

Putting Context in SNACS: A 5-Way Classification of Adpositional Pragmatic Markers

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Abstract

The SNACS framework provides a network of semantic labels called *supersenses* for annotating adpositional semantics in corpora. In this work, we consider English prepositions (and prepositional phrases) that are chiefly *pragmatic*, contributing extra-propositional contextual information such as speaker attitudes and discourse structure. We introduce a preliminary taxonomy of pragmatic meanings to supplement the semantic SNACS supersenses, with guidelines for the annotation of coherence connectives, commentary markers, and topic and focus markers. We also examine annotation disagreements, delve into the trickiest boundary cases, and offer a discussion of future improvements.

Keywords: adpositions, pragmatic markers, supersenses, context, discourse, annotation

1. Introduction

Sentence-level representations of meaning and compositionality in corpora tend to emphasize semantics, relegating pragmatics to the sidelines or sweeping it under the rug. Even pragmatics signaled explicitly with a lexical marker (*please, even, hopefully, however*) may be dumped into a miscellaneous category if the standard categories available to semantic elements are not a good fit: viz. UD’s miscellaneous syntactic relation called *discourse* (de Marneffe et al., 2021) and UCCA’s miscellaneous semantic category called *Ground* (Abend and Rappoport, 2013). Discourse-level representations, on the other hand, may explicate pragmatics in depth for certain kinds of markers: in particular, much work has targeted discourse connectives (e.g. Samy and González-Ledesma (2008)); some work has examined discourse particles (e.g. Stede and Birte (2000)); and few if any studies have attempted to examine the full range of pragmatic markers (§2).

Here we investigate whether a grammatically defined class of expressions (namely prepositions and idiomatic prepositional phrases in English, like *as for* and *in other words*) can be categorized at the token level with respect to their pragmatic status. We build on the SNACS framework and annotated data (Schneider et al., 2018). SNACS was designed to disambiguate adpositional *semantics* in corpora (§2.1). Expressions that cannot be assigned a semantic label were excluded from the regular SNACS supersenses (and annotated in corpora with a special “discourse” label, ``d`). Here we propose a small taxonomy to cover adpositional pragmatic markers in general (§3), with special designations for coherence connectives, commentary markers, and topic and focus markers (§4). A pilot study reveals that drawing boundaries is in some cases quite difficult (§5). We examine inter-annotator disagreements, diagnose some of the major problematic cases, and discuss possible improvements to the annotation guidelines (§6).

2. Background

Here we introduce the *semantic* framework for analyzing adpositions (§2.1), with an eye toward broadening it to include *pragmatic* meanings treated separately in the literature (§2.2 and §2.3).

2.1. SNACS Framework

The SNACS (Schneider et al., 2018, Semantic Network of Adposition and Case Supersenses) hierarchy is a multilingual annotation framework developed for annotating adpositional (i.e. prepositions and postpositions) and possessive markers. The hierarchy is an inventory of **supersenses**, categories designed to capture coarse-grained semantics while abstracting away from lexically particular meanings (e.g. the spatial difference between **inside** and **outside** is collapsed under the locative supersense, **LOCUS**).¹ Currently, the SNACS framework defines 50 supersenses that capture event participant or thematic roles (**PARTICIPANT** subhierarchy e.g. **AGENT**, **RECIPIENT**), circumstantial roles that define adjunct relations (**CIRCUMSTANTIAL** subhierarchy e.g. **TIME**, **PURPOSE**), and roles describing relations between entities (**CONFIGURATION** subhierarchy e.g. **POSSESSOR**, **WHOLE**).

Moreover, the SNACS framework makes use of an annotation mechanism called the **construal analysis** to handle meaning generalization across differing adpositional expressions (Hwang et al., 2017). In this approach, a token may receive two distinct supersenses. For example, both adpositions in “a slice **of** a cake” and “a page **in** a book” mediate a **WHOLE** relationship with respect to the governing nominal—but **in** contributes a distinctively locative framing. The generalization is captured by the **scene role**—semantic role associated with the scene (typically indicated by the predicate)—and al-

¹The complete SNACS hierarchy is available at <http://www.xposition.org/supersenses/>.

lowing the **function** to specify the meaning more closely associated with the adposition itself.² As detailed in §5.1, SNACS has been used to annotate multiple corpora in a handful of different languages. Extensive guidelines for English and expanded guidelines for other languages are publicly available.

2.2. Pragmatic Markers

Previous theoretical and sociolinguistic work has studied pragmatic and discourse markers in English and proposed several taxonomies. Fraser (1990) argued that pragmatic markers are linguistic devices to convey a speaker's potential communicative intentions, which do not belong to the content meaning of the proposition, as later categorized by Maschler and Schiffrin (2015). As Fraser (1996) further pointed out, pragmatic markers come in many different linguistic forms (e.g. syntactic, lexical, phonological), and their presence plays a crucial role in the interpretation of the utterances involved. Specifically, Fraser (1996) classified these pragmatic markers into four types: *basic pragmatic markers* (1a), *commentary pragmatic markers* (1b), *parallel pragmatic markers* (1c), and *discourse markers* (1d).³

- (1) a. **I promise** that I will be there on time.
- b. **Amazingly**, Derrick passed the exam.
- c. Good evening **ladies and gentlemen**, welcome to the home of the Black Bears.
- d. Jane is here. **However**, she isn't going to stay.

Fraser (2009, p. 892) proposed a further taxonomy concerning “meta-comments” on the structure of the discourse under the fourth type above, namely *discourse markers*, called *discourse management markers*. This taxonomy consists of the following subtypes: *discourse structure markers* (e.g. *In summary*), used to highlight the contribution of the following discourse segment within the overall discourse structure; *topic orientation markers* (e.g. *by the way*), linguistic devices to foreshadow topic change; and *attention markers* (e.g. *in any case*), signaling a topic change is in the making. In particular, we are interested in the *topic orientation markers* and their uses from Fraser (2009) as they pertain to our discussion and observations on the pragmatic adpositional usages in English. Notable functions of *topic orientation markers* characterized by Fraser (2009) are as follows:

- (2) a. return to a prior topic: **back** to my point
- b. continue with the present topic: speaking **of**
- c. digress from the present topic: **by** the way

²In other words, “a slice **of** a cake” would be annotated as plain **WHOLE**, while “a page **in** a book” would receive **WHOLE~LOCUS** (to be read as “**WHOLE** construed as **LOCUS**”) in recognition of the locative meaning contributed by the preposition **in**.

³The examples used here were selected from the original paper. (Each type was further categorized into several subtypes.)

- d. introduce a new topic: **on** a different note

Although the focus of the current work is on English pragmatic markers and in particular pragmatic uses of adpositions in English, it is worth pointing out that similar phenomena and linguistic devices are prevalent in other languages, such as discourse particles and their functions as well, for example, in German, as delineated in Stede and Birte (2000), and in a parallel corpus study for English, Spanish, and Arabic (Samy and González-Ledesma, 2008).

2.3. Pragmatic Markers vs. Discourse Markers

It is important to clarify that the categorization of pragmatic markers described in §2.2 is not mutually exclusive with contemporary computational approaches to discourse markers as in the Penn Discourse Treebank (Prasad et al., 2014, PDTB), nor are they subclasses of each other. While Fraser (1996) did not characterize pragmatic or discourse markers based on their syntactic categories, PDTB followed a well-defined set of syntactic classes to select explicit discourse markers,⁴ one of which includes prepositional phrases such as **as a result** and **on the other hand** etc. (Prasad et al., 2014).

Adverbial discourse connectives, as recognized by PDTB, may be semantic and/or pragmatic. The following examples indicate a clear semantic relationship between events:

- (3) a. **First**, preheat the oven to 350 degrees. **Then**, combine the ingredients in a saucepan. (temporal)
- b. We can go inside **if** it is raining. (conditional)
- c. The forecast was wrong. **As a result**, we got caught in the rain. (causal)

Adpositional expressions whose primary meaning is semantic would be covered by existing SNACS labels, even if the expression also functions as a discourse connective (see further discussion on this in §4.4).

Below we focus on expressions whose primary meaning is pragmatic. As we will demonstrate, a prepositional expression can even serve multiple pragmatic roles in English. In other words, a prototypical discourse marker considered by one discourse framework to signal a *coherence* relation between two propositions is not necessarily tied to that function invariably; instead, the interpretation of such markers depends on their specific use in context, and their contributions to a given discourse could be multi-dimensional, with some being primary and others being secondary.

⁴PDTB uses the term *discourse connectives* to refer to the lexical items that connect discourse segments based on syntactic criteria. For our purposes, the terms *discourse connective* and *discourse marker* are used interchangeably to refer to any lexical item that adds extra-propositional meaning to the understanding of discourse.

3. Pragmatic Adpositional Usages

In contrast to the semantic usages where prepositions mediate a relationship between the two constituents (e.g. “The cat is **on** the mat”—the mat is the location of the cat), pragmatic uses of adpositions do not directly comment on the content of the sentence. Rather, they add contextual information that situates that content in discourse. For example, a prepositional expression may mediate the relationship between two propositions in a discourse as in (4), where the prepositional phrase idiom “**for** instance” does not add propositional content to the sentence. Rather, it links to a prior utterance and specifies that the current proposition (“Florida has no state income tax”) is an example of the aforementioned situation.

- (4) *Your state of domicile impacts financial matters.*
For instance, Florida has no state income tax.

Prepositional expressions can be deployed for a range of pragmatic meanings: signaling the speaker’s opinion or perspective (5a); heralding a topical change in the discourse ((5b) switches the subtopic to snacks); or positioning the speaker’s utterance with respect to the larger context ((5c) exemplifies digression from the main topic).

- (5) a. **Without** a doubt, she’s the best in her field.
b. **As for** snacks, I prefer pita chips.
c. This is a drugstore, **by** the way, not a pharmacy.

SNACS has excluded such usages from supersense annotation, directing annotators to tag them as non-semantic discourse markers (label `d) (Schneider et al., 2020).

A proposal for extending SNACS to pragmatic usages by introducing a new **CONTEXT** subhierarchy was made by the Korean SNACS project (Hwang et al., 2020, K-SNACS). K-SNACS has particularly focused on pragmatic adpositions that contribute meaning at the level of **information structure**, a level that includes the notions of focus, topic, and givenness (Lambrecht, 1994; Krifka, 2008; Lüdeling et al., 2016). For these pragmatic adpositions, K-SNACS has proposed the **CONTEXT** branch for adpositions whose meanings rely on contextual information either available in discourse or implicit in the shared knowledge between interlocutors. It places two labels within the **CONTEXT** tree: **FOCUS** and **TOPICAL**. **FOCUS** is assigned to usages where the adposition indicates the information structure focus of a sentence, contributing meanings of contrastiveness, likelihood, or value judgements (among others). **TOPICAL** markers apply to a phrase indicating a new subtopic, similar to (5b).⁵ We will explore the details and usage of these labels in English and propose two additional labels for the **CONTEXT** subhierarchy in §4.

⁵The pragmatic label **TOPICAL** stands in contrast to SNACS **TOPIC**, which is the semantic role highlighted in locutions like *speak **about** something*.

4. Extending SNACS via Context

The current work extends upon the SNACS schema to include pragmatic relationships signaled by English prepositions. We build upon prior work by K-SNACS to introduce **CONTEXT** as a top-level *pragmatic* category on par with the existing *semantic* top-level categories: **PARTICIPANT**, **CIRCUMSTANTIAL**, and **CONFIGURATION**. For the purpose of SNACS, we note that an adpositional usage may qualify as **pragmatic** for one of two reasons:

- It provides *extra-propositional* reference to the interlocutors and/or their attitudes toward the propositional content or situation in which the conversation takes place.
- It mediates the relationship between sentences/utterances in the discourse, e.g. as a connective linking entire propositions, or as a marker that presupposes something was mentioned previously.

We propose four subcategories under **CONTEXT**: **TOPICAL**, **FOCUS**, **COMMENTARY**, and **COHERENCE**. These are expected to cover the lion’s share of the pragmatic uses of adpositions; any miscellaneous pragmatic usages of adpositions that do not fit under these subtypes are to be directly labeled with **CONTEXT**.

It is also important to note that, for pragmatic uses of adpositions, we do not make use of the construal analysis (§2.1). For semantic relations, construals allow scene role and function labels to differ. For pragmatic uses requiring the **CONTEXT** hierarchy, we assume for now that only one label applies. We will revisit this assumption in §6.

4.1. Topical

TOPICAL annotates the adpositions that mark the information topic in a sentence. The information topic emphasizes the topic in a discourse that is presented in *contrast* to the available discourse referent, thereby signaling a change of topic in discourse. For example, the phrase “when it comes to...” puts forward a new topic in contrast to the old one. Adpositional examples of **TOPICAL** include:

- (6) a. *Bill prefers beaches for vacations.*
As for me, I prefer the mountains.
b. *Jodi is a stickler about following directions.*
With regards to cooking, she never follows recipes.

4.2. Focus

The **FOCUS** label is used to mark the element of a sentence that contributes to information such as contrastiveness or likelihood, often evoking an implicitly understood pragmatic list (a set of alternatives or scale) pertinent to the object of the adposition. That is, **FOCUS** marks the tokens that emphasize an element of a sentence evoking an implicitly understood pragmatic scale pertinent to the object of the preposition. In English, the function of **FOCUS** is best exemplified by adverbials

like (*not*) *only*, (*not*) *even*, and *also*.⁶ In (7b), for example, by saying “*not even* Bill passed the test”, we are implying that Bill, the likely was the candidate that was most likely to pass, failed along with many others less worthy candidates.

- (7) a. **Only** Bill did a good job.
b. **Not even** Bill passed the test.

Most prototypical English **FOCUS** usages are exemplified by adpositional phrases like “**as** well”. In (8a), the phrase “**as** well” suggests that Bill is one of the many that would receive invitation. Modifying the utterance with “**in** itself”, as in (8b), places a limitation to the stated proposition—that the idea may be problematic if other extraneous factors are considered.

- (8) a. Don’t forget to invite Bill **as** well.
b. There’s nothing wrong with the idea, **in** itself.

4.3. Commentary

The label **COMMENTARY** marks material with the speaker’s orientation towards the main content, such as hedging, attributing it to themselves or someone else, or revealing their attitude (positive or negative) toward it or its veracity. Consider the following examples.

- (9) a. **Based on** the latest reports, our cumulative spending is expected to continue rising.
b. **In my opinion**, this is our only option.
c. **Without** a doubt, she’s the best in her field.
d. **For sure**, we can change it.

In (9a), the prepositional phrase provides attribution for the statement or conclusion in the main proposition. Example (9b) does something similar—it attributes the proposition to the speaker’s opinion, while also hedging the speaker’s commitment to the proffered assertion. In (9c) and (9d), the prepositional phrases comment on the level of veracity of the propositions.

4.4. Coherence

COHERENCE signals how two propositions (i.e. clauses or sentences) are related in the discourse at a pragmatic level. Grammatically, markers of **COHERENCE** in English are usually attached to the second proposition. The broad label **COHERENCE** targets a coarser level of granularity than discourse annotation frameworks such as the Penn Discourse Treebank (Prasad et al., 2014, PDTB), Rhetorical Structure Theory (Mann and Thompson, 1988, RST), and Segmented Discourse Representation Theory (Asher and Lascarides, 2003, SDRT). Note, however, that discourse relations between sentences that are primarily semantic receive labels from the semantic parts of the hierarchy, rather than **COHERENCE**, such as

⁶Tor be clear, these adverbials are not annotated in SNACS as they are not adpositional. We provide these examples here with straightforward and unambiguous markers only to illustrate how focus can be marked lexically in English.

PURPOSE or **EXPLANATION** shown below.⁷

- (10) I need \$10 (**in order**) **to: PURPOSE** see the movie. (Xposition_031)
(11) I will appoint him **as: EXPLANATION** he is most qualified for the job. (Xposition_008)

Although we do not formalize finer-grained coherence relations, we can illustrate some of the major subtypes that have been identified in English corpora following the aforementioned discourse formalisms such as the RST Discourse Treebank (Carlson et al., 2003; Carlson and Marcu, 2001, RST-DT) and PDTB 3.0 (Prasad et al., 2019):

- **JUXTAPOSITION**: The two propositions that the connective links contribute to the discourse jointly; that is, one proposition moves forward to the other proposition in a linear way: e.g. **JOINT** or **SEQUENCE** in RST-DT and **CONJUNCTION** in PDTB 3.0. Example: “**In** addition, we put in new floors.”
- **ELABORATION**: one of the propositions is more specific than the other: e.g. one proposition provides further details for the other proposition such as elaborating or reinforcing a point, or narrowing or broadening the scope of discussion, as defined in RST-DT. Example: “**In** particular, we ...”
- **EXCEPTION**: One proposition describes a situation, and the other proposition describes or provides a counterargument or an exception, as defined in PDTB 3.0. Example: “**Outside** of my opinions about them, we ...”
- **INSTANTIATION**: One proposition describes a general situation or a group of things / issues etc., and the other proposition specifies one or more instances that belong to the aforementioned generic situation, as defined in PDTB 3.0 and is equivalent to **ELABORATION-SET-MEMBER** and **EXAMPLE** in RST-DT. Example: “**For** instance, we ...”
- **CONTRAST**: One or more differences are raised in the two propositions. Example: “**In** contrast to our expectations, we ...”
- **CONCESSION**: One proposition is acknowledged but the other proposition is still claimed. Example: “**Despite** recent fluctuations in stock price, we ...”

Again, these are merely illustrative examples of **COHERENCE**. At present we do not seek to distinguish them in our framework, but once an adpositional expression is tagged as **COHERENCE**, another framework can be invoked to clarify the nature of the coherence relation.

4.5. Context

The **CONTEXT** label is used directly for miscellaneous pragmatic meanings not covered by the aforementioned subtypes. This includes metadiscourse expressions that comment on the speaker’s plan for the discourse such as

⁷The selected examples are from the SNACS project website, Xposition (Gessler et al., 2022): <http://www.xposition.org>.

by the way in (5c). Other prototypical uses in English include but are not limited to: on that note, speaking of, and moving on, which correspond to Fraser (2009)'s categorization of the topic orientation markers; and markers signaling something about the relationship between interlocutors such as politeness or formality (e.g. with all due respect).

5. Pilot Context Annotation

5.1. SNACS Corpora

A number of corpora in several languages have been annotated with SNACS such as English, Mandarin Chinese (Peng et al., 2020), Korean (Hwang et al., 2020), German (Prange and Schneider, 2021), and Hindi (Arora et al., 2022). Since the focus of the present pilot annotation effort is to annotate adpositional discourse elements in English, we extract such instances previously marked as discourse markers (`d) from the three English SNACS Corpora: PASTRIE (Kranzlein et al., 2020), STREUSLE (Schneider and Smith, 2015; Schneider et al., 2018), and The Little Prince (Schneider et al., 2020, LPP), amounting to 165 annotation instances. Specifically, PASTRIE contains data from Reddit produced by presumed speakers of four native languages (English, French, German, and Spanish).⁸ STREUSLE contains web reviews from the Reviews section of the English Web Treebank (Bies et al., 2012). LPP contains an English translation of the fiction story *Le Petit Prince*. Albeit limited, the resulting annotated data could also provide insights into the use and distribution of adpositional pragmatic markers in English across different types of data.

5.2. Annotation Procedures

The STREUSLE data was used as development data for developing the guidelines: it formed the basis of preliminary discussions and attempts at categorization, culminating in a final round of annotation and joint adjudication by the four researchers developing the guidelines. In order to test the validity of the guidelines, two new annotators were recruited to independently annotate the STREUSLE data in comparison to the adjudicated version produced by the researchers developing the guidelines.

In the annotation workflow, each extracted `d element is presented in a sentence, with the `d element highlighted and the preceding and following sentences provided for additional context.⁹ Annotations in (12)–(16) show prepositions (previously annotated with `d) updated to the appropriate **CONTEXT** labels.

- (12) Tourists like the other reviewer might not appreciate their efficiency or quality, but I certainly

⁸See Section 3.1 of Rabinovich et al. (2018) for details on the identification of the native languages.

⁹If the sentence that contains the `d element is the beginning or the end of the document, a special token ([START] or [END]) is used to indicate this, as shown in (12).

do. This isn'ta TGIF or Cafe, its a lunch sandwich place and a good one **at:FOCUS** that. [END] (STREUSLE_reviews-317846-0008)

- (13) Any ER would be the same. **As:TOPICAL** far as being treated like a drug seeker, that has not been my experience. As a nurse I know about drug seekers. (STREUSLE_reviews-169083-0005)
- (14) We have used them for plumbing & A/C and they are affordable and get the work done right. Great place 5 stars **for:COMMENTARY** sure. Thanks From Bill (STREUSLE_reviews-359433-0003)
- (15) And so you will love to watch all the stars in the heavens ... they will all be your friends . And , **besides:COHERENCE** , I am going to make you a present ... " He laughed again . (lpp_1943.1436)
- (16) This store is a real gem and has much to offer the serious crafter or the occasional crafter. **By:CONTEXT** the way, Salmagundi (the store name) means something like smorgasbord; pot-pourri; motley; variety; mixed bag; miscellaneous assortment; mixture, a variety of many kinds of things. Great name for a great store! (STREUSLE_reviews-377347-0011)

In addition to the five labels described in §4 (i.e. **FOCUS**, **TOPICAL**, **COMMENTARY**, **COHERENCE**, **CONTEXT**), the annotators were also instructed to use a **NOT_CONTEXT** label if they think that no pragmatic use of the adposition is involved; in other words, the `d element in question only involves a semantic reading, and the existing SNACS framework should capture its meaning, as shown in (17) and (18) below as well as (10) and (11) in §4.4.

- (17) They have messed up my order and.... The food was just not good! I had sonic in many other palces but **for:EXPLANATION** some reason this sonic is always just covered in grease and not good... :(I hope they get there act together... (STREUSLE_reviews-109263-0003)
- (18) Then the desserts came, and they were hands down the best dessert we ever had. I will sum it up **with:MEANS**, it was worth every penny! [END] (STREUSLE_reviews-388799-0006)

5.3. Reliability of Annotation

In order to evaluate the reliability of the taxonomy and the complexity of the task, we conducted an inter-annotator agreement (IAA) study on each of the three English SNACS datasets, described in §5.1, which comprise 165 annotation instances. Each of the `d elements from each English SNACS dataset were annotated by two native speakers of American English using the guidelines described in §4. Overall, there were three annotators: STREUSLE was annotated by the same two annotators (Annotator 1 and Annotator 2), and PASTRIE and LPP were annotated by the same two

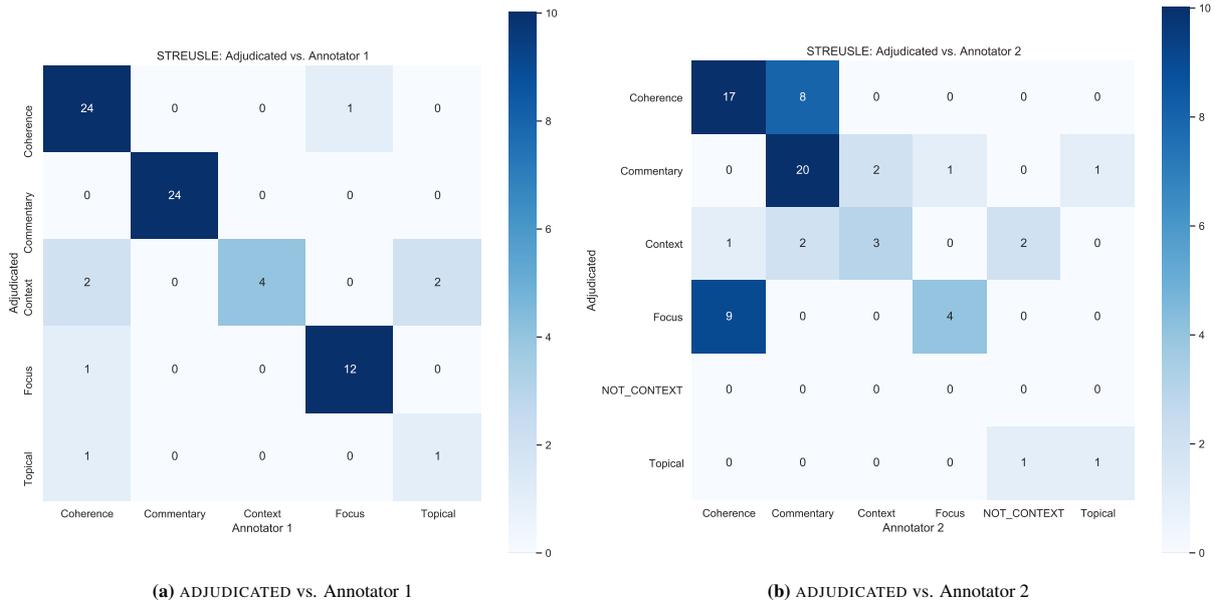


Figure 1: Confusion Matrices for STREUSLE Annotations.

annotators (Annotator 2 and Annotator 3), meaning that Annotator 2 annotated the STREUSLE, PASTRIE, and LPP data.

	# `d items	Raw Agreement	Cohen’s Kappa
PASTRIE	74	56.8%	0.41
STREUSLE	72	59.7%	0.42
LPP	19	89.5%	0.83

Table 1: IAA of SNACS Context Annotation in English.

Table 1 shows raw agreement and Cohen’s kappa scores between the two annotators for each dataset. Results show higher agreement levels for LPP than PASTRIE and STREUSLE. We attribute this to the fact that LPP is a formally written novella, while PASTRIE and STREUSLE are web or social media data written in a conversational style, in some cases with fragments or missing context from previous turns, which makes it much more difficult for the annotators to accurately gauge what was intended at the time of the writing. Feedback from the annotators indicated that for some cases the preceding and following sentences were insufficient context for interpreting the pragmatic markers.

We also note that the agreement for PASTRIE is slightly lower than that of STREUSLE. This is likely due to the fact that PASTRIE data contains Reddit discussions from a variety of topics, and some of the subreddits have their own jargon not readily understandable by annotators, as pointed out in Kranzlein et al. (2020). Another reason behind the complexity and difficulty of the PASTRIE annotations is that although the data is in English, 78.4% of the instances were produced by presumed native speakers of French, German, and Spanish. Though for the most part the text is fluent English, there may be instances where non-native speakers do not fully

conform to native speakers’ expectations in their use of pragmatic expressions.

For STREUSLE, we also noticed that Annotator 1 achieved higher agreement with the adjudicated version (i.e. the annotations produced by the researchers developing the guidelines) than Annotator 2, as shown in Figures 1a and 1b respectively. One possible interpretation is that Annotator 1 simply understood the annotation task better than Annotator 2, and thus the scores may indicate an issue with the guidelines instead of the categories themselves. Figure 2 also demonstrates that Annotator 2 underused the **FOCUS** label, which is unsurprising due to dearth of transparent and unambiguous cues in English. Additionally, the confusion matrices shown in Figure 1 also help identify some sources of confusion from the labels as well as the adpositional markers associated with such labels such as **FOCUS** vs. **COHERENCE** (e.g. **as well**) and **COHERENCE** vs. **COMMENTARY** (e.g. **in fact**). We will discuss these cases in detail in §6 below.

6. Analysis

In this section, we take a closer look at some of the challenges posed by the annotation of adpositional pragmatic markers.

6.1. **FOCUS** vs. **COHERENCE**

The status of adpositional **FOCUS** is fairly clear-cut in languages like Korean, which features a small set of high-frequency focus markers (Hwang et al., 2020). In English, however, focus is less often cued adpositionally—and to the extent that it is, there is an apparent overlap between **FOCUS** and **COHERENCE** usages, which was a source of difficulty for annotators. Consider the following examples with pragmatic adverbs:

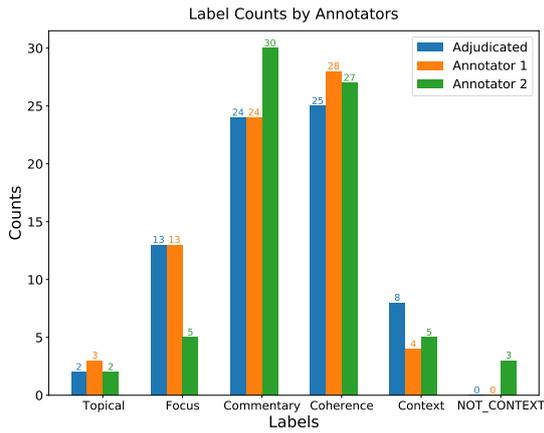


Figure 2: Distribution of Labels for STREUSLE Annotations.

(19) *It rained yesterday.*

- a. **Additionally**, it hailed. [COHERENCE]
- b. It **even** hailed. [FOCUS]

As a prototypical discourse connective, “additionally” in (19a) links the proposition “it hailed” to the previous utterance “It rained yesterday”, advancing the content in a coherent manner. “Even” in (19b) brings focus to the marked proposition, expressing that the new information exceeds the expectation set by the information that is available in the context: it not only rained yesterday, but in a surprising turn of events, it hailed. The prepositional phrase “as well” seemingly does both, complicating the annotation.

(20) *It rained yesterday. It hailed as well.*

The phrase “as well” serves the role of a discourse connective linking the proposition to the previous utterance, but it also plays a focusing role like “even”, in such a way that the *hailing* event is put forward as a surprising event that beyond contextual expectations. In other words, the interpretation of this piece of information is not contained in the semantics of the current proposition, nor does it inherit from the previous proposition. Rather, the focus reading here is extra-propositional.

As a means of addressing this issue, we considered the use of the construal analysis to resolve this semantic overlap was considered. That is, rather than having the annotators decide which label to go with, we would allow annotators to use both labels to annotate usages like “as well”. However, this created yet another concern: which label, i.e. COHERENCE or FOCUS, should be assigned as scene role versus function? In SNACS annotation, the scene role is the meaning assigned by the *scene* of a sentence (e.g. head predicate, head nominal, or the construction). However, pragmatic labels are what they are by virtue of *not* being directly related to any of the aforementioned elements. To call either label as scene or function would essentially violate the construal analysis, by definition.

For this reason, in this pilot annotation study we

only allowed one label per prepositional token, assigned at the annotator’s discretion based on their interpretation of what meaning was most salient. For example, since the phrase “as well” in (21) functions as a connective between propositions (i.e. the beers were good *and* there were good choice of beers), it receives the label of COHERENCE. The phrase “as well” in (22), marked with the FOCUS label, implies the existence of other unmentioned incriminating aspects of the organization in question (presumably, a vet).

(21) Good place to be on a Sunday Night. The beers were good, nice choice of beers **as:COHERENCE** well, and as usual the mussels were great, the place upstairs is a nice addition to the bar downstairs. Filled up on too much beer and hence cannot comment on the food. (STREUSLE_reviews-366946-0003)

(22) They refused. Terrible communication **as:FOCUS** well. At one point they told me the dog had been fixed, the next day it hadn’t. (STREUSLE_reviews-006970-0008)

We observe, however, that this practice does create annotation disagreements. (23) exemplifies a split between annotators. Annotator 1, who chose FOCUS, is cuing a perhaps more nuanced shade of meaning than Annotator 2, who chose COHERENCE. The extra-propositional meaning of “as well” would indicate the location to be an additional characteristic that further elevates their already high opinion of establishment. This suggests that the current guidelines will produce disagreements based on a variety of reasons: nuanced differences based on reading, familiarity with the topic of the text, or simple disagreement, to name a few.

(23) They are honest about ‘immediate’ concerns versus ‘recommended’ repairs and have very fair prices. Such a convenient location **as well** with coffee shop and bradley food and beverage right around corner. [END] (STREUSLE_reviews-303922-0005)

Thus, as alluded to in brief in §2.3, we also consider the possibility of introducing a modified version of construal analysis specifically for the CONTEXT tree whereby, when necessary, we recognize a secondary function (to the primary function) of pragmatic and discourse markers. That is, it is likely that multiple interpretations coexist, but they correspond to different aspects of the markers in question. Depending on the amount of available context provided and the common knowledge shared by the participants in a given discourse, some aspects and functions become more salient than the others.

6.2. COHERENCE vs. COMMENTARY

As can be seen from Figure 1b, another source of confusion comes from COMMENTARY and COHERENCE,

corresponding to the discourse marker “**in fact**”. Again, this is a prototypical discourse marker in English, but it mediates various types of relationships between discourse units, as attested in PDTB 3.0 (Prasad et al., 2019).^{10,11} In the following example, “**in fact**” signals an elaboration or reinforcement of the previous proposition by describing a related event (i.e. vomiting) that happened.

- (24) The sauce was dry and the enchiladas did not taste good.at all. **In:COHERENCE fact** my friend vomited after our meal. With higher than average prices to boot! (STREUSLE_reviews-150192-0004)

However, our annotation results indicate that “**in fact**” may project a pragmatic meaning beyond discourse linking. Consider the following examples:

- (25) Practicing your joke is crucial . You do n’t need to have it completely memorized — **in fact** , you " should n’t " memorize it — but you need to be really comfortable with it , so comfortable that you can continue on with telling it even if you get nervous or sidetracked , which is very possible once you ’re in front of an audience . (GUM_who_w_joke)
- (26) The question isn’t about Is smoking Marijuana a progress ?. **In fact**, we don’t care because we want to guarantee freedom not societal progress. In conclusion, we fight for the same results (on societal issues only). (PASTRIE_french-4c78c7ab-4fd2-4206-342f-22bae20cea4a-09)

Both of these examples of “**in fact**” manage the flow from one proposition to the next, consistent with the **COHERENCE** label. However, in addition to the coherence relationship they mediate, they inject a sense of the writer’s attitude towards the topic. This is the most clearly evident in (25),¹² the writer uses “**in fact**” as a means of signaling their own commitment to the upcoming proposition (*not* memorizing a joke) with respect to a perhaps a more standardized advice (minimal memorization). In the same way, the prepositional phrase advances an attitude contrast in (26) between the previous proposition and upcoming proposition. In other words, “**in fact**” blurs the boundary between the **COMMENTARY** and **COHERENCE** categories.

¹⁰Among those relations for “**in fact**” recognized by PDTB 3.0 are: EXPANSION.CONJUNCTION, EXPANSION.LEVEL-OF-DETAIL, COMPARISON.CONTRAST, and COMPARISON.CONCESSION.

¹¹The PDTB 2.0 manual, however, registered doubts about the status of “**in fact**” as a discourse connective (The PDTB Research Group et al., 2007, p. 8, fn. 9). “**Of course**” is a similar expression that was not annotated in PDTB (Bonnie Webber, p.c.).

¹²This example is from the GUM corpus (Zeldes, 2017).

Thus, it is clear that the assignment of **COHERENCE** to “**in fact**” is grounded in the criterion that **COHERENCE** marks the linking between the two propositions, according to the guidelines. The **COMMENTARY** reading depends on the interpretation of the single proposition that “**in fact**” is embedded in—i.e. whether it is also signaling something about the interlocutors’ attitude towards the content. We believe that the current guidelines would benefit from a richer array of examples for multi-functional markers like “**in fact**”. Additionally, the results from this pilot annotation work also suggest that for annotating adpositional pragmatic markers it may be necessary to either adopt a multi-label strategy (i.e. primary and secondary labels for different interpretations) or introduce a combined categorization (e.g. **COHERENCE~COMMENTARY** where the label on the left corresponds to the stronger reading) in order to better capture the pragmatic reading in context instead of imposing the constraint that only one single label is applicable.

7. Conclusion

In this paper, we presented a small taxonomy that aims to capture categories of pragmatic meaning associated with adpositional expressions in English. Our pilot annotation study sheds light on deficiencies in the guidelines that may explain annotator confusion and disagreements. These issues call for a deeper investigation of multi-functional uses of some of these pragmatic expressions. We intend to take these issues up in future work.

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