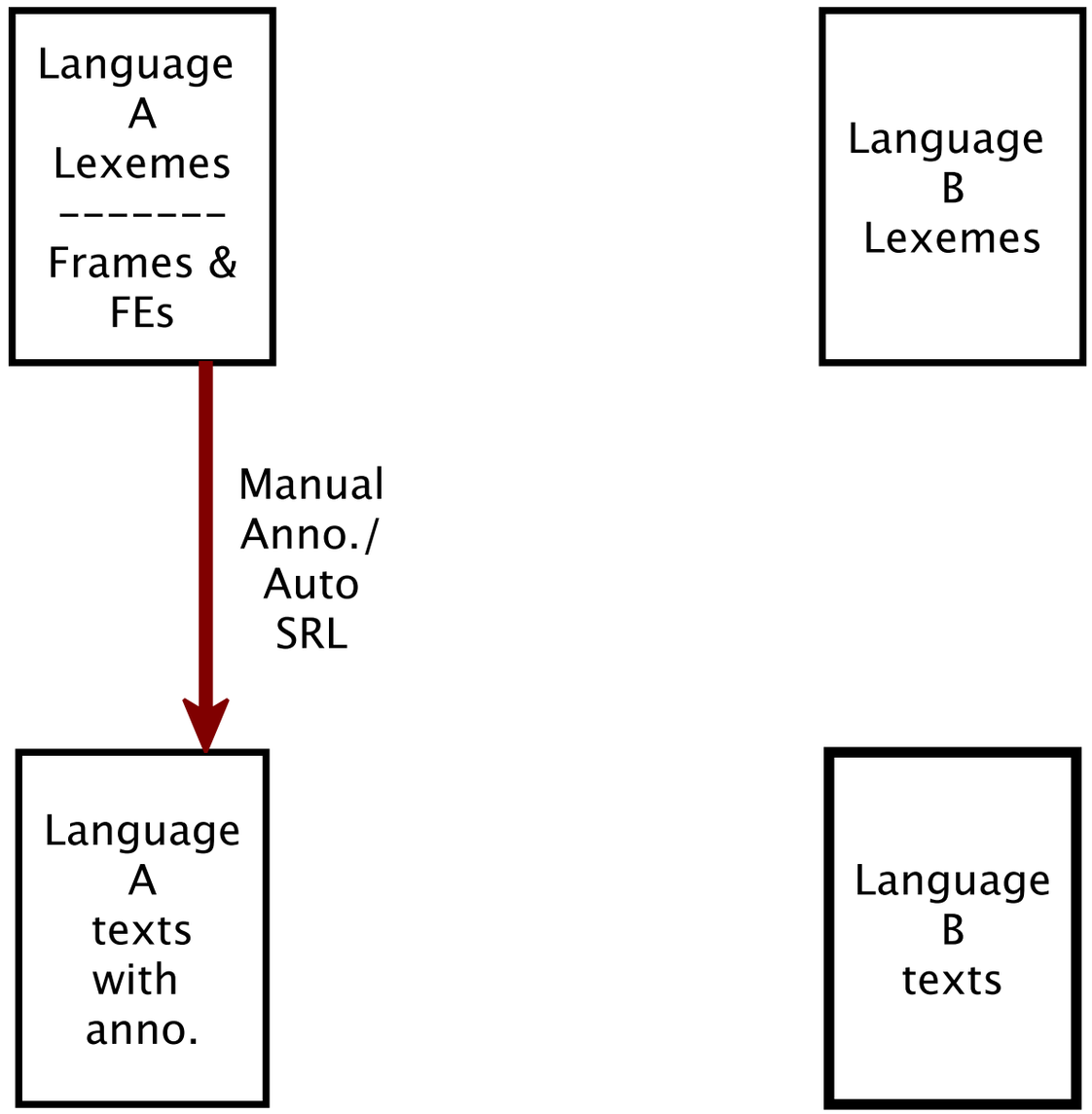


Pathways: Frame Projection

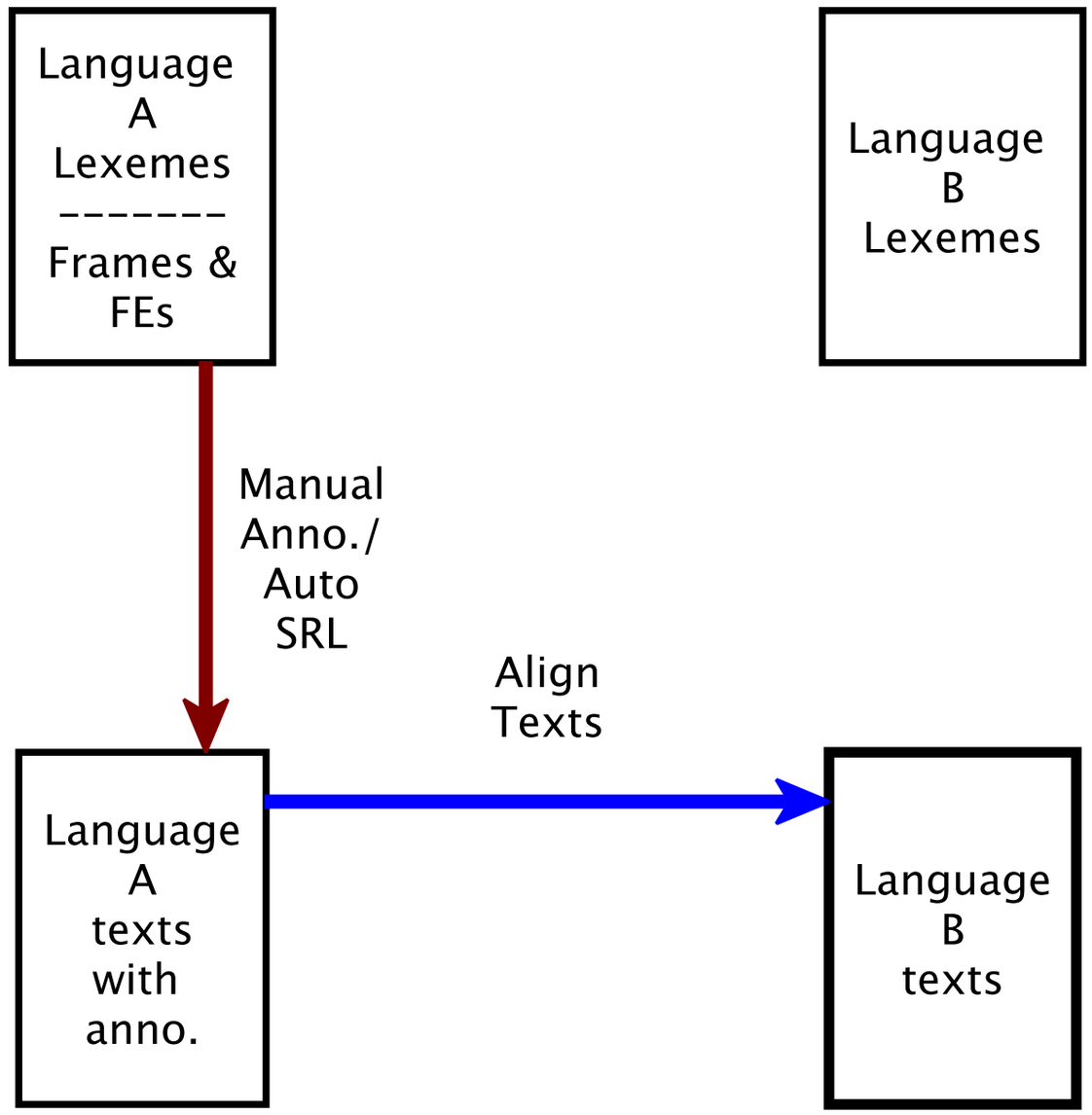


- B. Chen and P. Fung (2004 Chinese)

Pathways:Annotation Projection



Pathways:Annotation Projection



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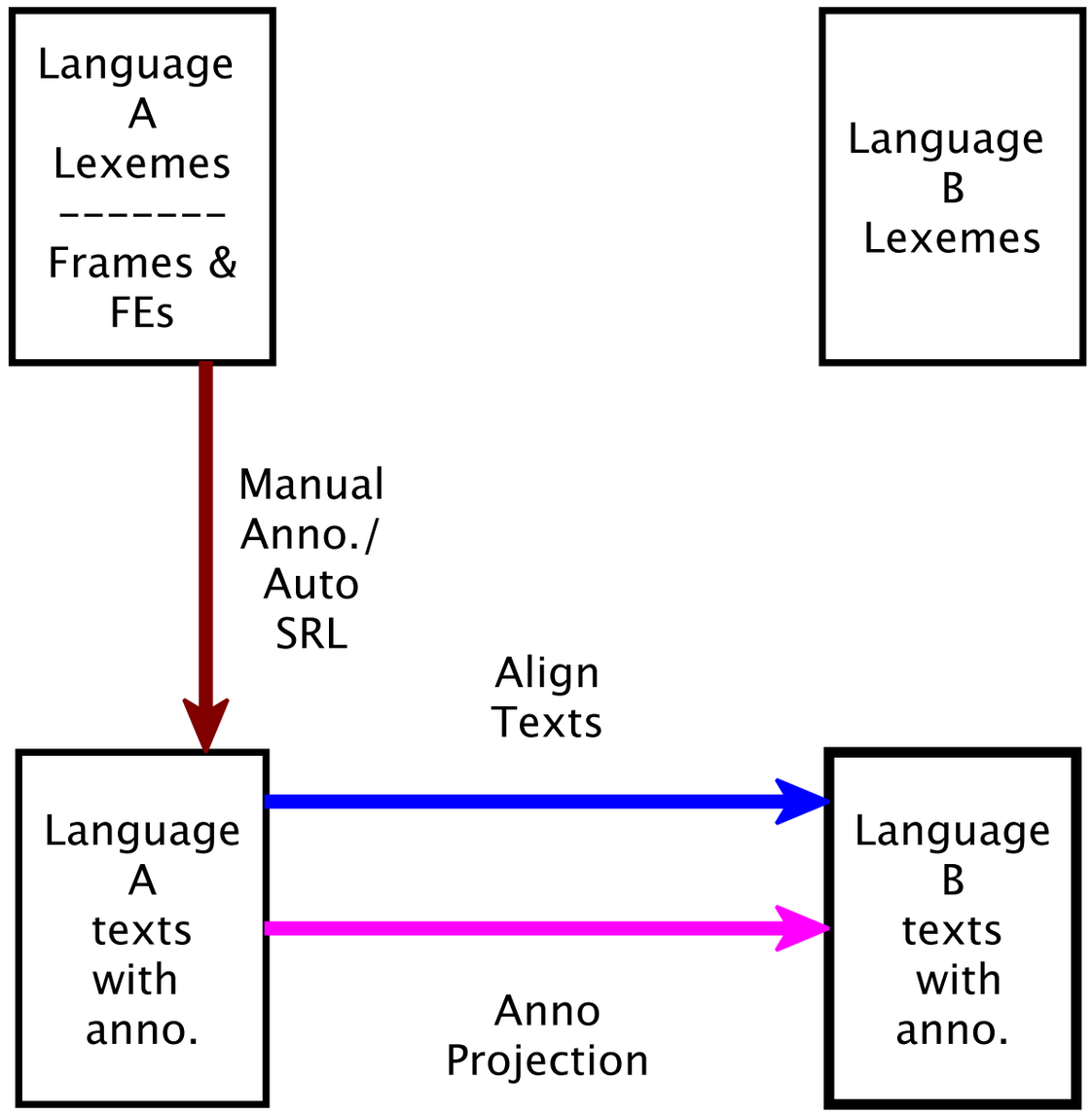
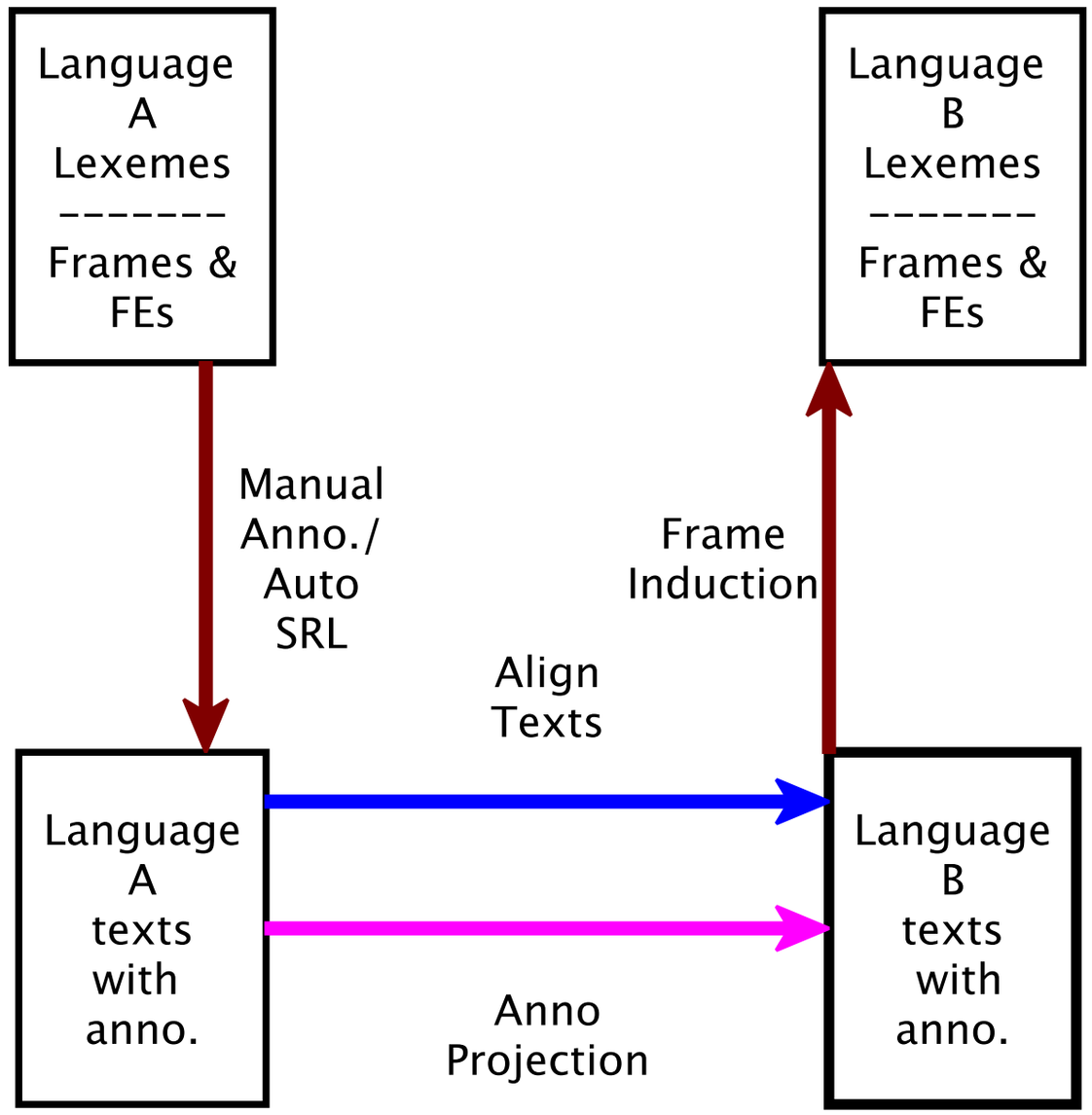
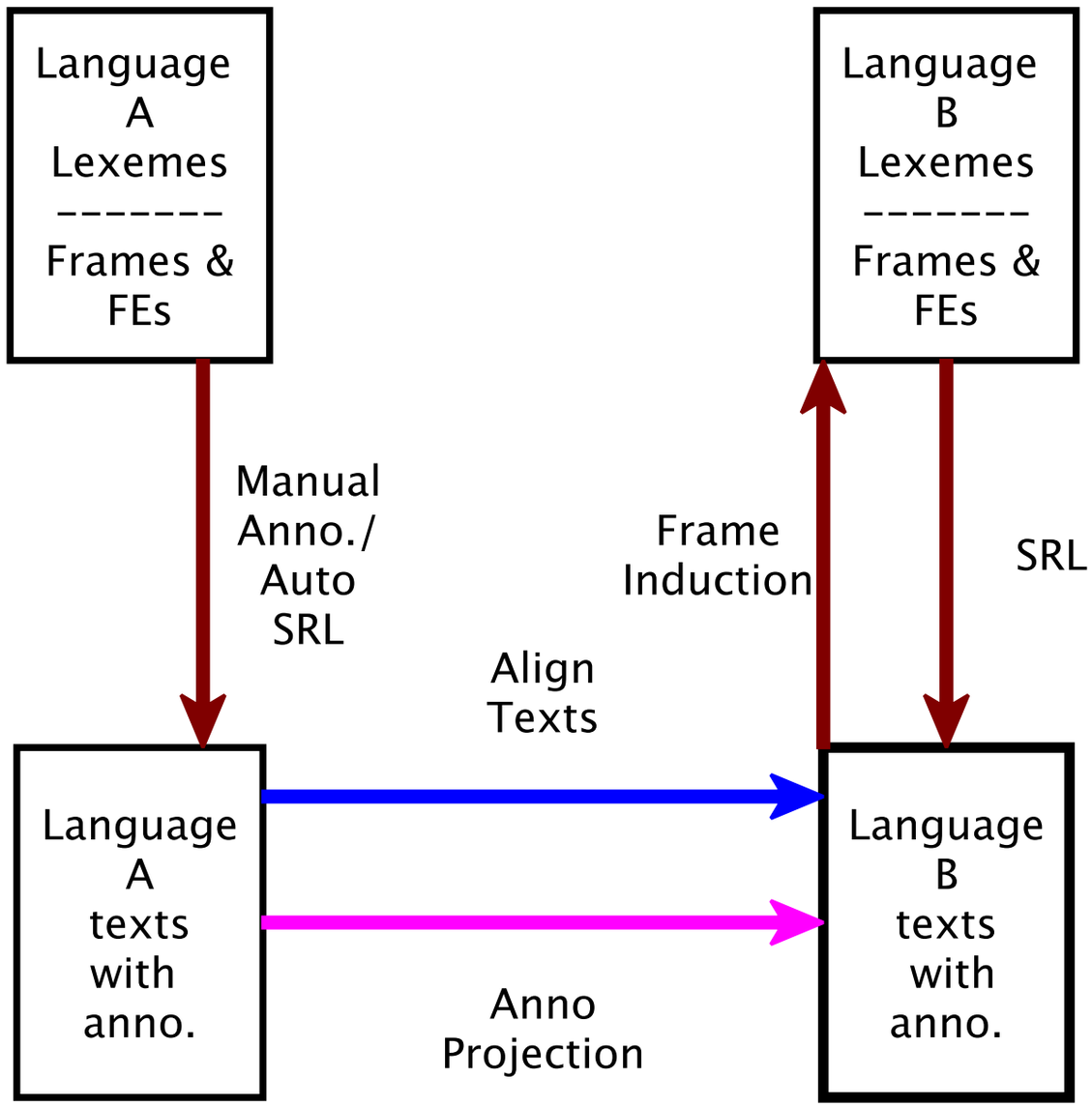


Pathways:Annotation Projection



Pathways:Annotation Projection

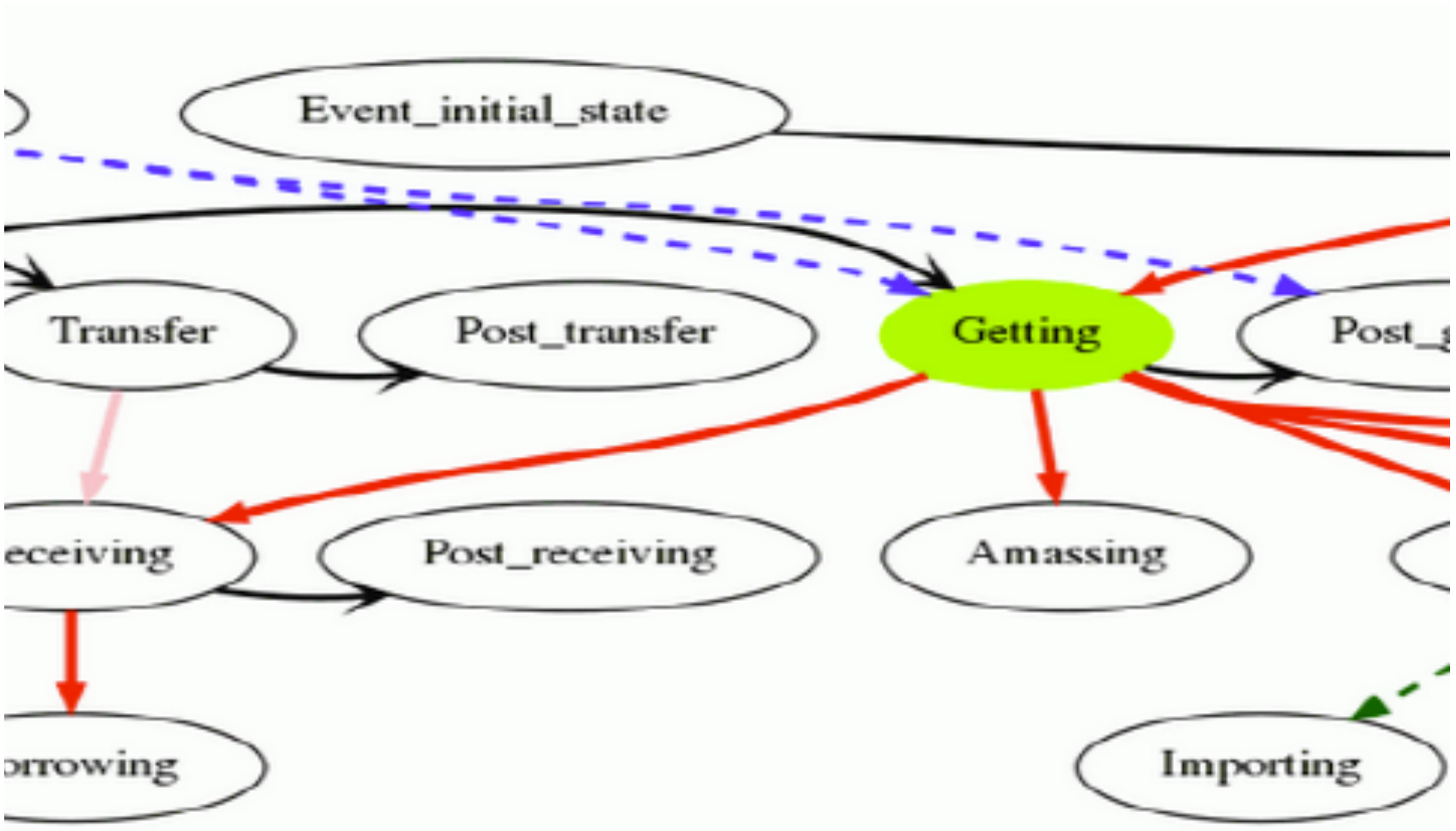


- R. Johansson and P. Nugues (2006 Swedish)
- S. Tonelli and E. Pianta (2008 Italian)
- S. Padó (2007 German, French)
- S. Padó and M. Lapata (2009 German)

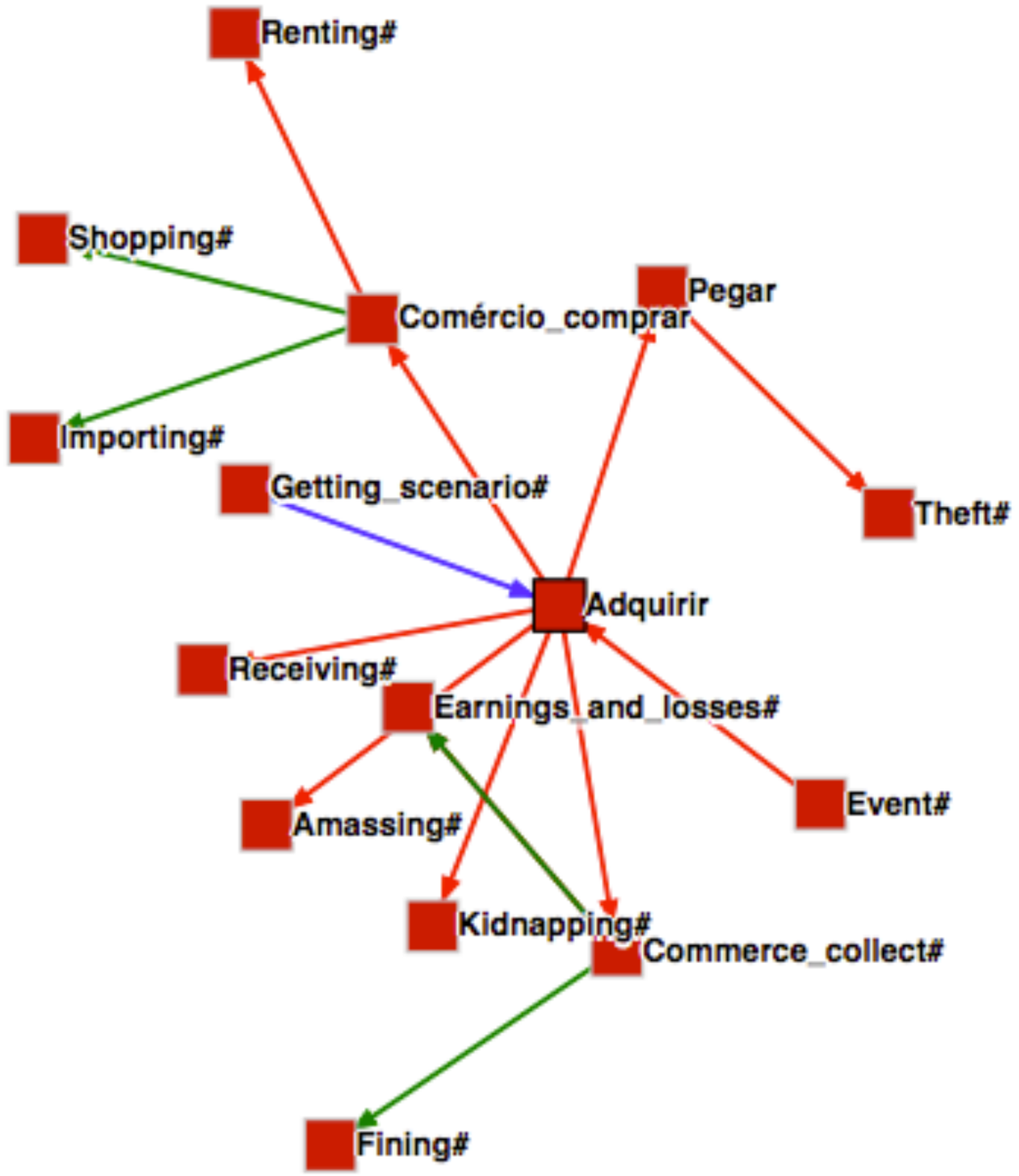
Software Sharing among FrameNets

- FNDesktop software created at ICSI has been adopted and adapted by several projects: Spanish FN, Japanese FN, and FN Brasil. Also used for Slovenian FN project (S. Može 2009 M.A. thesis)
    - Annotation, frame and LU creation all in one interface
    - Java GUI, not web based, not intended for remote use
- Japanese FN, FN Brasil and Chinese FN have each built their own web-based annotation tool; FN Brasil is using theirs exclusively. We are looking for an interoperable tool.

ICSI FN FrameGrapher interface



FN Brasil Frame Grapher



Opening up FrameNet (1)

- Volunteers: different skills needed for different tasks:
    - annotation (Lexicographic vs. full text, source of texts?)
    - adding LUs to frames (manual/automatic suggestions)
    - defining frames (FEs and LUs, writing definition, semantic types)
    - Linking frames with frame-frame relations (within langs./across langs.)
- Web-based tools,
- Concurrent editing? Wikipedia model?

Opening up FrameNet (2)

- Relation to unsupervised, semi-supervised approaches
  - R. Green (2004 U MD PhD. dissertation) "Inducing Semantic Frames from Lexical Resources"
  - M. Palmer (2009) SemLink (PropBank, VerbNet, FN)
  - E. Pavlik *et al.* (2015) Fast Paraphrastic Tripling FN
- Database will need to reflect provenance of all data
- Copyright and privacy issues

"Language Independence" in NLP
(Bender 2011)

- Do explicitly note which aspects of the methodology are intended to be language-independent, and which are explicitly language-dependent.

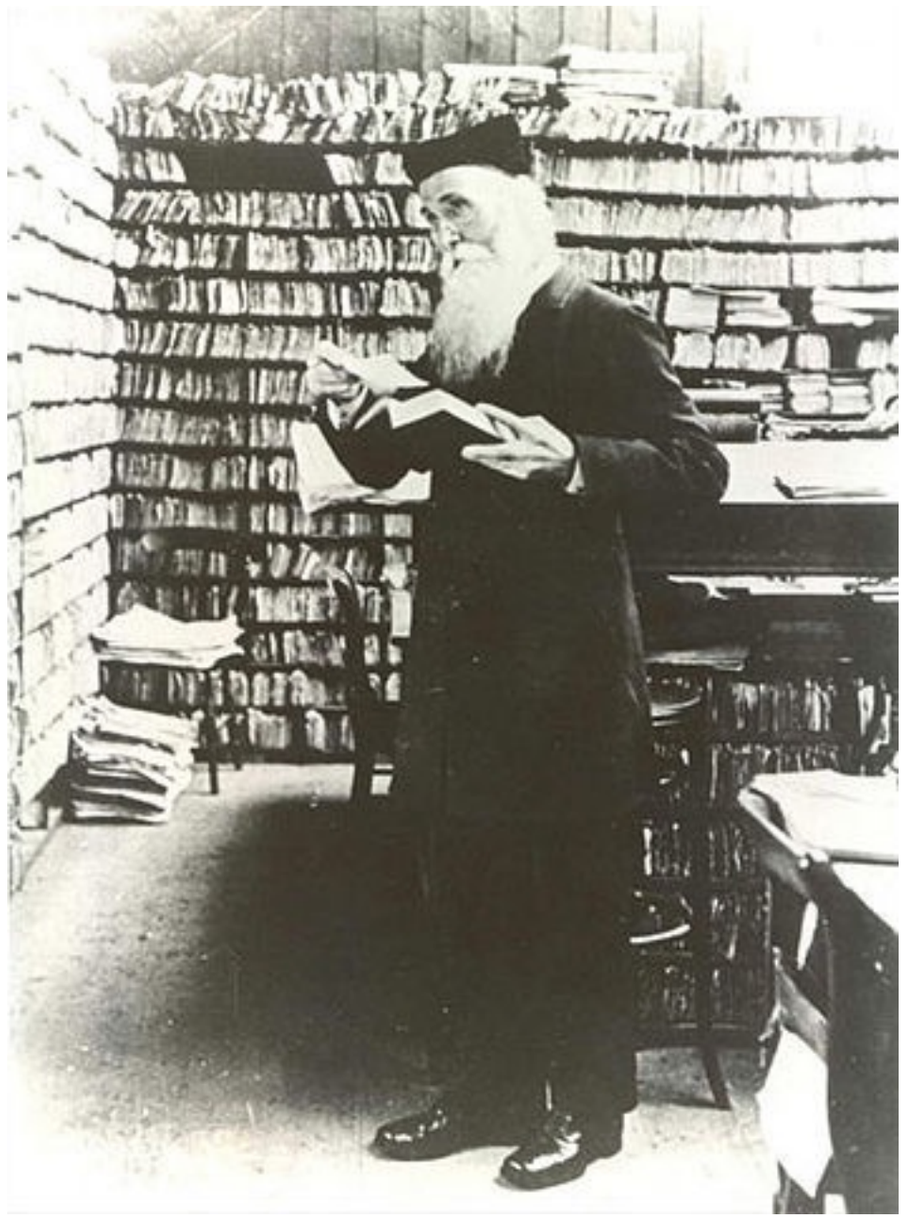
- Do evaluate claims of language independence by testing the algorithm against multiple languages.

- Don't evaluate language independence by only testing against related and/or typologically similar languages.

- Do expect comparable performance across languages from language independent systems. When performance varies, do error analysis based on typological properties...

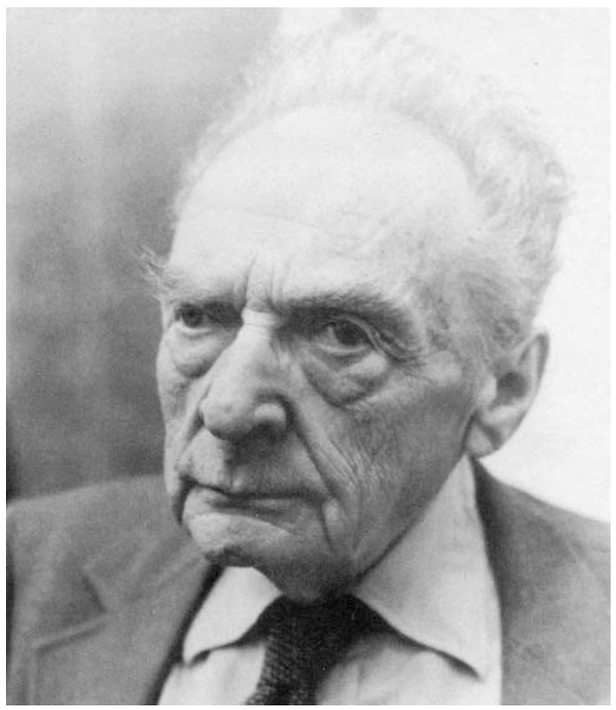
The OED: Crowdsourcing + Artisanal Lexicography

- Oxford English Dictionary
- 1857-1928 (First edition)
- ~5 million citation slips
- From ~2,000 volunteer readers
- Dozens of assistants
- Small team of editors
- 1 editor-in-chief (at a time)



Semantic Frames in Human and Machine Translation

Frames as language universals



Languages differ essentially in what they must convey and not in what they may convey.-- R. Jakobson

- Having equivalent frames across languages doesn't mean that they **must** be used in comparable situations
- Equivalent frames might not be used with the same **frequency**
- Much of what **must** be said is as closely related to constructions as to frames: e.g. gender and number on NPs, tense for verbs

Translation and Evaluation

- Translation
  - Machine /Manual
  - Computer-assisted human translation
  - Crowdsourcing
- Evaluation
  - Manual (Quantitative / qualitative)
  - Automatic scoring
    - BLEU (Papineni et al., 2002), NIST (Doddington, 2002)-- *n*-gram based
    - TER, (Snover et al. 2006), METEOR (Banerjee and Lavie 2005), MaxSim (Chan and Ng 2008), etc
    - RTE (Padó et al. 2009)

Frame parallelism

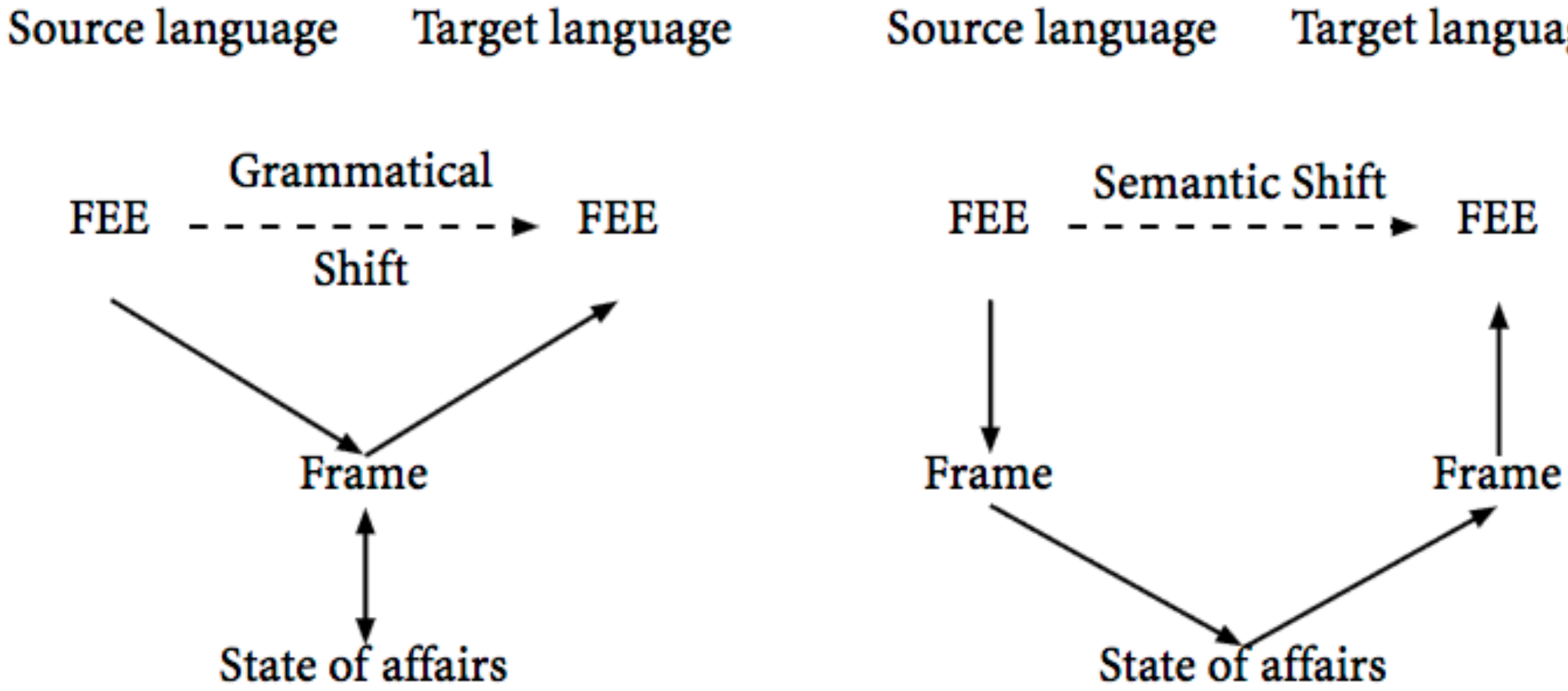


Diagram from S. Padó (2007 Nodalia)

Frame Shifts in Translation

SL: Tray 1 holds up to 125 sheets
TL: In Fach 1 können bis zu 125 Blatt Papier eingelegt werden

English allows unagentive subjects, German doesn't like them, so it uses a different construction, which leads also to a frame shift...

Čulo (2013)

Frame Shifts in Translation

SL: Tray 1 holds up to 125 sheets
TL: In Fach 1 können bis zu 125 Blatt Papier eingelegt werden

SL: Frame: **Containing**
[Container Tray 1] HOLDS [Content up to 125 sheets]

TL: Frame: **Filling**
[Goal In Fach 1] können [Theme bis zu 125 Blatt Papier]
EINGELEGT werden

Frame Shifts in Expressions of Causation

Wenngleich der Welthandel einen **höheren** Wohlstand zur **Folge** hat = Causation+Change
Position on a scale

even-if the world trade a higher prosperity as a result has

even if world trade has the **result** of/**results** in **higher** prosperity

though world trade can of course **increase** prosperity. = Cause change of position on a scale

Padó & Erk (2005)

Motion Reconceptualized as Showing/Appearing

...through$_{*Path}$ the fog, as **through**$_{*Path}$ a curtain, there **stepped**$_{Self\_motion}$ the man whom we were awaiting.

...銀の幕をたれたような濃霧の中から、待ちわびた人が**姿をあらわした**$_{Cause\_to\_perceive}$ [showed]。

...from the middle of the thick fog, which hung like a silver curtain, the awaited person showed (his) form

Ellsworth *et al.* (2006)

Towards fine-grained frame-based sentiment analysis

Josef Ruppenhofer

Institute for German Language [IDS], Mannheim
Leibniz Science Campus "Empirical Linguistics & Computational Language Modeling"

Overview

- Goal: Support recognition of explicit sentiment and inference on implicit opinions
  - need to work on the word sense level because e.g. of effect inconsistency across senses (Choi and Wiebe 2014)
  - need to use information on syntax-semantics mappings
- We work with FrameNet, whose frames and hierarchical organization provide a rich basis for deep Sentiment Analysis.
- We survey how FrameNet has been used so far for Sentiment Analysis and discuss where we see its unique potential for deeper analysis.
- We show how FrameNet is being further enriched for the purposes of deep sentiment analysis (cf. Ruppenhofer and Rehbein 2012).

The sentiment analysis task

- Convergence of research from diverse backgrounds

→ terminological diversity: subjectivity analysis, opinion mining, evaluative language, attitude analysis, . . .

- No widely agreed delimitation of its scope
- Usually ostensive definitions

> *In particular, we propose a detailed annotation scheme that identifies key components and properties of opinions, emotions, sentiments, speculations, evaluations, and other private states (Quirk et al. 1985), i.e., internal states that cannot be directly observed by others.*
> *(Wiebe, Wilson, and Cardie 2005)*

- For particular applications, only subsets may be relevant.

Granularity of analysis

	Shallow/Coarse	**Deep/Fine**
Unit of Analysis	aggregates: documents, data streams	individual expressions: words, morphemes
Text types	restricted: e.g. tweets, product reviews	general
Role extraction	from meta-data	from text
Mode of expression	explicit	implicit
Methods	simple features (e.g. no parsing)	more complex features (e.g. parsing, word sense disambiguation)
Result	polarity, intensity	roles, polarity, intensity

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- A more or less complete analysis of *individual* opinion-bearing expressions has to provide at least the following:

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  . . . . . .

  5. Presentation of the subjective attitude as real/actual or imagined/hypothetical — Realis/Irrealis
  6. Speech and reference time of the opinion expressed — Tense & Aspect

Some Research that has used FrameNet

- Assembling features/clues/polarity lexicons
  - Wilson, Wiebe, and Hwa 2006 (use of Pittsburgh Subjectivity Clues for recognizing strong vs weak opinion clauses)
  - Vechtomova 2010 (FN for opinion retrieval from blogs)
  - Yang and Cardie 2013 (frames as clues for recognizing opinions)
  - Seongsoon Kim et al. 2015 (use frame distribution for opinion spam detection)
  - ...
- **Source and Target extraction**
  - Bethard et al. 2004 (opinion propositions and holders)
  - Soo-Min Kim and Hovy 2006 (holders of 'judgment opinions')
  - Hawes and David 2012 (mappings for 81 frames with 681 verbs)
  - Wiegand and Ruppenhofer 2015 (inducing verbal categories with characteristic source/target mappings to semantic roles)

Mapping opinion roles to semantic roles
Example Frame: Complaining

`FEs of the Complaining frame`

Complainer	The Complainer is the sentient entity that produces the Complaint (whether spoken or written).
Topic	The Topic is the subject matter to which the Complaint pertains.
Complaint	The lamentable situation that the Complainer is communicating to the Addressee.
Addressee	The Addressee is the person to whom the Complaint is communicated.
Time	The Time when the complaint is made.
...	...

- Inherits from: Statement
- Lexical units: belly-ache.v, bitch.v, complaint.n, complain.v, grievance.n, gripe.n, gripe.v, grouse.v, grousing.n, grumble.v, lament.v, moan.v, piss and moan.v, whine.v, whinge.v

- [Now ^{Time}] [he ^{Complainer}] was **bitching**^{Complaining} [about all matters technical ^{Topic}] .
- [He ^{Complainer}] **complained** [about Tory colleagues ^{Topic}] : [‘ They don’t know what it is to run out of money at the end of the week . ” ^{Complaint}]

Mapping opinion roles to semantic roles: frame-internal source

Example: role mappings for FrameNet's `Complaining` frame

Semantic roles	Opinion roles
Complainer	Source
Topic	Target
Complaint	Target
Addressee	-
Time	-
...	-

[Now ^{Time}] [he ^{Complainer}] was **bitching**^{Complaining} [about all matters technical ^{Topic}] .

Now [he ^{Source}] was **bitching**^{Opinion} [about all matters technical ^{Target}] .

Mapping opinion roles to semantic roles: frame-external source

- Some predicates convey the opinion of an external viewer.
- We map relevant roles to Target but let the Source default to an external viewer.

Role mappings for the `Isolated places` frame

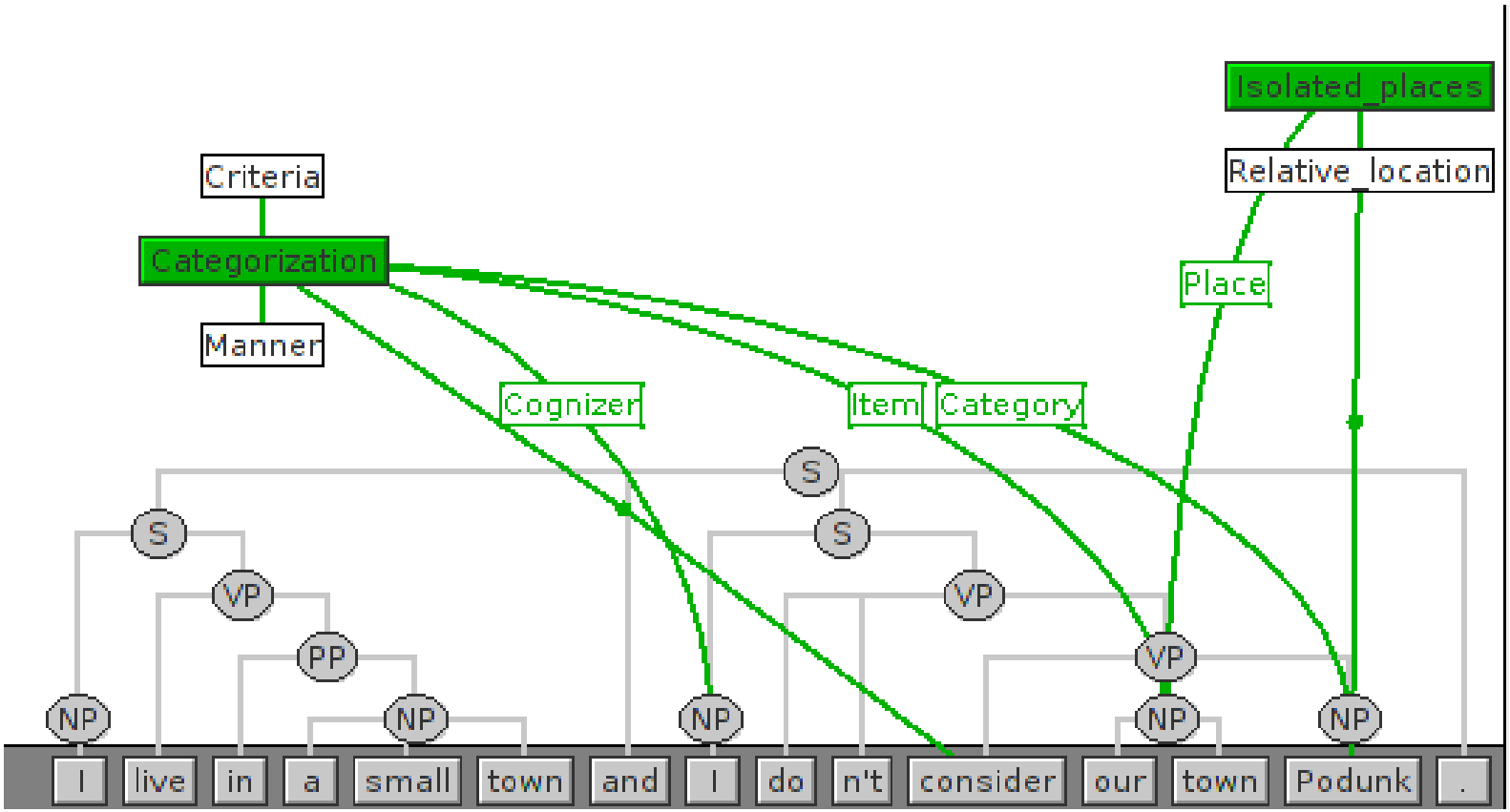
Semantic roles	Opinion roles
-	Source
Place	Target
Relative location	-
...	-

LUs: backcountry.n, back_of_beyond.n, backwater.n, backwoods.n, boondocks.n, boonies.n, Bumblefuck.n, fly-over country.n, godforsaken.a, middle_of_nowhere.n, outback.n, out-of-the-way.a, Podunk.n, the_sticks.n, *East Jesus.n

I live in a small town and I don't consider [our town ^{Place}] **Podunk**$^{Isolated\_places}$.

I live in a small town and I don't consider [our town ^{Target}] **Podunk**^{Opinion}.

Source retrieval via frame embeddings



Handling opinions at multiple levels

- Participant vs. reporter-level (Maks and Vossen 2011)
- Potentially distinct polarity, intensity (cf. *brag*)

Example: role mappings for FrameNet's `Bragging` frame

Semantic roles	**Internal view**	**External view**
Speaker	Source	Target
Topic	Target	
Message	Target	-
Addressee	-	-
Time	-	-
...	-	-

- ["I read the Observer and Times," ^{Message}] **bragged** [one ^{Speaker}]. frame
- ["I read the Observer and Times," ^{Target}] $\oplus$**bragged** [one ^{Source}]. internal
- "I read the Observer and Times," $\ominus$**bragged** [one ^{Target}]. external

Opinion inference

- In addition to explicit sentiment and evaluation, texts prompt readers / hearers to infer contextually defeasible implicit attitudes:
  1. She is **disappointed** that Peter is **happy** because the Colts lost .
- Early discussion in Ruppenhofer, Somasundaran, and Wiebe 2008 but more recently explored in depth by, among others, Choi, Deng, and Wiebe 2014; Wiebe and Deng 2014; Klenner, Amsler, and Hollenstein 2014; Reforgiato Recupero et al. 2015.
- Important: here focus of inference is on assessing the attitude of an external observer on the event. E.g. in (1), we do not care about the Colts' sentiments towards the loss!

Two related approaches

- Event evaluativity functors (Anand and Reschke 2010; Reschke and Anand 2011)
  - Lexicon → corpus
- Good-for/bad-for ; effect-based inference (Deng, Choi, and Wiebe 2013; Choi, Deng, and Wiebe 2014)
  - Corpus → lexicon

Functor approach

- Anand and Reschke 2010 model inferences as functors which map sets of participants to event evaluations.
- Focus on entailments of existence, **possession**, affectedness
- Work by Ruppenhofer and Brandes 2015 proposes additional functors.

	x	y	E_{have}	E_{lack}	$E_{withhold}$	$E_{deprive}$	E_{spare}
a	+	+	+	-	-	-	#
b	+	-	-	+	+	#	+
c	-	+	-	+	+	+	#
d	-	-	+	-	-	#	-

x,y: argument variables
#: blocked by presupposition

a My friend was given a promotion.

b My friend has cancer.

c That bastard has a lot of support among voters.

d That idiot got the worst assignment ever.

? Sadly, my neighbor didn't win the prize.

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? Sadly, my neighbor didn't win the prize. Poor Tony!

Full example: Kidnapping Frame

- I am currently manually annotating entailment information for LUs in FrameNet frames.
- Intentional FEs: Perpetrator

Blame/Praise $\propto$ Intentionality

LUs	Pol	Affected	Cause	Arg1	Func	Arg2	Val
all	+	Perp.	Perp.	Perp.	POSS	Vic.	n/a
all	-	Vic.	Perp.	Vic.	LOC	Source	n/a
all	+	Vic.	Perp.	Vic.	LOC	Perp.	n/a
all	+	Vic.	Perp.	Vic.	AFF	n/a	neg.

1. At approximately 08:30 hours on Saturday 10 September [an unknown offender *Perpetrator*] has attempted to **abduct** [a girl *Victim*] [during her paper round *Time*] [in the Henley area *Place*].
2. Mittal asserted that [he *Victim*] had been **abducted** [from outside his home *Source*] ...

Pol: sentence polarity; Val: valence / sentiment polarity

Related work on GermaNet synsets: Ruppenhofer and Brandes 2015

Enriching FN with presuppositions

- Support handling of negation/irrealis via annotations
- Distinguish entailments and presuppositions
  - [Possums and some other creatures ^{Evader}] **evade**^{Evading} [predators ^{Pursuer}] [by playing dead ^{Means}]

Intentional FEs: Evader, Pursuer

LUs	Pol	Affected	Cause	Arg1	Func	Arg2	Val	Status
evade	-	Pursuer	Evader	Pursuer	POSS	Evader	n/a	Entail
evade	-	Pursuer	Evader	Pursuer	POSS	Evader	n/a	Presupp
evade	-	Evader	Pursuer	Evader	AFF	neg.	n/a	Entail

Sentiment analysis rests on lexical semantics

- A great deal of information that is needed for sentiment analysis comes out of the lexicon (and the constructicon).
- Semantic roles are indispensable.
- The knowledge requirements of sentiment analysis encourage work on core areas of semantics:
  - semantic roles
  - gradable predicates
  - implicatives
  - ...

Lexical enrichment: beyond sentiment analysis

- Extensions to a general purpose lexical resource (FrameNet) are broadly useful.
- In particular, for tasks that can be reduced to entailment
  - Scalar information also relevant for e.g. understanding indirect answers (*Was it good? – It was great.*)
  - Knowledge about implicatives (e.g. *fail, manage*) is generally relevant for deep understanding (and applications like information retrieval, question answering, etc).
  - Evaluation data for automatic approaches to semantic relation detection: two lexical items cannot entail each other, if they don't share a functor.
  - ...

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Polarity as Semantic type in FrameNet

Lexical Entry

acclaim.v

Frame: Judgment_communication

Definition:

COD: praise enthusiastically and publicly

Semantic Type: Positive_judgment

Lexical Entry

boast.v

Frame: Bragging

Definition:

COD: talk with excessive pride and self-satisfaction about oneself

Effect approach

2. As president, Reagan raised taxes in seven of his eight years in office.

- Need to look at the positive or negative **effect** that an event has **on its object** (semantic role).
  - Effects and affected entities are not explicitly captured by the functor account.
- In combination with the attitude towards the object, this yields the evaluation of the state that results from the event (=the effect).
- That evaluation can then be transferred onto the agent or cause responsible for bringing about the effect, and onto the overall action brought about by the agent or cause.

Effect inconsistency

- Among 726 Germanet synsets annotated with functors by Ruppenhofer and Brandes 2015 , 148 unique lemmas with more than one synset.
- 110 of the 148 lemmas (74.3%) have an inconsistent effect on an affected entity (polarity / affected entity, or both)
  - ausstoßen 'emit': positive on object (creation)
  - ausstoßen 'expel': figure∼ground (location)
- Choi & Wiebe 2014 report that in the corpus of Deng et al. 2013, which contains 1,411 +/-effect instances, 196 different +effect words and 286 different -effect words. Among them, 10 words appear in both +effect and -effect instances, accounting for 9.07% of all annotated instances.

Effect inconsistency within the same frame

The verbs in FrameNet's Cure frame typically allow two different FEs to be realized as objects.

> *This frame deals with a Healer treating and curing an Affliction (the injuries, disease, or pain) of the Patient, sometimes also mentioning the use of a particular Treatment or Medication. This frame differs from Medical_intervention in that this frame deals only with cases in which the Patient is cured of the Affliction, not just treated for the Affliction.*

- The doctor **cured** [the patient ^{Patient}]. (+Affectedness)
- The doctor **cured** [the disease ^{Disease}]. (-Creation)

Alternative: handle such cases by considering syntactic subcategorization in combination with selectional restrictions. Klenner and Amsler 2016

New functor: Similarity

Item1	Item2	*similar*	*differ*
+	+	+	-
+	-	-	+
-	+	+	-
-	-	-	+

Functor for predicates of similarity

1. Charles Krauthammer said . . . "[Putin ^{Item1}] is **like** [Hitler ^{Item2}] but he's more subtle and he's also weaker, . . . "
2. Look, [he's ^{Item1}] not **like** [you and me ^{Item2}]. He's not going to school. He's not interested in a career.

Ruppenhofer and Brandes 2015

Meta-Sentiment

Intuition: We routinely have feelings about other people's feelings!

Experiencer	Stimulus	*love*	*hate*
+	+	+	-
+	-	-	+
-	+	-?	-
-	-	+?	+

Functor for predicates expressing sentiment

- [My sister ^{Experiencer}] **loves** [that idiot cousin of yours ^{Stimulus}] ...
- They should know that [a creep ^{Experiencer}] is in **love** [with her ^{Stimulus}]

A further extension: propositional attitude predicates

- The properties of propositional attitude predicates are also relevant for an understanding of inferred sentiment.
  - She doesn't *know* that he's **annoying**.
  - He *denied* having **stolen** the car.

- I explicate the properties of these items in FrameNet

LUs	Pol	Aff.	Cause	Arg1	Func	Arg2	Val	Temp	Status
learn	+	Cogn.	n/a	Cogn.	KNOW	Cont.	n/a	E	Entail
aware	+	Cogn.	n/a	Cogn.	KNOW	Cont.	n/a	S	Entail
ignorant	-	Cogn.	n/a	Cogn.	KNOW	Cont.	n/a	S	Entail
aware, ignorant	+	n/a	n/a	Spk*	KNOW	Cont.	n/a	S	Presupp
believe	+	Cogn.	n/a	Cogn.	BELIEF	Cont.	pos.	S	Entail
doubt	+	Cogn.	n/a	Cogn.	BELIEF	Cont.	neg.	S	Entail

- Reasoning now more complex, involving not only attitudes but also notions like truth and credibility.

For this we can build on seminal work by Karttunen and others (Karttunen 1971; Karttunen 1973).

The Temp feature distinguishes states from events

Computer Assisted Language Learning via Frames

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Fillmore on Language Pedagogy

In a program designed for the teaching of English vocabulary to, say, students of English as a second language, we would surely be surprised to find the words *Thursday* introduced in the first lesson, *Sunday* in the fourth, and the remaining weekday names distributed randomly throughout the curriculum. Nor would we expect to find *father*, *mother*, *son*, *daughter*, *brother*, and *sister* separated from each other, or *buy*, *sell*, *pay*, *spend*, and *cost*, or *day*, *night*, *noon*, *midnight*, *morning*, *afternoon*, and *evening*. These words form groups that learners would do well to *learn together*, because in each case they are lexical representatives of some single coherent schematization of experience or knowledge.

Fillmore (1985:223)

Frames

- Calendric_units (and Subunits)
- Kinship
- Commercial_transaction

Frame Semantics for Language Pedagogy

- ATZLER, J. 2011. *Twist in the list: Frame Semantics as a Vocabulary Teaching and Learning Tool.* UT Austin Dissertation
- *HUANG, L.-S. 2003. Resolving Word Sense Ambiguity of Polysemous Words in a Second Language.* UT Austin Dissertation.


GFoL
German
FRAME-SEMANTIC
ONLINE LEXICON

GFoL: German Frame-Semantic Online Lexicon

- Developed at UT Austin
  - Hans C. Boas, Project Director
  - Ryan Dux, Ph.D. Candidate
  - Maggie Gemmell, Research Associate
  - Annika VanNoy, Grad Student (Germanic Studies)

- http://coerll.utexas.edu/frames
- For English-speaking students of German
- U.S. Department of Education Grant #P229A100014

GFoL: German Frame-Semantic Online Lexicon

- Frames (or groups thereof)
  - Personal Relationship
  - Grooming
  - Eating and Drinking
  - Education
  - Experiencing Emotion
  - Sleep
  - Causation
  - Buying and Selling

GFoL: German Frame-Semantic Online Lexicon

- Frames
  - frame description
  - frame elements
  - lexical units
- Lexical Entries
  - meaning of lexical unit
  - examples of usage in context with English translation
  - grammar notes on aspects of structures associated with lexical unit, and examples
  - sentence templates
  - alternate forms

GFoL: German Frame-Semantic Online Lexicon

Grooming

Frame description

In this frame, an Agent engages in personal body care. An Instrument (e.g. a wash cloth) can be used in this process as well as a Medium (e.g. soap and water).

Frame Elements

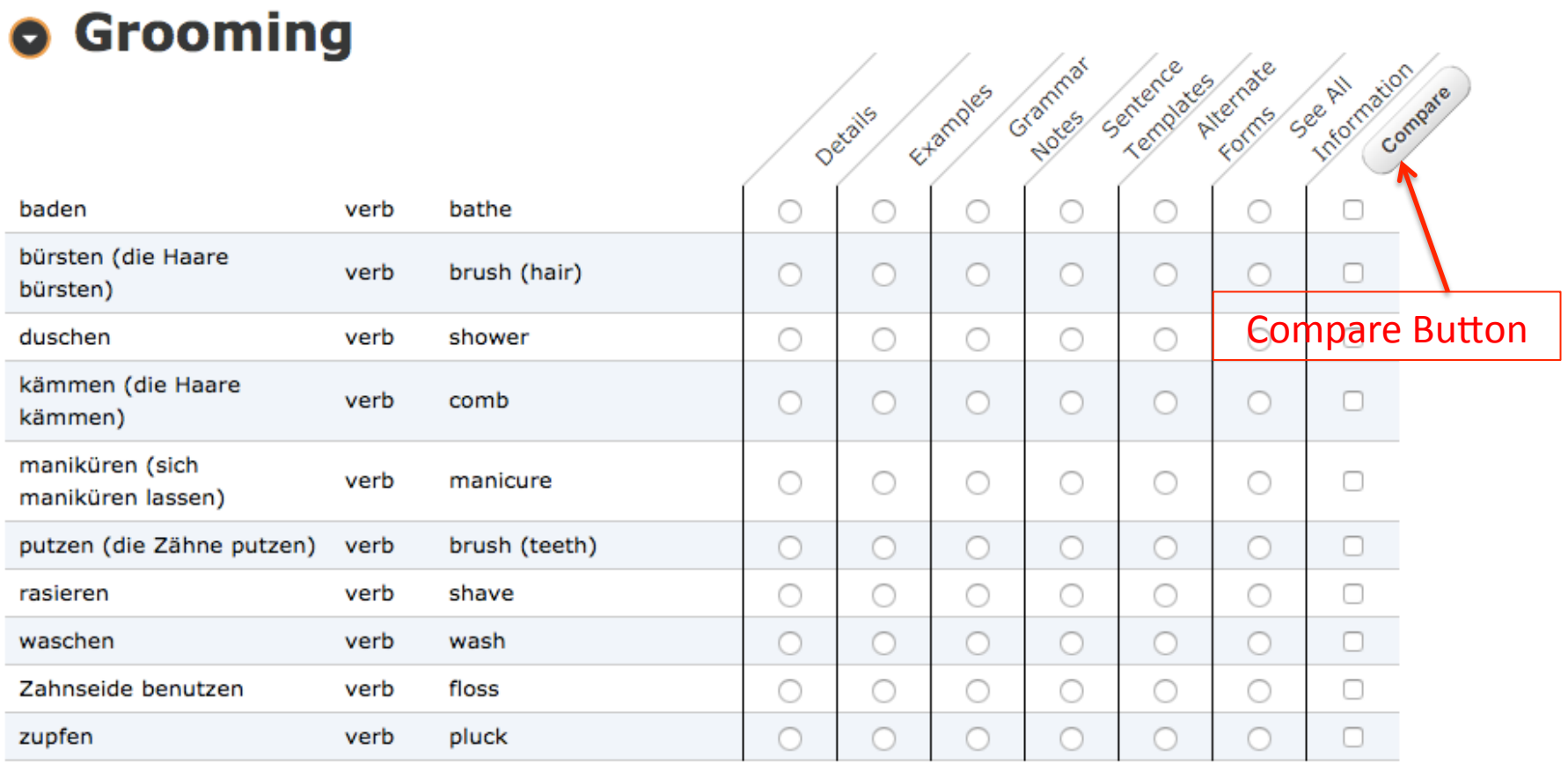
Frame Element descriptions (on hover):

Agent

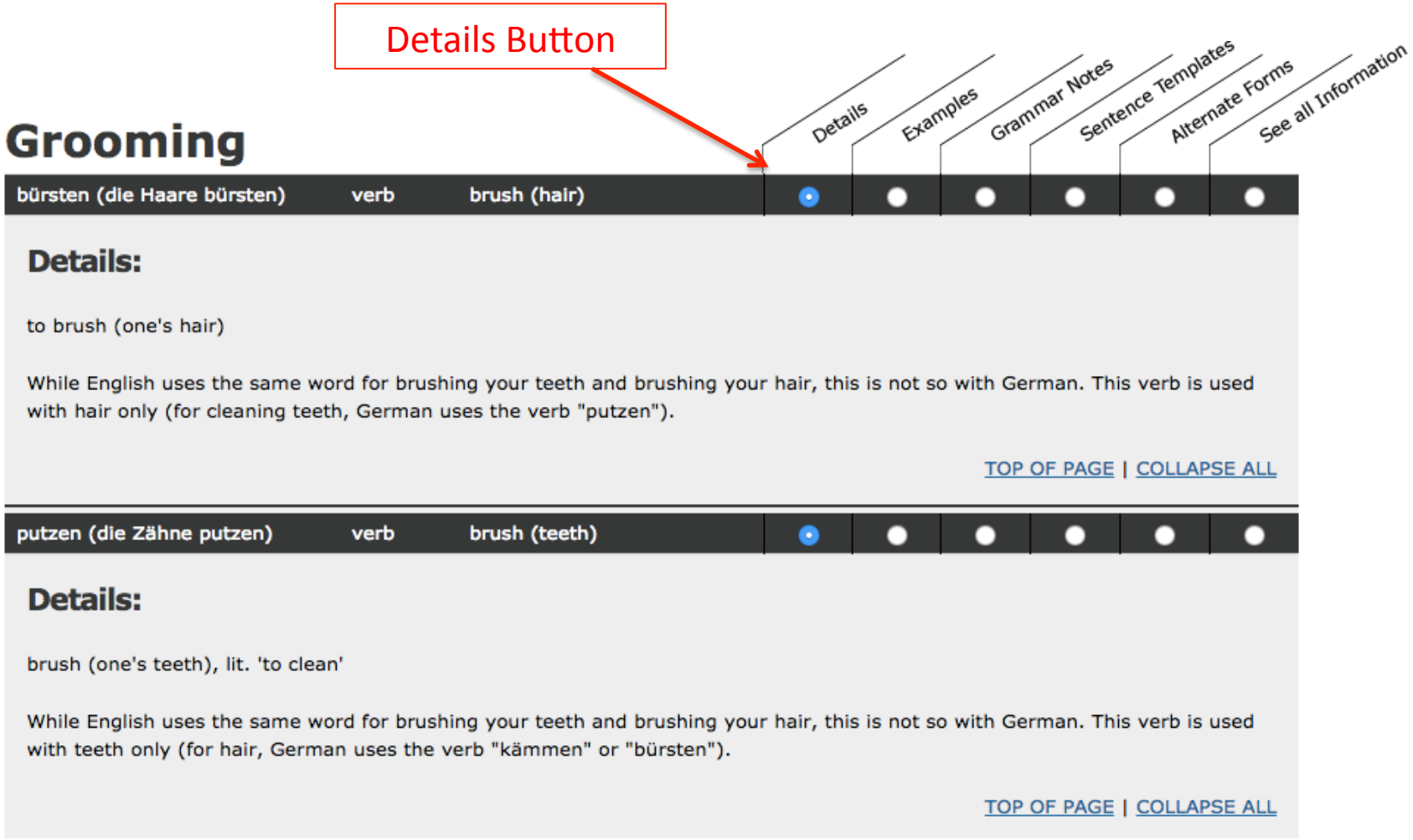
Body_part

Patient

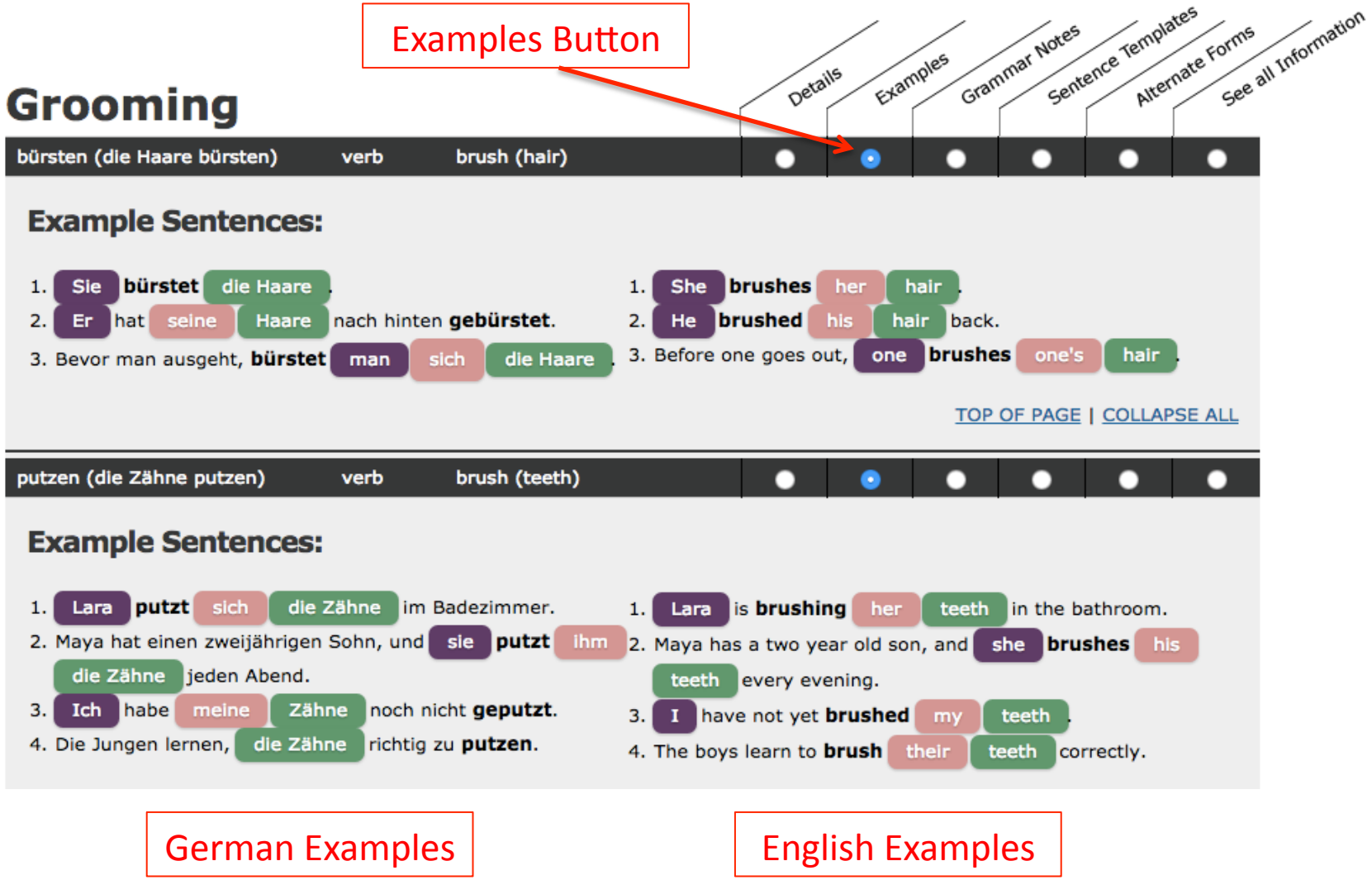
GFoL: German Frame-Semantic Online Lexicon



GFoL: German Frame-Semantic Online Lexicon



GFoL: German Frame-Semantic Online Lexicon



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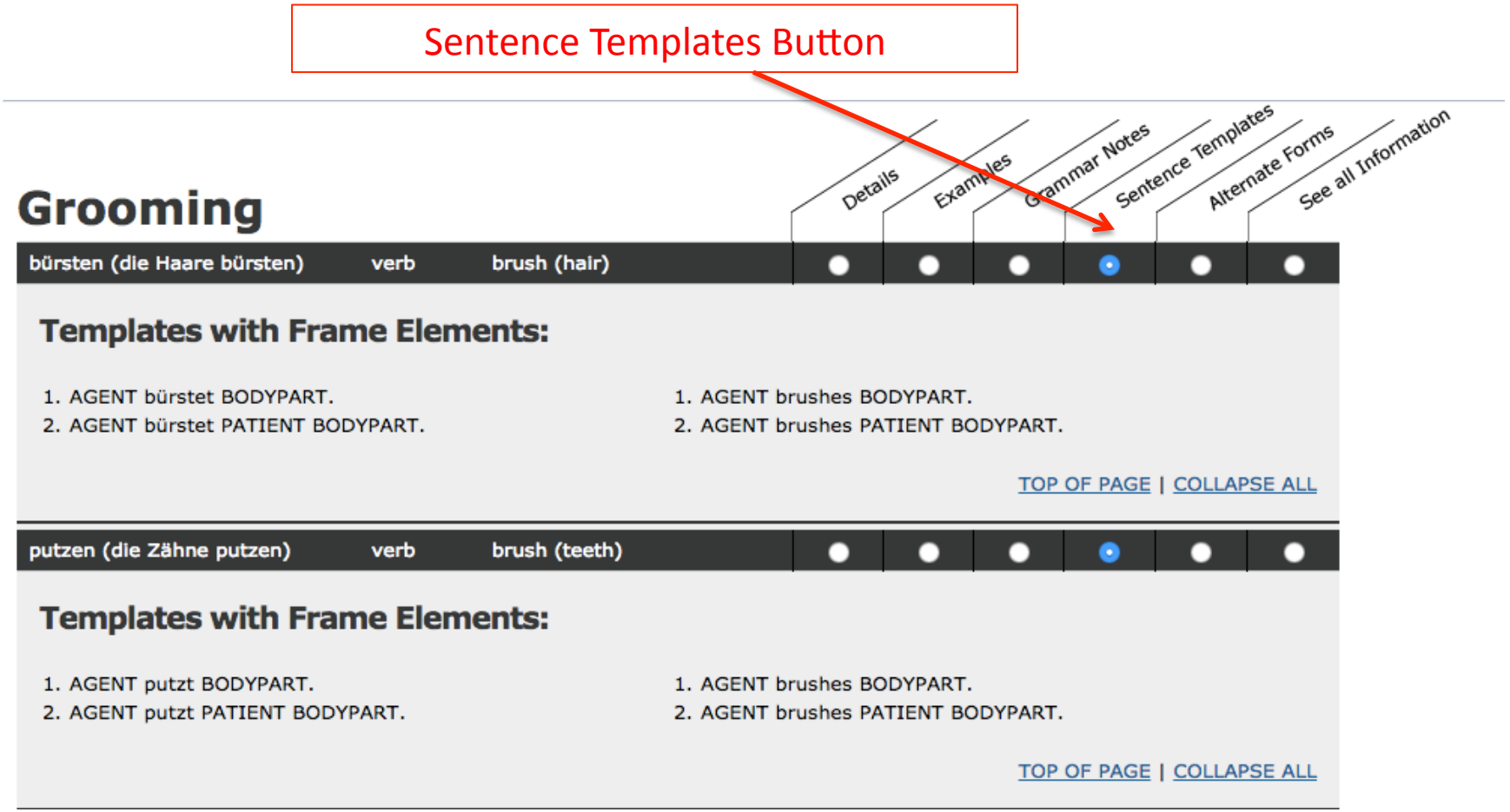

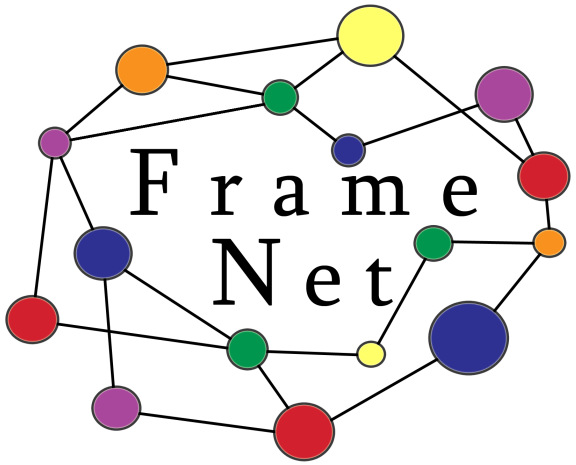

Thanks!

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