Background to FrameNet

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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
  • Frames
    – Frame Elements
    – Lexical Units
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  • FrameNet: New Developments
Charles J. Fillmore (aka OFL)

1929-2014
What is FrameNet?


- 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 **ITERATION**].
  Sue **BAKED** the cookies [for me **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

BAKE the souffle for 12 minutes, then increase the heat for another 5 minutes to crisp the top.
BAKE spanakopita for about 40 minutes, then increase the heat for another 5 minutes or until the base sounds hollow when tapped.
BAKE the tart on a preheated baking sheet at 350°F (180°C) gas mark 4 for 40-45 min until the filling is creamily set.

FE: BAKE [the souffle] [for 12 minutes] GF: Object Dep
PT: NP PP for

Cook CNI
HEATING_INSTRUMENT INI

24 May 2016 LREC 2016
Cover and **BAKE** [in a preheated 200°C/400°F/Gas 8 oven for **HEATING** _**INSTRUMENT**_] for 15-20 minutes.

**[200°C/400°F/Gas 8 **TEMPERATURE** _**SETTING**]**
Lexicographic Annotation Results:

**Apply_heat.bake.v**

<table>
<thead>
<tr>
<th>Number Annotated</th>
<th>Patterns</th>
<th>Number Annotated</th>
<th>Patterns</th>
<th>Number Annotated</th>
<th>Patterns</th>
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</table>
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.

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-ppother
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.'
2. A special birthday cake was BAKED to mark the occasion, which was held in Graham School.
Lexicographic Annotation Results: Cooking_creation.bake.v

<table>
<thead>
<tr>
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Lexicographic Annotation Results:
Cooking_creation: \textit{bake.v}

\begin{quote}
Cooking: \textit{bake.v}.
\end{quote}

\begin{quote}
\texttt{FE: \textit{[l\_Cook] BAKED [some currant buns PRODUCED\_FOOD] [for you \textit{Recipient}].}}
\end{quote}

\begin{quote}
\texttt{GF: External Object Dependent}
\texttt{PT: NP NP PP for}
\end{quote}

\begin{quote}
The wife of Senator Arlen Specter even \textit{BAKE\texttt{Target \textit{Recipient}All} \texttt{[Produced\_food\texttt{\_a double chocolate-mousse pie}]}}.
\end{quote}

\begin{quote}
\texttt{Cook\texttt{] BAKED\texttt{Target [Produced\_food\_some currant buns] [Recipient\texttt{for you}].} “}
\end{quote}

\begin{quote}
\texttt{Cook\texttt{Louse\texttt{] had BAKED\texttt{Target [Produced\_food\_pie] [Recipient\texttt{for him}] and was bringing a new pair of sheets from the airing cupboard.}}}
\end{quote}
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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
Annotating...

39. A series of DISASTROUS catastrophes DECISIONS led to the BEGINNING of the 20th CENTURY. Calendric unit BEGAN. Activity starts to SOUNd. Make noise a DEATH knell for the Ottoman EMPIRE. Political locales. The Turks LOST the competition. A SHORT duration description WAR. Hostile encounter with Italy, and were PERSECUTED by the DODECANESE ISLANDS. Natural features to the ITALIANS. People by origin, Greeks 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 Primary time this DEBACLE, catastrophe, the OTTOMAN People by origin RULES Leadership, and Kemal Atatürk ROSE. Motion directional to POWER. Leadership on a WAVE of quantified mass of POPULAR popularity support. He PROMISED a modernization of his ORGANIZATION. State leadership in his PEOPLE. But as the situation BECAME volatile, civil STRIFE. Nation/civil conflict BROKE OUT. Process start in the INNER profile relation TURKEY. People by origin, TOWN. Political locales, and those CONSIDERED CATEGORIZED as GREED. People by origin were VICTIMIZED, precariously in TERROR, commitment, and violence. Many HAD to LEAVE. Departing their birthplaces, FLEEING to coastal places. Lesbos, Chios, and Samos, the Greek ruled ISLANDS. Natural features to the OFFSHORE. Local relation. THOUSANDS of PEOPLE. ARRIVED. Amusing little MORE quantified mass than the CLOTHES. Nothing they WORE. The WEARING. PUTTING. Facing Great strain on the resources of the ISLANDS. Natural features.

FINALLY. Time vector: Greece was OUSTED. Removing from its NEW TERRITORY. Political locales. IN INNER profile relation.Asia Minor, which BECAME. Becoming WEST. Part of the political locales.

42. Greece ATTEMPTED. Attempt to STAY. State Continue out of World WAR. Hostile encounter II. But Mussolini SAW CATEGORIZED Greece as a desirable addition to his ITALIAN. Origin EMPIRE. Political locales. His FORCES. Political locales. Made a series of ATTACKS. From their BASE. Locales by use IN. Inner profile relation the DODECANESE ISLANDS. Natural features. INCLUDING Concluding a GREEK Origin NAVAL military VESSEL. Vehicle IN Inner profile relation the HARBOR. Locales by use of Thess TOWN. Political locales. But they only SUCCEEDED in forging or STRENGTHENING cause of change of support from the POPULATION. AGGREGATE. Taking sides them.

43. AFTER Time vector. New DODECANESE ISLANDS. Natural features FINALLY. Time vector. Greece, BECAME. Becoming WEST. Part of the GREEK Origin NATION. Political locales. But the COUNTRY. Political locales was politically FRAGMENTED. Cause of fragment change, with ARGUMENTS. Bickering 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 Consecutive THERE. Existence WAS. Existence fierce FIGHTING. Hostile encounter ON. Spatial contact. Samos. Even AFTER Time vector. The FIGHTING. Hostile encounter STOPPED. Process stop MORE. View as a DECAY. 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. Way. Transport SAW. Cancellation shipping DECLINE. Change position on a scale in IMPORTANCE. The Aegean ISLANDS. Natural features. Which were for CENTURIES. Measure, duration, had been IMPORTANT. Importance PORTS. Locales by use on the trading ROUTES. Way. BECAME. Becoming the BACKWATER. Isolated places of this NEW AGE. TRANSPORT. Bringing the NETWORK. Network and the ECONOMY of several ISLANDS. Natural features came close to collapse.

45. IN. Temporal calendar. 1967. The MILITARY. Military took the reins of POWER. Leadership IN. Inner 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. Chooses to LEAVE. Departing rather than live in POVERTY. Wealthlessness and TERROR. Fear, and MANY. Quantified mass. MADE. intentionally create. NEW AGE. HOMES. Buildings. IN Inner profile relation. The United States and Australia. The EXPANSION. Expansion of air TRAVEL. Travel. BEGAN. Activity start the AGE. Calendric unit of mass. TOURISM. Tourism. 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**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**EMPIREPolitical_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**ISLANDSNatural_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, **LOSE**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**.
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 Locate a PART Part whole of greater Greece.

Clear Sentences  Turn Colors On

[X] FOLLOWING Target [Landmark_occasion this debacle], [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** Relative time **this** [DEBACLE] Catastrophe, the **OTTOMANS** People by origin then allied themselves to **Germany** in the World **WAR** Hostile encounter I, **LOSE** 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**.

Clear Sentences   Turn Colors On

[X] **FOLLOWING** [Target] [Landmark occasion] this debacle, 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 [Undesirable Event] DEBACLE [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. [Undergoer DNI]
40. **FOLLOWING**Relative_time this **DEBACLE**Catastrophe, the **OTTOMANS**People_by_origin then allied themselves to **Germany in the World War**Hostile_encounter I, **LOSE**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**.

Clear Sentences  Turn Colors On

[X] **FOLLOWING**Target **Landmark_occasion**this debacle], [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 [Undesirable_Event **DEBACLE**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. [Undergo_DNI]

[X] Following this debacle, the [Person **OTTOMANS**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 frame
- 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
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
FE to FE mapping

F to F relation
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
FrameGrapher

Legend

Parent frame → Child frame

Parent → Child Relation Types:
- Inheritance
- Subframe
- Perspective On
- Involving
- Cause or Off
- Inclusive or Off
- See Also

Ordering Relation:
- Precedes
Road Map

• FrameNet
• Frames
  – Frame Elements
  – 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

<table>
<thead>
<tr>
<th></th>
<th>Bleached</th>
<th>Not Bleached</th>
</tr>
</thead>
<tbody>
<tr>
<td>+Idiomatic</td>
<td>+FE Support</td>
<td>+FE Support</td>
</tr>
<tr>
<td>-Idiomatic</td>
<td>Copula or Controller</td>
<td>Copula</td>
</tr>
</tbody>
</table>
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 designated 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
References


References


FrameNets in "Other" Languages

A Quick Introduction

Collin Baker
Multilingual FrameNet Tutorial
LREC 2016,
Portorož, Slovenia
# FrameNets in Other Languages

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

<table>
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<th>Count</th>
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<tbody>
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<td>Chinese FN</td>
<td>3,947</td>
</tr>
<tr>
<td>FN Brasil (BPT)</td>
<td>251</td>
</tr>
<tr>
<td>FN Brasil (Copa)</td>
<td>1,125</td>
</tr>
<tr>
<td>Japanese FN</td>
<td>3,392</td>
</tr>
<tr>
<td>SALSA (DE)</td>
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<tr>
<td>Spanish FN</td>
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<tr>
<td>Swedish FN</td>
<td>33,183</td>
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<tr>
<td>ICSI FN</td>
<td>13,235</td>
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</table>

Numbers are not reliable, do not cite!
## Counts by POS

<table>
<thead>
<tr>
<th></th>
<th>Spanish</th>
<th>Swedish</th>
<th>Japanese</th>
<th>English</th>
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<td>N</td>
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<td>24,736</td>
<td>2,043</td>
<td>5,348</td>
</tr>
<tr>
<td>V</td>
<td>856</td>
<td>5,398</td>
<td>908</td>
<td>5,080</td>
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<tr>
<td>Adj</td>
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<td>133</td>
<td>2,320</td>
</tr>
<tr>
<td>Adv</td>
<td>16</td>
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<td>201</td>
</tr>
<tr>
<td>Other</td>
<td>26</td>
<td>216</td>
<td>221</td>
<td>420</td>
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<tr>
<td>Tot LUs</td>
<td>1,269</td>
<td>33,780</td>
<td>3,394</td>
<td>13,189</td>
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<tr>
<td>Anno.s</td>
<td>10k</td>
<td>13k?</td>
<td>73k</td>
<td>`200K</td>
</tr>
</tbody>
</table>

Numbers are not reliable, do not cite!
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
  • 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)
  – Copyright-free
  – Contains 143-million words of texts taken from:
    • Magazines, Newspapers, Government white papers, Books, Congress proceedings, Internet, and Textbooks

Structure of the BCCWJ

<table>
<thead>
<tr>
<th>Publication Subcorpus</th>
<th>Library Subcorpus</th>
<th>Special-Purpose Subcorpus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Books, magazines, and newspapers published during 2001-2005</td>
<td>Books catalogued at more than 13 public libraries in Tokyo area, and published after 1986</td>
<td>Whitepaper texts, Internet text, Dial minutes, Best selling books etc.</td>
</tr>
<tr>
<td>35 million words</td>
<td>30 million words</td>
<td>35 million words</td>
</tr>
</tbody>
</table>
Input: JFN-KWIC

JFN Concordancer Program

Display of parsed sentence
Annotation: JFNDesktop

Postposition Layer
Output:
Lexical Entry Report

Valence Patterns:
These frame elements occur in the following syntactic patterns:

<table>
<thead>
<tr>
<th>Number Annotated</th>
<th>Patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) TOTAL</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Postposition Layer
全文テキストアノテーション

[PBS6_00002.txt]

1. パイロット
2. ここで操縦
3. その後、自家用
4. ここで言う
5. しかし、状況
6. 一方、一定期
7. 一方、一定期
8. これを基準

その後、自家用機体、事業用機体、許可、サービス、

Output: Full Text Annotation
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 in current state of affairs, quite often it refers to a general situation which causes the emotion.

- Mjl 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]
Choose JP word

Choose EN comparable word/frame

Good EN frame candidate?

Examine EN frame specs

EN frame compatible w/ JP?

Create JP Unique frame

Create JP LU

EN frame modified?

More comparable EN word/frame exists?

Yes

No

Yes

No

Yes

No

Yes
3. Work in Progress:
JFN Web Application Tool (JFNWAT)
Input: New JFN-KWIC
Annotation: Web Annotation Tool

Arriving

Definition
An object Theme moves in the direction of a Goal. The Goal may be expressed or it may be understood from context, but it is always implied by the verb itself.

Semantic Types

FEs

Core
Theme: Theme is the object that moves. It may be an entity that moves under its own power, but it need not be.
- The officer approached the house.
- I dashed as the baseball approached my head.

Goal: Goal is any expression that tells where the Theme ends up, or would end up, as a result of the motion.
- We arrived in Paris before midnight.
- Although always conceptually present and specific, Goal may sometimes be understood from context, rather than expressed by any separate constituent.

Core Unexpressed
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

• 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
- \(\rightarrow\) important to choose a development strategy

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

- Lemma-by-lemma strategy
  - e.g. SALSA, Burchardt et al. 2006
  - \(\rightarrow\) 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

  → 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 parallel 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”
- can be used to train a framenet parser restricted to the 4 domains
- 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

<table>
<thead>
<tr>
<th></th>
<th>Nb of FEE</th>
<th>% of N</th>
<th>% of V</th>
<th>Inter-annotator Fscore</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Frame</td>
</tr>
<tr>
<td>Overall</td>
<td>17667</td>
<td>36</td>
<td>50</td>
<td>85.9</td>
</tr>
</tbody>
</table>

Break-down by notional domain

<table>
<thead>
<tr>
<th></th>
<th>Nb of FEE</th>
<th>% of N</th>
<th>% of V</th>
<th>Inter-annotator Fscore</th>
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<tbody>
<tr>
<td></td>
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<td></td>
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<td>23</td>
<td>76</td>
<td>89.6</td>
</tr>
</tbody>
</table>

Break-down by POS of the FEE

|  | Nb of FEE | % of N | % of V | Inter-annotator Fscore |
|  |           |        |        | Frame | Exact FE | Partial FE |
| 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

• → 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

Department of Swedish, Språkbanken
University of Gothenburg, Sweden
dimitrios.kokkinakis@svenska.gu.se
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.
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

Culture specific LUs... e.g.

- surströmming: fermented fish

Cultural differences: no juries in Sweden
more general definition fits better than a specific one
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.

<table>
<thead>
<tr>
<th>domain</th>
<th>Gen</th>
</tr>
</thead>
<tbody>
<tr>
<td>kärnelement</td>
<td>Activity Entity Event</td>
</tr>
<tr>
<td>periferielement</td>
<td>Circumstances Depictive Duration Event_description Explanation Manner Means Purpose Time</td>
</tr>
<tr>
<td>exempel</td>
<td></td>
</tr>
<tr>
<td>[Gångbron till en förja kollapsade platsligt]</td>
<td>Event när</td>
</tr>
<tr>
<td>- så</td>
<td>[dag]</td>
</tr>
<tr>
<td>[Det i natt gör att</td>
<td>[see]</td>
</tr>
<tr>
<td>- [Vilket]</td>
<td>[höl på]</td>
</tr>
<tr>
<td>[Hederskolan]</td>
<td>[höl på]</td>
</tr>
<tr>
<td>[Många]</td>
<td>[se]</td>
</tr>
<tr>
<td>[Många skolor]</td>
<td>[är i fäd]</td>
</tr>
<tr>
<td>lu-förslag</td>
<td>[höl på</td>
</tr>
<tr>
<td>kommentar</td>
<td>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.</td>
</tr>
</tbody>
</table>
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)
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
Contents

- Simple Alignments
- Less Straightforward Connections
- Ecosystem of Resources
Contents

- Simple Alignments
- Less Straightforward Connections
- Ecosystem of Resources
Perfect Alignments?

English
- automobile
- biology
- Cologne

German
- Automobil
- Biologie
- Köln
Perfect Alignments?

English
- automobile
- biology
- Cologne

German
- Automobil
- Biologie
- Köln
- Eau de Cologne
Sense Alignments

English
- automobile
- biology
- Cologne (Germany)
- cologne (perfume)

German
- Automobil
- Biologie
- Köln
- Eau de Cologne
Sense Alignments

**English**
- automobile
- Eau de Cologne
- Cologne (Germany)
- cologne (perfume)

**German**
- Automobil
- Auto
- Köln
- Eau de Cologne
Sense Alignments: Implied Synonyms

English
- automobile
- Eau de Cologne
- Cologne (Germany)
- cologne (perfume)

German
- Automobil
- Auto
- Köln
- Eau de Cologne
Algorithms: Computing Similarity Scores

Resource A
- Entry A1
- Entry A2
- Entry A3
- Entry A4

Resource B
- Entry B1
- Entry B2
- Entry B3
- Entry B4
Algorithms: Computing Similarity Scores

Resource A
- Entry A1
- Entry A2
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Metrics:
- Word overlap
- Gloss overlap
- Etc.
Algorithms: Computing Similarity Scores

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Algorithms: Choosing Best Alignments

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Algorithms: Choosing Best Alignments

Resource A

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Resource B

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- Entry B3
- Entry B4

Which one has the highest Score?
Algorithms: Choosing Best Alignments

Resource A
- Entry A1
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- Entry A3
- Entry A4

Resource B
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Which one has the highest Score?
Algorithms: Choosing Best Alignments

Resource A
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- Entry A4

Resource B
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- Entry B2
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- Entry B4

Which one has the highest Score?
Algorithms: Choosing Best Alignments

Resource A
- Entry A1
- Entry A2
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Resource B
- Entry B1
- Entry B2
- Entry B3
- Entry B4

Which one has the highest Score?
Choosing Best Alignments

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)

## Separated Concepts (Multilingual Wikipedia)

<table>
<thead>
<tr>
<th>English concept</th>
<th>German concept</th>
<th>Explanation</th>
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<tbody>
<tr>
<td>Coffee percolator</td>
<td>French Press</td>
<td>different brewing devices</td>
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<td>Baqa al-Gharbiyye</td>
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</tr>
<tr>
<td>Leucothoe (plant)</td>
<td>Leucothea (Orchamos)</td>
<td>plant vs. figure of Greek mythology</td>
</tr>
<tr>
<td>Compulsory education</td>
<td>Right to education</td>
<td>duty vs. right</td>
</tr>
<tr>
<td>Franz Kafka's Diaries</td>
<td>Franz Kafka</td>
<td>diaries vs. person</td>
</tr>
</tbody>
</table>
Contents

- Simple Alignments
- Less Straightforward Links
- Ecosystem of Resources
## Separated Concepts (Multilingual Wikipedia)

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Model as two separate entries

- Coffee percolator
- French press
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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) import, 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, accord, 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, gun (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, postpone, 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)

Non-Straightforward Alignments

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

Solution:

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

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

**Multilingual Alignments**

### FrameNet Index of Lexical Units

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 provides two tables with information about the LU: Frame Elements and their Syntactic Realizations; and Valence Patterns.

### KO - fulltext

<table>
<thead>
<tr>
<th>Frame Index</th>
<th>Lexical Unit Index</th>
<th>Frame Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 태풍 Hugo가 남긴 피해들과 회사</td>
<td>Earnings and losses</td>
<td></td>
</tr>
<tr>
<td>재해</td>
<td>Aetna Life and Casualty Co.</td>
<td></td>
</tr>
<tr>
<td>Catastrophe</td>
<td>Change of position on a scale</td>
<td></td>
</tr>
<tr>
<td>손실은 Earnings and losses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>순이익을 Hugo로 인한 36 백만 달러를 포함하여</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>50 백만 달러로 감소시켰다.</td>
<td></td>
</tr>
<tr>
<td>지난 Relative_time 재해,</td>
<td>Earnings and losses</td>
<td></td>
</tr>
<tr>
<td>손실은 Earnings and losses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>순이익이 Earnings and losses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>235.5 백만 달러 또는 주당 20.7 달러 또는 5 백만 달러의 축적에 이르렀다.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amounting to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. 그 해 Measure_duration 이전, Relative_time 결과는 회계변경을 Undergo change 반영하기 위해 다시</td>
<td></td>
<td></td>
</tr>
<tr>
<td>접점을</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. 보험회사는 겨울 Relational_quantity 2주 Measure_duration 갑 Time_vector, 북 칼레포니아 지진</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moving_in_place, 대에 정구를 처리하기 시작하였다.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. 그러나 이들 정구는 폐쇄하기</td>
<td>Assessing 더 어렵고 Difficult 더 누리기</td>
<td></td>
</tr>
<tr>
<td>Difficult, Taking_time 때문에</td>
<td></td>
<td></td>
</tr>
<tr>
<td>회사는</td>
<td>Businesses 4Ordinal_numbers,颱風 Calendar_unit, 실적</td>
<td></td>
</tr>
<tr>
<td>Earnings and losses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. 가장 최근, Relative_time 분기에서 Calendar_unit, 지난 Relative_time, 재난</td>
<td>Earnings and losses</td>
<td></td>
</tr>
<tr>
<td>손실은 Earnings and losses 이전 Evaluative_comparisons, Aetna는 자동차/주택소유자 계약에서 23 백만 달러의 손실을 Earnings and losses 가져왔다.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. 영리보험 부주의의 이익은 Earnings and losses</td>
<td>3년 Measure_duration 동안 더 많은</td>
<td></td>
</tr>
<tr>
<td>Position on a scale 재난 Catastrophe 손실과 Earnings and losses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>자산 Possession, 상해보험</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catastrophe, 재난에서의 경우 Commerce_scenario Listening_Hostile_encounter, 반영되어, 30% 감소하여</td>
<td></td>
<td></td>
</tr>
<tr>
<td>59 백만 달러를 기록하였다.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Korean FrameNet by Key-Sun Choi**
Multilingual Alignments

Commitment

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 Addressed. Some of the words in this frame allow an Addressed 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, Addressed 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 habían 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.
Some non-English framenet projects re-use Berkeley FrameNet frames
Non-English LUs can be added to existing English FrameNet frames

Multilingual Alignments

Motion Frame

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**

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.

Motion with Intention
Contents

- Simple Alignments
- Less Straightforward Connections
- Ecosystem of Resources
Some multilingual framenets are linked to English FrameNet
SemLink

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

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

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

- VerbNet ↔ FrameNet
- PropBank ↔ VerbNet
- VerbNet ↔ WordNet

FrameNet

- Sender
- Theme
- Goal
- Recipient

VerbNet

- Agent
- Theme
- Destination

Sending Frame

Class 11.1
Multilingual LUs via Universal WordNet (UWN)
Multilingual LUs via Universal WordNet (UWN)

Over 1,000,000 LUs in over 100 languages can be attached to nearest frames.

http://www.lexvo.org/uwn/
The Semantic Web

A Web of machine-readable entity-relationship data

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

Tim Berners-Lee

Frankfurt

The Web of Data: Linked Data
The Web of Data: Lexvo.org

Interdisciplinary Work, e.g. in Digital Humanities

Semantic Web Journal 2014
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
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

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
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 construction 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


*ki o tukeru*.v – ‘be careful’

*arai*.a – ‘coarse’


*Noroma*.an – ‘stupid’

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

*ippan ni*.adv – ‘in general’


*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)

Differences in the two types of languages

.edge[shape=right triangle, color=blue, fill=blue!20]

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

- \textit{wataru.v} ‘go across, cross’: \textit{<2-dimensional> PATH\_SHAPE}
- \textit{koeru.v} ‘go over, cross’: \textit{<1-dimensional> PATH\_SHAPE}

We do NOT need to divide the FE \textit{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

- \textit{across.part}: \textit{<2-dimensional> PATH\_SHAPE}
- \textit{over.part}: \textit{<1-dimensional> PATH\_SHAPE}
- \textit{cross.v}: UNSPECIFIED for \textit{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] Motion
   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

Placing

Inheritance

Dispersal

tirasu.v – ‘scatter’

Causative_of

Becoming_dispersed

tiru.v – ‘become scattered’
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 vori] [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

  \{ [\text{Clause} kir -ase te-morau] [CEE \text{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


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

Translation Equivalents

Language A Lexemes

Language B Lexemes
Pathways: Frame Projection

Translation Equivalents

Language A Lexemes
-------
Frames & FEs

Language B Lexemes
-------
Pathways: Frame Projection

- B. Chen and P. Fung (2004 Chinese)
Pathways: Annotation Projection

- Language A Lexemes
  - Frames & FEs
  - Manual Anno./Auto SRL
  - Align Texts
  - Language A texts with anno.
  - Anno Projection
  - Language B texts with anno.
- Language B Lexemes
Pathways: Annotation Projection

Language A Lexemes ------ Frames & FEs

Language B Lexemes ------ Frames & FEs

Manual Anno./ Auto SRL

Frame Induction

Align Texts

Language A texts with anno.

Anno Projection

Language B texts with anno.
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 höhere 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.

...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”
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

<table>
<thead>
<tr>
<th></th>
<th><strong>Shallow/Coarse</strong></th>
<th><strong>Deep/Fine</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unit of Analysis</strong></td>
<td>aggregates: documents, data streams</td>
<td>individual expressions: words, morphemes</td>
</tr>
<tr>
<td><strong>Text types</strong></td>
<td>restricted: e.g. tweets, product reviews</td>
<td>general</td>
</tr>
<tr>
<td><strong>Role extraction</strong></td>
<td>from meta-data</td>
<td>from text</td>
</tr>
<tr>
<td><strong>Mode of expression</strong></td>
<td>explicit</td>
<td>implicit</td>
</tr>
<tr>
<td><strong>Methods</strong></td>
<td>simple features (e.g. no parsing)</td>
<td>more complex features (e.g. parsing, word sense disambiguation)</td>
</tr>
<tr>
<td><strong>Result</strong></td>
<td>polarity, intensity</td>
<td>roles, polarity, intensity</td>
</tr>
</tbody>
</table>
Sub-tasks in analyzing explicit opinions

- A more or less complete analysis of *individual* opinion-bearing expressions has to provide at least the following:
  - Whose opinion? (Source)
  - What is it about? (Target)
  - What is its valence? (Polarity)
  - How strongly positive/negative? (Intensity)
  - Presentation of the subjective attitude as real/actual or imagined/hypothetical
  - Speech and reference time of the opinion expressed
Sub-tasks in analyzing explicit opinions

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

  1. Whose opinion? *(Source)*
  2. What is it about? *(Target)*

Opinion roles:
Sub-tasks in analyzing explicit opinions

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

1. Whose opinion? *(Source)*
2. What is it about? *(Target)*
3. What is its valence? *(Polarity)*
   - subset of \{positive, negative, conflicted, mixed, neutral\}

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

1. Whose opinion? (Source)
2. What is it about? (Target)
3. What is its valence? (Polarity)
4. How strongly positive/negative? (Intensity)

- Opinion roles
- Opinion Holder
- Topic
- Orientation
- Strength
Sub-tasks in analyzing explicit opinions

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

1. Whose opinion? *(Source)*
2. What is it about? *(Target)*
3. What is its valence? *(Polarity)*
   *subset of \{positive, negative, conflicted, mixed, neutral\}*
4. How strongly positive/negative? *(Intensity)*
5. Presentation of the subjective attitude as real/actual or imagined/hypothetical *(Realis/Irrealis)*
Sub-tasks in analyzing explicit opinions

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

1. Whose opinion? *(Source)*
2. What is it about? *(Target)*
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   - subset of \{positive, negative, conflicted, mixed, neutral\}
4. How strongly positive/negative? *(Intensity)*
5. Presentation of the subjective attitude as real/actual or imagined/hypothetical
6. Speech and reference time of the opinion expressed
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

<table>
<thead>
<tr>
<th>Semantic roles</th>
<th>Opinion roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complainer</td>
<td>Source</td>
</tr>
<tr>
<td>Topic</td>
<td>Target</td>
</tr>
<tr>
<td>Complaint</td>
<td>Target</td>
</tr>
<tr>
<td>Addressee</td>
<td>-</td>
</tr>
<tr>
<td>Time</td>
<td>-</td>
</tr>
<tr>
<td>...</td>
<td>-</td>
</tr>
</tbody>
</table>

[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

<table>
<thead>
<tr>
<th>Semantic roles</th>
<th>Opinion roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>Source</td>
</tr>
<tr>
<td>Place</td>
<td>Target</td>
</tr>
<tr>
<td>Relative location</td>
<td>-</td>
</tr>
<tr>
<td>...</td>
<td>-</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Semantic roles</th>
<th>Internal view</th>
<th>External view</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaker</td>
<td>Source</td>
<td>Target</td>
</tr>
<tr>
<td>Topic</td>
<td>Target</td>
<td>-</td>
</tr>
<tr>
<td>Message</td>
<td>Target</td>
<td>-</td>
</tr>
<tr>
<td>Addressee</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Time</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>...</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

- "[I read the Observer and Times,] bragged [one ]". frame
- "[I read the Observer and Times,] ⊕bragged [one ]". internal
- "[I read the Observer and Times,] ⊖bragged [one ]". external
Opinion inference

- In addition to explicit sentiment and evaluation, texts prompt readers / hearers to infer contextually defeasible implicit attitudes:
  - 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 $\rightarrow$ corpus

- Good-for/bad-for; effect-based inference (Deng, Choi, and Wiebe 2013; Choi, Deng, and Wiebe 2014)
  - Corpus $\rightarrow$ 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.

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
<th>E_{have}</th>
<th>E_{lack}</th>
<th>E_{withhold}</th>
<th>E_{deprive}</th>
<th>E_{spare}</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>#</td>
</tr>
<tr>
<td>b</td>
<td>+</td>
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<td>+</td>
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<td>+</td>
</tr>
<tr>
<td>c</td>
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<td>+</td>
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<tr>
<td>d</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>#</td>
<td>-</td>
</tr>
</tbody>
</table>

x, y: argument variables
# : blocked by presupposition

- My friend was **given** a promotion.
- My friend **has** cancer.
- That bastard **has** a lot of support among voters.
- That idiot **got** the worst assignment ever.
- Sadly, my neighbor didn’t **win** the prize.
Functor approach

- Anand and Reschke 2010 model inferences as functors which map sets of participants to event evaluations.
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<tr>
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<td>+</td>
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<tr>
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<td>+</td>
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<td>#</td>
<td>-</td>
</tr>
</tbody>
</table>

\(x,y\): argument variables

\#: blocked by presupposition

a  My friend was **given** a promotion. **Yay!**
b  My friend **has** cancer. **It’s so sad.**
c  That bastard **has** a lot of support among voters. **Crap!**
d  That idiot **got** the worst assignment ever. **Serves him right!**

?  Sadly, my neighbor didn’t **win** the prize.
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.

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<tr>
<th>x</th>
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<th>$E_{\text{have}}$</th>
<th>$E_{\text{lack}}$</th>
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</tr>
</tbody>
</table>

x,y: argument variables
# : blocked by presupposition

- a My friend was **given** a promotion. **Yay!**
- b My friend **has** cancer. **It's so sad.**
- c That bastard **has** a lot of support among voters. **Crap!**
- d That idiot **got** the worst assignment ever. **Serves him right!**
- ? 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

\[ \text{Blame/Praise} \propto \text{Intentionality} \]

<table>
<thead>
<tr>
<th>LUs</th>
<th>Pol</th>
<th>Affected</th>
<th>Cause</th>
<th>Arg1</th>
<th>Func</th>
<th>Arg2</th>
<th>Val</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
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<td>Perp.</td>
<td>Perp.</td>
<td>Perp.</td>
<td>POSS</td>
<td>Vic.</td>
<td>n/a</td>
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<tr>
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<td>Vic.</td>
<td>Perp.</td>
<td>Vic.</td>
<td>LOC</td>
<td>Source</td>
<td>n/a</td>
</tr>
<tr>
<td>all</td>
<td>+</td>
<td>Vic.</td>
<td>Perp.</td>
<td>Vic.</td>
<td>LOC</td>
<td>Perp.</td>
<td>n/a</td>
</tr>
<tr>
<td>all</td>
<td>+</td>
<td>Vic.</td>
<td>Perp.</td>
<td>Vic.</td>
<td>AFF</td>
<td>n/a</td>
<td>neg.</td>
</tr>
</tbody>
</table>

1. At approximately 08:30 hours on Saturday 10 September [an unknown offender \text{Perpetrator}] has attempted to \text{abduct} [a girl \text{Victim}] [during her paper round \text{Time}] [in the Henley area \text{Place}].

2. Mittal asserted that [he \text{Victim}] had been \text{abducted} [from outside his home \text{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 \textit{Evader}] evade \textit{Evading} [predators \textit{Pursuer}]
  - [by playing dead \textit{Means}]

Intentional FEs: Evader, Pursuer

<table>
<thead>
<tr>
<th>LU</th>
<th>Pol</th>
<th>Affected</th>
<th>Cause</th>
<th>Arg1</th>
<th>Func</th>
<th>Arg2</th>
<th>Val</th>
<th>Status</th>
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<td>Entail</td>
</tr>
<tr>
<td>evade</td>
<td>-</td>
<td>Pursuer</td>
<td>Evader</td>
<td>Pursuer</td>
<td>POSS</td>
<td>Evader</td>
<td>n/a</td>
<td>Presupp</td>
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<tr>
<td>evade</td>
<td>-</td>
<td>Evader</td>
<td>Pursuer</td>
<td>Evader</td>
<td>AFF</td>
<td>neg.</td>
<td>n/a</td>
<td>Entail</td>
</tr>
</tbody>
</table>
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.
  - ...
References


References IV


References VI


References


References IX


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
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.
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

<table>
<thead>
<tr>
<th>Item1</th>
<th>Item2</th>
<th>similar</th>
<th>differ</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
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<td>+</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Experiencer</th>
<th>Stimulus</th>
<th>love</th>
<th>hate</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>+</td>
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<td>-</td>
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<td>+</td>
<td>-?</td>
<td>-</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>+?</td>
<td>+</td>
</tr>
</tbody>
</table>

Functor for predicates expressing sentiment

- 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

<table>
<thead>
<tr>
<th>LUs</th>
<th>Pol</th>
<th>Aff.</th>
<th>Cause</th>
<th>Arg1</th>
<th>Func</th>
<th>Arg2</th>
<th>Val</th>
<th>Temp</th>
<th>Status</th>
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</thead>
<tbody>
<tr>
<td>learn</td>
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<td>Cogn.</td>
<td>n/a</td>
<td>Cogn.</td>
<td>KNOW</td>
<td>Cont.</td>
<td>n/a</td>
<td>E</td>
<td>Entail</td>
</tr>
<tr>
<td>aware</td>
<td>+</td>
<td>Cogn.</td>
<td>n/a</td>
<td>Cogn.</td>
<td>KNOW</td>
<td>Cont.</td>
<td>n/a</td>
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<td>Entail</td>
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<tr>
<td>ignorant</td>
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<td>Cogn.</td>
<td>n/a</td>
<td>Cogn.</td>
<td>KNOW</td>
<td>Cont.</td>
<td>n/a</td>
<td>S</td>
<td>Entail</td>
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<tr>
<td>aware, ignorant</td>
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<td>n/a</td>
<td>n/a</td>
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<td>KNOW</td>
<td>Cont.</td>
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<td>BELIEF</td>
<td>Cont.</td>
<td>pos.</td>
<td>S</td>
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<td>BELIEF</td>
<td>Cont.</td>
<td>neg.</td>
<td>S</td>
<td>Entail</td>
</tr>
</tbody>
</table>

- 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

Miriam R L Petruck

miriamp@icsi.berkley.edu
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


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](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

#### Grooming

<table>
<thead>
<tr>
<th>Grooming Verbs</th>
<th>Verb Form</th>
<th>English Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>baden</td>
<td>verb</td>
<td>bathe</td>
</tr>
<tr>
<td>bürsten (die Haare bürsten)</td>
<td>verb</td>
<td>brush (hair)</td>
</tr>
<tr>
<td>duschen</td>
<td>verb</td>
<td>shower</td>
</tr>
<tr>
<td>kämmen (die Haare kämmen)</td>
<td>verb</td>
<td>comb</td>
</tr>
<tr>
<td>maniküren (sich maniküren lessen)</td>
<td>verb</td>
<td>manicure</td>
</tr>
<tr>
<td>putzen (die Zähne putzen)</td>
<td>verb</td>
<td>brush (teeth)</td>
</tr>
<tr>
<td>rasieren</td>
<td>verb</td>
<td>shave</td>
</tr>
<tr>
<td>waschen</td>
<td>verb</td>
<td>wash</td>
</tr>
<tr>
<td>Zahnseide benutzen</td>
<td>verb</td>
<td>floss</td>
</tr>
<tr>
<td>zupfen</td>
<td>verb</td>
<td>pluck</td>
</tr>
</tbody>
</table>
# GFoL: German Frame-Semantic Online Lexicon

## Grooming

<table>
<thead>
<tr>
<th>verb</th>
<th>brush (hair)</th>
</tr>
</thead>
<tbody>
<tr>
<td>bürsten (die Haare bürsten)</td>
<td></td>
</tr>
</tbody>
</table>

### Details:

to brush (one's hair)

While English uses the same word for brushing your teeth and brushing your hair, this is not so with German. This verb is used with hair only (for cleaning teeth, German uses the verb "putzen").

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>putzen (die Zähne putzen)</td>
<td></td>
</tr>
</tbody>
</table>

### Details:

brush (one's teeth), lit. 'to clean'

While English uses the same word for brushing your teeth and brushing your hair, this is not so with German. This verb is used with teeth only (for hair, German uses the verb "kämmen" or "bürsten").
GFoL: German Frame-Semantic Online Lexicon

Examples Button

German Examples

Examples

German Examples

English Examples

Examples
The Grammar of Grooming

The verbs in the Grooming frame are interesting from a German-English perspective, because German commonly uses a reflexive pronoun to specify that the Agent is washing her/himself, and thus that the Agent and the Patient are the same entity.

**When a Body Part is not mentioned, the reflexive pronoun is in the accusative.**

Ich dusche mich.--I shower (myself).

**When it is mentioned, the reflexive pronoun is in the dative, and the Body Part is in the accusative.**

Ich putze mir die Zähne.--I brush (myself) the teeth.

The grammar note entitled "Reflexive Pronouns" contains a chart with both dative and accusative forms; visit Grimm Grammar for more information (http://courl.utexas.edu/gg/gr/vr0_01.html).

**If the Patient is a different person than the Agent, then the dative and accusative cases are used as normal.**

Ich kamme dem Kind/inhn die Haare.

German vs. English

When it comes to Grooming, English differs from German in two respects. First, instead of using a simple verb like German duschen, English often uses a phrasal verb, where a meaningful noun (shower, bath) combines with a 'light' verb (take).

I take several showers a day. -- Ich dusche mich mehrmals am Tag.

Second, while German expresses the Patient as though it is directly affected by the verb (as a direct or indirect object), English construes this participant more as a possessor of the body part (with a possessive pronoun).

I brush my teeth--Ich putze mir die Zähne.

I brush his teeth--Ich putze ihm die Zähne.
**GFOIL: German Frame-Semantic Online Lexicon**

**Sentence Templates Button**

### Grooming

<table>
<thead>
<tr>
<th>bürsten (die Haare bürsten)</th>
<th>verb</th>
<th>brush (hair)</th>
<th>Template 1</th>
<th>Template 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGENT bürstet BODYPART.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGENT bürstet PATIENT BODYPART.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Templates with Frame Elements:

1. AGENT bürstet BODYPART.
2. AGENT bürstet PATIENT BODYPART.

### putzen (die Zähne putzen) verb brush (teeth)

<table>
<thead>
<tr>
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<th>Template 2</th>
</tr>
</thead>
<tbody>
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<td></td>
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<tr>
<td>AGENT putzt PATIENT BODYPART.</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### Templates with Frame Elements:

1. AGENT putzt BODYPART.
2. AGENT putzt PATIENT BODYPART.

**German Templates**

**English Templates**
Thanks!

miriamp@icsi.berkeley.edu