From information structure to argument structure

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1 Introduction

The distinction between information structural categories as abstract semantic notions on the one hand and their marking in natural language on the other is widely accepted in the literature (Krifka 2008, Zimmermann and Onea 2011, Roberts 2011). For example, at the semantic level, topic may stand for some notion of *aboutness* (Reinhart 1981) and focus may signal the presence of alternatives (Rooth 1985). At the formal level, certain types of left dislocations or functional expressions are considered marking strategies of topicality, see, e.g., Wälchli (2020) for a recent overview, and certain prosodic or morphosyntactic patterns are marking strategies of focus in various languages, e.g., Hartmann and Zimmermann (2012). However, the exact locus of information structural categories in grammar remains quite mysterious as they pop up in quite various domains from the cartographic projections (Rizzi 1997) to subtle micro-level interactions with various phenomena in the domain of prosody, case-marking, scrambling, etc. Moreover, these notions are arguably not marked in a systematic one-to-one way in natural languages (see, e.g., Matić and Wedgwood 2013 for focus).

This then raises the question whether there could be a parsimonious broad explication of these notions that captures their omnipresence in grammar, provides a natural typology and semantics for them as grammatical and not only as functional notions. In this paper, I attempt a radical answer to this question by claiming that these notions are *semantic roles* and thus indeed part of argument structure. I acknowledge right from the very start that this will likely be a hard-to-swallow idea and I will do my best to defend it, albeit my arguments in this programmatic paper will target topicality only and I will limit myself to a very brief sketch on how the argument could go for focus in the final section of the paper. However, I wish to at least tentatively point out right from the start that in the large-scale picture emerging from this discussion, one should expect

the entirety of information structure to be reducible to argument structure and argument structure only.

In the remainder of this paper I will start out with a brief background section explicating some of my assumptions about events in natural language, followed by a somewhat detailed analysis of topic and an outlook about how the picture might generalize to focus.

2 Background

One of the core functions of natural language is to report things that happen in the world. In such cases, a sentence α is used to denote an event e (Davidson 1967 and subsequent literature). Importantly, the way in which events are conceptualized and thus represented in grammar is neither entirely objective (thus subject to variation) nor random (being arguably constrained by human cognition) and reveals important aspects about natural language ontology. The usual way in which languages denote events involves some verbal expression, often a finite verb, and a range of syntactic arguments that correspond to the event participants. Thereby the participant structure of the event is usually assumed to mirror the argument structure of the verb, thus grammatical devices of argument structure coding are intimately related to event ontology. One widespread method to make transparent the way in which grammar encodes event structure is Neo-Davidsonean event semantics (Parsons 1990), exemplified in (1) (ignoring event decomposition, higher grammatical projections such as aspect, tense and modality.)

(1)   a.   Elisa hit Jane.
             $\lambda e.hit(e) \wedge$ AG$(e,Elisa) \wedge$ PAT$(e,Jane)$
        b.   Elisa hit Jane with her pillow.
             $\lambda e.hit(e) \wedge$ AG$(e,E) \wedge$ PAT(e,J)
             $\wedge$ INST$(e, \iota x.[pillow(x) \wedge owner(x,E)])$

In (1-a) the event happening in the world which is reported by the sentence is an event of hitting and the two participants in that event are two individuals, Elisa and Jane. They play different roles in that event: Elisa is the AGENT and Jane is the PATIENT. These roles are reflected in the argument structure of the verb *to hit*. In particular, the agent is encoded as the subject and the patient is encoded as the direct object. In (1-b) the event is different. This time, we have an additional participant: *the pillow*, which plays the role of the INSTRUMENT and is realized as a PP in the sentence. These observations constitute common sense linguistic knowledge, even though the technical implementations can differ substantially in various theories, e.g., semantic roles could be mapped to asymmetric syntactic projections of verbs sensu (Hale and Keyser 1998).

It is still nearly common sense that these observations about events in general transpose, mutatis mutandis, to speech acts. When a speech act occurs, some individuals are involved in specific ways in that event. Under the assumption made above that it is the grammar of natural language that reveals the details of event ontology, the most natural way to further investigate the way in which they are involved in these events, is by considering reports of speech acts, i.e., sentences that express that some speech act happened. Hence, examples like (2) are relevant to study the nature of speech act events. In particular, usually, a speaker and an addressee and the content of what is being communicated immediately come to mind. Good arguments can be made for subsuming these under more general semantic roles such as AGENT, GOAL/RECIPIENT or THEME. However, I will assume in this paper that the above are semantic roles in their own right (whether or not they are special cases of more general ones, following Pietroski 2000, Moulton 2009 and others). Thus, in both examples in (2) the SPEAKER and the ADDRESSEE are the same individuals. Arguably, the CONTENT is different. In (2-a), CONTENT is a proposition, in (2-b), CONTENT might be a question. All three participants have distinct semantic roles in the reported speech act events, and they are realized in different ways as part of the argument structure of the respective verbs: *to tell* and *to ask*.

(2)   a.   Elisa told Ashanti that it is raining.
              $\lambda e.tell(e) \wedge \text{SP}(e,E) \wedge \text{ADDR}(e,A) \wedge \text{CONT}(e,\lambda w.rain(w))$
       b.   Elisa asked Ashanti whether it is raining.
              $\lambda e.ask(e) \wedge \text{SP}(e,E) \wedge \text{ADDR}(e,A)$
              $\wedge \text{CONT}(e,\lambda v.\lambda w.rain(w) = rain(v))$

With this very basic and hopefully little controversial background, we can turn to the case of topic and how it relates to speech acts.

3 Topics in reported speech acts

Consider the two sentences in (3) which are meant to be speech act reports of the very same speech act. Ashanti may report what she witnessed in at least two entirely accurate ways. Firstly, as in (3-a), which is – at least at first sight – unremarkable for our purposes. Secondly, however, Ashanti may – for whatever reason – want to signal in her speech act report that Elisa made an assertion about Johnny, as in (3-b).

(3)   a.   Ashanti: Elisa told me that **Johnny** is a real idiot.
       b.   Ashanti: Elisa told me about **Johnny** that he is a real idiot.

The *about*-PP in this type structure is naturally understood as part of the argu-

ment structure of the respective verb (e.g., *to tell*). After all, the PP requires a specific licensing verb whose meaning is needed to interpret the event participation of the PP referent. A list of verbs licensing *about*-arguments in English is provided in Rawlins (2013). In the context of what we have established so far, however, this utterly nonsurprising observation turns out to have an important consequence: it seems to suggest that the argument of *about*, in (3-b), Johnny, plays a role in the event reported, i.e., in the speech act performed by Elisa and directed towards Ashanti.

In the context of intensional verbs and the complexities of deriving *de re* readings it has been suggested by Cresswell and von Stechow (1982) that attitude embedding predicates may have a *res* argument. Moulton explicitly analyses the *about*-argument as the *res*-argument of such predicates. While I stress that I consider Moulton (2009) on the spot in the specific domain of his analysis, I will suggest that indeed topic and res are simply the same thing. What appears as topic from the perspective of information structure is in fact the res from the perspective of argument structure. And because this double-terminology appears unnecessary, I will expand on the idea of Onea and Mardale (2020) and call the *about*-argument the syntactic coding of the semantic role TOPIC thus biting the bullet and claiming that TOPIC is thereby a category of argument structure and argument structure only.[1]

The immediate advantage of this analysis is that it correctly predicts that whatever surfaces as the TOPIC of a speech act verb will indeed be the topic of the speech act it reports on. Hence, any of the following speech acts would do as a witness to the speech act report in (3):

(4)   a.   Elisa to Ashanti: As for **Johnny**, he is a real idiot.
       b.   Elisa to Ashanti: **Johnny**, he is a real idiot.
       c.   Elisa to Ashanti: **Johnny** is a real idiot.
       d.   Elisa to Ashanti: I hereby assert about **Johnny**, that he is a real idiot.

But there is a complication. While there can be a one-to-one correspondence between the overt root topic of an utterance and the *about*-argument of a speech act report paraphrasing that very utterance, this is not entirely necessary. When reporting on a speech act with an explicitly marked root topic, it is preferred but not necessary to keep the actually marked root topic as the TOPIC of the speech act verb. Consider the sentence in (5) and some ways to report on that speech act.

(5)   Elisa to Ashanti: As for Mary, she loves Jane.

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[1] In what follows TOPIC refers unambiguously to a semantic role, whereas *topic* may also refer to the category of information structure.

     a.   Michael: Elisa told Ashanti about Mary that she loves Jane.
     b.   Michael: Elisa told Ashanti that Mary loves Jane.
     c.   Michael: Elisa told Ashanti that Jane is loved by Mary.
     d.   Michael: Elisa told Ashanti about Jane that Mary loves her.

The reports in (5) are ordered (roughly) by acceptability/accurateness. Thus, we can quickly agree that (5-d) is far from an ideal paraphrase. But is (5-d) literally false? It is hard to say. However, it does seem, at least, that (6) is entailed by (5). This is a serious issue: if the event reported has a certain TOPIC participant, it should be wrong to report it having a different TOPIC participant.

(6)   Elisa said something about Jane.

In the following, I try to strengthen the argument by first considering in more detail the way in which the putative TOPIC-role is encoded in the argument structure of speech act verbs. In the second step, we consider whether we can learn something about the meaning of topics by focusing on the role of TOPICs in the argument structure and whether this can help elucidate the problem posed by examples such as (6).

3.1 Topic in the argument structure

If TOPIC is a semantic role, we would expect that various languages systematically mark it as part of the argument structure of speech act verbs, albeit with some variations. Ideally we would even expect it to occasionally be marked as a direct object.

    In English, the default preposition that introduces the TOPIC role is *about*. We have seen such examples above. In Romanian, the default marker of TOPIC is the preposition *despre* which etymologically appears to stem from Latin *de super*, meaning the direction down from above. Other prepositions used in Romanian include the abstract partitive *de*. Similarly, in French, we find the preposition *de* as the main encoder of TOPIC. In German, the main TOPIC marker is the preposition *über* (above, on) as shown in (9). Finally, in Hungarian, delative is the default case for TOPIC, as shown in (10).

(7)   a.   Ion a   vorbit despre ea.
               John has talked despre her
               'John talked about her.'   (Romanian)
    b.   Ion a   vorbit de tine.
               John has talked de you
               'John has talked about you.'

(8)   J'ai parlé de toi.   (French)

(9)   Ich habe über dich gesprochen.   (German)

(10)   Jancsi Marirról beszélt.
        John Mary.DEL talked.
        'John talked about Mary.'   (Hungarian)

We further find some verbs that seem to introduce the TOPIC-argument as a direct object in present day Romanian. The example (11) is a case in point, showing an alternation between *despre* and a direct object marker *pe* in encoding the same semantic role.

(11)   a.   Preotul   a   vorbit de bine despre Maria.
             priest.DEF has talked of good about Mary
             'The priest praised Mary'
        b.   Preotul   a   vorbit=o   de bine pe   Maria.
             priest.DEF has talked=CL.3SG.FEM.ACC of good on.ACC Mary
             'The priest praised Mary'

Even in English we can find interesting argument alternations with TOPIC: Consider verbs like *discuss*, as in (12), which appear to encode TOPIC as a direct object. (Moulton 2009: 24) provides more examples of this sort in the domain of non-derived content nouns, such as in (13), and argues convincingly that in such cases the *of-* or *about*-argument is not the CONTENT argument, even though such nouns do usually take a content argument.

(12)   a.   They debated the president's role in the crisis.
        b.   The debated about the president's role in the crisis.

(13)   a.   The rumor of John's resignation is spreading.
        b.   The rumor about John's resignation is that it was forced.

While the claim that TOPIC can be encoded as a direct object in English would strengthen the argument that it is part of the argument structure, I am not convinced that in (12-a) and (13-a), we really have a TOPIC argument, because one can more easily add an overt CONTENT-argument to the b-examples, as shown for (12) in (14). Hence, I leave this question open for future investigations.

(14)   a.   ?They debated the president's role in the crisis whether it was to
             be considered positive for the party.
        b.   They debated about the president's role in the crisis whether it
             was to be considered positive for the party.

3.2 Topic as a category of thought

Not only speech act verbs in the narrow sense have a TOPIC argument. Indeed, going back to the *res*-argument discussion, it is very natural to see verbs of various propositional attitudes like verbs of knowlegde, dreaming, thinking, imagining etc. also taking *about*-arguments. Some English examples are given in (15), which also show alternations of the prepositions used in such cases. We have also seen nominals with *about*-arguments already above, in (16) we show some additional examples.

(15)   a.   John knows something about Bill.
         b.   Warren thinks about Skylar.
         c.   Warren dreams about/of Skylar.

(16)   book/report/teaching on/about something/someone.

One way to analyse such examples, suggested in Onea and Mardale (2020) is that such verbs or nominals involve some discourse and thereby indirectly some speech act component which the in some way 'inherit' their topic role. However, it is possible to exploit these additional TOPIC-taking expressions to get one step closer to the very 'meaning' of TOPIC.

In particular, note that it is not exactly true that *about* arguments provide a realworld object as the notion *res* would suggest. It can also be an object of thought only. Consider an example in the spirit of Kamp et al. (2011), related of course to cases discussed in Geach (1967):

(17)   John thought that there is a gold coin in his pocket. He boasted about
         it.

This brings us back to the question how exactly a TOPIC participates in an event. Since whatever way TOPICs participate should generalize to cases such as (17), it should follow that topicality is a *thought-level* event participant. In other words, the TOPIC is not involved in the speech act as an individual but as a thought-of-an-individual in the speaker's mind. If, then, verbs of thinking (in the broad sense) encode a TOPIC participant, this is because TOPIC is an integral part of thought and only indirectly of speech. A speech act has a TOPIC because acts of thinking have one. While I suspect that a full analysis would need to involve some notion of intentionality in the sense of Brentano (1874), for the purposes of this paper it will suffice to stick with Reinhart (1981): Topics represent (as in a file-card metaphor) the content within an act of thought (or speech act). Hence, whatever the CONTENT of a thought about Skylar may be, that thought is in some sense internally represented by Skylar. If that is correct, we can analyse *a book about Skylar* as a book whose CONTENT can be represented by Skylar in some act of thinking (typically as an integral part of

a speech act). Why natural language would choose to encode this representational object into the argument structure of the respective verbal and nominal expressions remains a question that I can only answer in a way that may seem circular: because this is the event structure of such expressions.

With this in mind, we can return to the problem posed by example (5), repeated here in the relevant part: (18-a) at least seems to entail (18-b).

(18)   a.   Elisa to Ashanti: As for Mary, she loves Jane.
        b.   Elisa said something about Jane

I suggest that there are two readings of (18-b) shown in (19) and only (19-b) follows from (18-a). But just as with (16), a content can only be *about Jane* through a possible speech act or act of thought such that instantiating the content would make Jane the participant of that particular event.

(19)   a.   Elisa performed a speech act about Jane with some content.
        b.   Elisa perfomed a speech act with some content which is about Jane.

This immediately predicts the lower acceptability of (5-d), since this would require that we process several steps: Elisa told Ashanti something about Mary, the content is something about Jane, because there can be events that would be about Jane and which would have the same content, thus, Elisa said something about Jane. More generally, think of the well known cases of epistemic closure *know*:

(20)   John knows that a and he is able to deduce from a that b logically follows. Hence, John knows b, even if he may in fact believe non-b.

Notice that this argumentation is in perfect harmony with my claim that topicality is in general a matter of thought and only indirectly a communicative category. If it were a more direct communicative category, one would expect pragmatics to make it even harder to accept sentences such as (5-d) in the relevant situation.

From this we can conclude that there is fair enough evidence that TOPIC is indeed a semantic role which is part of the argument structure of a range of expressions, primarily, speech act verbs, and – moreover – we have a (rough) direction regarding the semantics of topics as forced upon us by the very usage of the typical markers of topicality at this non-root level.

3.3 Root topics

We have thus provided an outline of a theory of TOPIC as a verbal argument of speech act verbs. Thus, we say that TOPIC is part of the event structure of speech acts (and some acts of thought). It should follow then, that when a speech act is actually occurring it will also have a TOPIC participant. Indeed, this can be well observed in (21). In (21-a) *my cousin* is marked both as the TOPIC of the actually occurring speech act, and of the performative verb. In (21-b) *my cousin* is marked as the argument of the occurring speech act only and can be deduced to be the argument of the performative due to the performativity itself. In (21-c) *my cousin* is marked as the argument of the performative verb and thus it can be deduced that it is also the TOPIC of the occurring speech act.

(21)   a.   As for my cousin, I hereby claim about him that he is a fake doctor.
        b.   As for my cousin, I hereby claim that he is a fake doctor.
        c.   I hereby claim about my cousin that he is a fake doctor.

Marking the TOPIC of the occurring speech act is a root phenomenon and is governed by specific grammatical rules. One way to implement the idea is by using silent performative verbs, following Ross (1970) or a speech act projection in the sense of Speas and Tenny (2003), further developed, e.g., in Miyagawa (2012). In this case, one would argue that the root TOPIC is the semantic role mapped to one of the argument of a speech act verb/projection, thus yielding a structure such as (22), though of course a more specific version would likely be necessary as a syntactic implementation.

(22)   a.   Elisa to Jane: John, he really loves Eric.
        b.   [Elisa [Jane [John$_i$ [SA(e') [... [He$_i$ [loves(e) Eric]]]]]]]

From this perspective, if we think of TOPIC as a semantic role of speech act events, it naturally follows that it needs to be added to the set of *pragmatic roles* identified by Speas and Tenny (2003) that are then mapped to the actual semantic roles of the denoted speech act event.

   A natural way to capture the difference between a left-dislocated/hanging topic and a plain topical subject, then, would be a matter of spell-out. A non-dislocated topic is co-indexed with the TOPIC argument of the speech act event, however, at spell-out only the lower copy gets produced and the higher copy remains implicit.

   Importantly, however, even some version of the performative hypothesis naturally lends itself for implementing the current approach at the syntax-semantics interface, the suggestion that TOPIC is a semantic role of speech act events is not necessarily tied to the performative hypothesis. After all, even

scholars who do not buy into the performative hypothesis, would agree that when a sentence is produced some speech act happens. Thus, the event of the speech act with its participants will in some way be tied to the form of the utterance itself. All that really needs to be stated is then that grammar encodes or governs some mappings between the form of an utterance and the semantic roles of the speech act, TOPIC being one of the latter, and thus yielding to some grammatical repercussions.

Importantly, it is not necessary to mark the TOPIC-role at all, but the form of the utterance can or will – by default – always be used to infer the TOPIC, precisely because TOPIC, as a semantic role of utterances, will need to be somehow reconstructed as part of interpreting/understanding speech acts. This claim has to be somewhat qualified, however, as TOPIC – as a category of thought of the speaker – has a lower communicative relevance as compared to the CONTENT, and thus, not being able to reconstruct the TOPIC of a speech act will not always be deemed a communicative failure.

4 Outlook

Let us take the suggested analysis to the limit in this section. What we usually think of as information structure is nothing but a way in which grammar informs about (non obvious) speech act participants. How could this, for example, apply to focus?

While this paper does not provide the space to actually spell out the idea in any detail, I wish to suggest that what we usually call *focus* is the formal reflex of another speech act participant. Moreover, the fact that focus is usually better captured within semantics than topic may be directly tied to this very fact.

In particular, I suggest that every utterance, as a goal-oriented human action, will have its GOAL as an event-participant. Expanding on Roberts (2012) and Onea (2016), I shall call this goal the *question under discussion*.[2] Thus, while there can be doubts as to whether every speech act has a TOPIC-role (some imperatives may be an exception), I argue that every speech act has a QUD-role by definition (potentially excepting pure expressives!). Because the QUD is usually known from the context, one would expect the QUD to be anaphoric in general, with some under-specified content to help retrieval in context. This

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[2]Here, one needs to clearly distinguish between private goals speakers may associate with speech acts that usually are expressed as adjuncts with some sense of finality, and basic communicative goals we are considering here. This is exemplified in (i):

(i)   I hereby claim for my own pleasure that ASHANTI is the most intelligent.

         a.   QUD: Who is the most intelligent

         b.   Private goal: the speaker's pleasure

is indeed the usual semantics of focus! Thus, I suggest: the category focus in general can be understood as a formal way in which grammar encodes another speech act participant, namely the QUD, which maps to GOAL.

Indeed this comes with a range of correct predictions. Firstly, it predicts that focus can never have a semantic effect that is not mediated by the QUD. While semanticists would have traditionally used the case of focus-sensitivity (e.g. Jackendoff 1972, Rooth 1985) and subsequent literature as a counter-argument, at least since Beaver and Clark (2008) not only exclusives but a range of additional focus-particles have been analysed using the QUD as a semantic device. Thereby focus merely acts as an interface device signalling the QUD. Secondly, it predicts that – because questions and thereby the QUD are well-defined semantic objects – a model theoretic account of focus is much easier to give than a model-theoretic account of topic. Thirdly, it predicts that there cannot be sentences without focus, because that would mean the same as having sentences with no goal, which would amount to an absurd analysis of human action. More interestingly, perhaps one would expect that variation in encoding and interpretive exploitation of focus will be more related to basic notions of question semantics and goals: one would expect that the QUD can vary along the typology of questions, including categories such as polar, wh-, open vs. closed, exhaustive vs. mention-some questions etc. Little surprisingly, a wide range of variation in focus semantics has been linked to such notions in the literature. Lastly, there is no *a priori* reason to assume that focus is the sole means to signal the QUD argument and there is no reason to assume that QUD is the only way in which the GOAL-argument can be manifested. For example, one could think of semantically encoded decision problems such as the ones discussed in Csipak (2015) as cases in point.

The grand picture emerging from my suggestion in this paper is that speech acts, as events, not only have CONTENT, SPEAKER and ADDRESSEE as event participants but a range of further objects including TOPIC and GOAL that in turn determine the interpretation and grammatical coding of the main notions of information structure. Thus, information structure is – on this account – an expression of speech act event structure. The performative hypothesis, may offer the possibility of a completely unified syntax of information structural categories as parts of a higher-verb argument structure, potentially within a cartographic approach Rizzi (1997) and subsequent literature.

One problem of the analysis suggested here is that topic and focus seem to behave differently in embedded environments, focus exhibiting way more and way more intricate local effects. In this programmatic paper, I have little choice but to leave this matter for future research.

Instead, I wish to end by pointing out a final prediction of the approach defended above: in general with semantic roles, an exact definition is usually

difficult, languages exhibit variation where they categorize event participant roles as one or more natural classes. Moreover, languages are expected to solve the problem of mapping of semantic roles to grammatical roles differently and while broad generalizations are useful to a certain extent, micro-variation in these notions will always exist and require more finegrained analysis. Hence, thinking of focus and topic as semantic roles contextualizes the problems of variation in a broader frame and makes variation in marking strategies entirely expected within most of not all grammatical frameworks.

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