1. Subject Asymmetries

In this paper, we examine the distributional differences of a relatively narrow class of “proposition embedding” predicates, those that fit into the sentential complement schema in (1), excluding predicates that only take expletive subjects. In particular, we are concerned with answering why a predicate like claim is acceptable with an animate subject like critic but not with an inanimate like notepad, as exemplified in (2).

(1) subject verb/adjective [CP that …]

(2) a. The critic claims that the food is good here.
   b. #The critic’s notepad claims that the food is good here.

On the face of it, (2) may simply diagnose a classic “selectional restriction”: claim selects for sentient entities, and notepads are not sentient. And, indeed, if all speech and attitude predicates relate their propositional complement to some cognitive state of the subject, this seems quite intuitive. However, there are reasons for thinking that the situation is more subtle, since other intuitively inanimate entities, like review, can be subjects of claim, but not subjects of believe.

(3) a. The critic’s review claims that the food is good here.
   b. #The critic’s review believes that the food is good here.

Whence the contrast between (2b) and (3a)? Anand & Hacquard (2009) (hereafter, AH) suggest that the contrast diagnoses a difference in attitude predicate argument structure, indexed by semantic category: doxastic predicates like those in (3) require a sentient subject. In contrast “proffering” predicates, i.e., predicates that express a communicative act, like those in (2), which include the say verbs of Grimshaw (2015), can take a limited set of inanimate subjects that are “Repositories of Information” (R-of-Is), such as book or review.1 In brief, we take the difference between reviews and notepads, are agentive, that is, they are entities capable of making a move in discourse, as opposed to merely being associated with information content.2 How robust are these generalizations once we move beyond claim and believe, and what can they tell us about the meanings of predicates?

In this paper, we report on a broader and deeper examination of such subjects. We examine four types of subjects – animates, agentive R-of-Is (book), non-agentive R-of-Is (notepad), and general inanimates (glove) – and four semantic categories of predicates – communicatives (claim), doxastics (think), emotives (love), and inferentials (demonstrate).

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1 Expressions like according to show a similar distinction: according to my notes, #according to my notepad…
2 Grimshaw (2015) proposes instead that these subjects are locations rather than agents. We leave it to future research to determine the differences in predictions that these two proposals make.
Drawing on several hundred verbs and adjectives across our four categories, we ask which of our subject types can combine with which of our semantic categories of predicates. We find that SAY verbs, and communicatives more generally, split our subject classes in half. Sentient beings (e.g., John) and R-of-Is associated with agents (like books) are both felicitous subjects of these predicates, but non-agentic R-of-Is (transcripts) and inanimates (bloody gloves) are not. The interpretation that we pursue here is that communicative predicates do not partition their subjects by notional sentience. In contrast, we find that doxastics and emotive predicates are indeed felicitous only with sentient subjects. That is, the contrast above between think and claim with respect to the felicity of book subjects seems to be a more robust generalization about cognitive and speech-act predicates in general. Still, we show that communicative predicates do not uniformly accept book subjects (e.g., mumble, apologize). Building on the analysis of SAY verbs in Grimshaw (2015), we argue that such predicates involve meaning components that render them incompatible with book conversational agents.

One further correlation emerges in the work we report here: there is a negative correlation between allowing book subjects and factivity. That is, no factive predicate selects for agentive R-of-I subjects. More pithily, all factive predicates require sentient subjects. This then means, of course, that no communicative predicate is factive, a fact discussed at length in Anand & Hacquard (2014).

In what follows, we first motivate the need for this investigation in Section 2, discussing the typology of verbs laid out in AH, and describing our methodology. Section 3 discusses our results for communicatives, focusing on some potentially difficult cases and Section 4 discusses the distribution of factivity.

2. Why subjects?

While the “alternations” of various predicates have been a central focus of research in argument structure, those combining with clausal complements have been less intensively studied. And where work does exist on such predicates, it has focused primarily on the syntactic or semantic types of complements, not the restrictions on subjects. Of course, research in this area aims to develop theories of predicate meaning and possible subject meanings that, when coupled, would predict subject-predicate felicity. In some domains we do seem to have met something akin to this goal. Consider the theory of thematic roles, and in particular the hypothesis that some predicates can combine only with Experiencers (animate entities that necessarily experience a cognitive state). As Experiencers must be animate, a predicate which allows only Experiencer subjects (external arguments) will combine only with animate DPs and will never combine with CPs in subject position. This predicts the paradigm in (4) for hate:

(4)  a. #That stone hates the weather.
    b. The tourist hates the weather.
    c. #That it is raining hates…

Many predicates that fit the schema in (1) seem at first blush like hate, admitting only animate subjects. Minimally, many of them allow animate subjects quite naturally:

(5)  a. John {believes, thinks, knows} that the earth is flat.
b. John \{claims, argues\} that the earth is flat.
c. John \{demonstrated, implied, suggested\} that the earth is flat.

However, once we turn to inanimate subjects, interesting restrictions emerge, cutting apart both the predicates in (5a-c) and the kinds of subjects they can combine with. Here, we review some of the distinctions that AH briefly make. First, it is argued that while “doxastic” predicates like those in (5a) require a sentient subject, “proffering” predicates, i.e., predicates that express a communicative act, like those in (5b), can take inanimate subjects so long as they are “Repositories of Information” (R-of-Is), such as book or review. AH argue that what allows proffering verbs like claim or argue to combine with such subjects is that these verbs only require agents capable of making discourse contributions. While books are not sentient, they can still be discourse participants in generic conversations. Being non-sentient, they, however, are incapable of thoughts, and hence cannot combine with verbs like think or know. This is illustrated in the examples below, adapted from AH.

(6)  
   a. #The book \{believes, thinks, knows\} that the earth is flat.
   b. The book \{claims, argues\} that the earth is flat.
   c. The book \{demonstrates, implies, suggests\} that the earth is flat.

   Second, inanimate subjects that are not repositories of information, such as bloody gloves or time of death, cannot be discourse participants. They thus can neither appear with doxastics nor profferings. Interestingly, predicates of “inference” such as demonstrate or suggest allow such subjects:

(7)  
   a. #The time of death \{believes, thinks, knows\} that the butler is the murderer.
   b. #The time of death \{claims, argues\} that the butler is the murderer.
   b. The time of death \{demonstrates, implies, suggests\} that the butler is the murderer.

The cases in (5-7) suggest a complex interplay between predicate category, subject type, and felicity. Doxastics are only felicitous with sentient subjects, while communicative predicates like claim or argue admit sentient subjects and book-type subjects, and inferentials allow both of these types and more general inanimates. AH split inanimates in two: the repository of information type (like book) and the inanimate (like glove).

However, what counts as a repository of information is not entirely clear – Does it simply mean that the object is associated with content in some vague way? Or is there a more substantive notion? As discussed extensively in the literature on polysemy (e.g., Pustejovsky (1995), Cruse (2000), and Asher (2010)), one crucial property of terms like book is the ability to predicate either of the physical object (e.g., having a red cover) or the propositional content encoded in the physical object (e.g., being an adaptation of a film). One question we address in this study is whether this chimerical quality was crucial for being a “repository” of information. To investigate this further, consider two intuitive kinds of repositories: words like book, which can be seen as adaptations or longwinded or conceited (which pertain to the agent involved in the creation of the R-of-I), and words like transcript or audio recording, which cannot. The first we call Agentive repositories of information and the transcript-like ones we call Non-agentive repositories of information. All told, this yields four types of subjects to consider:
(8) **Types of subjects**
- **Sentient beings**, which can be experiencers (*John*)
- **Agentive repositories of information**: R-of-Is which can be communicative subjects (*book, article, review*)
- **Non-agentive repositories of information**: R-of-Is which cannot be communicative subjects (*data, transcript*)
- **Inanimates**: Inanimate objects that lack propositional content (*bloody gloves, time of death*)

In addition, we chose predicates that cover the spectrum in (5-7). That yields the four categories of predicate in (9):

(9) **Types of predicates**
- **Communicatives** (which include Grimshaw’s *SAY* predicates, AH’s “profferings”): predicates that express communicative acts (e.g., *say, argue*)
- **Doxastics**: predicates that express beliefs (e.g., *think, know*)
- **Emotives**: predicates that express emotions (e.g., *hate, love*)
- **Inferentials**: predicates that express demonstrations (e.g., *show, demonstrate*)

Our goal in this work is to be as comprehensive as we can reasonably be in examining the space of predicates. To do so, we draw on two sources. For verbs, we examined a list of *that*-clause embedding verbs that one author (JG) has compiled over several years, and excluded all verbs that did not allow the frame in (1) with a non expletive subject. This yielded 475 verb senses (439 distinct morphemes). Although we attempted to supplement this list with existing lexical resources (FrameNet and VerbNet) and corpus extractions, the manually-collected list turned out to be far more accurate and complete than those resources. For adjectives, there was very little in existing resources, so we chose to extract them from text. First, we extracted all instances in Annotated Gigaword (Napoles et al. 2012) of adjectives that are found with a *that* clause complement in the machine-generated parses. We then pruned that noisy list manually to those that fit the frame in (1) with a non expletive subject. This yielded 154 unique adjectives.

Finally, as for the protocol for the investigation itself, we found in starting the examination that the judgments were sufficiently subtle (involving keeping track of word sense and syntactic structure) that we decided to pursue an annotation study, leaving an experimental acceptability follow up for another occasion. The procedure for this was the following: for each predicate, two of the authors were presented with the various subject possibilities as schematized in (10) below and had to specify whether the subject-predicate combination was valid, invalid, or unknown. We allowed ourselves to see all of the possible subjects at once. After performing this task independently, we met to discuss and adjudicate our results. Our pre-adjudication reliability was reasonably high (pairwise Cohen’s kappa = .76), suggesting that this task was sufficiently well-founded for experts to perform it reliably.

(10) book? transcript? glove?

_____ VERB/ADJ that the Earth was flat

Our hypothesized interactions of predicate and subject are provided in Table 1:
Table 1: Predicted felicity of subject-predicate combinations.

Table 2 provides a summary count of the felicitous subject-predicate combinations for the forms we considered. For the most part, the expectations in Table 1 were confirmed: where we expected infelicity, there are very few predicates that seem to combine with the relevant subject, and where we expect felicity, the majority of predicates can take the relevant subject type.

Two kinds of exceptions to our predictions (bolded in Table 2) arise: doxastic and emotive predicates that seem to combine successfully with Agentive R-of-I subjects (about 29% and 8% respectively) and communicative predicates that do not combine with them (about 37%). We consider each of these in the following section.

Table 2: Counts of felicitous subject-predicate combinations.

All of our predicates are listed and grouped by semantic class in the Appendix, along with information about whether they allow book subjects and whether they are factive.

3. Subjects of doxastic and emotive predicates

There are a few emotive and doxastic predicates that combine with Agentive R-of-I subjects, several of which have communicative senses. Only a handful of emotive predicates allow book subjects (13 out of 159). They are listed in (11) below:

(11) Emotives felicitous with Agentive R-of-I subjects: deplore, exult, adamant, despair, fear, hope, hopeful, optimistic, obsess, pessimistic, sanguine, suspicious, worry

When an emotive predicate combines with a book subject, the resulting sentence reports a preference expressed by the book. That is, despite being classed as an emotive predicate, all of the ones in (11) can be used to report on speech acts, and hence should be acceptable with
Agentive R-of-I subjects. The sentence in (12), for instance, reports that the book expresses the hope/fear that our sources of fossil fuels will be deplete by 2030:

(12) The book {hopes/fears} that our sources of fossil fuels will be deplete by 2030.

One important question we leave aside here is why among the emotives only those in (11) seem to be acceptable as reporting expressed preferences (e.g., why fear and not afraid?). However, we note in passing that, interestingly, most of these predicates encode both emotive and doxastic content (they correspond to Anand & Hacquard’s (2013) “emotive doxastics”). The verb hope, for instance, not only expresses a preference for \( p \), but further requires that \( p \) be a doxastic possibility for its subject. However, as the appendix shows, many other “hybrid” attitudes do not allow agentive R-of-I subjects.

The proportion of doxastic predicates that allow book subjects is larger (36 out 125). Many of these predicates also have a communicative sense, which we take to be responsible for allowing these R-of-Is subjects. The remaining verbs fall into three subclasses: predicates of “forecast”; predicates of “assumption”; and predicates of “reasoning”:

(13) Doxastics felicitous with Agentive R-of-I subjects

a. Communication sense: calculate, conclude, deem, determine, forecast, generalize, hold, judge, predict, rationalize
b. Forecast: anticipate, envisage, envision, forecast, foresee, predict, prognosticate, project
c. Assume: appreciate, discern, make out, recognize, accept, assume, estimate, figure, presuppose, posit, postulate, suppose, surmise, trust
d. Reason: diagnose, establish, reason, reckon, verify

We believe that the felicity of these predicates with agentive R-of-I subjects is a symptom of something larger: these are not, in truth, predicates involving a sentient “thinker.” For instance, the fact that agentive R-of-Is can appear as subjects of predicates of forecast follows from the fact that discourse agents can make predictions about the future, independent of sentience. Similarly, when book subjects combine with predicates of reasoning, the resulting sentence describes a chain of argumentation that is made explicit in the book. Again, discourse agents are capable of delivering an argument, without necessitating sentience. Finally, the ability of book subjects to combine with the class of predicates of assumption show that agentive R-of-Is can not only make discourse moves (assertions), but they do so against a set of background assumptions, which can explicitly be described using these predicates of assumption. Again, assumptions do not require sentience.

4. Subjects of communicative predicates

We find quite a few infelicitous communicatives with Agentive R-of-I subjects. The partial list in (14) illustrates. For a complete list, see the Appendix.

(14) Communicatives infelicitous with Agentive R-of-I subjects: cackle, enthuse, exclaim, explode, fib, frown, fume, gasp, gesticulate, mumble, whisper...
We believe that these cases are explicable with a more articulated theory of how communicative verbs are analyzed. We will now demonstrate, building on Grimshaw’s (2015) analysis of SAY verbs, how this occurs. To begin, we review Grimshaw’s theory.

Note that while a vast majority of our communicative predicate are SAY verbs, we have also included predicates that express a communicative act, but are not SAY verbs (36 out of 322, the majority of which are adjectives). As far as our subject generalizations, these additional predicates behave like the SAY verbs. The Appendix lists all of the communicative predicates, and whether they allow book subjects or not.

4.1 The SAY hypothesis

The fundamental idea of the proposal in Grimshaw (2015) is that all verba dicendi which admit clausal complements are the result of enriching the basic schema for linguistic production in (15) with additional material, such as the force of the speech act or the mode of speech. What unifies a vast variety of verbs, from ask and assert and mutter and bitch and even think (to oneself) is the core predicate SAY, and the associated property of having an Agent that produces Linguistic Material potentially directed toward some Goal (i.e., Addressee); this is, hence, the core component of the verbs of linguistic communication that Grimshaw refers to as “SAY-verbs”. Furthermore, this basic core (without any additional enriching filigree) is lexicalized in English by the verb say, at least under one sense.

(15) SAY  \{Agent/i
Linguistic Material/j
Goal/k\}

Crucially, SAY verbs do not exhaust the range of verbs describing coordinated verbal interactions. However, unlike verbs such as converse, discuss, speak, utter, the SAY verbs all have a Linguistic Material role, which can be filled by complement clauses, quotations, or certain DPs.

Grimshaw proposes that the SAY schema can combine with existing intransitive verbs in the lexicon, in which case the enriching element imposes its own constraints on the subject. Three concrete ways in which the SAY schema can be elaborated are argued for: an enriching verb may add “force” (to turn SAY into ask), “means” (to turn it into mutter or write) or affective “attitude” (to turn it into bitch). (16) provides some examples of this relationship.

(16) How SAY verbs are constructed

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3 The following criteria were used to determine whether a verb was a SAY verb: it had to allow quotes as mediated complements (ia); and quotative inversion with parentheticals (ib).

(i) a. I am, he announced, applying for law school.
        b. They would be home by 3pm, calculated John.

4 The representation in (15) and the following from Grimshaw (2015) provides an argument structural schema of semantic roles coupled with indices for reference.
Concretely, the proposal is that when the verbs and SAY schema combine, the independent restrictions from the verb compose with the SAY schema, thereby imposing additional constraints. For *bitch*, for instance, the Agents of bitching and saying are identified with each other, but otherwise the Goal/Target of *bitch* is simply added to the representation.

(17)  

(a) *bitch*  

\{Agent/\alpha
\}

\{Goal or Target/\gamma
\}

(b) SAY-bitch  

\{Linguistic Material/j
\}

\{Goal or Target/k, \gamma
\}

4.2 Subjects of SAY verbs

Because SAY verbs are a composite of a schema and another predicate, their subjects must meet the independent criteria imposed by two component. We can check whether the requirements of SAY are met by checking if the most general verb of saying, *say*, is compatible with the relevant subject. If they are, the only potential source of a felicity clash rests in the predicate: SAY-by-means (*write*) and SAY-with-attitude (*complain*) will allow a particular SAY-acceptable subject if and only if that subject is compatible with the meaning of the enriching predicate. This furnishes a diagnostic for predicates that can take CP complements and non-sentient subjects –look at the intransitive version of the verb. This diagnostic correctly predicts that SAY-whisper will not take Agentive R-of-I subjects but SAY-bitch will:

(18)  

(a) #The book whispered.

(b) #The book wrote.

(c) The book bitched.

(d) The book griped.

The distinction in (18) is ultimately a difference between predicates characterizing the means of linguistic production on the one hand (*whisper, write*) and affective attitude on the other (*bitch, gripe*), a difference that projects into one of SAY-means versus SAY-attitude. Grimshaw (2015) notes that SAY-by-means verbs are grammatical with *a few words*, and the examples which follow show that the same is true for verbs like *whisper*. In contrast, verbs of affective attitude or force disallow such complements:

(19)  

(a) John \{whispered, wrote\} a few words.

(b) *John \{bitched, griped, griefed, rejoiced\} a few words.

(c) *John \{asked, reported\} a few words.
This suggests that verbs of utterance are verbs of “linguistic unit” emission, where a few words provides the quantity of linguistic units (but not the content of the linguistic material in the say schema). Verbs like bitch and gripe cannot combine with linguistic units because they are not verbs of sound/linguistic unit emission. Correspondingly, this entails that say-by-means verbs are combinations of the say schema with verbs of linguistic unit emission, and that agentive R-of-I subjects will not be compatible with any say-by-means verb. This prediction appears to be correct: the vast majority of communicative predicates that are incompatible with book subjects are say-by-means.

Recall that none of the communicative predicates are compatible with non-agentive R-of-I subjects (like transcript, corpus, archive, or data). We claim that this is because although these elements do denote repositories of information, they are incompatible with the say schema: they are not possible agents that communicate linguistic material. Given what we said above, this would suggest that such subjects should be infelicitous with say, a prediction that does not at first appear to be borne out:

(20) The {transcript, corpus, archive, data} says that Bill is the murderer.

However, our intuition is that in grammatical instances of (20), the subject is functioning not as an agent in any respect, but rather as the grounding for a conclusion that some community comes to. That is, these are instances where say is not a manifestation of the say schema, but rather being used as an inferential, like show, demonstrate, tell, and imply. As the argument structure of inferentials is itself a complex topic that we cannot take up here, we simply provide two diagnostics that this is a distinct sense of say. First, we note that under this reading, say, like the inferentials, allows a host of subjects that say verbs do not—inanimates, facts, events:

(21) a. {The bloody glove, (The fact) that he is sweating, Him sweating} says that Bill is the murder.
   b. #{The bloody glove, (The fact) that he is sweating, Him sweating} claims that Bill is the murder.

Second, Grimshaw (2015) notes that all say verbs allow their linguistic material to be instantiated by direct quotation; non-say verbs do not admit clausal quotation. Turning to say, we see that its compatibility with clausal quotation co-varies with the subject. Both sentient and agentive R-of-I subjects permit it, in contrast to the other subjects allowed by inferentials:

(22) a. {John, the book} says, “this is a great restaurant.”
   b. *{The transcript, The bloody glove, (The fact) that he is sweating, Him sweating} says, “this is a great restaurant.”

What (21-22) suggest, then, is that is that the use of say in (20) is not an instantiation of the say schema.

Let us now turn to the case of say-plus-force verbs, such as assert, ask, and report. Following Grimshaw (2015), these verbs enrich the say schema with a specification of the role of the linguistic material in discourse, where the notion of role specifies how the speech act in

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5 A few additional communicatives can’t take book subjects. They are: add in, candid, put in, tell, throw in, publish, record, verbalize.
question integrates into the larger conversational structure (e.g., assert, ask, remind). Grimshaw points out that, like other SAY verbs, these all admit direct quotations. As SAY verbs, these all will be restricted to at most the SAY subjects: sentient elements and agentive R-of-I elements. Although, in principle, one could imagine additional restrictions that would militate in favor of sentient agents exclusively, our examination of SAY-plus-force verbs revealed none that prohibit agentive R-of-I subjects. Thus, sentient subjects and agentive R-of-I subjects are divided only by SAY-by-means verbs, which come with an inference of physical production.

4.3 An Interim Summary

What we have seen in this section is that subjects of embedding verbs which canonically report speech acts are not limited to the obvious cases, namely human speakers. However, we have argued that the subjects that they occur with follow some general principles which relate the various components of the verbs to their subjects. As an illustration of the generality of these principles, we note that the very factors we exploited in distinguishing among verbs which take that-clause complements also partition similar verbs that do not allow clausal complements. For instance, while discuss cannot take that-clauses, it shows the same subject properties as SAY-plus-force verbs and affective attitude SAY verbs: it allows sentient and agentive R-of-I subjects, and excludes the other two subject categories. And speak can only take sentient subjects, since it, like whisper, is a verb of linguistic unit emission (just not one that is compatible with SAY). This suggests that the constraints we have identified for that-clause embedders will generalize more broadly.

5. Factivity and subject variation

5.1 Factivity and communicatives

As we have seen, Agentive R-of-I subjects differentiate communicative predicates from doxastics and emotives. This leads us to ask what other properties cut the pie the same way. One possible place to go hunting is factivity, since the classic factive attitude predicates are cognitive factives (know, figure out, realize) and emotive factives (love, hate, be surprised) (Kiparsky & Kiparsky 1970, Kartunnen and Peters 1979). And yet, there seem to be some communicative predicates that are also understood as factive (acknowledge, admit).

In order to ascertain the robustness of the doxastic/emotive-factivity correlation, we investigated which of the predicates described in Section 2 were factive, veridical or neither. While different authors make different assumptions about veridicality and factivity, here we understand these terms as follows: both factives (e.g., know) and veridicals (be true that) have a veracity entailment. As an illustration, both factive know in (23a) and veridical be true in (23b) entail (23c):

(23) a. John knows that it is raining.
   b. It is true that it is raining.
   c. It is raining.
Factives differ from veridicals in that this veracity entailment gets foregrounded with veridicals, but backgrounded (“presupposed”) with factive predicates. Evidence for this backgrounding comes from the fact that the veracity inference typically projects out of negation, questions and antecedents of conditionals. Unlike in (25), a speaker uttering any of the sentences in (24) seem to presuppose that it is raining.

(24)  
   a. John doesn’t know that it is raining.  
   b. Does John know that it is raining?  
   b. If John knows that it’s raining, he’ll take an umbrella.  

(25)  
   a. It’s not true that it is raining.  
   b. Is it true that it is raining?  
   b. If it’s true that it’s raining, John will take an umbrella.  

We thus subjected each of the predicates from section 2 to the family of sentences test. What we found upon close investigation of all of these predicates is that none of the putatively factive communicative predicates are actually factive. We thus have the following generalization (see Anand & Hacquard 2014):

(26)  
**Factivity generalization:** No book subject-taking predicate is factive. We only find factivity amongst the doxastics (*know, discover, learn…*), and emotives (*hate, love…*).  

In what follows, we discuss several potential counterexamples to this generalization and show how the predicates are not factive.

5.2. Some potential counterexamples

To begin with, certain speech reports have been argued to be factive (Schlenker 2010, Egre & Spector, *to appear*):

(27)  
Did Mary tell her parents that she’s moving to Australia?  

A speaker uttering (27) seems to be presupposing that Mary is moving to Australia. Note, however, that while verbs like *tell* or *say* can have factive uses as in (27), where the speaker seems to take for granted the truth of the complement clause, these verbs do not have a veracity entailment, as the lack of contradiction in (28) shows:

(28)  
Mary told her parents that she’s moving to Australia, but she’s not.  

Hence, these verbs are not truly factive: they lack a veracity entailment that can be backgrounded. Given our understanding of factivity as backgrounding of an entailment, (28) would come out contradictory. We argue that the apparent factivity in (27) has to do with how speakers use attitude and speech reports in context, and the flexibility in what they can foreground and background with an attitude report (see also Simons 2007, Simons *et al* 2010).
With the assertion of a speech report, the speaker can either foreground the speech report, or its content. Consider the contexts in (29) and (30). In (29), the “main point” of B’s utterance seems to be about what Mary said: it is carried by the main clause of the predicate report. In (30), on the other hand, the main point of B’s utterance seems to be carried by the complement clause. In this context, what matters is Mary’s whereabouts, not her claims. The main clause gets a parenthetical interpretation, and seems to merely play an evidential role (see Simons 2007).

(29) A: What kind of crazy claim is Mary making these days?
   B: She told her parents she’s moving to Australia.

(30) A: Is Mary going to be here next month? I’d like to invite her to my party.
   B: She told her parents she’s moving to Australia.

Hence, with communicative predicates, the speaker can easily appear to endorse the content of the complement clause, and choose to foreground the main clause or the complement clause (see Dayal and Grimshaw 2009).

Returning to (27), the speaker seems to take for granted that Mary is moving to Australia, and to ask about whether she informed her parents of that fact. Why should this be? All else equal, we assume that Mary should be a reliable source of information about whether she’s moving to Australia or not. All else equal then, we assume that the interesting question is whether she has informed her parents of that fact. But here again this assumption can easily disappear, depending on context. If we know Mary to be a compulsive liar, we might assume that the question in (27) is not so much about Mary’s whereabouts, but about her claims, in which case the factivity illusion disappears.

A few communicatives (acknowledge and admit), however, seem less prone to contextual manipulation, and thus more stubbornly factive. These verbs allow book subjects, and are hence communicative given our analysis.

(31) a. The book acknowledges that the earth is flat.
   b. Does the book acknowledge that the earth is flat?

Both (31a) and (31b) seem to presuppose that the earth is flat. However, even in this case, Anand & Hacquard (2014) argue that there is no veracity entailment, which means that there is no factivity. However, these verbs have other presuppositions, which can be exploited to yield an inference very close to a factive presupposition. Verbs like acknowledge and admit seem to presuppose that their subject was the last hold out for acceptance of their complement in the common ground of the reported communicative act. Once the subject acknowledges or admits $p$, $p$ becomes accepted in the reported common ground. Assuming that no further relevant information leads to $p$ to later be removed from the common ground, we assume that $p$ still holds in our common ground. However, $p$ is not entailed in our world. This can be seen by creating enough distance from the reported common ground and our common ground (from Anand & Hacquard 2014):

(32) In Ancient Greece it was widely accepted that the Earth was flat. Eratosthenes however thought that it was round. After his peers demonstrated to him that he couldn’t be right, he finally {acknowledged/admitted} that the Earth was flat
Based on these results, Anand & Hacquard (2014) propose that there is a lexical gap in factivity. No communicative predicate is factive. What underlies this lexical gap? We would like to suggest a functional explanation, in analogy to Horn’s (1972) explanation for the lexicalization of logical words.

Horn observes systematic gaps in the kinds of logical operator meanings that get lexicalized in natural language. While we find words like some, all, and even no, there doesn’t seem to be words nall, that express the meaning not all. Similarly, while we find words like and, or, there doesn’t seem to words nand, that express the meaning not and. Why should this be? Horn argues that these lexical gaps can be provided a functional explanation, by considering not just the semantics of particular words, but also what (enriched) meanings can be expressed with just a few words. In particular, the meanings not all and not and can easily be conveyed via scalar implicatures: a speaker using some in a context where the stronger term all would have been appropriate seems to imply not all from their choice of using some rather than all. Because such meanings can easily be pragmatically derived, there is no need for a language to lexicalize such words.

Similarly, as we have seen in (27)-(30), speech reports can easily be pragmatically enriched, in ways in which the speaker can endorse the truth of the complement clause. A speaker can use a speech report to indirectly assert the complement clause (this is why Hooper 1975 calls such predicates “assertives”). Hence, there is no functional pressure to lexicalize a factive communicative, since such meanings are easily pragmatically communicated.

We thus see that our factivity generalization seems to hold: upon closer scrutiny, the only two “factive” predicates amongst the communicatives (acknowledge, admit) appear to lack a veracity entailment, and hence not to be factive. Note that there are three more counterexamples to the factivity generalization as stated in (26): we found one doxastic factive which takes book subjects, namely uncover, and two emotive factives, namely exult and deplore. Uncover seems to be a genuine counterexample to our generalization. Importantly, however, its subject is agentive, not an experiencer. What is less clear to us is whether uncover is truly a doxastic predicate that requires awareness, unlike realize and discover (which disallow book subjects): Can “John uncover that Iraq has weapons of mass destruction” be true if John does not believe that Iraq has weapons of mass destruction? If so, uncover may be more of a causative doxastic (like, e.g., persuade), where the subject causes a distinct (sentient) entity to believe the proposition expressed by the complement. As for exult and deplore, these verbs interestingly seem to lose their factivity when they combine with a book subject, as the lack of contradiction in (33) seems to show. This thus seems to fit a larger pattern that we discuss next.

(33)  The book₁ deplores that Iraq₂ has weapons of mass destruction, which it₂ doesn’t.

5.3. Factivity and frame

A particularly powerful case for the allergy of communicatives to factivity comes from predicates that can appear in multiple argument structural frames. Consider the case of worry which can (rather uniquely) appear with its individual argument as either subject or object (trading with the proposition denoting CP):
As indicated in (33), the alternation simultaneously affects both the factivity of the predicate and whether it admits agentive R-of-I individuals. When the subject is the individual argument, agentive R-of-I elements are felicitous, and there is no veracity entailment for the proposition denoted by the CP (instead, it is taken to be epistemically possible for the subject). In contrast, when the proposition-denoting CP is the subject, a factive inference arises (and hence a speaker asserting (33b) seems to be committed to a rather definitive claim about the future) and agentive R-of-I subjects are infelicitous.

To our knowledge, worry is unique in being possible in both the syntactic frames in (33) without overt morphological modification. However, the pattern in question is much more general. In general, across our corpus, the frame that-clause-V-DP is uniformly factive, and agentive R-of-I objects are systematically forbidden. DP-V-that-clause and DP-be-Adj-that-clause frames (where the adjective is derived from the relevant verb), in contrast, are much more diverse: sometimes they are factive (be surprised) and sometimes they are not (be obsessed). What we find is that agentive R-of-I subjects are systematically excluded from factive sentences, regardless of whether they are formed from a passive verb or not. For instance, in the DP-V-that-clause frame, obsess and worry are able to take a book subject (34a). However, in the that-clause-V-DP, which is exclusively factive, these verbs cannot take a book subject (34b). Table 3 provides several instances of this pattern.

(34)  
a. The book {worries, obsesses} that Iraq has weapons of mass destruction.  
b. # That Iraq has weapons of mass destruction {worries, obsesses} the book.

<table>
<thead>
<tr>
<th></th>
<th>That-clause-V-DP</th>
<th>DP-V-that-clause</th>
<th>DP-be-A-that-clause</th>
</tr>
</thead>
<tbody>
<tr>
<td>obsess</td>
<td>Factive</td>
<td>Non factive</td>
<td>Non factive</td>
</tr>
<tr>
<td>worry</td>
<td>Factive</td>
<td>Non factive</td>
<td>Non factive</td>
</tr>
<tr>
<td>concern</td>
<td>Factive</td>
<td>*</td>
<td>Non factive</td>
</tr>
<tr>
<td>distress</td>
<td>Factive</td>
<td>*</td>
<td>Factive</td>
</tr>
<tr>
<td>upset</td>
<td>Factive</td>
<td>*</td>
<td>Factive</td>
</tr>
<tr>
<td>doubt</td>
<td>*</td>
<td>Non factive</td>
<td>Non factive</td>
</tr>
<tr>
<td>resent</td>
<td>*</td>
<td>Factive</td>
<td>Factive</td>
</tr>
<tr>
<td>scare</td>
<td>Factive</td>
<td>*</td>
<td>Non factive</td>
</tr>
<tr>
<td>frightened</td>
<td>Factive</td>
<td>*</td>
<td>Non factive</td>
</tr>
<tr>
<td>fret</td>
<td>*</td>
<td>Non factive</td>
<td>Non factive</td>
</tr>
<tr>
<td>hope</td>
<td>*</td>
<td>Non factive</td>
<td>Non factive</td>
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<td>-------------</td>
</tr>
<tr>
<td>grieve</td>
<td>Factive</td>
<td>Factive</td>
<td>*</td>
</tr>
</tbody>
</table>

**Table 3:** Predicate-frame correlations with factivity and admission of agentive R-of-I (*book*) subjects. Forms in a frame that allow agentive R-of-I subjects are in **boldface**.

We take the existence of this pattern across the English lexicon, regardless of which predicate is possible in any given frame, as an argument that communicative predicates are incompatible with factivity.

### 6. Prospects

In this paper we have reported on a fairly systematic investigation of the subject-taking properties of several hundred *that*-clause embedding predicates in English. We have argued on the basis of this investigation that the preliminary claims of Anand & Hacquard (2009) are largely right: speech and attitude predicates split between those that select for sentient entities (experiencers) and those that select for communicative agents. These are what AH called agentive repositories of information – entities that can be understood as interlocutors in generic conversations. We also showed that a finer-grained understanding of the landscape of say-verbs and other communicatives can derive why not all of them are compatible with these arguments. The subjects that say-verbs occur with follow general principles which relate the semantic components of the verbs to their complement-taking capacities as well as their subject possibilities. We closed with an argument that this same split in attitudes is reflected in a somewhat orthogonal-seeming dimension: which predicates are factive.

We see this investigation as a start toward a more articulate understanding of attitude meaning and, more generally, *that*-clause embedding predicates. One large hole in our understanding at present is the structure of inferential predicates. We have argued that say has an inferential sense, but we do not at present know what restrictions, if any, inferentials possess. The structure of inferentials also looms large in our exploration of factivity. We have argued that there are no factive communicatives, but what we have in fact shown is that several putative counterexamples do not even possess a veracity entailment. If that is the case generally, then it is not merely the case that there are no factive communicatives. Rather, we would have a stronger generalization: communicative predicates are incompatible with veracity entailments. What we are looking for then are communicative predicates with a non-backgrounded veracity entailment; that is, we are looking for veridical (but non-factive) communicatives. The inferentials may be precisely such a case: *John demonstrates that it's raining* seems to entail that the complement is true, an entailment that does not survive questioning or negation. But does this arise because demonstrate is veridical or because there is a covert doxastic (which can be made overt by an experiencer to Mary)? Answering this seemingly minor question could be central in understanding how unenrichable communicative predicates may be.
Appendix

<table>
<thead>
<tr>
<th>DOXASTICS</th>
<th>Factive</th>
<th>Non factive</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔️ book subject</td>
<td>appreciate, discern, make out, recognize, uncover</td>
<td>accept, anticipate, assume, <strong>calculate</strong>, <strong>conclude</strong>, <strong>deem</strong>, <strong>determine</strong>, diagnose, envisage, envision, establish, estimate, figure, <strong>forecast</strong>, foresee, <strong>generalize</strong>, <strong>hold</strong>, <strong>judge</strong>, presuppose, posit, postulate, <strong>predict</strong>, prognosticate, project, <strong>rationalize</strong>, reason, reckon, suppose, surmise, trust, verify</td>
</tr>
<tr>
<td>*book subject</td>
<td>Factive</td>
<td>absorb, acknowledge, ascertain, aware, catch on, catch, comprehend, conscious, detect, discover, figure out, find out, forget, get, glimpse, grasp, hear, ignorant, intuit, know, learn, mindful, mystified, notice, observe, puzzled, realize, recall, recollect, register, remember, see, smell, surprised, take in, unaware, understand, uninformed, unsurprised, well-aware</td>
</tr>
<tr>
<td></td>
<td>Non factive</td>
<td>agree, believe, bet, certain, clueless, cocksure, cognizant, conceive, confident, consider, convinced, decide, deduce, disagree, doubt, doubtful, dream, dubious, expect, fancy, fantasize, feel, find, gather, guess, hallucinate, imagine, infer, internalize, note, overhear, paranoid, perceive, positive, pray, presume, resolve, ruminate, sense, skeptical, sure, suspect, think, uncertain, unconvinced, unsure visualize, wish, work out</td>
</tr>
</tbody>
</table>

**Boldface:** predicate also has a communicative sense.

**Forecast class:** anticipate, envisage, envision, **forecast**, foresee, **predict**, prognosticate, project

**Assume class:** appreciate, discern, make out, recognize, accept, assume, estimate, figure, presuppose, posit, postulate, suppose, surmise, trust

**Reason class:** diagnose, reason, reckon, verify, establish
### Emotives

<table>
<thead>
<tr>
<th>book subject</th>
<th>Factive</th>
<th>Non factive</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔book subject</td>
<td>deplore, exult</td>
<td>adamant, despair, fear, hope, hopeful, optimistic, obsess, pessimistic, sanguine, suspicious, worry</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>*book subject</th>
<th>Factive</th>
<th>Non factive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>abashed, abhor, accept, admire, adore, aggrieved, aghast, agonize, amazed, amused, angry, anguished, annoyed, apologetic, apoplectic, appalled, appreciate, appreciative, ashamed, astonished, astounded, awed, bear, befuddled, bemused, bewildered, bitter, calm, care, celebrate, cherish, concerned, delighted, delirious, depressed, depressing, despairing, despise, detest, disappointed, disgruntled, disgusted, dislike, dismayed, displeased, dissatisfied, distraught, ecstatic, elated, embarrassed, enjoy, envious, euphoric, excited, exhilarated, exultant, face, flabbergasted, fortunate, frantic, freak out, frightened, furious, giddy, glad, gleeful, grateful, gratified, grieve, happy, hate, heartbroken, heartsick, impatient, incredulous, indignant, irate, jealous, joyful, jubilant, leery, like, livid, loathe, love, lucky, mad, mind, nervous, oblivious, outraged, overjoyed, pained, peeved, pissed, pleased, proud, regret, regretful, remorseful, rejoice, relish, resent, resentful, respect, rue, sad, satisfied, scared, self-aware, shocked, sorrowful, sorry, stand, thankful, tolerate, unabashed, unconcerned, uneasy, unfazed, ungrateful, unhappy, unimpressed, unlucky, uptight, value, wistful, worry, wrathful</td>
<td></td>
</tr>
</tbody>
</table>

| Non factive | afraid, anxious, apprehensive, desire, dread, fearful, fretful, keen, manic, overconfident, petrified, prefer, resolute, self-assured, upbeat, wary, worried |

**Boldface**: also has a (nonfactive) communicative sense.

### Inferentials

<table>
<thead>
<tr>
<th>book subject</th>
<th>Factive</th>
<th>Non factive</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔book subject</td>
<td>betray</td>
<td>assure, certify, confirm, demonstrate, guarantee, highlight, hint, illustrate, implicate, imply, indicate, manifest, mean, prove, reassure, show, signal, reveal, suggest, teach, underline</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>*book subject</th>
<th>Non factive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factive</td>
<td>--</td>
</tr>
<tr>
<td>Non factive</td>
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<tr>
<td></td>
<td>Factive</td>
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<tr>
<td>----------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Factive</td>
<td>acknowledge, admit</td>
</tr>
<tr>
<td>Non factive</td>
<td>add, admonish, advertise, advise, advocate, affirm, agonize, agree, allege, animadvert, announce, answer, argue, ask, assert, assure, attest, aver, bark, bawl, beef, beg, bellow, beseech, bitch, blabber, bleat, blubber, bluster, boast, brag, bray, bring in, bring up, bubble, calculate, caution, certify, charge, cite, claim, clarify, clear, command, comment, complain, concede, conclude, concur, confess, confirm, conjecture, contend, continue, correct, corroborate, counter, criticize, declare, decree, deem, demand, demur, deny, deplore, detail, determine, dictate, disagree, disclose, dispute, divulge, document, elaborate, emphasize, emphatic, explain, explicit, expositulate, express, exult, forecast, foretell, forewarn, fret, fuss, generalize, gloat, go on, grant, gripe, grousse, grumble, guarantee, guess, gush, hazard, hint, hold, hypothesize, impart, implore, implore, incorrect, indicate, inform, insinuate, insistent, instruct, intimate, jest, joke, josh, judge, kvetch, lament, lay out, leak, leave out, let slip, lie, maintain, marvel, mean, mention, muse, note (down), object, observe, omit, opine, overemphasize, philosophize, plead, pledge, point out, preach, predict, proclaim, profess, promise, prophesy, propose, protest, publicize, put out, question, quip, radio in, ramble, rant, rationalize, rave, reaffirm, reassure, recommend, reemphasize, reflect, reiterate, rejoice, relate, relay, remark, remind, remonstrate, repeat, reply, report, request, respond, retort, reveal, right, say, share, signal, soliloquize, specify, speculate, spell out, state, steadfast, stipulate, stress, submit, suggest, swear, tease, telegraph, theorize, threaten, tout, unveil, urge, unanimous, vehement, venture, vow, warn, whine</td>
</tr>
<tr>
<td>*book subject</td>
<td></td>
</tr>
<tr>
<td>Factive</td>
<td>add in, apologize, apprise, babble, blurt, blurt out, boom, burst out, cackle, call, call in, call out, candid, carol, chant, cheer, chime in, chirp, chortle, chuckle, cluck, confide, coo, cry, cry out, editorialize, enthuse, exclaim, explode, fib, frown, fume, gasp, gesticulate, gesture, get in, get out, giggle, glare, grimace, grin, groan, grunt, harrumph, hiss, holler, insist, jot down, laugh, let out, moan, move, mumble, mutter, notify, order, pray, pretend, pronounce, publish, put in, rage, read, read out, recite, record, roar, rule, scoff, seethe, shout, shout out, shrug, sigh, sign, sing, smirk, snap, snarl, sneer, snicker, sniff, snort, snuffle, sob, splutter, sputter, squall, squawk, squeak, squeal, stammer, stutter, tell, testify, text, think, throw in, thunder, tisk, trill, trumpet, tweet, twitter, verbalize, wait, warble, wave, wheeze, whimper, whisper, whistle, whoop, write, yammer, yap, yell, yell out, yelp, yodel</td>
</tr>
</tbody>
</table>

**Boldface:** communicative predicates that are not SAY verbs.
References


Pranav Anand panand@ucsc.edu
Jane Grimshaw grimshaw@ruccs.rutgers.edu
Valentine Hacquard hacquard@umd.edu