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Introducing agents by binding indices: Implications for subjectless presuppositions and agent entailments

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(Bale 2007) argues, on the basis of the differential availability of subjectless repetitive presuppositions with *again* with certain verb classes, that the agent argument of eventive transitive verbs is introduced VP-externally (Kratzer 1996), but that the agent argument of intransitive and stative transitive verbs must be taken as a true argument by the verb. We challenge Bale's claim from two directions. First, we observe that two classes of eventive transitive verbs, resist subjectless presuppositions with *again*. Second, we show that the unavailability of subjectless presuppositions with these and other verb classes is not an ironclad argument against severing agents from their verbs generally, and, develop a semantic analysis, inspired by an analysis of stative transitive verbs due to Hale & Keyser (2002), on which the relevant classes of verbs inherently make reference to the agent of their event argument in the form of an *anaphoric index*. This index is subsequently bound by a functional head that introduces the agent argument. The facts and analysis proposed here have wider theoretical implications for the way agents qua external arguments are introduced in general, suggesting that verbs of certain classes and VP-external functional heads may both play crucial roles in the syntactic introduction of the agent argument and its interaction with sublexical modifiers like *again*.

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1 Introduction

At least since Marantz (1984), it has become widely accepted that agents qua external arguments have a different status from internal arguments, in that they do not condition the meaning of the verb as internal arguments do. As shown in the by now classic examples in (1)–(2), the meaning of the verb *kill* varies depending on the referential properties of its internal argument, but no such special interpretations of the verb arise on the basis of the referential properties of the external argument.

- (1) Internal arguments conditioning special interpretations
- a. kill a cockroach.
 - b. kill a conversation (i.e., stop it).
 - c. kill an evening watching TV (i.e., spend it).
 - d. kill a bottle (i.e., empty it).
 - e. kill an audience (i.e., wow them).
- (2) External arguments do not condition special interpretations
- a. Harry killed DP.
 - b. Everyone is always killing DP.
 - c. The drunk refused to kill DP.
 - d. Silence can certainly kill DP.
 - e. Cars kill DP.

Building on Marantz's observation, Kratzer (1996) proposed an analysis on which the above observation falls out from the fact that verbs denote functions from their internal arguments only. External arguments, including agents, are not semantic arguments of the verb, and thus do not compose with the VP by FUNCTION APPLICATION. Rather, a special functional head, dubbed VOICE by Kratzer, introduces the external argument, and composes with the VP by the compositional rule EVENT IDENTIFICATION. Since the external argument is introduced VP-externally, it is never local enough to the verb to condition special interpretations in the same way internal arguments can as direct arguments of the verb.

While highly influential, Kratzer's approach is not without its critics (e.g., Wechsler 2005; Bale 2007; Müller & Wechsler 2014; Wechsler 2020). Bale (2007), in particular, shows that Kratzer's approach makes incorrect predictions regarding the availability of certain types of repetitive presuppositions with the sub-lexical modifier *again*. *Again* is an ideal modifier for testing the hypothesis that external arguments are always severed from verbs, because it triggers a repetitive presupposition whose shape is uniquely determined by the constituent to which it attaches. If the agent is always severed from its verb, then *again* should be able to scope between the VP and the agent, producing a repetitive presupposition that excludes the external argument, what Bale calls a *subjectless presupposition*. If Kratzer is right, *again*'s presupposition

should always be satisfied by a previous event of the sort described by the VP regardless of the identity of the agent. As Bale shows, the empirical evidence suggest that Kratzer (1996) is not completely right: while transitive verbs seem to allow subjectless presuppositions readily, as expected on Kratzer's analysis, intransitive verbs and stative transitive verbs uniformly resist subjectless presuppositions. This in turn leads Bale to conclude that not all external arguments can be severed from their verbs, and that both transitivity and the eventivity/stativity distinction are crucial factors in determining how external arguments relate to their verbs.

In this paper, we challenge Bale's conclusions from two directions. First, we point out two classes of eventive transitive verbs that resist subjectless presuppositions: verbs of ingestion like *eat* and *drink* (Jackendoff 1992; Jerro 2019) and intentional verbs of killing like *murder* *massacre* (Beavers & Koontz-Garboden 2012; Ausensi et al. 2021). Second, we challenge the claim that resistance of subjectless presuppositions by a particular verb class requires an analysis on which the agent is not severed from verbs of that class. This is implemented by building on an intuition due to Hale & Keyser (2002), in the form of an *anaphoric index* encoded semantically in the verb. Stative transitive verbs and verbs of ingestion and intentional killing bear indices that are *bound* by the verbal functional head syntactically that introduces the external argument, here Kratzer's VOICE, via a mechanism proposed for reflexive pronouns in Kratzer (2009). Compositionally, this straightforwardly accounts for those cases where transitive verbs resist subjectless presuppositions with *again* in a way that is fully compatible with the idea that agents, and external arguments more generally, are uniformly severed from the verb.

We proceed as follows. Section 2 provides a background discussion of the proposal in Kratzer (1996) and the predictions it makes regarding subjectless presuppositions as discussed by Bale (2007). Section 3 demonstrates that just like stative transitive verbs, verbs of ingestion and intentional verbs of killing similarly resist subjectless presuppositions. Section 4 presents our analysis in terms of indices and binding, together with the empirical motivations about the specific lexical entailments of these two verb classes that necessitate reference to an agent argument. We also present further evidence from reflexive theme arguments conditioning the availability of subjectless presuppositions in support of the proposed analysis. Section 5 concludes the paper by reflecting on the larger question of whether agent arguments are syntactically and semantically represented in the verb, drawing on previous criticisms of Kratzer (1996) in Wechsler (2005; 2020) and Müller & Wechsler (2014), in line with the broader objective of this special volume.

2 Background

To account for the observations in (1)–(2), Kratzer (1996) proposes that external arguments are not semantic arguments of the verb. Formally, taking the type of individuals as e , the type of eventualities as ν , and the type of truth values as t , transitive verbs denote functions from individuals to event predicates, type $\langle e, \langle \nu, t \rangle \rangle$, where the individual argument corresponds

to the internal argument of the verb. An example using the transitive verb *feed* is illustrated below, with the thematic specification of the verb's arguments given in Neo-Davidsonian fashion as functions from events to individuals.

$$(3) \quad \llbracket \text{feed} \rrbracket: \lambda x. \lambda e. \text{FEED}(e) \wedge \text{THEME}(e) = x$$

Kratzer proposes that composition of the VP with the external argument is achieved through a separate functional head VOICE, whose semantic contribution is to relate an individual to the event contributed by the verb. For example, agentive VOICE will have the denotation below, a function of type $\langle e, \langle v, t \rangle \rangle$.

$$(4) \quad \llbracket \text{Voice}_{\text{Agent}} \rrbracket: \lambda x. \lambda e. \text{AGENT}(e) = x$$

Notice now that upon composition with its internal argument, the verb phrase (VP) *feed the dog* denotes an event predicate of type $\langle v, t \rangle$ in (5). Neither the VP nor VOICE can compose via FUNCTION APPLICATION, for neither is the right type to serve as an argument to the other.

$$(5) \quad \llbracket \text{feed the dog} \rrbracket: \lambda e. \text{FEED}(e) \wedge \text{THEME}(e) = \textit{the dog}$$

To compose these two constituents, Kratzer proposes a rule of EVENT IDENTIFICATION. Taking as input two functions of type $\langle e, \langle v, t \rangle \rangle$ (VOICE) and $\langle v, t \rangle$ (VP), EVENT IDENTIFICATION produces as output a function from individuals to event predicates derived by saturating the arguments of the functions, conjoining the result, and then abstracting over the event argument common to both functions and the individual argument of the first function (6).

$$(6) \quad \text{Event Identification:} \\ f_{e,vt} + g_{vt} \rightarrow \lambda x. \lambda e. f(x)(e) \wedge g(e)$$

With the above ingredients in place, we can now see a full derivation of the introduction of a transitive verb's arguments (7) (Kratzer 1996: 122)

$$(7) \quad \llbracket_{\text{VoiceP}} \text{Mary Voice} \llbracket_{\text{VP}} \text{feed the dog} \rrbracket \rrbracket \\ \text{a. } \llbracket \text{Voice} \rrbracket: \lambda x. \lambda e. \text{AGENT}(e) = x \\ \text{b. } \llbracket \text{VP} \rrbracket: \lambda e. \text{FEED}(e) \wedge \text{THEME}(e) = \textit{the dog} \\ \text{c. } \llbracket \text{VoiceP} \rrbracket: \lambda e. [\text{AGENT}(e) = \textit{mary} \wedge \text{FEED}(e) \wedge \text{THEME}(e) = \textit{the dog}]$$

Kratzer's implementation ensures that the agent is never a true argument of the verb. It is this property that leads to the observations in (1)–(2). The proposal also makes a further testable prediction: given that the external argument is never contained in the VP, then any modifier that can target VP-type constituents should be able to make semantic contributions that *exclude the external argument*. One modifier with the right properties for testing this prediction is the presupposition trigger *again*. *Again* is standardly treated as a modifier of event predicates (type $\langle \langle v, t \rangle, \langle v, t \rangle \rangle$) that introduces a presupposition that an event of the sort denoted by its

argument occurred previously (von Stechow 1996; Beck & Johnson 2004; Bale 2007). Importantly, *again*'s presupposition is *uniquely determined by the event predicate it takes as argument*.

- (8) $\llbracket \textit{again} \rrbracket (P)$ is defined iff $\exists e^1 \exists e^2 [e^1 < e^2 < E \wedge P(e^1) \wedge \neg P(e^2)]$, i.e., iff there are two events e^1 and e^2 such that e^1 temporally precedes e^2 , which temporally precedes a contextually specified event E , and both e^1 and e^2 are P events.

When defined, $\llbracket \textit{again} \rrbracket (P) = P$.

(Bale 2007: 451)

As Bale (2007) notes, if external arguments are always severed from the verb, then the VP comprising the verb and its internal argument is of the right type for *again* to modify. Additionally, since the VP contains no specification of the external argument, *again* will simply presuppose that an event with the same internal argument occurred previously. The external argument of this previous event may therefore differ from that of the asserted event, producing what Bale dubs a *subjectless presupposition*. As Bale demonstrates, such subjectless presuppositions are indeed attested with eventive transitive verbs, such as *hit* and *kick*. The contexts below specify that two distinct agents carried out the previous and the at-issue event, indicating that *again*'s presupposition indeed excludes the agent argument in the (a) examples. Note that the availability of a subjectless presupposition is sensitive to the linear placement of *again* (von Stechow 1996; Beck & Johnson 2004); in the (b) examples, *again* appears to the left of the agent argument, indicating it must take the agent in its scope and therefore include it in its presupposition, explaining the infelicity of the (b) sentences in the given contexts. The (c) examples involve passivized versions of the verb, standardly assumed to existentially quantify the agent argument introduced by a passive VOICE head, and are therefore also compatible with the given contexts.

- (9) CONTEXT: Seymour's dryer broke. He called **a repairwoman who simply hit the dryer until it started working**. The dryer broke down two days later. So ...

- a. Seymour hit the dryer again.
- b. #Again Seymour hit the dryer.
- c. The dryer was hit again.

- (10) CONTEXT: **Brendan kicked the soccer ball towards the net**, but it didn't quite make it. So ...

- a. Anne kicked it again.
- b. #Again Anne kicked it.
- c. It was kicked again.

(Bale 2007: 464)

The examples in (9)–(10) suggest that Kratzer's approach is on the right track, and there is indeed a VP constituent excluding the agent argument. Nonetheless, Bale makes a crucial observation; unlike (9)–(10), eventive intransitive verbs and stative transitive verbs uniformly reject subjectless presuppositions with *again*. Importantly, examples with unergative verbs like *run* in (11) show that subjectless presuppositions are not uniformly available with agent arguments.

- (11) CONTEXT: Last week, **Jon's wife ran all morning**. Then after she got home, Jon was able to do some exercise. So ...
 a. #Jon ran again.
 b. #Again Jon ran. (intransitive (unergative))
- (12) CONTEXT: **Seymour's wife was the first person ever to arrive at the new airport**. Then a week later ...
 a. #Seymour arrived again.
 b. #Again Seymour arrived. ((intransitive unaccusative))
- (13) CONTEXT: **Seymour's mother loved Frank** although she was the only one who did. After a while she no longer cared for Frank. However, Seymour became attached to the man, and developed strong feelings for him after his mother's love subsided. So ...
 a. #Seymour loved Frank again.
 b. #Again Seymour loved Frank.
 c. Frank was loved again. (stative transitive)
- (14) CONTEXT: **Seymour's sister hated George**. But she seemed to be the only one who did. After a while George worked his charm on her and the hatred subsided. After a few months, Seymour realized that George's charm was all an act. Underneath, he was pure evil. So ...
 a. #Seymour hated George again.
 b. #Again Seymour hated George.
 c. George was hated again. (stative transitive)
 (Bale 2007: 469–471)

On the basis of this evidence, Bale concludes that the availability of a subjectless presupposition with *again* turns on the transitivity and eventivity of the VP in question, which in turn suggests that not all external arguments can be severed from their verbs. Rather, stative transitive verbs and intransitive verbs uniformly denote functions from all of their arguments, ruling out subjectless presuppositions. More formally, stative transitive verbs are of type $\langle e, \langle e, \langle v, t \rangle \rangle \rangle$ (15a) and eventive intransitive verbs of type $\langle e, \langle v, t \rangle \rangle$. This is in contrast to eventive transitive verbs, which return an event predicate when supplied with an internal argument (15d), explaining their compatibility with subjectless presuppositions. The entries for examples of each verb class discussed above are provided in (15).

- (15) a. $[[love]]: \lambda y. \lambda x. \lambda e. \text{EXPERIENCER}(e) = x \wedge \text{LOVE}(e) \wedge \text{THEME}(e) = y$
 b. $[[run]]: \lambda x. \lambda e. \text{AGENT}(e) = x \wedge \text{RUN}(e)$
 c. $[[arrive]]: \lambda x. \lambda e. \text{ARRIVE}(e) \wedge \text{THEME}(e) = x$
 d. $[[hit]]: \lambda x. \lambda e. \text{HIT}(e) \wedge \text{THEME}(e) = x$

3 Intentional killing and ingestion verbs

Bale's observations lead to the conclusion that certain classes of verbs must denote functions from their external arguments while others do not in (15a)–(15d), thereby explaining the distribution of subjectless presuppositions with *again*. Type-theoretically, this explanation seems adequate and correctly predicts when a subjectless presupposition is (un)expected with *again*. Nonetheless, this approach raises two important questions. First, on an empirical level, does Bale (2007)'s conclusion hold up across sub-classes of transitive verbs, whether eventive or stative? Second, does the fact that a particular class of verbs resists subjectless presuppositions necessitate the analysis that Bale suggests, on which the agent is not severed from verbs of certain classes?

In this section, we suggest that the answer to the first question is negative, illustrating with two transitive verb classes that resist subjectless presuppositions, verbs of ingestion and verbs of intentional killing. We also provide a negative answer to the second question, and propose a unified analysis of verbs that resist subjectless presuppositions without positing differences in the manner in which verbs ultimately associate with their external arguments.

Beginning with the first question, we identify two eventive transitive verb classes that resist subjectless presuppositions, contrary to what is expected given Bale's observations. The first class consists of intentional verbs of killing, such as *murder*, *assassinate*, *slay*, etc. As shown at length by Ausensi et al. (2021), these verbs systematically require that any previous event satisfying *again*'s presupposition be carried out by the same agent, ruling out subjectless presuppositions.¹

- (16) CONTEXT: In a Hollywood slasher movie, **Mike Myers murdered Bill**. Bill was revived by a sorcerer, but after chasing the revived Bill down, ...
- a. #Freddy murdered Bill again.
 - b. Mike Meyers murdered Bill again.
- (17) CONTEXT: The king of Genovia is visiting a local town. Suddenly, **Bill jumped out of the shadows and assassinated him**. The king's court sorcerer was able to bring the king back from the dead, but emerging from hiding in a fit of rage, ...
- a. #Mary assassinated the king again.
 - b. Bill assassinated the king again. (Ausensi et al. 2021: 7)

Interestingly, as has been noted by many, semantically similar verbs like *kill*, which at least shares some subset of the lexical entailments of intentional verbs of killing, freely license subjectless presuppositions with *again*.

¹ Two anonymous reviewers point out a significant amount of variation in the availability of subjectless presuppositions with verbs of intentional killing: one reviewer disagrees with the judgments, while another reports judgments from three speakers, one of whom accepts subjectless presuppositions in all of (16–17). While we cite Ausensi et al. (2021) as a published source for the judgments, we acknowledge the variation that exists within this class, and attempt to account for it in the analysis to come.

- (18) CONTEXT: In a Hollywood monster movie, **Seymour's father killed the zombie**. But, being a Hollywood movie, of course they came back to life. But in the end ...
Seymour killed the zombie again. (Bale 2007: 465)

The second class consists of verbs of ingestion, such as *eat*, *drink*, *swallow*, etc. In contexts establishing distinct agents between the presupposed and asserted events, we see plainly that *again* does not produce subjectless presuppositions when modifying verbs of this class; a different agent ingesting the theme previously does not license the use of *again*.²

- (19) CONTEXT: **John ate a slice of cheesecake**. He got punched in the gut, causing him to spit the cake back into his bowl. Then, Tim came up, grabbed his spoon, and unknowingly...
a. #Tim ate the slice of cheesecake again.
b. #Again, Tim ate the slice of cheesecake.
- (20) CONTEXT: **John drank a glass of red wine**. He got punched in the gut, causing him to spit the wine back into his cup. Then, Bill came up, grabbed the cup, and unknowingly...
a. #Bill drank the wine again.
b. #Again, Bill drank the wine.

Taken together, we see that, *contra* Bale (2007), transitivity and eventivity are not the only criteria regulating the availability of subjectless presuppositions with *again*. There are clearly eventive transitive verbs that resist subjectless presuppositions, alongside intransitive and stative transitive verbs.

² An anonymous reviewer presents an argument against our claim that verbs of ingestion disallow subjectless presuppositions based on the following example.

- (i) Each town has its own giant, which regularly eats people who wander into the town. Town 1 has a giant named Gobble, Town 2 has a giant named Lizkers, and Town 3 has a giant named Mizzie. Poor John kept getting eaten and spat out, over and over, as soon as we set out each day. On the first day, we set off and Gobble ate him right away. The next day, we set off and Lizkers ate him again. On the third day, Mizzie ate him again.

While we don't agree with the reviewer that this example is felicitous, we accept that it may be felicitous for the reviewer. To the extent that variation exists in these cases, it seems that, of the class of ingestive verbs, it is only *eat* that exhibits such variation. For example, *drink* and *swallow* seem to be simply incompatible with a context that allows for subjectless presuppositions with *again*. This is reminiscent of an observation in Ausensi et al. (2021) with the class of intentional killing verbs, where *murder*, being the least manner-specified verb in its class compared to other verbs like *assassinate* and *massacre*, similarly has been pointed out by reviewers to show significant variation amongst speakers in allowing subjectless presuppositions, whereas other verbs in the class strongly resist them. One intuitive explanation, then, is that as the least specified and most general verbs of their class, *eat* and *murder* are most susceptible to change in terms of how they refer to their agents (as outlined in footnote 8 in terms of using an index or a thematic role function), and therefore show the most variation with respect to subjectless presuppositions. Nevertheless, this does not invalidate the argument that as a class, these verbs generally resist subjectless presuppositions.

Moving on now to the second question, what might be the intuitive explanation behind why intentional killing and ingestion verbs resist subjectless presuppositions, while semantically similar verbs like *kill* do not? Our answer begins with the observation that both classes of verb make reference to the agent in more than one component of their meaning. For verbs of intentional killing, this lies in entailments about the *agent's intentions to kill*, while for verbs of ingestion, this lies in reference to the ingester in the result state component of the verb's lexical semantics. We address each of these points in turn.

As Ausensi et al. (2021) note, one key difference between *kill* and intentional verbs of killing, as suggested by the label used here, concerns the entailment of *intentionality of the agent* in carrying out a killing event. While intentional killing verbs require that the agent intentionally carry out the event, *kill* does not. Evidence for this comes from the possibility of non-animate causer subjects and modification by adverbial phrases that cancel or reinforce intentionality entailments, such as *by accident* or *on purpose*. *Kill* permits such subjects and adverbials while intentional killing verbs do not. This suggests that intentional killing verbs lexically entail intentionality.

- (21) a. Floods killed thousands.
 b. Cancer killed two million people last year.
 c. That weapon killed thousands.
- (22) a. #Cancer murdered every man in that hospital.
 b. #Pneumonia assassinated every US president.
 c. #That magical dust slew the dragon.
- (23) a. #Floods murdered five US citizens.
 b. #Strong winds assassinated the president.
 c. #The magical storm slew the dragon.
- (24) a. #That weapon murdered my brother.
 b. #The poison from that snake assassinated the president.
 c. #The magical sword slew the dragon.
- (25) John killed Tom by accident / on purpose.
- (26) a. #John murdered Tom by accident / on purpose.
 b. #The wizard slew the ogre by accident / on purpose.
 c. #The sniper assassinated the president by accident / on purpose.

(Ausensi et al. 2021: 8–9)

Moving on to verbs of ingestion, there is a significant precedent for analyzing these as bi-eventive change-of-state verbs. On this treatment, these verbs encode an entailment of *motion*, in which a theme argument moves into a body part specified as part of the agent (Jackendoff 1996;

Krejci 2012; Jerro 2019). For example, Jackendoff (1992) analyzes the verb *drink* as having the conceptual semantic structure as that of a verb of caused motion; the theme moves along a path to a location inside an individual's mouth. Notably, as shown in (27), the individual whose mouth the theme ends up in is represented twice in the semantic representation: once as the *causer of the event*, and one as the *inalienable possessor of the location the theme ends up in*, as indicated through the co-indexing of the relevant arguments.

- (27) $[_{Event} \text{ CAUSE}([_{Thing} \text{ CAUSER }]_i, [_{Event} \text{ GO}([_{Thing} \text{ LIQUID}]_j, [_{Path} \text{ TO}([_{Place} \text{ IN}([_{Thing} \text{ MOUTH OF}([_{Thing} \text{ CAUSER }]_i)])])])])])]$

One can see some motivation for a semantics involving change of location in the following, where attempting to cancel an entailment of change of location into someone's body is infelicitous with a verb of ingestion.

- (28) John ate the salmon, #but it didn't go inside him.

Other work has argued for similar representations for the lexical semantics of ingestion verbs on the basis of other entailments associated with this verb class. For example, Krejci (2012) argues that ingestive verbs like *eat* are *lexically reflexive*, such that the causer argument is coindexed with an argument of a transitive *digested-by* relation with the theme argument such that the causer digests the theme.³ On Krejci's approach, the event structure template of an ingestive verb like *eat* in the style of Rappaport-Hovav & Levin (1998) is provided in (29) below; here, an actor *x* acts in a food-manipulating way that causes some object *y* to potentially become digested.

- (29) eat: $[[\text{ACT}_{\text{manipulate-food}}(x)] \text{ CAUSE } [\text{BECOME}_{\text{potentially-digest}}(x,y)]]$

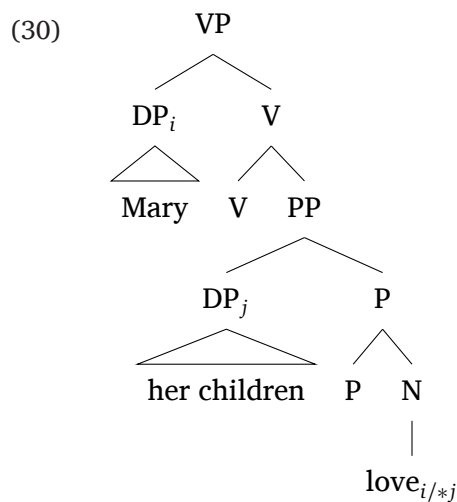
(Krejci 2012: 42–43)

While this differs from Jackendoff (1992), for whom the relevant result state involves a change of location in (27), what is crucial is that in both proposals ingestive verbs are lexically reflexive, encoded via a form of coindexation between the agent of the event and holder of the result state of the event. If verbs of ingestion involve coindexation of their agent with an argument of the result state component of its meaning, then we have the beginnings of an explanation for why these verbs resist subjectless presuppositions with *again*: even if their agents are introduced outside of the lexical VP, an argument within the lexical VP must be coindexed with the agent, and this coindexation persists within *again*'s presupposition.

The idea that particular verb classes track their external arguments via an indexation mechanism has independent precedent in the analysis of stative transitive verbs of emotion, such as *love* and *respect* due to Hale & Keyser (2002). On their analysis, stative transitive verbs

³ There is more direct morphosyntactic evidence from languages outside of English. For example, ingestive verbs appear with middle morphology that is characteristic of inherently reflexive verbs in the Bolivian language Movima (Haude 2006; Jerro 2019).

are built out of a corresponding nominal form bearing an anaphoric index in a relational, prepositional sub-structure. Importantly, this index, which intuitively references the ‘possessor’ of the emotional state in question, must not corefer with the closer theme argument in (30) and must instead be bound by the external subject experiencer argument, what Hale & Keyser (2002) refer to as an *obviative* binding relationship. That is, *Mary loves her children* intuitively means Mary has *her own love* for her children and *cannot* be interpreted as Mary has *her children’s love* for her children.



(based on Hale & Keyser 2002: 42)

Hale & Keyser (2002) argue for this representation by considering the alternation of verbs like *love* in an overt possession construction in its nominal form in (31a); here, the genitive pronoun referencing the ‘possessor’ of the emotion cannot corefer with the surface subject. Furthermore, with an intervening DP indirect object in a double object construction with *give* (31b), coreference is possible now only with the structurally more distant surface subject.

- (31) a. Mary_i has her_{*i/j} love.
 b. Mary_j gives her daughter_i all her_{*i/j} love.

What’s more, as noted by Bale (2007), and discussed in section 2 above, this class of stative transitive verbs is similar to intentional verbs of killing and ingestive verbs in being infelicitous with subjectless presuppositions. Given this similarity, and the general cross-referencing of external arguments across these three verb classes, we take such an indexation mechanism to be the key property that explains the absence of subjectless presuppositions with *again* observed with these verbs. The challenge is to formalize this in an explicit compositional semantics that explains how these classes of verbs interact with *again*’s presupposition. We turn to this in the following section.

4 Analysis

4.1 Formal implementation

As in the previous section, we take seriously the intuition that there is some form of coindexation between the argument positions encoded in the lexical semantics of intentional verbs of killing and ingestive verbs, and that it is this property that explains their incompatibility with subjectless presuppositions. Formally, we take an *index* to be represented simply by a natural number, variables over which we represent with n . This index is mapped to an individual by an *assignment function*, notated g , as is standard following Heim & Kratzer (1998). The resulting individual, of type e , is notated $g(n)$, the individual returned by applying the assignment g to the index n . On Jackendoff's (1992) style of analysis in which ingestive verbs encode change-of-location, we may give a verb like *eat* the following denotation, where the index $g(1)$ serves as the 'possessor' of the body part into which the theme moves. The verb *drink* is a function from individuals x to predicates of drinking events e which cause a state s of x being within $g(1)$.⁴

$$(32) \quad \llbracket \textit{drink}_1 \rrbracket^g: \lambda x. \lambda e. \text{DRINK}(e) \wedge \exists s [\text{CAUSE}(e, s) \wedge \text{IN}(s, x, g(1))]$$

Upon composing with its internal argument, the verb returns a predicate of events of drinking, with an index specifying the location in which the theme ends up. The next step is to determine how this index is mapped to the agent of the event. Following Kratzer (1996), we introduce the agent argument *outside* of the VP through a functional head in the extended projection of the verb, particularly VOICE. Further, following Kratzer (2009), verbal functional heads effect

⁴ As a simplifying assumption, we forego further decomposition of ingestive verbs into separate eventive and stative subconstituents, as is common in the analysis of result verbs, such as *open* (von Stechow 1996). Nevertheless, an anonymous reviewer points out that *restitutive* readings of *again*, where *again* presupposes the restoration of a prior state entailed by the verb, are in fact available with verbs of ingestion. We provide two of the reviewer's examples, which were found on the internet, to support this claim.

- (i) a. Is it okay to let my dog **eat the vomit again** once they have vomited?
<https://bettervet.com/resources/pet-health-care/vets-discuss-home-treatment-for-dogs-vomiting-bile>
- b. Newts that eat too much or eat something way too big will vomit it back out. I've seen mine do it. They are pretty stupid, though, so will try to **eat the vomit again** immediately.
<https://www.caudata.org/threads/will-can-newts-over-eat.69695/>

Crucially, in this example the vomit could not have been eaten before, ruling out a repetitive reading. We take this to be evidence in favor of the bi-eventive approach to ingestive verbs, and thus to support our general approach.

The reviewer makes a further claim, however, that it is possible to substitute the subject between the presupposed and asserted events, such that, in a context where one's son vomited, it is possible for the doctor to recommend that *you eat your son's vomit again*. We disagree with the reviewer's judgment, and find this latter example infelicitous. We further note that the naturally occurring examples above, which, in agreement with the reviewer, we do find felicitous, involve the same individual across the presupposed and asserted situations. The naturally occurring examples are thus not a problem for our approach, on which the index is located in the result state component of the verb's meaning.

binding of indices.⁵ This can be implemented by having the functional head VOICE map an index in its complement to the argument it introduces. Formally, VOICE shifts the assignment function g to an assignment just like g , except that it maps index n to some individual x .⁶ This shifted assignment is notated $g[n \rightarrow x]$, as in (33) below. In this case, VOICE maps the index in its complement to its individual argument. Since VOICE also encodes a condition that this individual be the agent of its event argument, this has the effect of mapping the index to the agent of the event, as desired. A full derivation is provided in (34).

$$(33) \quad \llbracket \text{VOICE}_1 \rrbracket^g: \lambda V_{v,t}. \lambda x. \lambda e. \text{AGENT}(e) = x \wedge \llbracket V \rrbracket^{g[n \rightarrow x]}(e)$$

- (34) a. $\llbracket \text{drink}_1 \text{ wine} \rrbracket^g: \lambda e. \text{DRINK}(e) \wedge \exists s [\text{CAUSE}(e,s) \wedge \text{IN}(s, \text{wine}, g(\mathbf{1}))]$
 b. $\llbracket \text{VOICE}_1 \text{ drink}_1 \text{ wine} \rrbracket^g: \lambda x. \lambda e. \text{AGENT}(e) = x \wedge \text{DRINK}(e) \wedge \exists s [\text{CAUSE}(e,s) \wedge \text{IN}(s, \text{wine}, x)]$
 c. $\llbracket \text{Tom VOICE drink wine} \rrbracket^g: \lambda e. \text{AGENT}(e) = \text{tom} \wedge \text{DRINK}(e) \wedge \exists s [\text{CAUSE}(e,s) \wedge \text{IN}(s, \text{wine}, \text{tom})]$

We can now confirm that even if *again* attaches to VP, the attachment site assumed by Bale (2007) to produce subjectless presuppositions, it will nonetheless include a representation of the agent within its presupposition. Assuming the lexical entry of *again* as in (8), repeated below, attaching it to the VP in (34a) will produce a presupposition that includes the index $g(\mathbf{1})$, which is then compositionally mapped to the agent argument *Tom* after VOICE is introduced (36). In other words, the effect of binding persists in *again*'s presupposition through the use of an anaphoric index, with VOICE being the locus of binding of this index.

$$(35) \quad \llbracket \text{again} \rrbracket P \text{ is defined iff } \exists e^1 \exists e^2 [e^1 < e^2 < E \wedge P(e^1) \wedge \neg P(e^2)].$$

When defined, $\llbracket \text{again} \rrbracket P = P$.

(Bale 2007: 451)

- (36) a. Presupposition produced when attaching to VP in (34a):
 $\exists e^1 \exists e^2 [e^1 < e^2 < E \wedge [\text{DRINK}(e^1) \wedge \exists s^1 [\text{CAUSE}(e^1, s^1) \wedge \text{IN}(s^1, \text{wine}, g(\mathbf{1}))]] \wedge \neg [\text{DRINK}(e^2) \wedge \exists s^2 [\text{CAUSE}(e^2, s^2) \wedge \text{IN}(s^2, \text{wine}, g(\mathbf{1}))]]]$
 b. Presupposition after VOICE is introduced in (34c):
 $\exists e^1 \exists e^2 [e^1 < e^2 < E \wedge [\text{DRINK}(e^1) \wedge \exists s^1 [\text{CAUSE}(e^1, s^1) \wedge \text{IN}(s^1, \text{wine}, \text{tom})]] \wedge \neg [\text{DRINK}(e^2) \wedge \exists s^2 [\text{CAUSE}(e^2, s^2) \wedge \text{IN}(s^2, \text{wine}, \text{tom})]]]$

⁵ By *binding*, we do not mean the syntactic relationship familiar from classical Government and Binding Theory (Chomsky 1981). Instead, we mean a semantic dependency between a variable and an instance of lambda abstraction over that variable. Here, what is meant by *effecting binding* is manipulating an assignment function in the abstraction's scope so that the new assignment maps an index to the variable bound by the λ prefix. We thank an anonymous reviewer for asking us to clarify this point.

⁶ This is a standard technique in the analysis of bound pronouns, especially those bound by quantified noun phrases (Heim & Kratzer 1998), and, more generally, any phenomenon involving covariation of variables with a higher argument.

With the above tools in place, it becomes straightforward to extend this account to verbs of intentional killing. As noted previously, the key lexical entailment of verbs of intentional killing that separates them from verbs like *kill* is that of intentionality itself, and this plays a role in determining the availability of subjectless presuppositions. Following Beavers & Koontz-Garboden (2012) and Ausensi et al. (2021), we analyze verbs like *murder* as involving an *intentional caused change-of-state* towards a result state of death. Intentionality here is analyzed as a modal notion involving universal quantification over possible worlds compatible with the intentions of the agent, written here as a meaning postulate of the relation $\text{MURDER}(e)(\mathbf{g}(\mathbf{1}))(e)$ in (37) (Ausensi et al. 2021).⁷ We can indicate the agent's intentions with an anaphoric index on *murder*, as we did previously with verbs of ingestion, with VOICE ultimately binding this index and mapping it to the agent argument it introduces, as in (38).⁸

- (37) $\llbracket \text{murder}_1 \rrbracket^{\mathfrak{s}}: \lambda x. \lambda e. \lambda w. [\text{MURDER}(e)(\mathbf{g}(\mathbf{1}))(w) \wedge \text{THEME}(e)(w) = x]$
 where $\text{MURDER}(e)(\mathbf{g}(\mathbf{1}))(w) = 1$ iff $\exists s[\text{CAUSE}(e,s) \wedge \text{DEAD}(s) \wedge \text{HOLDER}(s) = \text{THEME}(e)] \wedge \forall w'[\text{INTENTION}_w^{\mathfrak{s}(1)}(w') \rightarrow \exists e'[\text{AGENT}_{w'}(e') = \mathbf{g}(\mathbf{1}) \wedge \exists s[\text{CAUSE}_{w'}(e',s) \wedge \text{DEAD}_{w'}(s)]]]$
- (38) a. $\llbracket \text{murder}_n \text{ Frank} \rrbracket^{\mathfrak{s}}: \lambda e. \lambda w. [\text{MURDER}(e)(\mathbf{g}(\mathbf{1}))(w) \wedge \text{THEME}(e)(w) = \text{frank}]$
 b. $\llbracket \text{VOICE murder Frank} \rrbracket^{\mathfrak{s}}: \lambda x. \lambda e. \lambda w. [\text{AGENT}(e)(w) = x \wedge \text{MURDER}(e)(x)(w) \wedge \text{THEME}(e)(w) = \text{frank}]$

⁷ The careful reader might notice that, in our truth conditions for *murder*, no representation for the holder argument is provided in the modal component of the truth conditions. This is because one can be said to have murdered an individual, even if the murdered individual is not the one who was intended to be killed. This can be seen from the felicity of the following sentence in the context below.

- (i) CONTEXT: John hatches a plan to kill Burt. He sneaks into Burt's house at night, and kills someone he believes to be Burt. However, when he shines his light on the body, John realizes that the man he has killed is in fact Burt's neighbor Steve, who has been watching the house while Burt is away.
 John murdered Steve.

From this example, we can see that the presence of intention to kill is enough to render the use of *murder* felicitous, even if the theme of the event is not the intended target of the murder.

⁸ As pointed out in footnote 1, there is some variation among speakers with respect to the acceptability of subjectless presuppositions with verbs of intentional killing. This variation can be accommodated on our approach by replacing the index in the verb's intentionality entailment with $\text{AGENT}(e)$, which merely picks out the individual acting as agent of the event in question. For these speakers, the intentionality entailment would simply be as follows:

- (i) $\forall w'[\text{INTENTION}(w') \rightarrow \exists e'[\text{AGENT}_{w'}(e') = \text{AGENT}_w(e) \wedge \exists s[\text{CAUSE}_w(e,s) \wedge \text{DEAD}_w(s)]]]$

Unlike the indexation analysis, which would map the index to a particular individual independently of their role in an event, $\text{AGENT}(e)$ returns whichever individual is the agent of the event in question. This means that, in the presupposition of *again*, $\text{AGENT}(e)$ will return the agent of the presupposed event, which is not constrained to be the same as the agent of the asserted event. This would allow for subjectless presuppositions with verbs of intentional killing for some speakers, and would pin the variation on whether a given speaker possesses an indexation-based semantics for intentional killing verbs or a semantics merely making reference to the agent of the event. In both cases, intentional killing verbs do not need to be analyzed as *functions* from their agents arguments in order to make some reference to them in their lexical entailments.

- c. $\llbracket \text{Tom VOICE murder Frank} \rrbracket^{\text{g}}$: $\lambda e.\lambda w.[\text{AGENT}(e)(w) = \text{tom} \wedge \text{MURDER}(e)(\text{tom})(w) \wedge \text{THEME}(e)(w) = \text{frank}]$

As with verbs of ingestion, scoping *again* over the VP to the exclusion of the agent-introducing VOICEP will nonetheless produce a repetitive presupposition that includes the index that is eventually mapped to the agent argument (38c). This therefore predicts the lack of a subjectless presupposition as desired, since the meaning postulate in (37) ensures here that Tom will always be the agent of the presupposed prior murdering event.

- (39) a. Presupposition produced when attaching to VP in (38a):
 $\exists e^1 \exists e^2 [e^1 < e^2 < E \wedge [\text{MURDER}(e^1)(\mathbf{g}(1))(w) \wedge \text{THEME}(e^1)(w) = \text{frank}] \wedge \neg \dots]$
- b. Presupposition produced after VOICE is introduced (38c):
 $\exists e^1 \exists e^2 [e^1 < e^2 < E \wedge [\text{MURDER}(e^1)(\mathbf{tom})(w) \wedge \text{THEME}(e^1)(w) = \text{frank}] \wedge \neg \dots]$

To complete the overall picture, we can easily extend the same treatment to transitive verbs of emotion as discussed previously, adopting Hale & Keyser's (2002) insight that such verbs involve indexing the inalienable possessor of the emotional state encoded in the verb. For example, we may indicate the lexical content of a transitive stative verb of emotion like *love* as the relation LOVE-OF between a state of love and its inalienable possessor. As with the examples involving ingestive verbs and intentional verbs of killing, modification of the VP by *again* will produce a presupposition that contains an index, which will be bound by the experiencer argument introduced by a different 'flavor' of index-binding VOICE (Kratzer 1996; Folli & Harley 2005), deriving the same observation that such verbs resist subjectless presuppositions.

- (40) $\llbracket \text{love}_i \rrbracket^{\text{g}}$: $\lambda x.\lambda s.\text{LOVE-OF}(\mathbf{g}(1))(s) \wedge \text{THEME}(s) = x$

Importantly, we see that the unavailability of subjectless presuppositions is not exclusively tied to either transitivity or the eventivity/stativity distinction, as suggested by Bale (2007). It is also not tied to the thematic interpretation of the external argument as agent versus experiencer: there are classes of eventive transitive verbs whose agents cannot be excluded from the presupposition of *again*. Rather, the unavailability of subjectless presuppositions is further determined by verb class, as a result of lexical entailments inherent to certain kinds of verbs that reference their external arguments in different ways, explaining the absence of subjectless presuppositions with a seemingly idiosyncratic set of verb classes. Importantly, however, this does not mean that a Kratzerian approach that severs agents from their verbs is untenable: rather, indices on verbs of certain classes can be bound by functional heads that map said indices to the agent argument the head introduces. This allows for a uniform compositional severing of external arguments from the lexical VP while enabling individual verbs to include some reference to their external arguments via an independently motivated bound index.

4.2 Indices eliminate subjectless presuppositions: reflexive objects

Given that the presence of bound variables within the VP leads to the absence of subjectless presuppositions with *again*, we expect that binding of indices may generally lead to the absence of such presuppositions, even with verbs that are otherwise compatible with them. We consider the case of *reflexive pronouns in object position*, which Kratzer (2009) treats as minimal pronouns, essentially an index bound by the closest external-argument introducing head VOICE.⁹ The semantic derivation is familiar, utilizing an index that saturates the internal argument position of a verb like *blame*. VOICE shifts the index to the agent argument as before, and a reflexive interpretation is derived once the individual denoted by the DP in the specifier of VoiceP saturates the individual argument.¹⁰

(41) I blame myself.

$[_{VoiceP} I [VOICE_n [_{VP} blame g(n)]]]$

(42) a. $[[VOICE_n]_g: \lambda V. \lambda x. \lambda e. AGENT(e) = x \wedge [[V]_g^{[n \rightarrow x]}(e)$

b. $[[blame]: \lambda x. \lambda e. BLAME(x)(e)$

c. $[[blame g(n)]: \lambda e. BLAME(g(n))(e)$

d. $[[VOICE blame g(n)]: \lambda x. \lambda e. AGENT(x)(e) \wedge BLAME(x)(e)$

e. $[[I VOICE blame g(n)]: \lambda e. AGENT(I)(e) \wedge$

$BLAME(I)(e)$

(adapted from Kratzer 2009: 194)

Note now that when the theme is a reflexive pronoun, the VP in (42c) denotes a predicate of events, but crucially, one that contains an index that will ultimately be bound by the agent argument. Because this is the exact configuration that rules out subjectless presuppositions with the verb classes discussed above, we predict that *subjectless presuppositions should be impossible* with *again* whenever the theme object argument is a reflexive pronoun, regardless of whether the verb in question is compatible with subjectless presuppositions in the absence of a reflexive pronominal object. This prediction is indeed borne out. Recall that an eventive transitive verb like *hit* was independently shown to allow subjectless presuppositions in (9), repeated below.

(43) CONTEXT: Seymour's dryer broke. He called **a repairwoman who simply hit the dryer until it started working**. The dryer broke down two days later. So ...

a. Seymour hit the dryer again.

b. #Again Seymour hit the dryer.

c. The dryer was hit again.

⁹ Kratzer (2009) labels this as little v , though it is assumed this is equivalent to the head in Kratzer (1996), which is labelled VOICE.

¹⁰ For consistency we have used our own compositional setup, rather than Kratzer's which opts for abstracting over the numerical index in the syntax.

However, if the object is a reflexive pronoun, subjectless presuppositions become impossible. This follows directly from Kratzer's (2009) analysis of reflexive pronouns as indices: since the reflexive is bound by the agent argument in the assertion, the theme of the asserted hitting event in (44) must be Seymour's father. Therefore, the context involving Seymour hitting himself will not satisfy *again's* presupposition.

- (44) CONTEXT: **Seymour** messed up on his exam and was so angry that **he hit himself** repeatedly. Later on, he calmed down and sat down next to his father. After learning that Seymour messed up on his exam and feeling guilty that he did not help Seymour with his schoolwork, Seymour's father got so angry that...
Seymour's father hit himself again.

An analysis along the lines of Kratzer (2009) for reflexive pronouns makes another prediction regarding subjectless presuppositions with *again*. Assuming *again* attaches to a VP containing an index that saturates the theme argument of the verb as in (9), the repetitive presupposition produced simply specifies that the theme of the presupposed prior event must be co-referential with the agent of the asserted event. Unlike with ingestive and intentional verbs of killing, this index *need not be specified as being the agent of the presupposed event*. We illustrate the presupposition with a verb like *hit* in (45) for the asserted sentence in (44).

- (45) a. Presupposition produced attaching to reflexive VP with *hit*:
 $\exists e^1 \exists e^2 [e^1 < e^2 < E \wedge [\text{HIT}(e^1) \wedge \text{THEME}(e^1) = \mathbf{g(n)}] \wedge \neg [\text{HIT}(e^2) \wedge \text{THEME}(e^2) = \mathbf{g(n)}]]$
- b. Presupposition after VP combines with VOICE:
 $\exists e^1 \exists e^2 [e^1 < e^2 < E \wedge [\text{HIT}(e^1) \wedge \text{THEME}(e^1) = \mathbf{\text{seymour's-father}}] \wedge \neg [\text{HIT}(e^2) \wedge \text{THEME}(e^2) = \mathbf{\text{seymour's-father}}]]$

Given the presupposition derived above, we predict two ways of satisfying it. First, a context in which Seymour's father hits himself will straightforwardly satisfy *again's* presupposition in (45), since here the agent argument of the reflexive event is straightforwardly the theme of the presupposed prior event. More interestingly, because the presupposition only imposes the requirement that the asserted agent be the theme of any presupposed prior event, we predict that the presupposed prior event can be carried out by a different agent *only if the theme of the presupposed event is co-referential with the agent of the asserted event*, since the index saturates only the verb's theme argument. This is indeed borne out, as demonstrated in (46).

- (46) CONTEXT: **Seymour** messed up on his exam and was so angry that **he hit his father** repeatedly. Later on, he managed to calm down and sat down next to his father. After seeing how agitated Seymour got over schoolwork and feeling guilty that he did not help Seymour with his schoolwork, Seymour's father got angry with himself and...
Seymour's father hit himself again.

On the other hand, we do not make the same prediction with ingestive verbs and verbs of intentional killing even with reflexive themes. This is because even with reflexive objects, the verb itself nonetheless will contain an index tracking the agent argument of the verb. Contexts like (46) are predicted not to satisfy *again*'s presupposition even if *again* modifies a VP containing a reflexive object, since a second index will reference the agent argument according to verb-specific lexical entailments. We can illustrate this with *slay* in (47) below; the key observation is that with a reflexive object, the VP itself will contain two separate indices indexing both the agent argument and the theme argument, both of which will be mapped to the agent argument that VOICE introduces.

(47) Tom slew himself.

- a. $[[slay_1 g(1)]^*]: \lambda e.\lambda w.[SLAY(e)(g(1))(w) \wedge THEME(e)(w) = g(1)]$
- b. $[[VOICE slay_1 g(1)]^*]: \lambda x.\lambda e.\lambda w.[AGENT(x)(e) \wedge SLAY(e)(x)(w) \wedge THEME(e)(w) = x]$
- c. $[[Tom VOICE slay_1 g(1)]^*]: \lambda x.\lambda e.\lambda w.[AGENT(tom)(e) \wedge SLAY(e)(tom)(w) \wedge THEME(e)(w) = tom]$

Unlike in the case of *hit*, we predict that a context analogous to (46), where only the theme argument is co-referential with the asserted agent, will not support a subjectless presupposition with *again* in the case of intentional verbs of killing like *murder*. The intuition here is clear: in addition to the co-indexation of the agent argument with the theme in the assertion, the agent is also referenced by the index in the verb's intentionality entailment. Any prior murdering event satisfying *again*'s presupposition must therefore be intentionally carried out by the asserted agent, who must also be the theme of the event. Simply specifying the asserted agent as the theme of the previous murdering event is insufficient, as demonstrated by (48).

(48) CONTEXT: **The young knight** hated his father, the king's wizard, from a young age because the king only favored his father. After many years, **the knight slew his father** in order to gain the favor of the king. He fled after learning the king cared only about his father's powers. The king feared that losing his wizard would weaken his rule over the land, so he ordered a witch to revive the wizard. The wizard, learning of the king's evil plot to harness his powers to make himself immortal, decided that the best course of action was to end his life, so...

The wizard slew himself again.

Overall, we see that an account of the differential availability of subjectless presuppositions with *again* couched in the binding of indices allows not only for an explanation of the unavailability of subjectless presuppositions with certain verb classes, but also accounts for the interaction between subjectless presuppositions and reflexive objects. Specifically, we see that even eventive transitive verbs, which are typically compatible with subjectless presuppositions, no longer support them when their direct object is a reflexive pronoun. This receives a natural explanation under a binding account since reflexive pronouns uncontroversially require binding.

Adopting a binding account thus allows for a unified analysis of the unavailability of subjectless presuppositions with certain classes of verb and with reflexive objects.

5 Conclusion: On the compositional nature of agent entailments

We have argued here for an account of how verbs make reference to their agent (external) arguments, making use of evidence from the unavailability of subjectless presuppositions with *again*. Specifically, we argued that certain classes of verbs make reference to their agent arguments via an anaphoric index, which is bound a VP-external argument introducing head VOICE that shifts the assignment function to one mapping the index to the argument it introduces. This semantic, binding-theoretic account is independently motivated by prior proposals that present evidence for the presence of reflexive-like behavior in the lexical semantics of verbs in the classes of interest. The account is able to explain the absence of subjectless presuppositions with the relevant classes of verbs, while nevertheless maintaining an analysis on which the agent (and other external arguments, such as experiencers) are introduced VP-externally by a higher functional head. The analysis further permits a unified understanding of the absence of subjectless presuppositions with *again* in the presence of VP-internal bound variables, including reflexive objects of verbs that otherwise permit such presuppositions.

Zooming out to the bigger picture, our analysis leads us to something of a middle road with regard to the compositional status of agents, and external arguments more generally. On the one hand, our proposal does allow verbs of certain classes to encode information related to their agent arguments in such a way that this has demonstrable semantic effects in interaction with other operators. This ability to interact with other operators, such as *again*, is reminiscent of, but ultimately distinct from, the fact that verbs may have entailments relevant to the agent of the event they introduce, of the sort discussed by Dowty (1989) and Wechsler (2005; 2020) (see also Müller & Wechsler 2014). For Dowty and Wechsler, agentive verbs must entail something about properties of their agents; for example, the difference between *sing* and *whistle* depends, among other things, on properties of the agent's vocal chords during the event. A meaning postulate of the sort in (49) can capture this fact.

(49) $\forall e \forall x [[\text{singing}(e) \wedge \text{Agent}(x,e)] \rightarrow \text{moving.vocal.chords}(x)]$

This information, however, seems to behave differently from the sort of verb-internal reference to the agent we have discussed in this article. In particular, it does not seem to interact with subjectless presuppositions with *again* in the same way: the agents may differ between asserted and presupposed singing events, for example, as (50) shows.

(50) CONTEXT: John sang the *Cheers* theme song. Since the song is so catchy, Bill couldn't get it out of his head, so...

Bill sang the *Cheers* theme song again

In this sense, then, the evidence we have discussed in this paper presents a stronger argument that verbs, at least those belonging to certain classes, must encode information about their agents in a way that is compositionally accessible to other operators, and thereby affect the felicity conditions those operators place on a sentence containing them.

On the other hand, however, we maintain that the presence of this information in the verb does not necessitate abandoning a Kratzerian approach to the composition of VPs with their external arguments via a VP-external functional head; if anything, the very existence of subjectless presuppositions with *again* seems to us to require such a compositional setup. Rather, if reference to the agent is encoded in an index on the verb, and argument-introducing functional heads can bind this index to the argument they introduce by shifting the assignment function their complement is evaluated with respect to, then the absence of subjectless presuppositions with verbs in the classes we have studied here can be accounted for without requiring that such verbs denote functions from their agent arguments. Indeed, on this approach, the agent, and external arguments more generally, can be introduced VP-externally in all cases, with the absence of subjectless presuppositions in certain cases arising from the presence of a necessarily bound index within the VP that *again* takes scope over.

In this way, our analysis occupies a middle ground between approaches that systematically sever agents from their verbs (Kratzer 1996) and those that argue that verbs must take their agent arguments as true arguments (Wechsler 2005; Bale 2007). Verbs of certain classes may track their agent argument via indices without denoting functions from that argument.

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The authors have no competing interests to declare.

References

- Ausensi, Josep & Yu, Jianrong & Smith, Ryan Walter. 2021. Agent entailments and the division of labor between functional structure and roots. *Glossa: A journal of general linguistics* 6(1). 53, 1–25. DOI: <https://doi.org/10.5334/gjgl.1207>
- Bale, Alan. 2007. Quantifiers and verb phrases: An exploration of propositional complexity. *Natural Language & Linguistic Theory* 25. 447–483. DOI: <https://doi.org/10.1007/s11049-007-9019-8>
- Beavers, John & Koontz-Garboden, Andrew. 2012. Manner and result in the roots of verbal meaning. *Linguistic Inquiry* 43(3). 331–369. DOI: https://doi.org/10.1162/LING_a_00093
- Beck, Sigrid & Johnson, Kyle. 2004. Double objects again. *Linguistic Inquiry* 35(1). 97–123. DOI: <https://doi.org/10.1162/002438904322793356>
- Chomsky, Noam. 1981. *Lectures on government and binding*. Dordrecht: Foris.
- Dowty, David. 1989. On the semantic content of the notion ‘thematic-role’. In Partee, Barbara & Chierchia, Gennaro & Turner, Ray (eds.), *Properties, types, and meaning Volume II*, 69–130. Dordrecht: Kluwer. DOI: https://doi.org/10.1007/978-94-009-2723-0_3
- Folli, Raffaella & Harley, Heidi. 2005. Flavors of v. In Kempchinsky, Paula Marie & Slabakova, Roumyana (eds.), *Aspectual inquiries*, 99–120. Dordrecht: Springer. DOI: https://doi.org/10.1007/1-4020-3033-9_5
- Hale, Kenneth & Keyser, Samuel Jay. 2002. *Prolegomenon to a theory of argument structure*. DOI: <https://doi.org/10.7551/mitpress/5634.001.0001>

- Haude, Katharina. 2006. *A grammar of movima*: Radboud University, Nijmegen dissertation.
- Heim, Irene & Kratzer, Angelika. 1998. *Semantics in generative grammar*. Blackwell.
- Jackendoff, Ray. 1992. *Semantic structures*. Cambridge, MA: MIT Press.
- Jerro, Kyle. 2019. Ingestive verbs, causatives, and object symmetry in Lubukusu. *Linguistic Inquiry* 50(1). 219–232. DOI: https://doi.org/10.1162/ling_a_00297
- Kratzer, Angelika. 1996. Severing the external argument from its verbs. In Ann Zaring, Laurie & Rooryck, Johan (eds.), *Phrase structure and the lexicon*, 109–137. DOI: https://doi.org/10.1007/978-94-015-8617-7_5
- Kratzer, Angelika. 2009. Making a pronoun: Fake indexicals as windows into the properties of pronouns. *Linguistic Inquiry* 40(2). 187–237. DOI: <https://doi.org/10.1162/ling.2009.40.2.187>
- Krejci, Bonnie. 2012. *Causativization as antireflexivization: A study of middle and ingestive verbs*: University of Texas at Austin MA thesis.
- Marantz, Alec. 1984. *On the nature of grammatical relations*. Cambridge, MA: MIT Press.
- Müller, Stefan & Wechsler, Stephen. 2014. Lexical approaches to argument structure. *Theoretical Linguistics* 40. 1–76. DOI: <https://doi.org/10.1515/tl-2014-0001>
- Rappaport-Hovav, M. & Levin, B. 1998. Building verb meanings. In Butt, Miriam & Geuder, Wilhelm (eds.), *The projection of arguments: Lexical and compositional factors*, 97–134. Stanford, CA: CSLI Publications.
- von Stechow, A. 1996. The different readings of *wieder* ‘again’: A structural account. *Journal of Semantics* 13(1). 87–138. DOI: <https://doi.org/10.1093/jos/13.2.87>
- Wechsler, Stephen. 2005. What is right and wrong about little *v*. In Dimitrova-Vulchanova, Mila & Åfarli, Tor A. (eds.), *Grammar and beyond – Essays in honour of Lars Hellan*. 179–195. Oslo: Novus Press.
- Wechsler, Stephen. 2020. The role of the lexicon in the syntax-semantics interface. *Annual Review of Linguistics* 6. 67–87. DOI: <https://doi.org/10.1146/annurev-linguistics-011619-030349>

