

Mediating relations and the semantics of noun incorporation

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Abstract

Noun incorporation is commonly thought to avoid the weak compositionality of compounds because it involves conjunction of an argument noun with the incorporating verb. However, it is weakly compositional in two ways. First, the noun’s entity argument needs to be bound or saturated, but previous accounts fail to adequately ensure that it is. Second, non-arguments are often incorporated in many languages, and their thematic role is available for contextual selection.

We show that these two weaknesses are actually linked. We examine two languages, Kiowa and English, which generally bar objects from incorporation but allow non-arguments. We show that a mediating relation is required to link the noun to the verb. Absent a relation, the noun’s entity argument is not saturated, and the entire expression is uninterpretable. Objects in these languages are routinely allowed to incorporate in exceptional environments that independently a mediating relation.

We close by beginning to apply this approach to languages that do routinely incorporate objects, and demonstrate that even object incorporation is more complicated in the semantics than mere conjunction.

1 Introduction

This paper brings together two issues in the semantics of word-building to argue that mediating relations are present in the interpretation of many incorporation structures. Compounds are renowned for their “weak compositionality” (Pirrelli, 2002), because the link between the combining parts involves material left to the context; for instance, compare *sundress* to *sunflower*. Noun incorporation is commonly held to be distinct in that sense, because it involves the straightforward composition of an argument noun to incorporating verb, like the West Greenlandic *timmisartu+liur-* [airplane+make-] ‘make an airplane’ (Van Geenhoven, 1998). However, noun-incorporating structures can also show weak compositionality in a number of languages, like Nahuatl, where the incorporated noun in *kočillo+tete’ki* [knife+cut] is the instrument of the described event (Baker 1988: 79). In these cases, the noun’s thematic role is available for contextual selection.

We will demonstrate that the cases of object incorporation also have weak compositionality of a different kind: The noun’s entity argument is not saturated by any noticeably overt morpheme or available functional head. Most of the literature on the semantics of incorporation (and pseudo-incorporation) has argued for a clear composition, based mainly or solely on cases where objects are incorporated. In this paper we focus on two typologically distinct languages that allow many types of noun incorporation, but generally bar objects: Kiowa and English. We will zero in on the systematic semantic environments that do permit object incorporation in these languages, *e.g.*, synthetic compounds in English (*dog catcher*) and control-like incorporation in Kiowa (*čí+kàu+chàn* [[meat+get]+arrive] = ‘come to get meat’). In doing so, we will demonstrate that ‘weak compositionality’ and the availability of object incorporation are crucially linked. Both require the presence of a mediating relation that saturates the noun’s entity argument. Absent this relation, this argument is not saturated, and the entire expression is uninterpretable, so **dog-catch* and **čí+háu-* [meat+get-] are impossible verbs. Mediating relations also fill the gaps that create an impression of weak compositionality, permitting productive incorporation of non-objects.

2 Weak compositionality in object incorporation

Noun incorporation is the combination of a nominal stem with a verbal stem to which it is thematically related. For example, in (1), from West Greenlandic, the object noun *timmisartu* ‘airplane’ is combined into a complex word with the verb *liur* ‘make’.

- (1) *West Greenlandic*¹
Suluut timmisartu+liur-puq.
 S.ABS **airplane**+make-IND:INTR:3S
 ‘Suulut made an airplane. (Van Geenhoven 1998: 99)

Accounting for noun incorporation has required continuous revisiting of our understanding of argument structure, word building, and spell-out (Sadock, 1980; Mithun, 1984; Baker, 1988; Rosen, 1989; Baker, 1996; Harley, 2011; Compton and Pittman, 2010, inter alia). It has also inspired us to question the semantics of how verbal meaning is built, because it requires a verbal mechanism to fully interpret the noun.

In the semantics, we find that incorporated nouns have similar properties in language after language. They must generally bear obligatory low scope, be number neutral, and often have effects on valence. These properties are fairly easy to obtain since nouns denote properties. As a property, though, the noun’s individual argument still requires saturation, and there the picture becomes more complicated.

In her seminal book, Van Geenhoven (1998) proposes a process called **Semantic Incorporation**, by which the noun’s argument is bound by an operator in the verb (2). The verb takes the noun’s property as its argument in the semantics. It binds the noun’s argument, forcing low scope. Since the noun denotes a property it is compatible with singular or non-singular meanings.

- (2)
- $$\begin{array}{c}
 \langle s, wt \rangle \\
 \lambda e_s \lambda w_w. \exists x [\text{airplane}(x)(w) \ \& \ \text{make}(x)(e)(w)] \\
 \swarrow \quad \searrow \\
 \lambda x_e \lambda w_w. \text{airplane}(x)(w) : \langle e, wt \rangle \qquad \langle \langle e, wt \rangle, \langle s, wt \rangle \rangle^2 \\
 \qquad \qquad \qquad \lambda P_{e,wt} \lambda e_s \lambda w_w. \exists x [P(x)(w) \ \& \ \text{make}(x)(e)(w)]
 \end{array}$$

A binding-verb analysis captures the interpretation well, and is related to classic approaches to weakest-scope indefinites (Carlson, 1977; Heim, 1982) and opaque intensional objects (Zimmermann, 1993; Van Geenhoven and McNally, 2005). It has also served as the basis for our understanding of pseudo-incorporation (Farkas and de Swart, 2003; Dayal, 2011) and weak definites (Schwarz, 2014).

However, it comes with two costs. First, non-incorporating verbs do not quantify over their objects, so verbs either must shift from entity arguments to property arguments, or the language’s verbs must have at least two versions in the lexicon. Lexical doubling might not pose a problem in languages where only certain verbs incorporate (Chung and Ladusaw, 2006; Johns, 2007). However, in languages where nearly any verb can incorporate nouns, it seems unlikely that they all double, especially given our modern understanding of decomposing verbal semantics. A systematic change like type-shifting might be more accurate, but it is unclear whether it occurs in the lexicon or the semantic composition.

Semantic Incorporation can be thought of as a version of type-shifting, but it comes with another more crucial cost. It closes off the noun from further modification, but further modification is normal in West Greenlandic (3), where the free adjective phrase ‘wooden’ intersectionally modifies the incorporated ‘airplane’.

- (3) *West Greenlandic*
Suluut qisum-mik timmisartu+liur-puq.
 S.ABS **wood-INSTR.SG** airplane+make-IND:INTR:3S

¹Autonym: *Kalaallisut*. ISO-639-3 code: kal. In the Eskimo-Aleut group, spoken in Greenland.

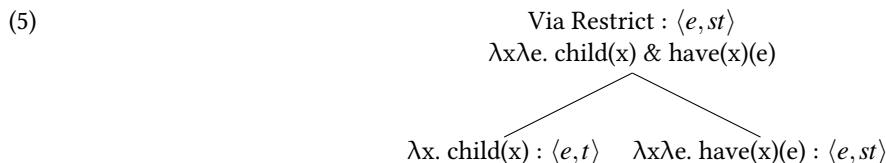
²Van Geenhoven’s formalism has been updated to include Davidsonian events (of type *s*) and possible worlds (of type *w*). We also employ the routine omission of ‘= 1’ from each semantic conjunct.

‘Suulut made a wooden airplane. (Van Geenhoven 1998: 100)

Van Geenhoven’s solution to this problem involves recomposing the entire LF after it’s been built, to allow the adjective to be interpreted as the sister to the incorporated object. She admits this is an *ad hoc* solution. Moreover, this kind of solution would require revisiting the architecture of the grammar, for very little gain.

An alternative approach is Chung and Ladusaw (2003, 2006)’s composition operation Restrict, which effects range restriction on the verbal function without changing its lexical meaning or closing off interpretation by binding.

- (4) *Chamorro* (cha, Austronesian, Guam -(Chung and Ladusaw 2006: 330))
Hayi gäi+patgun si Carmen?
 who have+**child** DET Carmen
 Whose child is Carmen? (lit. who child+has Carmen)



Crucially, Restrict leaves the noun’s argument unsaturated, so it can be saturated by a DP later. As a compositional rule, it avoids the problems of Semantic Incorporation. However, when no other DP is used, Existential Closure is needed to bind the noun’s argument and complete its interpretation, even when it’s unmodified (6).

- (6) *Chamorro* (Chung and Ladusaw 2006: 329)
Hayi gäi+patgun?
 who have+**child**
 Who has a child?

Assuming that the semantics is mapped directly from the syntax, any binder needs to be introduced by a syntactic head, leaving Existential Closure to be an *ad hoc* solution to the same problem: How do we interpret the noun’s entity argument? If neither Semantic Incorporation nor Existential Closure are reliable mechanisms for binding that argument, this leaves us with a gap in the compositionality of object incorporation.

The central problem to the semantics of noun incorporation is the way the entity argument is interpreted. Both of the major well-understood mechanisms we have discussed involve conjunction of the noun with the verb, and an introduction of an existential quantifier. The latter is problematic due to concerns about the mapping of semantics from the syntax. The former is also a problem, because conjunction only applies when all of the noun’s arguments, its entity and possible world, are identical to the corresponding arguments of the verb. This leaves conjunction out of the picture completely if the noun does not describe the theme of the verb, or is intensional.

3 Weak compositionality in non-object incorporation

Much of the literature on noun incorporation focuses on object incorporation, but many languages feature nouns with other thematic roles, and no obvious morphology to indicate it.

- (7) *Mohawk* (moh, Iroquoian, US/Canada - Mithun (2009: 8))
 a. *kahserie’táneren* ‘It is tied up **with string**’
 b. *onke’nionhsókha* ‘I leak **from the nose**’ (‘My nose is running’)
 c. *tentewaronta’serónnion* ‘Well build it **out of logs**.’

- (8) $\llbracket \textit{kahserie'táneren} \rrbracket = \lambda x \lambda e \lambda w. [\text{tie up}](x)(e)(w) \ \& \ \exists y [\text{string}(y)(w) \ \& \ \text{instrument}(y)(e)(w)]$

The specific thematic roles of the noun’s entity may be left to the context but its composition still requires some kind of mediating relation that links it to the event, because the noun’s entity argument is not identical to that of the verb’s theme. The question of the source of this relation reveals that noun incorporating structures can have the same kinds of weak compositionality that noun-noun compounds are infamous for. The question becomes urgent in languages that generally only allow noun incorporation with these additional thematic roles, so the rest of this section focuses on two of these: Kiowa and English.

3.1 Kiowa generally bars object incorporation

Some languages go further. Not only do they feature non-object noun incorporation, they generally do not allow object incorporation at all. One such language is Kiowa.³ Incorporation is frequent in Kiowa (Watkins, 1984), placing nouns between an agreement prefix and the main stem. Two other signals of incorporation are tone and conditioning. Incorporated stems often force the rest of the word's syllables to have low tone; and many incorporated stems have distinct forms when incorporated or used in compounds.

- (9) a. *jó-cù á-bá-hêl.*
house-toward 3P-go_P-EVID_P
'they went home (I heard)'⁴
- b. *á-jò+bán-ê.*
3P-house_C+go_I-EVID_I
'they were headed home (I heard)'
- c. *á-jò+chá+hàfê-hêl.*
3P-house_C+go_C+raise.DETR_P-EVID_P
'they started to go home (I heard)'

Despite widespread incorporation, simple objects do not incorporate (10b), barring exceptions that we will discuss in section 4.

- (10) a. *Belle àn káu Ø- àumàu.*
B. HAB shawl 3S>3S- make.IPFV
'Belle makes shawls.' ('shawl' triggers singular agreement)
- b. **Belle àn Ø- káu+àumàu.*
B. HAB 3S>3S- shawl_C+make.IPFV
'Belle makes shawls.' (Adger et al. 2009: XX)

Meanwhile, non-objects freely and routinely incorporate, replacing postpositional expressions (11).⁵ A selection of other possible thematic roles can be found in (12)–(13).

- (11) a. *Màuchát-jò à-sébé.*
point-with_{INSTR} 2S>3S-stab_P.IMPER
- b. *À-màuchát+sèbè.*
2S>3S-point_C+stab_P.IMPER
'Stick him with the pointy end.'
- (12) Natural Cause (Toyeyo n.d. Jonah and the Whale)
Hègáu cáubót mìn dáu-góm+qâubèp!
then boat about to 3I:1PD-wind_C+tip over.IPFV
'Our boat is about to capsize from the wind!'
- (13) a. Vehicle/Means
káu+hò+chàn |[car_C+travel_C+arrive] 'arrive by car'

³English pronunciation: [ˈkʰaj.ou.wə], autonym: *Cáuijògà* [kʰj.tò:gjà]. ISO code: kio. Kiowa-Tanoan group, spoken by a few dozen elders in Oklahoma, US. The Kiowa Tribe has not designated any official orthography. We employ one commonly-used orthography, devised by native speaker and self-taught linguist Parker McKenzie, with the addition of morpheme boundary markers. McKenzie and Meadows (2001) and Watkins and Harbour (2010) discuss this orthography's origins and linguistic intricacies. Roy (2007) and Neely and Palmer, Jr. (2009) discuss social and political aspects of orthography in the Kiowa community.

⁴Uncited Kiowa examples are taken from fieldwork conducted in 2015 and 2017. We gloss morphological conditioning of stems with a subscript. Incorporated stems are glossed with X_C, for 'combining' stem, which is also found in nominal compounds. Main verbs also have distinct perfective and imperfective stems, which will be glossed as X_P and X_I, respectively.

⁵At present, all Kiowa speakers are multilingual, and all speak English. However, we are certain that the similarities listed here are not due to interference, for they are routinely found in the data from the fieldwork done by J.P. Harrington in the 1920's, which often involved monolinguals. The similarities remain robust in modern speakers.

- b. Location
dè-thòpòt+sàugà | [1S>R-[shade_c+sit.PFV] ‘I sat down in the shade’
- c. Material
dé-tháp+kàui+àum- | 1S>3I-[[deer_c+skin_c]+make-] ‘make out of deerskin’
- d. Affected Body Part
dè-àul+sòjàu | [1S>R-**hair**_c+brush_p:MOD] ‘I will brush my hair’
- e. Similarity
màyí+àgà | [**woman**_c+be sitting] ‘be sitting like a woman’
- f. Kin relation
é-fàbì+qàu | [3s:1sD-**brother**_c+lying down] ‘he’s my brother’
- g. Other relation
chêhì+fàudò | [dog_c+keep] ‘keep as a dog’ (idiomatic expression meaning ‘treat harshly’, Harrington (1928: 130))
- h. Goal
jò+bà- | [house_c+go-] ‘go home’
- i. Source
jó+zòn- | [**shoe**_c+pull out-] ‘take out of (one’s) shoe’

Nouns related intensionally to the event can be incorporated. In (14a), taken from a story, the incorporated noun *báuláu* ‘butter’ is the substance that the actual object *gómjǎgá* ‘mentholatum’ [wind+grease] resembles in its way of being eaten. Elicitation outside of the story’s context finds that the sequence [butter+eat] cannot mean ‘eat butter’ (14b). Instead, the non-incorporated form must be used; the verb’s tone reveals the lack of incorporation (14c).

- (14) a. *Góm+jǎgá á-dǎumê gàu Ø-báuláu+fǎulê.*
wind_c+grease 3s:3sD-be.EVID and.SS 3s>3s-**butter**_c+eat_t.EVID
‘He had mentholatum and was eating it like butter.’ (Watkins 1990: 417)
- b. $\llbracket \text{Ø-báuláu+fǎulê} \rrbracket \neq$ ‘he was eating butter’
- c. $\llbracket \text{báuláu Ø-fǎulê} \rrbracket =$ ‘he was eating butter’

Intensional nouns differ from the verb in both arguments— its entity is not that of the verb’s theme, and its possible world is not that which the verb describes. Instead, some intensional operator must bind the incorporated noun’s world argument to attain an intensional reading— if he were eating butter in some world, he would be doing so in the way he actually ate the mentholatum. In (15), we can characterize a similarity relation as being true when in the relevantly circumstantially similar worlds where butter is eaten, the butter-eating events are like the main verb’s event of eating mentholatum, which is represented by the variable x_2 . The butter does not have to be any particular butter in the actual world, and the modal ensures that it has the properties of actual butter.⁶

- (15) $\llbracket \text{báuláu+fǎu- } x_2 \rrbracket = \lambda e \lambda w. \text{eat}(x_2)(e)(w) \ \& \ \text{in all worlds } w' \text{ relevantly like } w$
where an eating of x_2 occurs, that event occurs as if there was some butter in w' involved.

In cases like (15), both the world and entity argument of the incorporated noun are bound. Whether a single operator binds both or distinct operators bind each, such operators still require some kind of mediating relation to provide the relevant meaning, for it is not part of the meaning of ‘eat’ or the meaning of ‘butter’.

3.2 English generally bars object incorporation

English is another language that routinely allows noun-verb compounds, though their status as the result of a productive building process has long been disputed. Lieber (1992) for instance claims they are all back-formed from nominal

⁶This similarity relation is essentially the semantics of *like*, which is fraught with difficulty due to its interaction with ellipsis and donkey anaphora, either of which suffices to take us well beyond the scope of this paper. The version here is crude but works enough for our purposes here. We do not intend it to be the final word on the matter.

compounds. However, Bauer and Renouf’s (2001) corpus search turns up dozens of clear noun-verb, adjective-verb, and verb-verb compounds, and in any case, a back-formation account does not fill in the interpretive gap in the semantics of the noun-verb compound.

Following Harley (2011), we treat noun-verb compounding as noun incorporation, although our motivation is ultimately semantic. In the semantics, English and Kiowa noun incorporation share the curious but robust restriction that object incorporation is generally not allowed, while incorporation of other roles is allowed.

- (16) *We *paper-wrote* all weekend. (= we wrote a paper all weekend)
- a. **Instrument:** We *hand-washed* the dishes.
 - b. **Means:** They will *pan-fry* anything.
 - c. **Location:** Pratchett *window-shops*.
 - d. **Similarity:** The doctor *pimp-slapped* the patient.
 - e. **Performative** We will *test-release* the new OS next week.
role:

As in Kiowa, the noun may be intensional; for instance the slang expression *pimp-slap* means to ‘slap in the cruelly ostentatious manner of a pimp’, whether that pimp is real or not.

4 The proposal: mediating relations solve both problems

Noun incorporation involves weak compositionality in two senses. First, the use of conjunction to link incorporated object nouns to verbs lacks an adequate mechanism to bind the noun’s entity argument. Second, the incorporation of non-objects requires the introduction of some mediating relation that links the noun’s semantic arguments to the corresponding ones in the verb.

We contend that these two compositional gaps are actually linked. First, we have already shown that incorporated nouns require something inside the verbal construction that binds its nominal argument. This binder completes the interpretation of the noun, and ensures that the non-object is distinct from the object/theme. We have also seen that non-object nouns also require something inside the verbal construction that assigns it a thematic role.

We propose that mediating relations serve both needs, binding the noun and giving it a thematic role. Incorporated themes are given a role by the verb and share arguments with it, so they don’t require mediating relations to compose with the verb. However, in the absence of some binder, the noun never gets interpreted.

4.1 Mediating relations introduce thematic roles

A mediating relation does more than bind arguments. It also introduces a broad thematic semi-role we call ‘involvement’, which is not one of the core thematic arguments (theme, agent, recipient/benefactive) that are introduced by verbal heads. The exact role is chosen by the speaker.

- (17) $\text{Involve}(x)(e)(w) = 1$ if and only if x is has a non-argument role in e in w

The involvement roles are those introduced to phrases by various functional heads (including adpositions), whose projections adjoin to a projection in the verbal projection. These heads assign the thematic roles. Within words, similar functional heads assign similar roles (Jackson and Punske, 2013). Combining this proposal with our observations about binding incorporated noun arguments, we propose that these functional heads introduce a mediating relation R_M that quantifies over or otherwise binds the noun’s entity argument, and introduces a mediating relation.

The structure in (18) is a simple tree at LF, and deliberately sidesteps the question concerning the syntactic process that builds incorporation structures in the rest of the grammar (Sadock, 1980; Mithun, 1984; Baker, 1988; Rosen, 1989; Baker, 1996; Compton and Pittman, 2010; Harley, 2011, *inter alia*), in the hopes that coming at the issue from the semantic side can shed light on an eventual understanding of the syntax. What is crucial is that the noun combines with this functional head, not the verb.

(18)



In the case of *hand+wash* (in Kiowa, *máun+pił*), we can propose a more specific relation E_{inv} , which existentially quantifies over the noun and introduces the involvement relation. The result is a property that can combine with verbs via Event Identification.

- (19) a. $E_{inv} = \lambda P_{ewt} \lambda e_s \lambda w_w. \exists y [P(y) \ \& \ \text{Involve}(y)(e)(w)]$
 b. $\llbracket [\text{hand } E_{inv} \text{ wash}] \rrbracket = \lambda x_e \lambda e_s \lambda w_w. \exists y [\text{hand}(y) \ \& \ \text{Involve}(y)(e)(w)] \ \& \ \text{wash}(x)(e)(w)$

4.2 Properties of binders and binding

The requirement that the noun be bound by the mediating relation ensures that the noun carries low scope.

- (20) a. *jé sâdâu xô-jò ê-qìgà*
 all child:INV rock-with_{INSTR} 3I>1S-throw.PFV
 ‘All the children threw a rock at me’
 (lit. all the children threw-at me with a rock)
- b. *jé sâdâu ê-xò+qìgà*
 all child:INV 3I>1S-**rock**_c+throw.PFV
 ‘All the children threw rocks/a rock at me’ ($\forall > \exists / \# \exists > \forall$)
 Consultant comment: “They all had their own rocks.”

The mediating relation can also introduce a definite determiner that binds the nominal argument. The definiteness can be weaker (21) or stronger (22), although either is more common in Kiowa than in English. Assuming that names denote properties that often take a null determiner in a full DP (Elbourne, 2005), we can define a relation D_{inv} that takes a property, binds its argument with a definite determiner, and assigns it an involvement role (23). We employ w^* to express a selected part of w relevant to that utterance.

- (21) *bé-**chát**+tógái!*
 2S>3I-**entrance**_c+pass_p.IMPER
 ‘Open the door/tipi flap!’
- (22) *á-Énédâukò+bâ.*
 3P-**Anadarko**_c+go.PFV
 ‘They went to (the city of) Anadarko.’
- (23) a. $D_{inv} = \lambda P_{ewt} \lambda e_s \lambda w_w. \text{Involve}(\iota y [P(y)(w^*)])(e)(w)$
 b. $\llbracket [\text{Anadarko } D_{inv} \text{ go}] \rrbracket = \lambda x_e \lambda e_s \lambda w_w. \text{Involve}(\iota y [\text{Anadarko}(y)(w^*)])(e)(w)$

If the definiteness is precise enough, pragmatics can push it into a possessive meaning.

- (24) *bé-**âul**+mâbòp.*
 2S>R-**head**_c+nod.PFV
 ‘you were nodding your head’ (not just any head)

4.3 Why object incorporation is unavailable

The mediating relation between noun and verb thus fills one of our gaps in compositionality, and suggests an answer to the second, by showing why object incorporation is generally unavailable in these languages: The noun’s entity argument is never saturated or bound.

Theme arguments are introduced by the verb and the role is assigned by the verb, not by a functional head. Full DP themes are sisters to the verb, and will compose by saturating the verb’s entity argument. Inside a word, an incorporated theme noun’s entity and world arguments are identical to those of the verb, so the noun is syntactically a sister to the verb, and can combine by some means of conjunction (like Restrict).

$$(25) \quad \begin{array}{c} \diagup \quad \diagdown \\ N^\circ \quad V^\circ \end{array} \quad \lambda x \lambda e \lambda w. \text{make}(x)(e)(w) \ \& \ \text{shawl}(x)(w)$$

$$\quad \quad \quad \begin{array}{c} \diagup \quad \diagdown \\ \llbracket \text{shawl} \rrbracket \quad \llbracket \text{make} \rrbracket \end{array}$$

However, at this point there is nothing in the verb that does the job the mediating relation does. This causes compositional problems, like blocking composition with aspect. Also, since there is no separate DP object due to noun incorporation, the entity argument will never be saturated, so the proposition will be uninterpretable.

Assuming that verbs do not shift freely, and that an open class does not rely on multiple lexical entries for different argument types, only a mediating relation above the verb could preserve the interpretation. Since we observe no relation saving the expression, we can conclude that in English and Kiowa, there is no mediating relation above the verb.

This conclusion seems problematic in light of languages like West Greenlandic, Chamorro, or Mohawk, which do allow object incorporation. It is even more problematic in light of languages like Southern Tiwa (ISO: tix) which usually *requires* objects to be incorporated (Allen et al., 1984). To reconcile this approach with these languages, we will first reconcile it with the exceptional contexts in English and Kiowa that do allow object incorporation.

5 Contexts that license object incorporation

In the previous section we showed that object incorporation requires a mediating function, but that no such function could appear above the main verb in Kiowa or English. Throughout this paper, we have taken care to assert that Kiowa and English *generally* do not allow object incorporation, because sometimes they do. However, it is limited to certain environments. We will show that those environments independently involve a functional head above the object-taking verb, and conclude that this functional head introduces a mediating relation. So long as the verb is not the main verb that projects an extended projection, it can be placed under a mediating functional head, and thus incorporate objects.⁷

5.1 Shared exception 1: Nameworthy lexicalization

In Kiowa, verbs describing culturally salient activities that Mithun (1984) calls ‘nameworthy’ can have incorporated objects, including having babies or opening doors. The object/theme still triggers agreement— singular in (26) and inverse number, a special morphologically marked form which for inanimates marks singular, in (27).

$$(26) \quad \emptyset - \overset{f}{i} + x\dot{o}tj\grave{a}u$$

3s > 3s - **offspring**_c + put down / SG.IPFV

‘She’s having a baby’ (Harrington 1928: 85)

$$(27) \quad b\acute{e} - \overset{f}{c}h\acute{a}t + h\acute{e}d\grave{e}!$$

2s > 3i - **entrance**_c + remove_p.IMPER

‘Open the door/tipi flap!’

In English, nameworthy activities also license object incorporation, either at a cultural level or a subcultural level. Backformation only occurs when this kind of name-worthiness holds.

⁷See (Barrie and Li, 2015) for a case-driven explanation of why certain relations are unavailable.

- (28) a. We **deer** hunt every year.
 b. Pratchett **world**-builds like no other. (builds a world in sci-fi/fantasy)
 c. **Bilingual speakers** code-switch regularly.

This exception has no clear explanation from a purely syntactic perspective. If these verbs are impossible to build at all, they certainly are here. Under a semantic approach, the syntax builds noun-verb word structures, but the semantics cannot interpret them without help from a mediating relation. It seems that the process of lexicalization results in the addition of a mediating relation above the verb (29). Crucially, this head is derivational, in this case a verbalizing v° head. It is not a result of the extended verbal projection (like v°), whose arguments cannot be incorporated. The head binds the noun, saturating the argument. Let us define a simple mediating relation E , which takes a verbal expression and quantifies over its nominal argument.



(30) $E = \lambda P_{e,swt} \lambda e_s \lambda w_w. \exists y [P(y)(e)(w)]$

(31) $\llbracket E \text{ deer hunt} \rrbracket = \lambda e_s \lambda w_w. \exists y [\text{deer}(y)(w) \ \& \ \text{hunt}(y)(e)(w)]$

Once a built structure is lexicalized, no matter how it's built, it may cease to be a composed unit, and its meaning can drift. For instance, the Kiowa phrase *máun+càum* [hand_c+show] means 'point'. However, it is extremely rude in Kiowa culture to point with the hand or fingers. Instead, one points with the lips, which is described as *bél+màun+càum* [lip_c+hand_c+show]. The bleaching of *máun* indicates a more accurate gloss as *bél+màuncàum* [lip_c+point], where the stem [hand_c+show]. has become nameworthy enough to be lexicalized and lose its compositionality.

Kiowa has an additional kind of lexicalization that allows object incorporation, where a noun is created from a compound verb. This derivation process was commonly used to name new tools and technologies encountered after the confinement and acculturation programs began in the late 19th century. The following nouns exemplify the process.

- (32) Derived nouns
 a. *dáum+sá* | [ground_c+shatter_c] 'plow'
 b. *són+à+tãfè* | [grass_c+atop_c+pick up_c] 'hay truck'
 c. *háu+cù* | [metal_c+hit_c] 'telegraph' (later, 'telephone')

The final verb is in its combining form, signaling that it is not the main verb. This suggests a null nominalizing head, which contains the same mediating relation as we saw in (29), with an additional relation that gives a generic implement reading. In this case, we end up with the set of individuals such that, if used as intended, there is an event where the individual shatters some ground.



(34) $\llbracket \emptyset_{nom} \rrbracket = \lambda P_{e,swt} \lambda x_e \lambda w_w. \text{in all worlds } w' \text{ relevantly like } w \text{ where } x \text{ is used for its purpose, there is an event } e' \text{ whose agent is } x, \text{ and an individual } y \text{ such that } P(y)(e')(w').$

(35) $\llbracket \text{dáum} + \text{sã} + \emptyset_{nom} \rrbracket = \lambda x_e \lambda w_w. \forall w' [\text{circ}(w)(w') \ \& \ x \text{ is used for its purpose in } w' \rightarrow \exists e' [\text{agent}(x)(e')(w') \ \& \ \exists y [\text{ground}(y)(w') \ \& \ \text{shatter}(y)(e')(w')]]$

This is a more complicated head, since it not only has to bind the incorporated noun, it has to bind an event and do the work of an external argument head, assign an agent thematic role, and linking it to the nominal entity of which the entire expression is a property.

6 An exceptional context: Synthetic compounds in English

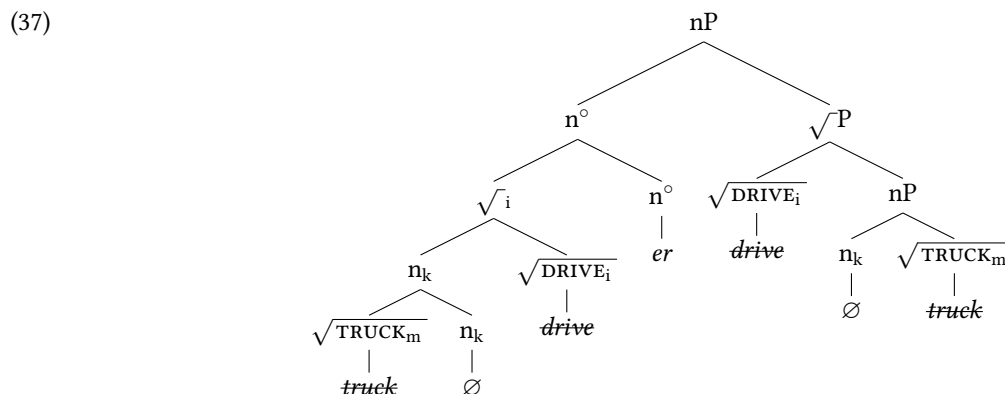
Another set of derivations license object incorporation, in both Kiowa and English. These are more syntactic in nature, in the sense that they are productively used to create new forms and not necessarily to put lexical items into the lexicon.

The English case we focus on are synthetic compounds, which involve a noun+verb-affix structure. These routinely allow object incorporation, causing a long-standing paradox— possible forms built out of impossible ones.

- (36) a. *truck driver, axe-wielding, data-driven*
 b. **truck-drive, *axe-wield, ??data-drive*

Synthetic compounds have been thoroughly studied, so our semantic approach requires specific motivation. A substantial literature attempts to use this observation to promote or dismiss derivational grammars, and to determine whether compounding is lexical or syntactic. With more recent theories of morphology (like Distributed Morphology), the second question has become less crucial. But the first question remains: How can the syntax build a structure out of one that can't be built? Solutions simply allow the syntax to build the noun-verb stem, but another module of the grammar prevents its expression or spell-out.

Harley (2011) demonstrates how treating synthetic compounds like noun incorporation works well. The syntax allows head-movement of the nominalized root to become the sister of the verbal root, and end up linearized before it.



Under this account, a noun-incorporating verb like **truck-drive* is barred by a prosodic constraint that prevents a verbalizing head (v°) from hosting internally-complex heads hosting more than one root, the way that nominalizing heads (n°) can. The prosodic constraint blocks the noun-incorporating verbs that do not occur, but would also block many verbs that do occur. We bring up three such kinds of verbs.

First, McIntyre (2014) points out that English speakers routinely zero-derive verbs that contain multiple roots, and which are not backformed.

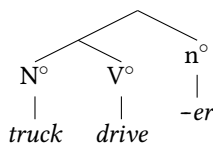
- (38) *grandstand, highlight, bear-hug*

Second, as we've seen many English verbs can contain incorporated objects, if they fit Mithun's (1984) observation that 'nameworthy' descriptions can be lexicalized and allow incorporation (28). Third, as we've also seen, English verbs routinely incorporate noun roots, as long as the entities described by the noun are not the object of the verb.

Given these exceptions, it seems that if there is a constraint it applies to the inability to build noun-incorporating verbs, rather than to the ability. Noun-incorporating verbs are perfectly grammatical to use if the noun is not the object, if the compound verb is lexicalized, or if the verb is embedded under an affix that creates a synthetic compound. As the first two are licensed by the presence of a mediating relation, so is the third: The affix hosts the relation.

We have seen that the extended verbal projection does not host mediating relations that can bind an incorporated noun, but that derivational projections do. Synthetic compounds employ such a projection, and in their case, the morpheme is overt. We give such a structure in (39); again, we employ a simple LF that abstracts away from the construction processes that build incorporating structures. The noun and verb are sisters that compose semantically by Restrict.

(39)



The affix then binds over the noun, completing the meaning. However, the affix is doing a lot of work besides that, so we need to lay out the elements of its meaning. First, it is well-known that there are several distinct derivational *-er* affixes in English, so we assume that agentive *-er* has multiple forms. Each one takes a verbal property, binds its event argument, and returns the property of being the agent of that event.

- (40) a. $\llbracket -er \rrbracket = \lambda P_{e,wt} \lambda x_e \lambda w_w. \exists e [\text{agent}(x)(e)(w) \ \& \ P(e)(w)]$
 b. $\llbracket \text{drive} + -er \rrbracket = \lambda x_e \lambda w_w. \exists e [\text{agent}(x)(e)(w) \ \& \ \text{drive}(e)(w)]$
- $\begin{array}{c} \diagup \quad \diagdown \\ \llbracket \text{drive} \rrbracket \quad \llbracket -er \rrbracket \end{array}$

With an incorporated object noun, the affix $-er_E$ does the work of *-er* and adds the mediating relation that existentially binds over the noun. For instance, imagine you're looking at a line of vehicles, one of which is a truck, and say *The truck driver is on the phone!*. The truck driver is the entity such that there is an event of them driving a truck.

- (41) a. $\llbracket -er_E \rrbracket = \lambda P_{e,swt} \lambda x_e \lambda w_w. \exists e [\text{agent}(x)(e)(w) \ \& \ \exists y [P(y)(e)(w)]]$
 b. $\llbracket \text{truck} + \text{drive} + -er_E \rrbracket = \lambda x_e \lambda w_w. \exists e [\text{agent}(x)(e)(w) \ \& \ \exists y [\text{truck}(y)(w) \ \& \ \text{drive}(y)(e)(w)]]$

Synthetic compounds can also create intensional interpretations if they also bind the possible world argument of the noun+verb structure. Describing someone as a *truck driver* does not entail they are currently driving anything, because the truck can be intensional: In ordinary worlds where certain circumstances apply, there is a truck and *x* drives it. In these cases, the intensionalizing affix $-er_{E-G}$ denotes a generic agent (42a). The genericity of events comes for free when the modal's circumstances are the normal relevant course of events. If talking about the profession of truck driving, the sense of it being a job arises if the circumstances involve *x* doing *x*'s job. In episodic uses (for instance, the person driving the truck in a movie scene), the circumstances are just the facts surrounding that particular event.

- (42) a. $\llbracket -er_{E-G} \rrbracket = \lambda P_{e,swt} \lambda x_e \lambda w_w. \forall w' [\text{circ}(w)(w') \rightarrow \exists e' [\text{agent}(x)(e')(w') \ \& \ \exists y [P(y)(e')(w')]]]$
 b. $\llbracket \text{truck} + \text{drive} + -er_{E-G} \rrbracket =$ the set of entities *x* in world *w* such that in all the worlds *w'* that follow the normal course of relevant events in *w* where *x* does *x*'s job, there is an event *e'* whose agent is *x* such that there is a truck *y*, and *e'* is a driving of *y* in *w'*.

Synthetic compounds can also bind with a uniqueness quantifier ($\exists!$) instead of a simple existential quantifier. This binding is most noticeable when proper names are incorporated, like *Obama-lover* or *Kardashian-following*. If one is talking about a specific Obama, say Barack, then the affix $-er_U$ will introduce a uniqueness quantifier ensuring that *Obama-loving* refers to him. If one is talking about Obamas in general, like the family, then the generic existential $-er_{E-G}$ is used instead.

- (43) a. $\llbracket -er_U \rrbracket = \lambda P_{e,swt} \lambda x_e \lambda w_w. \exists e [\text{agent}(x)(e)(w) \ \& \ \exists! y [P(y)(e)(w)]]$
 b. $\llbracket \text{Obama} + \text{love} + -er_E \rrbracket = \lambda x_e \lambda w_w. \exists e [\text{agent}(x)(e)(w) \ \& \ \exists! y [\text{Obama}(y)(w) \ \& \ \text{drive}(y)(e)(w)]]$

We have only looked at forms of *-er*, but the other affixes that build synthetic compounds work the same way. They may differ in what they add on their own, but they also carry the same kinds of mediating relations. These mediating relations bind nominal arguments, and that allows the use of object incorporation.

Kiowa does not allow synthetic compounding, but does allow object incorporation when nouns are incorporated to verbs embedded under a derivational nominalizing head. For instance, Kiowa lacks an agentive *-er* suffix. Instead, this meaning is expressed using nouns or bound forms describing types of people; these license object incorporation (45). The mediating function in these compounds is inserted in much the same way it is in a noun-noun compound.

- (44) a. *kířô+qî* | save_c+**man** ‘savior’
 b. *ô+êl+jò+qî* | throat_c+be big_c+speak_c+**man** ‘camp crier’ (big throated speaker)
- (45) a. *hòl+jàjò+mà* | **sick**_c+watch over_c+woman ‘female nurse’
 b. *sé+fi+gàu* | **peyote**_c+eat_c+NOM.INVERSE ‘peyote eaters’
 c. *tháp+é+qî* | **deer**_c+hunt_c+man ‘deer hunter’
 d. *dàum+âuiàum+qî* | earth_c+repair_c+man ‘Earthmaker’ (a holy figure, Kracht (2017: 178))

English synthetic compounds allow virtually free use of object incorporation, when its use in ordinary verbs is nearly completely prohibited. As with non-object incorporation, the use in synthetic compounds is made possible by the use of a mediating function above the verb. Since the function is introduced by the derivational head rather than an extended verbal head, it does not conflict with the thematic roles of the extended verbal projection.

7 An exceptional context: Control-like incorporation in Kiowa

Synthetic compounds demonstrate that a mediating function dominating a noun+verb structure completes the interpretation of the noun, even if that noun+verb structure is not saturated on its own. Kiowa lacks synthetic compounds, but does have another context where the same process occurs.

7.1 Verb incorporation

Kiowa allows productive verb+verb structures for a number of purposes. For instance, two verbs can be combined to make a serial description.

- (46) Serial description
 a. *Dè-kái+gún.*
 1S>R-**stretch**_c+jump.PFV
 ‘I jumped (up).’ (≈ I jumped myself up stretching)
 b. $\llbracket \text{kái+gún-} \rrbracket = \lambda x \lambda e \lambda w. \text{stretch}(x)(e)(w) \ \& \ \text{jump}(x)(e)$

Serial descriptions are the result of conjunction, when the two verbs share entity, event, and world arguments. In other cases, these arguments are not shared. For instance, an incorporated verb can be interpreted as if it were in a control structure or a tough-construction. In each case, the embedded verb’s event and world arguments are distinct from those of the main verb.

- (47) *é-fô+téndâu*
 3S:1SD-**see**_c+want
 ‘I want to see you.’

(48) *Á-dàu è-têm+còt*
 stick-INV 3I-**break**_c+be strong
 ‘The stick is hard to break’

(49) *á-kún+bà*
 3P-**dance**_c+gO.PFV
 ‘They went to dance.’

We call this phenomenon Control-like Incorporation (CI), because it shares with control two key semantic properties: It referentially links the embedded verb’s subject or agent to an argument of the superordinate verb, and it determines a relationship between the two verb’s events. It differs from control in that the structure lacks a PRO subject bound by a complementizer.

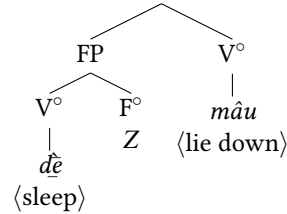
The CI-verb’s event and world arguments are bound by operators, so we cannot rely on conjunction. We might argue that controlling verbs provide these operators. However, in (49) there is no controlling verb or other overt morpheme to host them. Instead, we need a mediating relation.

CI contexts correspond specifically to some types of control that Landau (2015) calls ‘logophoric’, because they involve an attitude that binds the embedded world arguments. A proposition like ‘they went to dance’ expresses purpose: It holds if they went with an attitude such that in all worlds where that attitude holds, there is an event where they dance. It does not entail that they dance in the actual world, in English or in Kiowa.

(50) *Áuphàu á-fò+bà, né háun gáu-bòmâu*
 there 3P-**see**_c+gO.PFV but not 3P>2S-see.NEG
 ‘They went there to see you, but they didn’t see you.’

We propose the simple LF in (51), where a functional head inserts a mediating relation *Z* expressing a purpose relation that links the subject of the embedded unaccusative verb to the attitude holder.

(51) *dě+mâu* ‘lie down to sleep’



The relation it introduces has several components that combine to express the sense of subject-controlled purpose. In a full control clause, these would be decomposed. The first component relies on the fact that attitudes are often associated an event. For instance, if the agent of an event carries out the event with certain goals in mind, that mental state forms an attitude associated with that event (52a). That mental state has a holder, defined in (??). The world-binding modal has a modal base derived from that attitude: the worlds where the content of that attitude is true (52b). If the attitude is a desire, this base gives the worlds where those desires come true. The subject control comes from the two verbs sharing a single argument.

(52) Purpose relation and associated attitudes

a. Associated attitude

For any event *e*, let *a_e* be an attitude associated with *e*, held by the agent or acting participant of *e*.

b. Content relation

For any worlds *w*, *w'*, $\text{Cont}_w(a_e)(w') = 1$ iff *w'* is compatible with the content of *a_e* in *w*.

c. Purpose relation

$\llbracket Z \rrbracket = \lambda P_{e,swt} \lambda e_s \lambda w_w. \forall w' [\text{Cont}_w(a_e)(w') \rightarrow \exists e' [P(x)(e')(w')]]$

The purpose relation takes the embedded verb as its argument and returns a relation that can conjoin with the main verb phrase either through simple conjunction or through Event Identification (Kratzer, 1996). The result is a verb with an attached purpose.

- (53) $\llbracket \hat{d}\hat{e} + Z + \hat{m}\hat{a}u \rrbracket = \lambda x_e \lambda e_s \lambda w_w. [\text{lie down}](x)(e)(w) \ \& \ \forall w' [\text{Cont}_w(a_e)(w') \rightarrow \exists e' [\text{sleep}(\text{Holder}(a_e)(e'))(w')]]$

READ: *E IS AN EVENT OF LYING X DOWN IN W, AND IN ALL WORLDS WHERE THE CONTENT ASSOCIATED WITH E HOLDS, THERE IS AN EVENT WHERE THE HOLDER OF THAT CONTENT SLEEPS.*⁸

7.2 CI licenses object incorporation

The presence of a mediating relation below the verb allows noun incorporation, if a binding relation is introduced. We thus predict that CI licenses object incorporation, and it does. While the object of a main verb cannot easily be incorporated, the object of a CI-verb is freely and routinely incorporated, as easily as English-speakers make synthetic compounds. Hence, eliciting simple object incorporation triggers a swift rejection from speakers (54b), while the same structure embedded in a CI construction (54c) is accepted as freely as the use of the free noun.

- (54) a. *Áulháugà á-hàugà.*
 money 3P>3S-get.PFV
 ‘They got their money.’
 b. **Á-àulhàu+hàugà.*
 3P>3S-**money**_c+get.PFV
 ‘They got their money’
 c. *Á-[áulhàu+kàu]+bà.*
 3P-**money**_c+get_c+go.PFV
 ‘They went to get their money’

The same kind of fact applies to (10b), repeated below. The generic operator in the extended verbal projection is not able to license object incorporation

- (10b) * *Belle àn Ø- káu+àumàu.*
 B. HAB 3S>3S- **shawl**_c+make.IPFV
 ‘Belle makes shawls.’
 (55) *Belle àn Ø-[káu+àum]+chàn mà.*
 B. HAB 3S-**shawl**_c+make_c+arrive.IPFV
 ‘Belle comes to make shawls.’

These forms appear frequently in texts as well as in elicitation.

- (56) *Á-sé+fi+còpjè gàu héjáu háun háundé gà-háfâu-hèl*
 3P-**peyote**_c+eat_c+be sitting/PL and still not something 3P>3S-raise.NEG-EVID
 ‘They were sitting down to eat peyote and still hadn’t started anything yet’ (Watkins 1984: 248)⁹
 (57) *Dá=àl à-áufi+pó+bá-tháu.*
 must=also 1S-**fish**_c+trap_c+go_p-MOD
 ‘I ought to go catch some fish’ (SIL story # 14)

Object incorporating verbs are transitive, and we find that an object is incorporated with them. Overt referential DPs cannot be incorporated, but are instead placed outside the verb (definite determiners are not overt in Kiowa).

- (58) *qáhì à-fǒ+bá nàu hégáu Ø-hì-hèl.*
man 1S-see_c+go.PFV and:DS already 3S-die_p-EVID_p
 ‘I went to see the man but he had already died.’ (Harrington 1928: 35)

⁸The wording is ‘lying x down’ because *mâu* is actually a reflexive verb in Kiowa. That fact makes no difference here.

⁹Watkins’s transcription varies slightly, as it reflects an edition made by the consultant to clarify who ‘they’ were. The sentence here is from the original recording, which Watkins provided to the author(s).

These full DPs are base-generated in these adjoining positions (Harbour, 2003) and bind a null pronoun that is sister to the verb, as we show in (59), with Kiowa heads switched to English for clarity.

(59) *the man* $\lambda_1[\dots [v^\circ [\emptyset_1 \text{ see }] Z \text{ go }] \dots]$

Even *wh*-words can bind into this sister position from their obligatory fronted position.

(60) *Hâjêl èm-fô+chán?*
 who.Q 2s-see_c+arrive.PFV
 ‘Who did you come to see?’

Also, the pronoun once bound can trigger the number presuppositions of number-sensitive stems, because the DP will end up being interpreted as the object of the verb.

(61) a. *é-xó+tèndâu* | 3s:1sD-[put down/SG.DU+want] ‘I want to put (1 or 2) down.
 b. *é-qú+tèndâu* | 3s:1sD-[put down/PL+want] ‘I want to put (3+) down.

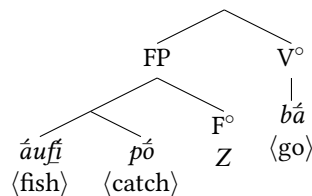
The mediating relation used with transitive verbs cannot be the same one used with unaccusative verbs because the embedded verb requires an external argument. However, the agentive Voice^o/*v*^o head that introduces that argument cannot be used inside the projection. The mediating relation must do that work.

We propose a relation Z_S that takes a property of events entity argument is already saturated. It then introduces the purpose relation and a condition (62a) expressing that the holder of the attitude is the agent of the embedded event. The result has the semantics of subject control.

(62) a. Subject control-like condition
 $HA(a)(e)(w) = 1$ iff Holder(a) = Agent(e) in w
 b. Subject control like purpose relation
 $\llbracket Z_S \rrbracket = \lambda P_{swt} \lambda e_s \lambda w_w. \forall w' [\text{Cont}_w(a_e)(w') \rightarrow \exists e' [HA(a_e)(e')(w') \ \& \ \exists y [P(e')(w')]]]$

When the embedded verb’s object is an incorporated noun, the sister position is filled by a property rather than a pronoun, so the verb’s entity argument is not saturated. For instance, here is the LF from (57).

(63) *âufî+pô+bâ* [fish_c+catch_c+go] ‘go to catch fish’



The mediating relation that introduces purpose thus needs an existential quantifier over that entity. We define the relation $Z_{S,E}$ to combine Z_S with such a quantifier.

(64) Existential subject-binding purpose relation
 $\llbracket Z_{S,E} \rrbracket = \lambda P_{e,swt} \lambda e_s \lambda w_w. \forall w' [\text{Cont}_w(a_e)(w') \rightarrow \exists e' [HA(a_e)(e')(w') \ \& \ \exists y [P(e')(w')]]]$

Composing this relation with (57), [fish_c+catch_c+go], gets us the following meaning:

(65) $\llbracket \hat{a}ufî+pô+Z_{S,E}+bâ \rrbracket =$
 $\lambda x_e \lambda e_s \lambda w_w. \text{go}(x)(e)(w) \ \& \ \forall w' [\text{Cont}_w(a_e)(w') \rightarrow$
 $\exists e' [HA(a_e)(e')(w') \ \& \ \exists y [$
 $\text{fish}(y)(w') \ \& \ \text{catch}(y)(e')(w')]]$

READ: *E IS A GOING BY X IN W, AND IN ALL WORLDS WHERE THE ATTITUDE ASSOCIATED WITH E HOLDS, THERE IS AN EVENT E' WHOSE AGENT IS THE HOLDER OF THAT ATTITUDE AND WHICH IS THE CATCHING OF A FISH*

7.4 Other types of control

CI constructions are also possible with correlates to object control (70), partial control (71), and arbitrary control (72), all of which license object incorporation.

- (70) **Interpreted like object control** (Watkins 1984: 208)
*èm-**cí**+càujàù+jót.*
 1s>2s-**meat**_c+buy_c+send.PFV
 ‘I₁ sent you₂ [PRO₂ to buy meat.]’
- (71) **Interpreted like partial control**
*é-kàulé+**cí**+càujàù+jót.*
 3s:1sD-together_c+**meat**_c+buy_c+send.PFV
 ‘I₁ want [PRO₁₊₂ to buy meat together.]’
- (72) **Interpreted like arbitrary control** (The last Sun Dance was held in 1889)
*yán-**qáuj**ò+kùn+hàìgàdàù.*
 3s:1sD-**Sun Dance**_c+dance_c+be known
 ‘He knows [how PRO_{arb} to dance the Sun Dance]’
 (lit. dancing the sun dance is known to him)

The differences in control are straightforwardly handled if the relations change slightly. For instance, partial control simply needs to involve an inclusion relation between the attitude holder and embedded agent, rather than an identity relation. Object control falls out naturally from *Z* if the embedded verb is unaccusative. If it requires an agent, the semantics requires a new mediating relation. *Z*_{OE} cuts the link between the attitude holder and embedded subject, but directly links the latter to the object of the predicate.

- (73) $Z_{OE} = \lambda P_{e,swt} \lambda x_e \lambda e_s \lambda w_w. \forall w' [\text{Cont}_w(a_e)(w') \rightarrow \exists e' [\text{agent}(x)(e')(w') \ \& \ \exists y [P(y)(e')(w')]]]]$

7.5 Predicative Control-like incorporation

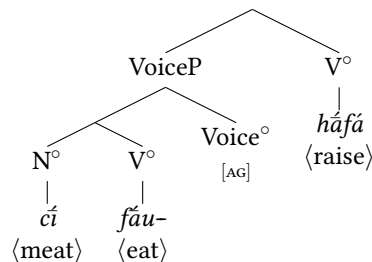
In this section we have employed Control-Like incorporation structures in Kiowa to demonstrate that mediating relations license object incorporation. These mediating relations also do the heavy lifting of adding the intensionality required for logophoric control clauses. Their number will be limited by the types of relations events can have, and the types of control-like relations two verbal clauses can have.

We have not explored correlates to what Landau (2015) describes as predicative control, which do not involve an attitude (*Alexis began [PRO to sing]*). Landau specifically finds that logophoric control involves the syntax and semantics of predicative control, which involves abstraction (Chierchia, 1989), plus the attitude-providing structure.

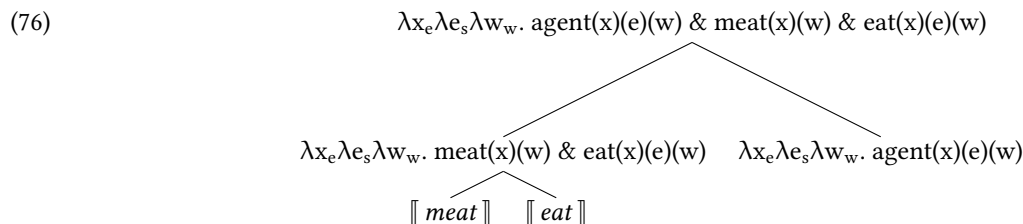
The CI-structures actually have no place for abstraction. Given a case of predicative control in Kiowa (74), where the main verb takes the incorporated verb as its argument, let us assume for the moment that the CI-structure has an agentive Voice°/V° (75) embedded with the incorporated verb.

- (74) *Alissa* Ø-**cí**+**fá**+hàfà.
 A. 3s-**meat**_c+eat_c+raise.PFV
 ‘Alexis began to eat meat.’

(75)

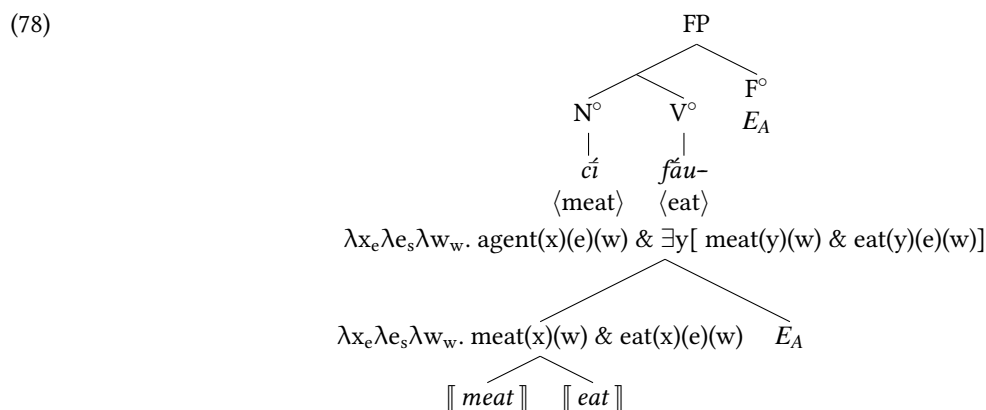


This structure cannot mean what we want it to mean. The Voice^o head introduces an agent condition, but if we have composed the verb and noun via Restrict, the conjunction would make the meat the agent of its own eating.



If we instead assume a mediating relation E_A that quantifies over the object and adds an agent role, we get the right semantics.

(77) $E_A = \lambda P_{e,swt} \lambda x_e \lambda e_s \lambda w_w. \text{agent}(x)(e)(w) \ \& \ \exists y [P(y)(e)(w)]$



This mediating relation preserves our claim that argument introducing heads of the extended verbal projection do not bind over their complements. Instead, only functional or derivational heads perform this function.

We could continue discussing ways that CI structures interact with questions about control, but we do not wish to become mired in the weeds of control when the topic is incorporation. Suffice it to say that the control-like incorporation leads to a semantic decomposition that raises questions about the distribution of meaning in control structures.

8 Summary and consequences for languages that incorporate objects

This paper has had one key goal : To fill in two gaps of weak compositionality in noun incorporation with the claim that noun incorporation relies on mediating functions. We have examined how this works in English and Kiowa, two languages whose peculiar behavior with regards to incorporation have led to important findings. In those languages, objects are only incorporated in cases where we independently need mediating functions, so it is fairly easy to fill the gaps with mediating functions. We also showed that mediating functions are compatible with controlling verbs, and perhaps preferable.

This brings us back to languages that do freely incorporate objects, like West Greenlandic and Chamorro. If our claim is correct, that verbal projections do not bind arguments, the heads of the extended projection are ruled out as possible sources to fill the compositional gaps. Instead, functional or derivational heads must provide mediating relations.

In the case of West Greenlandic, an incorporation structure like *timmisartu+liur* [airplane+make] ‘make an airplane’ is interpreted with an existential quantifier over the object noun. Between the noun and verb we proposed the E_{inv} relation (19a) that existentially quantifies over the object noun and gives it a vague non-argument thematic role. Perhaps West Greenlandic allows a mediating relation that gives the object a theme role.

$$(79) E_{theme} = \lambda P_{ewt} \lambda e_s \lambda w_w. \exists y [P(y) \ \& \ theme(y)(e)(w)]$$

The virtual impossibility of object incorporation in English and Kiowa would come down to those languages lacking this relation. However, we will not adopt E_{theme} because assigning theme relations are part of the semantics of the verb itself.

We might also propose a relation that takes the noun and the verb as arguments, but that is identical to a null existential quantifier. Both Kiowa and English already have these, so there is no semantic reason not to use them.

Instead, we can place the mediating relation above the verb, which worked for lexicalized noteworthy event descriptions (29) and synthetic compounds. The relation cannot be added by the extended verbal head $Voice^\circ/v^\circ$, but instead by some more derivational process, perhaps along the lines of a light verb.

$$(80) \quad \lambda e_s \lambda w_w. \exists y [\text{airplane}(y)(w) \ \& \ \text{make}(y)(e)(w)]$$

Another approach is that the incorporating verbs themselves are light verbs in a N+V construction, or at least reflect the combined spell-out of adjacent verb and light verb heads. (Butt, 2010) characterizes light verbs as forming a closed class in a given language. In many languages, incorporating verbs are limited to a closed class of final stems— the Inuit languages like West Greenlandic are included (Johns, 2007). Chamorro has only two incorporating stems, *gäi-* ‘have’ and its negative *päi-* ‘not have’.¹⁰ Moreover, these verbs obligatorily incorporate— they cannot appear independently.

The Algonquian language Ojibwe employs this strategy as well (Barrie and Mathieu, 2012). A verbalizing head *-ke* takes the noun to create a vague predicate.

$$(81) \quad \text{Eric } gii\text{-}naboob\text{-}ke\text{-}w$$

E. PAST-**soup**-VAI-3S.SUBJ

‘Eric was making soup.’

$$(82) \quad \lambda e_s \lambda w_w. \exists y [\text{soup}(y)(w) \ \& \ \text{make}(y)(e)(w)]$$

Interestingly, these constructions all involve intransitive constructions (VAI), which strongly suggests that they are derived forms; their derivation makes them intransitive.

This final section has sketched out possible ways to apply the requirement for mediating relations to languages that routinely incorporate objects. A full application would require extensive fieldwork in each of these languages, so we cannot progress further at this time. We do suggest, however, that the semantics of object incorporation requires more structure than simply making the noun and verb sisters.

9 Conclusion

Our central claim is that noun incorporation often occurs only when a mediating relation can link its semantics to that of the complex verb that it incorporates into. The mediating relation can vary based on what it binds, and which relations it establishes between the semantic arguments of the noun and those of the verb. In some cases, it forms part of an explicit morpheme, but it is usually unpronounced. Mediating relations cannot be introduced by the verb or its extended projection. Instead, they require functional or derivational heads.

This account in turn places requirements on the syntax of incorporating structures at LF. We have not explored how these LFs will link to the accounts of incorporation that involve processes in the syntactic derivation or at PF,

¹⁰One might also point out that the Chamorro stems might actually mean something more like ‘have as’, as in ‘Who has Carmen as a child?’, which would place the stems as expressing intensional mediating relations.

but we do hope that approaching the issue from this direction will help narrow the hypothesis space in a helpful way.

Abbreviations

Glossing follows the Leipzig conventions. Abbreviations are as follows: ABS: absolutive, D: dative/applicative argument, DET: determiner, DU: dual, EVID: hearsay evidential, HAB: habitual, I/INV: inverse number, IMPER: imperative, IND: indicative, INSTR: instrumental INTR: intransitive, IPFV: imperfective, MOD: modal inflection, NEG: negation inflection, PFV: perfective, P/PL: plural, R: reflexive, S/SG: singular, SS: same-subject marking, VAI: verbal animate intransitive, X_c: combining form, X_p: perfective form, X_i: imperfective form,

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