Analysis of Preposition Classes

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Abstract

1   Introduction

These are the classes into which the preposition senses of The Preposition Project (TPP) have been sorted – preliminarily. Each class is described, along with its reasons for existence, possible subdivisions, and possible amalgamations with other categories. They are in alphabetical order.

2   Purpose of Analyzing Preposition Classes

The objective of this analysis is develop a representation of the meaning of each prepostion sense in TPP that can be incorporated into an analysis or representation of the meaning of a larger text in which a preposition is used. As a guiding principle, the representation will be a FrameNet frame, identified or developed from the existing inventory of frames. It is envisioned that these frame representations will be used in creating a semantic dependency graph for a sentence, wherein a prepositional phrase will be a node branching off its point of attachment (labeled by the type of relation, i.e., a frame name) and where this node will have its prepositional object filling a slot (or frame element) in the frame. In this representation, it is envisioned that a frame may have several frame elements, only one of which will be filled by the preposition object, and where the others will be filled from the preposition definition. For example, a location relation may have the preposition object as the core locatum, but the definition may express some further nuance of distance or direction.

While this analysis will adhere as much as possible to the principles by FrameNet has been constructed, one key difference has emerged as necessary. In general, when a lexical unit evokes a FrameNet frame, the frame elements are merely taken as empty slots to be filled by sentence elements. An examination of the preposition definitions suggests a given sense may actually fill some of these slots. For example, in the **Spatial** class, using the **Locative_relation** frame, the sense of *up against* defined as <u>close to or in contact with</u> fills **Distance** frame element with either <u>close</u> or <u>in contact</u>. In general, FrameNet does not envision this kind of slot-filling, although it does characterize **Temporal** prepositions as being specializations of the **Spatial** class, with the **Domain** slot as filled by the value <u>Time</u>.

3   Principles of Analyzing the Preposition Classes

Analysis of each class involves an examination of the digraph that has been generated for the class and FrameNet frames, frame elements, and lexical units. The following steps are included:

- Examination of digraph to identify the prepositions in the class
- Examination of FrameNet lexical units for any prepositions in the class that have been analyzed (FrameNet does not include many prepositions). Since FrameNet uses definitions from the *Concise Oxford Dictionary*, close similarity in the definition can be used as the basis for making this link.
- Use of FrameNet frames associated with any prepositions. These frames establish the core semantic representation for the class. The frame elements of the frame can then be used as characterizations of the preposition complement and the point of attachment.
- Examination of verb primitives in a class to identify FrameNet frames. Overall, there are 49 verb primitives, many of which occur in multiple classes. The FrameNet frames associated with these primitives can be examined in the same way as the prepositions in identifying frames and frame elements.
- Examination of frame elements for correspondence to class. Where frames associated with prepositions and verb primitives do not cover a large proportion of the senses in the class, it is possible that the senses are reified inside frames as core, peripheral, or extra-thematic frame elements. If a preposition in the class is one of the 56 for which FrameNet instances have been annotated, the Frame::Element data of TPP can be used to identify frame elements.
- Examination of the definitions in each of the nodes. The words in the definitions may also yield links to FrameNet frames, and thence to frame elements. More importantly, the wording in the definitions may indicate that the frames and frame elements identified by any of the methods described above require further interpretation in applying them. The core frame elements will (almost) always characterize the preposition complement and the point of attachment. If a frame has other core frame elements and particularly extra-thematic frame elements, these may capture distinctions present in the definition. E.g., the definitions of spatial prepositions frequently express **Distance** and **Direction** extra-thematic frame elements of the core **Locative_relation** frame.
- Further detailed analysis of the frames and frame elements will involve identifying where they sit within the FrameNet hierarchy. This analysis will include identifying how frame elements are mapped from a lower level frame (i.e., a more specific one) into a higher level frame (i.e., a more general one).

4   Analyses of Preposition Classes

Each class is described first by identifying the nature of the class, i.e., the lexicographic considerations that have been used for putting senses into the class. This is followed by the results of comparing the class digraph with FrameNet data. After this analysis, the discussion identifies links to other classes, particularly as identified by primitives in the overall digraph that are not members of the class being analyzed.

4.1 ✓Activity

This category embraces prepositional senses that require the name of some (usually human) activity for complementation. By implication, agents appear somewhere in the sentence in which these are found, occasionally as a point of attachment (especially when the PP follows a copula and is the entire predicate). There are many instances however, especially in complex sentences, where the agent is not so closely related to the activity that appears as the complement of the PP.

Prepositions in this class evoke three frames: **Participation** (*in*), **Being_up_to_it** (*up to*), and **Emotion_directed** (*into*). Verb primitives evoke two frames: **Intentionally_act** (*do* and *doing*) and **Undergoing** (*undergoing*). The **Participation** frame has a frame element **Event**. **Being_up_to_it** has a frame element **Activity**. **Emotion_directed** has a frame element **Event**. **Intentionally_act** has a frame element **Act**. **Undergoing** has the frame element **Event**. In general, then, as suggested in the lexicographic description, the core frame element is either **Event** or **Activity**.

4.2 ✓Agent

This category includes prepositional complements denoting an agent – that is, a doer of some action. All such sentences could, in theory, be rewritten in a way that would make said agent the subject of a sentence, thus eliminating the prepositional construction. I mean "rewrite" in a very broad sense here: not merely rearranging the words present, but expressing the same idea using different words.

Frames evoked: **Similarity** (*unlike*, **Entity_2** (core)), **Attributed_information** (*according to*, **Speaker** (core)).

Agent is a frame element in 125 frames. Each of these can occur as an instantiation of a preposition in this class (*by*, *from*, *of*, *with*). Based on the FrameNet instances, many of the senses of *by* have been instantiated as **Agent** frame elements, along with many others that denote a primary actor in a frame, such as **Creator**, **Perpetrator**, **Perceiver**, **Cognizer**, **Buyer**, **Speaker**, and **Author**.

4.3 ✓Backdrop

Prepositional senses in this category are very often couched in disjuncts and subjuncts, i.e., prepositional phrases serving as sentence adverbs or quasi-independent observations, describing circumstances or features that are present as a way of characterizing or coloring how the subject and predicate are interpreted (in the face of stiff opposition . . .). Such PPs can also serve as entire predicates, when they describe a situation generally prevailing (they were at a serious disadvantage), and some of them can also be postpositive (dinner by candlelight, a man all at sea). In all cases the purpose is to associate the presence of a particular condition or fact with some other element of the sentence.

None of the prepositions in this class has a frame in FrameNet. However, the more common prepositions are frequently instantiated in frame elements. The preposition *with* is instantiated as **Manner**, **Depictive**, **Reason**, and **Purpose** frame elements. The preposition *in* is also frequently instantiated as **Manner**, **Depictive**, **Result**, **Conditions**, **Circumstances**, and **Ground**. Similar frame elements also occur with the prepositions *within*, *by*, and *from*.

Verb primitives in this class evoke the frames **Arriving** (*approaching* and *reaching* filling the **Goal** frame element), **Ingest_substance** (*taking*, **Substance** frame element), **Explaining_the_facts** (*taking into account*, *taking account of*, **Fact** frame element), **Cogitation** (*taking into consideration*, **Topic** frame element) *being*

4.4 ✓[Barrier](#)

This is a small category. The complement represents a physical thing that stops action. There is some kinship with Target, below, and this category could possibly be absorbed by it; except that the barrier may not be an intentional stopping place or destination, whereas the target is.

The preposition senses for *on* (3, 4) are subsenses of the sense that evokes the **Locative_relation** frame, but specialized to frame elements such as **Impactee**, **Subregion**, **Supporting_body_part**.. The preposition *against* (10) directly evokes the **Locative_relation** frame and also has frame elements in other frames such as **Impactee**, **Resistant_surface**, and **Goal**. The other preposition senses are not in FrameNet, but evoke frame elements inlcuding **Resistant_surface** (*over*) and **Goal** and **Direction** (*into*).

This analysis suggests that this class is a specialized subset of the **[Spatial](#)** class.

4.5 ✓[Cause](#)

This category embraces the many prepositional senses that name the cause for something – sometimes for the POA, but also for other things named in the sentence. The smaller category "Purpose" has been absorbed into this one.

None of the prepositions in this class directly evokes any frames. Based on the FrameNet TPP instances, several frame elements are evoked: *for* (6) evokes **Reason**, **Goal**, **Purpose**; *for* (7) evokes **Reason** and **Role**; *with* (13) evokes **Cause**, **Reason**, and **Emotion**; and *of* (18) evokes **Cause**. **Cause** as a frame element occurs in 78 frames; **Purpose** in 266 frames; **Reason** in 142 frames; and **Goal** in 70 frames. In the TPP sample, many of these frame elements are instantiated in prepositional phrases.

4.6 ✓[Doubles](#)

This is a small category that could possibly be combined with Tandem, though not usefully I think because Tandem is already a bit large and unwieldy. Doubles is confined to only two prepositions (*between* and *among*) whose complements, in the senses included, are always dual or plural, since the prepositions essentially stipulate a relationship embracing two or more things. Typically the POA indicates the nature of the relationship.

The preposition *among* is in FrameNet, evoking the **Inclusion** class. The frame elements evoked by its senses (3, 4) include **Cognizer**, **Experiencer**, **Interlocutor**, **Partners**, and **Sides**. The preposition *between* is not in FrameNet, but its senses (3, 4, 5, 6, 7, 8, 9) evoke the same frames, suggesting that it would be analyzed in FrameNet in the same **Inclusion** frame. This frame has core frame elements **Total** and **Part**; the object of either of these prepositions seems as if it is capturing both of these frame elements, capturing the parts that make up a total. This analysis would suggest that this class is a specialization of the **[Membership](#)** class.

4.7 ✓**Exception**

This category of prepositional senses includes mostly subjuncts and disjuncts that indicate something constituting an exception or exclusion to what is predicated in the related clause.

None of the prepositions in this class evokes FrameNet frames. Nor are any frame elements evoked. A core definition in this class is *not including* and a primitive definition is *including*, where it is negated. The negation suggests that the core concepts in this class are essentially related to those for *including*, which are covered in the **Membership** class.

4.8 ✓**Means/Medium**

This category takes in all prepositional senses where the complement identifies the means by which, or the medium through which, something happens or is done. This category roughly corresponds to a grammatical instrumental case. More granularity could be achieved if the means are separated from the mediums, but it doesn't strike me that this would be terribly useful.

None of the prepositions in this class is directly contained in FrameNet, so they do not evoke any frames in themselves. However, they are well represented in frame elements covered by the FrameNet instances in TPP. The senses of *through* (1, 6, 14, 16) evoke the frame elements **Path**, **Means**, **Medium**; *without* (3): **Manner**, **Circumstances**; *on* (14): **Medium**, **Circumstances**; *by* (5, 7, 8, 9, 10, 22): **Cause**, **Means**, **Instrument** (5), **Mode_of_transportation** (8); *from* (9, 15): **Material**, **Evidence**; *in* (11, 13): **Manner**, **Medium**; *with* (5): **Instrument**, **Means**, **Medium**. In general, then, the frame elements tend to repeat the name of this class. The spectrum seems to range from the class **Tandem** (i.e., mere association) to the class **Cause**.

4.9 ✓**Membership**

This relatively small category is for senses that establish a relationship of membership between POA and complement, wherein either can be a member of the genus that the other represents; the salient thing is that the preposition (and very often, along with other words in proximity) state that the relationship is one of genus and species.

FrameNet has five preposition senses directly related to frames: *as* (1) evokes **Performers_and_roles**, *including* (1) and *among* (2) evoke **Inclusion**, and *of* (2, 3) evokes **Partitive**. The prepostion object in the **Inclusion** frame is the core frame element **Part**. Some of the derived definitions in this class specify something about the **Total** frame element, such as membership on a committee, jury, or other body (*on* (11)), or that the **Total** is a genus term or a whole. In the **Partitive** frame, the object of the preposition is the **Subset** frame element and the point of attachment is the **Group** frame element. In the **Performers_and_roles** frame, the preposition object fill the **Role** frame element, while the POA would fill the **Performer** frame element, e.g., the part in a play. Several of the senses in this class draw attention to a similarity to other entities, i.e., the inclusive aspect is drawing attention to an overlapping quality or attribute with another **Part** and **Total**.

The verb primitive *containing* as a definition of *inclusive of* also evokes the **Inclusion** frame, with the object as the **Part** frame element.

4.10 ✓**Party**

Relatively small, and perhaps provisional category for senses whose complement is a person (though not the main actor, and so not classifiable under Agent) and that don't clearly fall into another category (such as, e.g., spatial or temporal). In principal, all SRTypes that begin with Party partake of this category; if they are assigned elsewhere it is because their current home to me reflects a more important or useful classification.

    None of the prepositions in this class evokes any FrameNet frames. Only a few frame elements are evoked in the TPP instances: *for* (3) **Undergoer**, **Experiencer**, **Affected_party**; *round* (4) **Goal**; *before* (3) **Judge**; *on* (13) **Affected_party**. No clear pattern emerges as to the relationship of this class to others; perhaps it is related to the **Tandem** class.

4.11 ✓**Possession**

A relatively small category for complements representing something that is owned, held, or worn by the complement. All such sentences could, in theory, be written with the complement or POA as subject and some form of the verb have. By implication then, some of this category could be absorbed into Agent.

    The preposition *in* (2) evokes the FrameNet frame **Wearing**, where the object of the preposition fills the core **Clothing** frame element. None of the other preposition senses is in FrameNet. The TPP instances evoke several frame elements: *with* (3) **Descriptor**, **Part**, **Style** (several frame elements of the **Clothing** frame); *about* (6) **Cognizer**; *in* (2) **Depictive**, **Clothing**, **Behavior**; *of* (7) **Wearer**, **Undergoer**, **Possessor**, *of* (8) **Conveyed_emotion**, **Depictive**; *of* (13) **Agent**, **Perceiver**, **Experiencer**, **Cognizer**. No clear pattern emerges as to the relationship of this class to others.

    The verb primitives in this class evoke the **Wearing** frame (*wearing*, **Clothing** frame element) and **Possession** frame (*possessing*, **Possession** frame element)

4.12 ✓**Quantity**

This category holds complements that can be expressed as a number or some other quantity.

    None of the prepositions in this class evokes a FrameNet frame. There are relatively few instances in the TPP sentences, but some frame elements are evoked: *for* (11) **Money**, **Compensation**; *under* (7) **Asset**, **Age**; *at* (6) **Age**; *from* (2) **Attachment**, **Co-Variable**, **Manner**; *of* (5) **Difference**, **Money**, **Comparison_set**, **Object**; *of* (7) **Age**.

    There is no overt scale in the prepositions in this class; the preposition object seems to be stated without any such reference. However, it seems that there is an implicit scale to be inferred. Hence this class would seem to be a specific subset of the **Scalar** class.

4.13 ✓**Scalar**

This category holds complements that have reference to a scale.. Most often, they identify a point on a continuum, but I have also included those that establish the existence of a scale, or the top or bottom values on one.

No frames are evoked by the prepositions in this class. Many frame elements are evoked: *for* (12) **Degree**, **Landmark_occasion**, **Standard**; *beyond* (7) **Degree**; *between* (3) **Goal**, **Co_Variable**, **Item**, **Asset**; *above* (9) **Goal**, **Temperature_goal**, **Value_2**; *below* (3) **Value_2**, **Temperature_goal**, **Age**; *at* (5) **Rank**, **Periodicity**, **Money**, **Rate**, **Level**, **Asset**, **Speed**; *by* (12) **Difference**, **Interval**, **Attribute**, **Degree**, **Speed**; *by* (15) **Criterion**, **Quality**; *from* (6) **Value_1**, **Initial_size**, **Rate**, **Age**; *in* (12) **Descriptor**. Clearly, this class covers a wide range of potential scales.

4.14 ✓Spatial

This is a more traditional category for prepositional senses that establish a spatial relationship between the complement and some other sentence element; sometimes the POA, sometimes the subject or some other object.

FrameNet has the basic frame **Locative_relation** which applies to all the senses in this class. This frame has the frame elements **Ground** (Core), **Figure** (Core), **Distance** (Extra-thematic), **Direction** (Extra-thematic), **Time** (peripheral), and **Figures** (Core). As reified with prepositions, the preposition object will be the ground. It looks as if the definitions of the spatial prepositions frequently incorporate such things as distance or direction. But, it appears that these other frame elements will not fully cover all the nuances expressed in all the definitions.

4.15 ✓Substance

The complements identify some uniform substance or thing that constitutes the contents or constituents of the POA.

The prepositions in this class are not directly related to any FrameNet frames. The three senses in this class evoke frame elements that repeat the name of the class: *of* (4) **Contents**, **Occupant**, **Stuff**; *of* (19) **Material**, **Resource**, **Constituent_parts**, **Substance**, **Components**; *with* (7) **Theme**, **Means**, **Ingredients**, **Substance**, **Resource**.

4.16 ✓Tandem

This is a large, somewhat problematic, catch-all category, for senses that do not fall easily into some other category and that establish some sort of relationship between the complement and the POA or the complement and another sentence element. Here are placed many prepositional senses which have no raison d'être other than the fact that English uses a preposition, and of a particular preposition with the preceding word (usually the POA) to express the idea present. I call the category "tandem" because a relationship is established, via the PP, between two things, as noted above. It's possible that this category could absorb "Party," but that would only have the effect of making it bigger and more nebulous. Many different kinds of relationships are denoted by prepositions in this category, but in general I think they have less to do with the preposition in question, and more to do with the POA which accepts only that preposition. The earlier temporary category "Idiom" has been largely absorbed in this one.

This class evokes only a few frames, but a large number of frame elements. The frames that are evoked are probably not representative of the whole class, and probably only give a slight

indication of the range of concepts involved in this class. The frames and the frame elements of the preposition object include: *with* (1) **Accompaniment** (**Co_participant**); *in favor of* (1) and *against* (1) **Taking_sides** (**Issue** and **Side**), *like* (1) and *unlike* (2) **Similarity** (**Entity_2**), *as* (1) **Performers_and_roles** (**Role**), and *in* (10) **Fields** (**Salient_entity**). The frame elements are core in their respective frames. The common thread of the frame elements (borne out by the frame elements evoked in other frames, discussed below) is that the preposition object is something that is viewed in a secondary role.

The number of frame elements evoked in the TPP instances is very large and diverse, making it difficult to group them. Several groups do emerge, however, although these groups must be viewed tentatively. The groups suggest that the class may be divided into subclasses.

As indicated above, the preposition object as a secondary element in a frame occurs frequently. For *with* (1), the frame elements includes **Part_2**, **Food2**, **Cotheme**, **Interlocutor2**, **Partner2**, **Depictive**, **Co_resident**, and **Co_traveler**. Sense 8 of *with* evokes **Side_2**, **Arguer2**, **Impactee**, **Issue**, and **Depictive**. Several other preposition senses also evoke similar secondary elements, along with some other frame elements. These include: *to* (6) **Value2**, **Focal_participant**, **Result**, **Result_size**, **Degree**, **Role**, **Content**, **Message**; *to* (10) **Partner_2**, **Employer**, **Institution**; *to* (11) **Sign_2**, **Landmark_occasion**, **Goal**, **Figure**, **Skill**; *to* (14) **Part_2**, **Goal**; *than* (1) **Entity_2**, **Degree**; *into* (7) **Part_2**, **Result**, **Whole**; *from* (16) **Phenomenon_2**, **Ground**; *with* (11) **Item_2**, **Focal_participant**, **Goal**, **Addressee**, **Controllee**, **Cognizer**, **Stimulus**, **Skill**, **Message**; *for* (9) **Sign_2**, **Entity**, **Message**; and *into* (8) **Phenomenon_2**, **Result**, **Parts**, **Pieces**, **Criteria**, **Category**.

From the senses in the previous paragraph, another form of a secondary element appears, one where the frame element names end in the suffix *-ee*, defined as "a person affected by, described as, or concerned with" the root form to which this suffix is attached. These include *of* (14) **Employee**, **Addressee**, **Cotheme**, **Patient**, **Theme**, **Ground**, **Reason**, **Content**, **Topic**; *of* (15) **Evaluee**, **Controllee**, **Theme**, **Content**; *to* (8) **Evaluee**, **Controllee**, **Experiencer**, **Affected_party**, **Stimulus**; *for* (1) **Evaluee**, **Focal_participant**, **Content**, **Message**; *for* (4) **Honoree**, **Attendee**, **Addressee**, **Patient**, **Phenomenon**, **Topic**, **Stimulus**; and *against* (1) **Evaluee**, **Side_2**, **Message**, **Topic**, **Stimulus**, **Content**.

In listing the frame elements associated with the senses itemized in the previous two paragraphs, several do not appear to follow strictly the set which was being exemplified. These include **Result**, **Goal**, **Content**, **Message**, **Manner**, **Degree**, **Topic**, **Patient**, **Stimulus**, **Employer**, and **Institution**. These frame elements are also invoked in other TPP instances for other senses in this class, including *under* (9), *on* (10), *for* (2), *with* (14), *as* (1), *under* (8), *with* (15), *for* (5), *at* (8), *by* (6), *in* (10), *like* (6), *of* (16), *of* (17), *above* (7), *like* (1), *against* (2), *like* (2), *with* (16), *like* (4), *under* (10), and *to* (15).

The senses in this class are related to those in several other classes: **Backdrop**, **Barrier**, **Cause**, **Party**, **Scalar**, **Target**, and **Topic**. The relationship is based on the fact that the senses in these other classes evoke frames and frame elements identified for the senses in this **Tandem** class.

The first set of senses in this class seem to characterize a relation of simple apposition. With the second set of senses, the relation is stronger and seems to express an activity where there is an agent performing the activity and the preposition object is the entity affected by the activity (i.e., a theme). The wide range of frame elements evoked by the other senses in this class does not admit of simple characterization. It may be that the relations evoked in using these senses are essentially

peripheral in nature, i.e., they correspond to aspects of some eventuality. In this respect, these senses are appositive in nature, reflecting co-occurrence of the preposition object with some other sentence element, and sometimes characterizable as certain types of co-occurrence (e.g., **Reason**, **Goal**, **Manner**, or **Degree**).

4.17 ✓ Target

This smallish category is for senses that identify the object or target of some action. The POAs are usually verbs, though they can also be adjectives when the adjective describes some attitude or feeling that is directed or felt toward a particular person or thing. As you can see, the prepositions included are a rather small set, and include nearly all the senses of *toward*, which is the targeting preposition par excellence.

None of the preposition senses in this class is contained in FrameNet, so that no frames are directly evoked. Several senses are represented in the TPP instances: *on* (12) **Goal**, **Addressee**, **Figure**, **Target**; *into* (3) **Goal**, **Impactee**, **Result**; *after* (7) **Addressee**, **Direction**, **Topic**; *after* (8) **Path**, **Focal_participant**; *at* (9) **Goal**, **Addressee**, **Path**, **Content**, **Topic**, **Content**; *at* (10) **Victim**, **Goal**; *to* (9) **Experiencer**, **Affected_party**, **Recipient**; *towards* (2, 4, 5, 6) **Goal**, **Affected_party**, **Focal_participant**. These frame elements are very similar to those in the **Barrier** and **Party** classes, as well the **Cause** class, where these frame elements may fill **Affected** or **Effect** slots.

4.18 ✓ Temporal

This is a more traditional category for prepositional senses that establish a temporal relationship between the complement and some other sentence element; sometimes the POA, sometimes the subject or some other object. It could possibly be broken down further into senses that denote a point in time, as opposed to a period or duration.

FrameNet contains five senses in this class, evoking three frames: **Time_vector** (*before* (1), *after* (1), *from* (3)), **Relative_time** (*after* (3)), and **Taking_time** (*in* (4)). The key frame seems to be **Time_vector**, which includes the following frame elements: **Landmark_event** (core), **Distance** (core), **Direction** (core), and **Event** (core). The definition of this frame states that it builds upon the **Direction** frame, with **Direction** mapped to **Path** and **Landmark_event** mapped to **Base_position** and with the **Domain** frame element specified as **Time**. Thus, the FrameNet analysis suggests that the senses in this class may be viewed as specializations of the **Spatial** class. FrameNet also suggests that the **Relative_time** frame is generally being remapped to the **Time_vector** frame, the only exception being those senses in which the **Landmark_event** occurs earlier or later (or perhaps repeatedly, as in the sense of *after* (3)). The **Taking_time** frame uses the **Duration** frame, i.e., specifically making reference to a time duration.

The senses in this class seem to follow these frames reliably, with the preposition objects expressing the **Landmark_event** and the specific prepositions and senses providing fillers for the **Distance** and **Direction** frame elements of **Time_vector** or the **Time_interval** frame element of the **Duration** frame. The senses in this class evokes a large number of instances in the TPP sentences (including *since*, *between*, *before*, *within*, *beyond*, *after*, *during*, *across*, *at*, *by*, *for*, *from*, *in*, *into*, *on*, and *over*). The frame elements evoked in these instances are predominantly **Time** and **Duration**, with other instances of **Time_of_Event**, **Landmark_occasion**, **Event**, **Time_of_Eventuality**,

Time_of_Creation, **Interval**, and **Period_of_Iterations**. Invariably, these frame elements occur in frames where the governing frame is specifying a type of **Event**, i.e., the frame element of **Time_vector** that is almost never present in any of the definitions of this class.

4.19 ✓Topic

This rather large category contains many synonymous and related prepositions that establish a topic about which other sentence elements make some statement.

Only a few of the prepositions in this class are included in FrameNet, *on* (8, 9), *regarding* (1), *about* (1), and *concerning* (1), all evoking the frame **Topic**. Most of the prepositions in this class are phrasal prepositions and hence not usually present in FrameNet. The **Topic** frame has three core frame elements: **Topic**, **Text**, and **Communicator**. The object of these prepositions clearly fills the **Topic** frame element. Except in a few definitions, the other two core elements are not specified in any way.

Relatively few senses in this class evoke frame elements in the TPP instances, again for the reason that most of the prepositions are phrasal. The frame elements are as follows: *about* (1) **Topic**, **Content**, **Stimulus**, **Reason**; *about* (2) **Topic**, **Domain**; *on* (9) **Topic**, **Field**, **Subject**, **Issue**; *over* (17) **Topic**, **Content**, **Issue**, **Reason**; *in* (7) **Topic**; *around* (2) **Topic**, **Issue**. As can be seen, most of these frame elements reprise the name of the class and the principal frame element of the **Topic** frame. The additional frame elements (**Stimulus**, **Reason**) suggest that the frame elements evoked in this class may fall in a spectrum from mere apposition (i.e., the topic of something, **Tandem**) to slightly causative (i.e., the reason behind something, **Cause**).

4.20 ✓Void

This small category is for senses which note a complement designated as missing or not present by other sentence elements.

The key frame for this class is **Possession**. Actually, the class represents the negation of possession. FrameNet describes this frame as "An Owner has (or lacks) a Possession." As a result, this class should be assessed in conjunction with the analysis of the **Possession** class. The Void class does not include the full range of expression as the Possession class, i.e., it is much simpler to analyze. There are two core frame elements, **Possession** (i.e., the thing possessed, or in this case, not possessed) and **Owner** (the entity that owns a possession). The Possession frame also contains a peripheral **Manner** frame element (the way that an Owner possesses the Possession) and an extra-thematic **Depictive** frame element (the state of the Owner or Possession).

FrameNet does not contain the prepositions included in this class as lexical units of the Possession class. Most of its lexical units for this class pertain to the positive possession, including only *lack* (both noun and verb), *want* (both noun and verb), and *wanting* (adjective). As shown in the primitives for the Void class, it is the definition "lacking" of *minus* that provides the key link.

The other prepositions in this class are *absent*, *bare of*, and *in default of*. The primitives of this class are senses in other classes. Particularly, the two senses of *without* are members of the **Backdrop** class. The other primitives are to senses of *of*, which express syntactic relations.

4.21 Tributary

This category is only for the small group of prepositions in the inventory that are merely orthographic variants of some other preposition and can substitute for any sense of that preposition.

5 Summary and Conclusions

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