



Conceptual Description of Verbs and their Semantic and Syntactic Features

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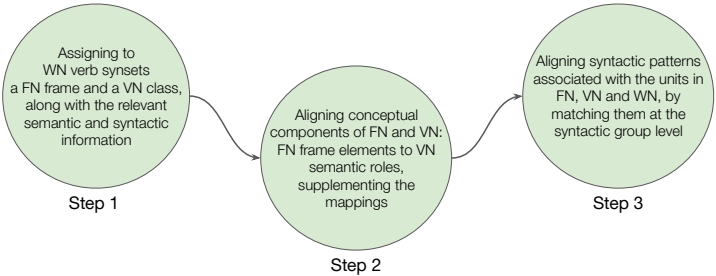
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Proposal: bridging among lexical resources

The goal is to bridge 3 resources: the vast lexical-semantic knowledge in WordNet (WN), focusing on verb synsets, the conceptual and syntactic description in FrameNet (FN) and the predicate-argument structure and syntactic description in VerbNet (VN).

The alignment of the semantic components and their syntactic realisations is essential for better exploiting the abundance of information across resources and shedding light on cross-resource similarities, discrepancies and inconsistencies.

The syntactic patterns facilitate the extraction of examples illustrating the use of verbs synset literals in corpora and their semantic characterisation (through the association of the syntactic groups with the semantic components, i.e. frame elements or semantic roles) and can be employed in various tasks requiring semantic and syntactic description.



Corpus examples (SemCor – semantically annotated corpus)

He was wearing sneakers and shorts and an open-collared shirt, and in his hand he **carried** a little black bag.

The surgeon **carried** a cage of live pigeons.

During the war it was in constant use by the wagon trains **transporting** supplies from the railroad at Grafton to the troops operating in the interior.

It is a simple task to **haul** a boat fifty or one hundred miles to a lake or reservoir on the new, light, strong, easy-to-operate trailers which are built to accommodate almost any kind of small boat and retail from \$100 to \$2000.

His statistical record that year, when Texas won only one game and lost nine, was far from impressive: he **carried** the ball three times for a net gain of 10 yards, punted once for 39 yards and caught one pass for 13 yards.

Food, medical, utensils, and equipment, if not already stored in the shelter, must be quickly gathered up and **carried** into it.

Towards a cross-language description

Proof of concept on knowledge and resource transfer has been carried out in the work on the conceptual and syntactic description of Bulgarian verbs.

- The **conceptual description** is to a great extent language-independent and transferrable cross-linguistically, even if in some cases corrections may be necessary.
- The **syntactic description** is adaptable:
 - syntactic patterns may be directly transferred or considered as valid/invalid for the language;
 - others need adjustments (e.g., prepositions or other lexical information), or might be language specific (constructions such as 'THERE (Aux) is / are ...').

EN: NP.**Agent** V NP.**Theme** PP.**Source/Initial_location**[from] PP.**Goal/Destination**[to,towards]

The soldiers were **transporting** supplies **from** the railroad at Grafton **to** the troops in the interior.

BG: NP.**Agent** V NP.**Theme** PP.**Source/Initial_location**[от] PP.**Goal/Destination**[към,до,в,във]

Воинците **транспортираха** провизии **от** гарата в Графтън **до** войските във вътрешността.

Voynitsite **transportiraha** provizii **ot** garata v Grafton **do** voyskite vav vatreshnostta.

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Acknowledgements

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Step 1: Assigning WN verb synsets FN frame and VN class

{**move**:2; **displace**:4} 'cause to move or shift into a new position or place; in a concrete or an abstract sense'

Assigned FrameNet frame Cause_motion:

An **Agent** causes a **Theme** to move from a **Source**, along a **Path**, to a **Goal**. Different members of the frame emphasize the trajectory to different degrees, and a given instance of the frame will usually leave some of the **Source**, **Path** and/or **Goal** implicit.

FrameNet LL: **move** cause (something) to move'
displace is not in FrameNet

Assigned VN class: slide-11.2

Example VerbNet predicate-argument structures (PAS):

Agent VERB **Theme** [PREP] **Trajectory**

Agent VERB **Theme** [PREP] **Initial_location** [to, towards] **Destination**

VerbNet class member: **move** (slide-11.2)
displace is not in VerbNet

{**transport**:2; **carry**:1} 'move while supporting either in a vehicle or in one's hands or on one's body'

Assigned FrameNet frame Bringing:

This frame concerns the movement of a **Theme** and an **Agent** and/or **Carrier**. The **Agent**, a person or other sentient entity, controls the shared **Path** by moving the **Theme** from a **Source** to a **Goal**.

Assigned VN class: carry-11.4

Example VerbNet predicate-argument structures (PAS):

Agent VERB **Theme** [to, towards] **Destination**

Agent VERB **Theme** [PREP] **Initial_location** [to, towards] **Destination**

FrameNet LL: **transport** take or carry from one place to another by means of a vehicle, aircraft, or ship'
FrameNet LL: **carry** 'move or transport from one place to another'

VerbNet class member: **transport** (send-11.1)
VerbNet class member: **carry** (carry-11.4)

- Automatic alignment based on existing mappings: FrameNet frames assigned to **4,306** verb synsets.
- Further procedures (Leseva et al. 2020): **13,104** alignments; more than **6,500** were manually validated.
- VerbNet class-to-FrameNet frame alignments have been taken as provided by previous initiatives.

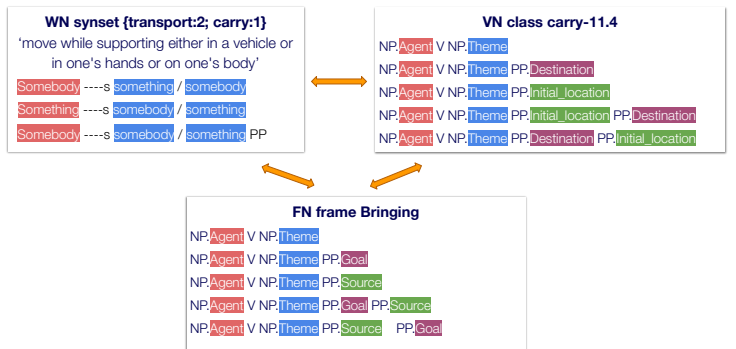
Step 2: FN frame elements to VN semantic roles

- Identity of naming coupled with semantic correspondence between the definitions
- Mapping based on established general (frame/class non-specific) correspondences in the naming conventions adopted in the two resources
- Inferring knowledge about the relations between more general and more concrete FEs

FN frame FEs: Bringing	Verbnet class SRs: carry-11.4
The Agent is a sentient being who physically controls the movement of the Theme via the carrier, accompanying the Theme .	Agent is an Actor in an event who initiates and carries out the event intentionally or consciously, and who exists independently of the event.
Theme is the objects being carried.	Theme is an Undergoer that is central to an event or state that does not have control over the way the event occurs, is not structurally changed.
Source indicates the beginning of the path along which the Theme travels.	Initial_location indicates the physical location where an even begins or a state becomes true.
Goal identifies the endpoint of the path.	Destination is a Goal that is a physical location.
Area is a general area in which the carrying action takes place when the motion is understood to be irregular or not to consist of a single, linear path.	N/A
Path is the trajectory along which carrying occurs.	N/A
The Carrier provides support for the Theme . Its movement results in moving the Theme .	N/A

Step 3: Aligning WN, FN and VN syntactic patterns

- Mapping based on the realisations of the corresponding pairs of frame elements and semantic roles
- Mapping based on the correspondences in syntactic expression (type of syntactic group, type of preposition, types of clause, complementisers)



WN synset {transport:2; carry:1}	FN frame Bringing	VN class carry-11.4
Somebody --s somebody/somebody	NP. Agent V NP. Theme	NP. Agent V NP. Theme
Something --s somebody/something	NP. Agent V NP. Theme PP. Goal	NP. Agent V NP. Theme PP. Destination
Somebody --s somebody/something PP	NP. Agent V NP. Theme PP. Source	NP. Agent V NP. Theme PP. Initial_location
NONE	NP. Agent V NP. Theme PP. Goal PP. Source	NP. Agent V NP. Theme PP. Destination PP. Initial_location
NONE	NP. Agent V NP. Theme PP. Source PP. Goal	NP. Agent V NP. Theme PP. Initial_location PP. Destination