REFLECTIONS OF COMPLEMENT TYPE: THE VIEW FROM BLACKFOOT*

NATALIE WEBER AND LISA MATTHEWSON
University of British Columbia

Abstract

This paper provides a semantic analysis of Blackfoot (Algonquian) verbal morphology within transitive stems, proposing that the choice of stem morphology reflects the semantic type of the complement. Formally transitive stems combine with referential objects of type e (introducing widest-scope choice functions), while formally intransitive stems can combine with two different unsaturated semantic complement-types (either predicates of type $\langle e,t\rangle$ or existential quantifiers of type $\langle\langle e,t\rangle,t\rangle$). Our evidence is that the complements to each stem type, although syntactically non-uniform, display a uniform semantic behavior with respect to their ability to 'escape' a clause and to interact scopally with clause-internal quantifiers and modals. Blackfoot is typologically interesting in that property-denoting complements are not treated uniquely in the grammar. Instead, Blackfoot morpho-syntax for properties and quantificational complements is the same, showing that grammar can also reflect whether arguments are saturated or not.

1 Introduction

In many languages, a distinction is encoded between ordinary transitive objects, and transitive complements which are property-denoting. Thus, languages as diverse as Inuktitut, Hungarian, Māori, Chamorro, Spanish and Hindi all encode a distinction between predicative and

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non-predicative transitive complements.[1] Various strategies are used to encode the distinction, including differential case marking and determiner choice.

In this paper our first goal is to empirically establish that Blackfoot (Algonquian) is a language which overtly encodes the semantic type of transitive complements. It does this via verbal stem morphology, which has previously been analyzed as encoding a purely syntactic distinction between complement types (Ritter and Rosen 2010). Our second goal is to show that unlike other languages discussed in the literature, and contra a previous analysis of Blackfoot (Bliss 2013), Blackfoot stem morphology does not instantiate (pseudo-)incorporation, whereby one form is used exclusively for property-denoting complements. Instead, the major division in Blackfoot is between referential complements on the one hand, and either predicative or quantificational complements on the other. This shows that languages have the option to overtly encode the distinction between saturated and unsaturated semantic complement-types.

The paper is structured as follows. In the remainder of 1 we introduce the three classes of semantically bivalent verbal stems in Blackfoot: 'transitive animate', 'transitive inanimate', and 'animate intransitive plus object' (Bloomfield 1946, Frantz 2009). 2 discusses the two previous analyses of the phenomenon, the syntactic approach of Ritter and Rosen (2010), and the pseudo-incorporation approach of Bliss (2013). We show that the former analysis cannot account for the distribution and interpretation of NPs preceded by numerals, and that the latter analysis, while making a range of correct predictions for bare NPs, incorrectly predicts that all complements to 'animate intransitive plus object' verbs display pseudo-incorporation effects. In 3 we present evidence that formally transitive stems (transitive animate and transitive inanimate verbs) combine with wide-scope choice functions of type *e*. We further show that complements to semantically bivalent but formally intransitive stems (animate intransitive plus objects) may be either predicates of type $\langle e,t\rangle$ or existential quantifiers of type $\langle\langle e,t\rangle,t\rangle$. Our evidence for these claims includes the (in)ability of complements to 'escape' a clause, and relative scope with respect to clause-internal quantifiers and modals. While predicates of type $\langle e,t\rangle$ are pseudo-incorporated (Bliss 2013) and must take narrow scope with, existential quantifiers can have either wide or narrow scope. 4 presents our formal analysis, and 5 concludes.

Blackfoot is a Plains Algonquian language spoken in Alberta, Canada, and Montana, USA. The majority of speakers are over the age of 60. Unless otherwise noted, all data in this paper come from original fieldwork with one speaker of the Káínaa dialect of Blackfoot who is in her late 60s. Our consultant's dialect differs in several respects from that described in Frantz (2009). Importantly for this paper, our consultant does not use the number-neutral suffix *-i*, glossed by Frantz as 'non-particular'. Instead, these forms have been replaced with either a bare noun or a bare plural. Our methodology involves the standard techniques of translation tasks (in either direction), elicited production tasks based on explicitly described discourse contexts, and acceptability judgment tasks in which the speaker judges the felicity of Blackfoot sentences in particular discourse contexts. See Matthewson (2004) for further details of methodology.

[1] See Van Geenhoven (1998) and Wharram (2003) on Inuktitut, Farkas and de Swart (2003) on Hungarian, Chung and Ladusaw (2004) on Māori and Chamorro, Bleam (2005) on Spanish and Dayal (2011) on Hindi, among others.

1.1 Transitive verb stem types in Blackfoot

The three types of stem for semantically transitive verbs are shown in (1)–(3): transitive animate (TA), transitive inanimate (TI), and animate intransitive plus object (AI+O) respectively.[2]

(1) naowatsiw [amo mamii]
na–**oowat**–yii–wa amo–yi mamii–yi
PST–**eat**.**TA**–DIR–PRX DEM–OBV fish.AN–OBV
'S/he ate this fish.' (Ritter and Rosen 2010, 134)

(2) naowatoom [ani akoopis]
na–**oowatoo**–m–wa ann–yi akoopis–yi
PST–**eat**.**TI**–DIR–PRX DEM–OBV soup.IN–OBV
'S/he ate that soup.' (Ritter and Rosen 2010, 134)

(3) naoyiw (mamii/akoopis)
na–**ooyi**–wa (mamii/akoopis)
PST–**eat**.**AI**–PRX (fish.AN/soup.IN)
'S/he ate (fish/soup).' (Ritter and Rosen 2010, 134)

These verb stems differ in the animacy of the complements they may take. (Subjects of transitive verbs in Blackfoot must be animate (Frantz 2009), so verb stem morphology is not affected by the animacy of the subject.) TA verbs occur with objects of animate gender, such as mamii 'fish' in (1), but cannot occur with objects of inanimate gender, such as *akoopis* 'soup', as in (4).[3] Conversely, the objects of TI verbs must be inanimate, as shown in (2) vs. (5). AI+O verbs allow complements of either gender, as in (3).

(4) naowatsiw [amo akoopis]
na–**oowat**–yii–wa amo–yi akoopis–yi
PST–**eat**.**TA**–DIR–PRX DEM–OBV soup.IN–OBV
'S/he ate this fish.' (Ritter and Rosen 2010, 135)

(5) naowatoom [ani mamii]
na–**oowatoo**–m–wa ann–yi mamii–yi
PST–**eat**.**TI**–DIR–PRX DEM–OBV fish.AN–OBV
'S/he ate that soup.' (Ritter and Rosen 2010, 135)

The three stem types also differ in their morpho-syntax. Both TA and TI verbs are formally transitive in the sense that they contain direct/inverse morphology, often called a *theme sign*

[2]We use the Blackfoot orthographic conventions given in Frantz (1978, 2009), except when transcribing word-final vowels. The transcriptions of elicited examples reflect the pronunciation of the speaker and may not match the spelling in Frantz and Russell (1995). Examples cited from other sources include the original transcription and free translation, but we have sometimes amended the glossed lines to match the conventions used in this paper.

[3]Animacy in Blackfoot is grammatical. The (in)animacy of the noun usually corresponds with real-world (non)sentience, but a subset of non-sentient referents are grammatically animate, such as *pokón* 'ball', *íssk* 'pail', and *isttoán* 'knife' (Bliss 2005, Frantz 2009).

(Bloomfield 1946, Frantz 2009). The form of the theme suffix depends on the person and proximate/obviate status of both the subject and object of the sentence (Bliss 2005). Examples (6) and (7) differ minimally in that the object of (6) is third person (proximate) and the object of (7) is first person. This shows that the object is indexed on TA/TI verbs.

(6) kitsíínowaa
kit–iino–**aa**–wa
2–see.TA–**DIR**–PRX
'You saw him/her.'

(7) kitsíínookị̊
kit–iino–**oki**
2–see.TA–**INV**
'You saw me.'

Although AI+O verbs are similarly semantically bivalent, they are formally intransitive in that the object is not indexed on the verb with a theme sign, as shown in (8) (repeated from (3) above). Instead, they have the same morphology as *in*transitive verbs with animate subjects (AI verbs) which cannot take a complement, such as *sspitaa* 'tall', shown in (9). Because AI+O verbs have the same morphology as semantically intransitive AI verbs, the Blackfoot literature often uses the term AI to refer to both types of verb (Bliss 2013, Ritter and Rosen 2010). We maintain the term AI+O in this paper to emphasize that we are only discussing semantically transitive verbs, like those in (8).

(8) naoyiw (mamii/akoopis) [=(3)]
na–**ooyi**–wa (mamii/akoopis)
PST–**eat**.**AI**–PRX (fish.AN/soup.IN)
'S/he ate (fish/soup).' (Ritter and Rosen 2010, 134)

(9) ííksspitaa
iik–sspitaa–wa
DEG–tall.AI–PRX
'S/he is tall.'

2 Previous analyses

The literature provides two ideas about what drives the choice between verb stems in Blackfoot. The first proposal is syntactic: Ritter and Rosen (2010) argue that verb stem choice is determined by the internal syntax of the complement. The second proposal is a syntax-semantics account; Bliss (2013) argues that AI+O complements are pseudo-incorporated and therefore have a set of syntactic and semantic features which differ from TA/TI complements. We discuss each of these proposals in the following two sections. In later sections we will motivate a semantic analysis whereby verb stem type depends on the semantic type of the complement, and which unlike Bliss's analysis, does not rely on all AI+O complements being necessarily pseudo-incorporated.

2.1 Syntactic explanation

Ritter and Rosen (2010) argue that the Blackfoot verb stem restricts the morpho-syntactic properties of the complement (see also Frantz 2009). More precisely, TA and TI stems occur with DP complements, while AI+O stems occur with morphologically bare NPs or null complements. Ritter and Rosen (2010) explain this by arguing that that TA and TI stems license DP objects while AI+O stems do not. The generalizations are summarized in 1.

Table 1: Morpho-syntactic correlations between verb stem and complement type (preliminary)

Type of complement	TA/TI stems	AI+O stems
DP	✓	✘
Bare NP	✘	✓
Null complement	✘	✓

New data shows that AI+O complements also include NPs with plural morphology, as well as NPs introduced by a numeral (Numeral NPs) (Bliss 2012, 2013, Weber and Matthewson 2013). A more complete summary of the distribution of complement types across verb stems is given in 2. For data supporting these distributions, see the references just cited.

Table 2: Morpho-syntactic correlations between verb stem and complement type

Type of complement	TA/TI stems	AI+O stems
DP	✓	✘
'Certain' NP[4]	✓	✘
Bare NP	✘	✓
Bare plural NP	✘	✓
Null complement	✘	✓
Numeral NP	✓	✓

A purely syntactic explanation cannot account for the fact that Numeral NPs are compatible with all verb stem types, unless additional assumptions are made. Perhaps an optional null D could be postulated for Numeral NPs, enabling us to retain the generalization that there is a DP/NP split. However, there is at present no independent evidence that Numeral NPs have a larger syntactic structure when they appear as complements to TA or TI verbs. Moreover, we will show below that there are clear semantic consequences to verb stem choice (for example, in terms of possible scope of the complements). We will therefore argue that the fundamental generalization is semantic rather than syntactic.

2.2 Pseudo-incorporation explanation

Bliss (2013) shows that bare NP complements to AI+O verbs exhibit several syntactic and semantic differences from the DP complements to TA/TI verbs. Bare NPs not only have an impoverished internal syntax, they have a restricted external syntax because they are tightly bound to the verb and remain *v*'-internal. Semantically, bare NPs are number-neutral, non-specific in the sense of Enç

[4]The word translated as 'certain' by our consultant is built on a demonstrative root (*ann-*), but differs from other demonstratives in morphological complexity (it includes a verbalizing suffix *=ayi*, (Heather Bliss p.c.) and semantics. 'Certain' NPs can designate specific indefinites in out-of-the-blue contexts (such as the beginning of a narrative) while other DPs cannot (Weber and Matthewson 2013).

(1991), and have obligatory narrow scope under quantifiers and other operators.[5] Based on these criteria, Bliss argues that bare NP complements are pseudo-incorporated in the sense of Massam (2001). Bliss also observes that bare plurals (i.e., plural NPs not preceded by a demonstrative) may occur as AI+O complements, but are semantically and syntactically distinct from bare NPs. Bare plurals are not number neutral, and they are a slightly larger morpho-syntactic, and containing a suffix that shows plurality and (in)animacy.

Bliss further claims, but does not show, that bare plurals are also pseudo-incorporated, suggesting that all AI+O complements combine with the verb via Restrict (Chung and Ladusaw 2004). This claim makes several predictions which we return to later in this paper. For instance, it predicts that bare plurals take narrow scope under quantifiers and other operators. We will show that this is not borne out, and that unlike bare NPs, bare plurals may take either wide or narrow scope. This shows that AI+O complements are not all pseudo-incorporated, and do not all compose via Restrict. In fact, AI+O complements are semantically non-uniform, although still distinguishable in terms of semantic type from TA/TI complements.

In the next section we turn to the evidence that verb stem type reflects the semantic type of the complement.

3 Verb stem reflects semantic type

Our proposal is that the complements to TA and TI verbs are of type *e*; they introduce free-variable choice functions, and combine with the verb via Functional Application. AI+O complements, in contrast, are of a non-referential semantic type. They are either quantificational (type $<<e,t>,t>$) or predicative (type $<e,t>$).

The evidence for our proposal is of two kinds. First, we show that complements to TA/TI verbs display the type of extraordinarily wide 'scope' first detected by Fodor and Sag (1982) for English specific indefinites. Complements to AI+O verbs, on the contrary, never scope outside their clause. Second, we show that clause-internally, TA/TI complements never scope below a clause-mate quantifier, except in cases of 'pseudo-scope' as discussed by Kratzer (1998). Instead, TA/TI complements are only felicitous in wide scope or cumulative contexts. Bare NP complements to AI+O verbs, on the other hand, must take narrow scope with respect to a clause-mate quantifier, which is predicted for property-denoting arguments. Finally, we show that bare plural and Numeral NP complements to AI+O verbs behave like other quantificational elements in Blackfoot: they can scope either above or below a clause-mate quantifier, and are infelicitous in cumulative contexts.

3.1 Exceptional wide-scope behavior

In Blackfoot, quantifiers occur as prefixes on the verb and can associate semantically with clause-mate DP subjects or objects, as shown in (10) for a TI verb.

(10) nitohkanáóhpommatoo'pinnaaniaawa
nit–**ohkana**–ohpommatoo–'p–innaan–yi=aawa
1–**all**–buy.TI–DIR–1PL–PL=PRX.PL
'We all bought them.' OR 'We bought all of them.' (Frantz 2009, 85)

[5] It is not clear that bare NPs are number-neutral for our consultant; she typically rejects bare NPs in plural contexts. Investigation of number-neutrality goes beyond the scope of this paper.

However, quantifiers are clause-bound in conjunct clauses, a type of embedded clause marked with the clause-typing suffix *-hs* 'CNJ'. Example (11) is based on data in Bliss (2012, 12) and uses the presupposition of *ayak-* 'both' that the argument it quantifiers over contains only two entities. Embedded *ayak-* can only associate with clause-mate arguments, not with matrix clause arguments. These data indicate that conjunct clauses serve as islands in Blackfoot.[6]

(11) nisíksstaahpinnaan [kitááhkayaksiistapoohsoaayi]
nit–ik–sstaa–hpinnaan kit–aahk–**ayak**–iistap–oo–hs–oaa–yi
1–DEG–want.AI–1PL 2–might–**both**–away–go–CNJ–2PL–OBV
✓'We want you both to go away.' Context: There are three of us and two of you.
#'We both want you to go away.' Context: There are two of us and three of you.

Given this background, we will now investigate the conjunct-clause-escaping properties of complements to transitive verbs of various stem types. Our tests are based on Fodor and Sag's (1982) island-escaping diagnostics. (Future work will investigate other syntactic islands not tested here; see Barrie (2014) for evidence that Blackfoot *wh*-movement displays a standard range of island effects.) The idea is that some arguments are able to 'escape' clauses, appearing to take scope outside the ordinary scope domain of quantifiers. However, as argued by Fodor and Sag, an element which escapes islands only to take *widest* (not *intermediate*) scope is not simply a quantifier with an unusual ability to escape islands, but is actually scopeless and must be analyzed as directly referential. The three relevant readings to investigate – widest, intermediate, and narrowest – are illustrated for an English example in (12).

(12) Those girls all want [to buy **a dog**].

Widest: $\exists y$**(dog(**y**))** [$\forall x$(girl(x)) [x wants [x buys y]]]
Intermediate: $\forall x$(girl(x)) [$\exists y$**(dog(**y**))** [x wants [x buys y]]]
Narrowest: $\forall x$(girl(x)) [x wants [$\exists y$**(dog(**y**))** [x buys y]]]

We will now show that in Blackfoot, complements to TA and TI verbs display exceptional widest-'scope' behavior, while complements to AI+O verbs remain clause-bound.

We begin by showing that unlike quantifier prefixes, complements to TA verbs are not clause-bound. Example (13) shows a DP complement to a TA verb within an embedded conjunct clause, and (14) contains a 'certain' NP complement. In both cases, the complement can only have the widest reading, just as we predict for a referential object of type *e*. The only possible reading is that there is a particular dog, such that each of the girls wants to buy that dog.

(13) ómiksi aakííkoaiks ikohkanáísstaya
om–iksi aakiikoan–iksi ik–ohkana–issta–yi=aawa
DEM–AN.PL girl–AN.PL DEG–all–want.AI–PL=PRX.PL
[omááhkohpommataahsa ómi imita]
o–m–aahk–ohpommat–aa–hsi=aawa **om**–yi imita–yi
3–3–might–buy.**TA**–DIR–CNJ=PRX.PL **DEM**–OBV dog.AN–OBV

[6]How quantification works compositionally in Blackfoot is an issue which has not yet been addressed in the literature, and which we do not attempt to solve here. We assume that somehow, the quantifier prefixes associate with referential arguments, quantifying over atomic sub-parts of the plural individual denoted by the nominal (cf. Matthewson's (2001) analysis of St'át'imcets quantification, albeit with additional compositionality puzzles in the Blackfoot case).

Table 3: Available scope readings for complements

Stem type	Complement	Scope
TA	DP	Widest
TA	'Certain' NP	Widest
TA	Numeral NP	Widest
TI	DP	Widest
TI	'Certain' NP	Widest
TI	Numeral NP	Widest
AI+O	Bare NP	Narrowest
AI+O	Bare plural	Narrowest
AI+O	Numeral NP	Narrowest

'Those girls all want to buy that dog.'

✓Widest: for one particular dog *x*, all the girls want to buy *x*
#Intermediate: for each girl, there is a different dog she wants to buy
#Narrowest: all the girls want to buy a dog, any dog

(14) ómiksi aakííkoaiks ikohkanáísstaya
om–iksi aakiikoan–iksi ik–ohkana–issta–yi=aawa
DEM–AN.PL girl–AN.PL DEG–all–want.AI–PL=PRX.PL
[omááhkohpommataahsa anísskayi imita]
o–m–aahk–ohpommat–aa–hsi=aawa **ann**–yi–hka=ayi imita–yi
3–3–might–buy.**TA**–DIR–CNJ=PRX.PL **DEM**–OBV–INVS=OBV.SG dog.AN–OBV
'Those girls all want to buy this one certain dog.

✓Widest: for one particular dog *x*, all the girls want to buy *x*
#Intermediate: for each girl, there is a different dog she wants to buy
#Narrowest: all the girls want to buy a dog, any dog

Likewise, Numeral NP complements to TA verbs within embedded conjunct clauses only ever take widest scope. This suggests that they are also referential and type *e*.

(15) ómiksi aakííkoaiks ikohkanáísstaya
om–iksi aakiikoan–iksi ik–ohkana–issta–yi=aawa
DEM–AN.PL girl–AN.PL DEG–all–want.AI–PL=PRX.PL
[omááhkohpommataahsa nióókskami imitáíks]
o–m–aahk–ohpommat–aa–hsi=aawa **niookskam**–yi imita–iksi
3–3–might–buy.**TA**–DIR–CNJ=PRX.PL **three.AN**–PL dog–AN.PL
'Those girls all want to buy three dogs.'

✓Widest: there is one particular set of three dogs that all the girls want to buy
#Intermediate: for each girl, there is a different set of three dogs she wants to buy
#Narrowest: all the girls want to buy three dogs, any three dogs

DP, 'certain NP', and Numeral NP complements to TI verbs also take widest scope, as shown in (16), (17), and (18), respectively.

(16) ómiksi aakííks áóhkanaisstaya
om–iksi aakii–iksi a–ohkana–issta–yi=aawa
DEM–AN.PL woman–AN.PL IPFV–all–want.AI–PL=PRX.PL
[omááhkokstoo'sáa ómi sináákia'tsis]
o–m–aahk–okstoo–'si=aawa **om**–yi sinaakia'tsis–yi
3–3–might–read.**TI**–CNJ=PRX.PL **DEM**–OBV book–OBV
'Those women all want to read that book.'

✓Widest: there is one particular book that all the women want to read
#Intermediate: for each woman, there is a different book she wants to read
#Narrowest: all the women want to read a book, any book

(17) ómiksi aakííks áóhkanaisstaya
om–iksi aakii–iksi a–ohkana–issta–yi=aawa
DEM–AN.PL woman–AN.PL IPFV–all–want.AI–PL=PRX.PL
[omááhkohpommatoo'sa anííhkayi asó'ka'simi]
o–m–aahk–ohpommatoo–'si=aawa **ann**–yi–hka=ayi asoka'sim–yi
3–3–might–buy.**TI**–CNJ=PRX.PL **DEM**–OBV–INVS=OBV.SG dress.AN–OBV
'Those women all want to buy that one certain dress.'

✓Widest: there is one particular dress that all the women want to buy
#Intermediate: for each woman, there is a different dress she wants to buy
#Narrowest: all the women want to buy a dress, any dress

(18) ómiksi aakííks áóhkanaisstaya
om–iksi aakii–iksi a–ohkana–issta–yi=aawa
DEM–AN.PL woman–AN.PL IPFV–all–want.AI–PL=PRX.PL
[omááhkohpommatoo'sa náátomka asó'ka'simists]
o–m–aahk–ohpommatoo–'si=aawa **naatokaa**–yi asoka'sim–ists
3–3–might–buy.**TI**–CNJ=PRX.PL **two**–PL dress.AN–IN.PL
'Those women all want to buy two dresses.'

✓Widest: there is a particular set of two dresses that all the women want to buy
#Intermediate: for each woman, there is a different set of two dresses she wants to buy
#Narrowest: all the women want to buy two dresses, any two dresses

The data above show that all types of complements to TA or TI verbs appear to scope outside the normal conjunct clause boundary which restricts quantifier scope. In contrast, the complements to AI+O verbs in embedded clauses can*not* escape a conjunct clause boundary, and they always take narrowest scope. Example (19) shows a bare NP complement within an embedded conjunct clause with an AI+O verb. The only possible reading is one where each of the girls has the desire to buy a dog, but none of them have a particular dog in mind.

(19) ómiksi aakííkoaiks íkohkanaisstaya
om–iksi aakiikoan–iksi ik–ohkana–issta–yi=aawa
DEM–AN.PL girl–AN.PL DEG–all–want.**AI**–PL=PRX.PL
[omááhkohpommaahsa imita]
o–m–aahk–ohpommaa–hsi=aawa imita
3–3–might–buy.**AI**–CNJ=PRX.PL dog
'Those girls all want to buy a dog.'

#Widest: for one particular dog *x*, all the girls want to buy *x*
#Intermediate: for each girl, there is a different dog she wants to buy
✓Narrowest: all the girls want to buy a dog, any dog

Similarly, bare plural and Numeral NP complements within embedded AI+O conjunct clauses must take narrowest scope, as shown in (20) and (21).

(20) ómiksi aakííkoaiks ikohkanáísstaya
om–iksi aakiikoan–iksi ik–ohkana–issta–yi=aawa
DEM–AN.PL girl–AN.PL DEG–all–want.**AI**–PL=PRX.PL
[omááhkohpommaahsa imitáíks]
o–m–aahk–ohpommaa–hsi=aawa imita–**iksi**
3–3–might–buy.**AI**–CNJ=PRX.PL dog–**AN.PL**
'Those girls all want to buy dogs.'

#Widest: there is one particular set of dogs that all the girls want to buy *x*
#Intermediate: for each girl, there is a different set of dogs she wants to buy
✓Narrowest: all the girls want to buy dogs, any dogs

(21) ómiksi aakííkoaiks ikohkanáísstaya
om–iksi aakiikoan–iksi ik–ohkana–issta–yi=aawa
DEM–AN.PL girl–AN.PL DEG–all–want.AI–PL=PRX.PL
[omááhkohpommaahsa nióókskami imitáíks]
o–m–aahk–ohpommaa–hsi=aawa **niookskam**–yi imitaa–iksi
3–3–might–buy.**AI**–CNJ=PRX.PL **three.AN**–PL dog–AN.PL
'Those girls all want to buy three dogs.'

#Widest: there is one particular set of three dogs that all the girls want to buy
#Intermediate: for each girl, there is a different set of three dogs she wants to buy
✓Narrowest: all the girls want to buy three dogs, any three dogs

In summary, the exceptional scope data show that all complements to TA and TI verbs are able to semantically escape conjunct clause boundaries (unlike quantifier prefixes). In fact, they take even wider 'scope' than quantifiers in a higher clause. The absence of intermediate readings further shows that rather than having unusual island-escaping scope-taking properties, these complements are in reality scopeless, because they are of type *e* (cf. Fodor and Sag 1982). Bare NP, bare plural, and Numeral NP complements to AI+O verbs, on the other hand, are clause-bound, which shows they are *not* of type *e*.

An important point is that Numeral NPs behave differently depending on whether they are complements to TA/TI verbs or AI+O verbs, e.g. (15) or (18) vs. (21). This shows that the choice between TA/TI and AI+O verbs reflects the semantic type of the complement (type *e* or not type *e*), regardless of the morpho-syntactic properties of the complement. In the next section we provide more evidence for our proposal that verb stem choice in Blackfoot reflects a distinction between complements of type *e*, and complements of other semantic types.

3.2 Clause-internal scoping data

In this section we examine the scoping behavior of TA/TI and AI+O complements with respect to clause-mate quantifiers and modals. We show that complements to TA/TI verbs are felicitous in wide scope or cumulative contexts. Complements to AI+O verbs show two different behaviors, depending on the type of complement: bare NPs always take narrow scope, while bare plurals and plurals modified by a numeral can take either wide or narrow scope. We use the quantifiers *ayak-* 'both', *a'tsoot-* 'both' and *iihkana-* 'all' in the examples below.

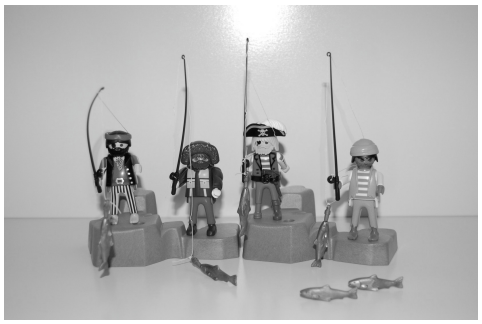
3.2.1 Scope with respect to clause-mate quantifiers

As predicted by our proposal that complements to TA/TI verbs are of type *e*, the data show that these complements never take narrow scope under clause-mate quantifiers. This is shown for TA verbs in (22)–(24) and for TI verbs in (25)–(27). In each case we show first a DP object, next a 'certain' object, and finally a Numeral NP object. We include both singular and plural objects in the data; the same scope facts obtain in either case.

(22) áyákohpommatsiiya [ómiksi isttoáíks]
ayak–ohpommat–yii–yi=aawa **om**–iksi isttoan–iksi
both–buy.**TA**–DIR–PL=PRX.PL **DEM**–OBV knife–AN.PL
'They both bought those knives.'
✓They bought those knives (together).
#They each bought a different set of knives.

(23) iihkanáínoyiiya [annískey piita]
iihkana–ino–yii–yi=aawa **ann**–yi–hka=ayi piitaa–yi
all–see.**TA**–DIR–PL=PRX.PL **DEM**–OBV–INVS=OBV.SG eagle.AN–OBV
'They all saw this one certain eagle.'
✓Three birdwatchers saw the same eagle (together or separately).
#Three birdwatchers each saw a different eagle. (Three eagles total.)

(24) iihkanáómihkatsiiya [ni'tókskam mamíí]
iihkana–omii–hkat–yii–yi=aawa **ni'tokskam** mamii
all–fish–acquire.**TA**–DIR–PL=PRX.PL **one**.AN fish.AN
'They all caught one fish.'
✓Each of their lines got hooked onto the same fish.
#They each caught their own fish.
Acceptable with the first picture, in which every fisherman's line is caught on one fish;
Unacceptable with the second picture, in which every fisherman's line is caught on a different fish (Bruening 2008):

(25) iihkanáwaahkánimiiya [ómi skinítsimaan]
iihkana–waahkani–m–yi=aawa **om**–yi skinitsimaan–yi
all–sew.**TI**–DIR–PL=PRX.PL **DEM**–OBV bag.IN–OBV
'They all sewed that bag.'
✓They all sewed that same bag (together).
#Each of them sewed a bag like that one.

(26) áyakokstoomya [anístsisskayi sináákia'tsists]
ayak–okstoo–m–yi=aawa **ann**–istsi–hka=ayi sinaakia'tsis–istsi
both–read.**TI**–DIR–PL=PRX.PL **DEM**–IN.PL–INVS=OBV.SG book–IN.PL
'They both read those certain books.'
✓They read the same books.
#They each read a different set of books.

(27) áyaká'pistotsimya [nióókskayi itáísóyo'pists]
ayak–a'pistotsi–m–yi=aawa **niookska**–yi itaisooyo'p–istsi
both–build.**TI**–DIR–PL=PRX.PL **three**–PL table–IN.PL
'They both built three tables.'
✓They both worked on the same three tables.
#They each made three tables. (Six tables total.)

The scope results with respect to clause-mate quantifiers are summarized in 4.

Table 4: Scope of TA/TI complements with respect to clause-mate quantifiers

Complement	Wide scope?	Narrow scope?
DP	✓	✘
'Certain' NP	✓	✘
Numeral NP	✓	✘

Turning to AI+O complements, we find a completely different situation. First, bare NP complements to AI+O verbs must take narrow scope. This is illustrated with an animate complement in (28) and with an inanimate complement in (29).

(28) iihkanááyaapiiya [pííta]
iihkana–yaapi–yi=aawa pííta
all–see.**AI**–PL=PRX.PL eagle.AN
'They all saw an eagle.'
#Three birdwatchers all saw the same eagle.
✓Three birdwatchers split up and they each saw a different eagle.

(29) iihkanáókstakiiya [sináákia'tsis]
iihkana–okstaki–yi=aawa sinaakia'tsis
all–read.**AI**–PL=PRX.PL book.IN
'They all read a book.'
#They all read the exact same book.
✓Each of them read a different book.

Bare plural nouns, on the other hand, may either scope high or low, as demonstrated in (30) with an animate complement and in (31) with an inanimate complement.

(30) iihkanááyaapiiya [píítaiks]
iihkana–yaapi–yi=aawa piitaa–**iksi**
all–see.**AI**–PL=PRX.PL eagle–**AN.PL**
'They all saw eagles.'
✓Three birdwatchers are together and they saw eagles.
✓Three birdwatchers split up and they each saw different eagles.

(31) áyakohpommayaa [sópa'tsists]
ayak–ohpommaa–yi=aawa sopa'tsis–**istsi**
both–buy.**AI**–PL=PRX.PL chair–**IN.PL**
'They both bought some chairs.'
✓The shopowner dishonestly (re)sold the same chairs to two people.
✓Two people each bought some chairs separately.

Numeral NPs complements to AI+O verbs may also scope high or low around clause-mate quantifiers. This is shown for an animate complement in (32), and for an inanimate complement in (33). Example (33), with an AI+O verb, is felicitous in a context where they each worked on a different set of three tables, while the almost-minimal pair with a TI verb in (27) was not.[7]

(32) náátookámiiks aakííkoaiks á'tsootáyinnakiiya [náá'tokami iihtáísinaakio'piks]
naato'kam–yi–iksi aakiikoan–iksi **a'tsoot**–a–yinnaki–yi=aawa **naato'kam**–yi iihtaisinaakio'p–iksi
two.AN–PL–AN.PL girl–AN.PL **both**–IPFV–hold.**AI**–PL=PRX.PL **two.AN**–PL pen–AN.PL

[7]We have not been able to elicit inverse scope readings (e.g., where in (32), two pens are each held by a different set of two girls, for a total of four girls). We believe this indicates that the subject noun phrase involves universal quantification over a particular set of two girls.

'Two girls are both holding two pens .'
✓The girls are both holding on to the same two pens. (Two pens total.)
✓The girls are at separate desks, holding two pens each. (Four pens.)

(33) anááhk píítaaki ki anááhk sááko
ann–wa–hka píítaa–aakii ki ann–wa–hka sááko
DEM–OBV–INVS eagle–woman CONJ DEM–OBV–INVS saako
áyaka'pistotakiiya [niióókskayi itáísóyo'pists]
ayak–a'pistotaki–yi=aawa **niookska**–yi itaisooyo'p–ists
both–build.**AI**–PL=PRX.PL **three**–PL table–IN.PL
'Piitaakii and Saako both built three tables.'
✓They both worked on the same three tables. (Three tables total.)
✓They each made three tables. (Six tables total.)

The AI+O complement scoping facts are summarized in 5. We have confirmed Bliss's (2013) observation that bare NPs must scope under quantifiers. However, bare plurals and Numeral NPs are not pseudo-incorporated, as they do not obligatorily take narrow scope under quantifiers. Not all AI+O quantifiers compose via Restrict, contra Bliss's (2013) claim.

Table 5: Scope of AI+O complements with respect to clause-mate quantifiers

Complement	Wide scope?	Narrow scope?
Bare NP	✘	✓
Bare plural	✓	✓
Numeral NP	✓	✓

The AI+O data presented here show a clear distinction between the acceptable contexts for bare NP complements on the one hand, and bare plurals and Numeral NPs, on the other: only the latter are acceptable in contexts where they do not co-vary with respect to the clause-mate quantifier. Compare, for example, (28), in which the bare NP is rejected if the same eagle was seen by all the bird-watchers, with (30), in which the bare plural is accepted if the same eagles were seen by all the bird-watchers.

The scope of AI+O complements with respect to clause-mate quantifiers does not actually force us to postulate the possibility of wide scope for bare plurals and Numeral NPs. Since the wide-scope reading for the complement entails the narrow-scope reading, the supposedly wide-scope cases (where, e.g., the same eagles are seen) could simply be instances of the narrow-scope reading, in which for every bird-watcher there are eagles that they saw, which happen to be the same eagles for every bird-watcher.[8] However, there is supporting evidence for the wide-scope analysis: we have found that bare plurals and Numeral NPs can also take wide scope with respect to the modal *aahkama'p-* 'might', while bare NP complements cannot. The bare NP facts are shown in (34)–(36). The bare NP scopes under *aahkama'p-* in (34), but cannot scope over it, as shown in (35) and (36).

[8]Thanks to Angelika Kratzer (p.c.) for reminding us of this. See also Reinhart (1997, 341) and references cited therein, among others.

(34) Context: You are thinking of buying a car, so that you no longer have to ride the bus.

ninááhkama'pohpómmḁ	áíkistoomatomaahka		
ni–n–**aahkama'p**–ohpommaa	aikistoomatomaahka		
1–1–**might**–buy.AI	car		
nitákitssowáttoohpokkssápopiimáayii			matápiks
nit–aak–it–saw–att–a–ohpok–isap–opii–m=ayi			matapi–iksi
1–FUT–LOC–NEG–again–IPFV–with–inside–sit.AI–TA=OBV.SG			person–AN.PL

'I might buy a car so that I wouldn't have to ride with people.' (✓ narrow scope)

(35) Context: You are thinking of buying a car, but you haven't found one you like yet. You saw a red one for sale yesterday that you liked and you are thinking of buying it.

#ninááhkama'pohpommḁ	áíkistoomatomaahka.	máóhksinamm.
ni–n–**aahkama'p**–ohpommaa	aikistoomatomaahka	maohk–inamm–wa.
1–1–**might**–buy.AI	car	red–appear.as.AI–PRX

Intended: 'I might buy a car. It is red.' (✘ wide scope)

(36) Context: As in (35).

#ninááhkama'pohpommḁ	máóhksinamm	áíkistoomatomaahka.	
ni–n–**aahkama'p**–ohpommaa	maohk–inamm–wa	aikistoomatomaahka	
1–1–**might**–buy.AI	red–appear.as.AI–PRX	car	
nitsíínowaa	matónni.		
nit–iino–waa–wa	matonni		
1–see.TA–DIR–PRX	yesterday		

Intended: 'I might buy a car. I saw it yesterday.' (✘ wide scope)

Bare plurals, on the other hand, are accepted in either narrow scope or wide scope contexts, shown in (37) and (38) respectively. Crucially, the second sentence in (37) serves as evidence that the bare plural complement semantically scopes over the modal, since discourse anaphora can refer back to the plural individual without modal subordination (Roberts 1989).

(37) Context: You are going to go hiking. You know you might see some wildlife.

ninááhkama'pyáápi̥	kiáyoks	ámo	nitó'ohtowáawahkaahpi
ni–n–**aahkama'p**–yaapi	kiaayo–iksi	amo–yi	nit–oht–a–waawahkaa–hp–yi
1–1–**might**–see.AI	bear–AN.PL	DEM–OBV	1–MEANS–IPFV–walk.AI–IND–OBV

'I might see bears where I'm walking.' (✓ narrow scope)

(38) Context: You are going to hike up Grouse Mountain. There are two baby bears in captivity there, and if they are awake and outside then you might see them.

ninááhkama'pítsaapi̥	pókohkiáyoks.	iyínnimataya.
ni–n–**aahkama'p**–it–yaapi	pok–ohkiaayo–iksi	iyinnimat–aa–yi=aawa
1–1–**might**–LOC–see.AI	smal–bear–AN.PL	catch.TA–DIR–PL=PRX.PL

'I might see bears. They were caught.' (lit. 'Someone caught them.') (✓ wide scope)

Likewise, Numeral NP complements are felicitous in either narrow or wide scope contexts, as shown in (39) vs. (40). Again, the discourse anaphora data in (40) provide evidence that this is a true wide-scope reading for the Numeral NP complement.

(39) Context: You are so hungry that you might eat two sandwiches instead of one.

ninááhkama'piooyi̥	náátokaa	pó'tstáánists.	nitsííksstonnatsisttso'kini̥
ni–n–**aahkama'p**–yooyi	naatokaa–yi	po'tstaa–n–istsi	nit–iik–sstonnat–isttso'kini
1–1–**might**–LOC–eat.AI	two–PL	assemble–NMLZ–IN.PL	1–DEG–really–hungry.AI

'I might eat two sandwiches. I'm really hungry.' (✓ narrow scope)

(40) Context: You are at a party and someone asks you if you are going to eat anything. You explain that you left two sandwiches inside where you can find them, and you'll eat them if you get hungry.

ninááhkama'piooyi̥	náátokaa	pó'tstákssists.
ni–n–**aahkama'p**–yooyi	naatokaa–yi	po'tstaki–hsin–istsi
1–1–**might**–LOC–eat.AI	two–PL	assemble.AI–NMLZ–IN.PL

nitsítsipssts̥tskii'pya	pisstóóhtsi.
nit–it–ipsst–itski–'p–yi=aawa	pisst–oohtsi
1–LOC–inside–leave.TI–DIR–PL=PRX.PL	inside–LOC

'I might eat two sandwiches. I left them inside.' (✓ wide scope)

Given the scoping data just presented, we conclude that complements to AI+O verbs take variable scope depending on their form: bare NPs take obligatorily narrow scope, while bare plurals and Numeral NPs have variable scope.[9]

There is one further fact which our account must explain . Even though bare NPs necessarily scope low, there is still the question of why they are rejected in contexts where there is accidental coreference. For example, in a case like (29) above, the consultant rejects the bare NP in contexts where they all read the same book, even though the narrow-scope truth-conditions do not rule out them all accidentally reading the same book. Our proposal explains the attested judgments under the assumption that if everyone did read the same book, it would be uncooperative of the speaker to use the form which obligatorily indicates narrow scope. Instead, it is more cooperative to use the form which semantically allows the wide scope reading. This can be viewed as a similar effect to that seen with English bare plurals, which are argued by Carlson (1977, 420) to obligatorily scope low, on the basis of data such as (41).

[9]We have also begun to investigate scopal interactions with other types of elements, such as negation. Preliminary results reveal that Numeral NP complements to AI+O verbs only take *narrow* scope under the negatives *maat-* and *saw-*, a fact which appears to go against our proposal that Numeral NP complements allow wide scope. As documented by Glougie (2000), the negative *maat-* also allows other unexpected interpretations. For example, Numeral NP complements to TA verbs can take either wide or narrow scope with respect to *maat-*, which is unexpected, given that TA complements must take wide scope with respect to quantifiers. We leave this negation puzzle for future research, noting only that cross-linguistically, negatives display many scopal oddities, including NEG-raising, meta-linguistic negation effects, and the 'frozen' scope of English modal-negation combinations like *cannot* (Horn 1989).

(41) a. Everyone read *a book* on caterpillars. [same book or different books]

b. Everyone read *books* on caterpillars. [different books]

Carlson argues that the singular indefinite in (41a) allows wide scope, but the bare plural in (41b) does not. Just like the Blackfoot bare NPs, the English bare plural in (41b) is technically still licensed if everyone happened to read the same books. Nevertheless, speakers would not typically use (41b) if they knew that the same books were read by everyone. Likewise, Blackfoot speakers refrain from using bare NPs if they know that there is no co-variance.[10]

In this section, we showed that no TA/TI complement takes narrow scope with respect to clause-mate quantifiers or modals. In contrast, all AI+O complements can take narrow scope with respect to clause-mate quantifiers or modals. Bare plurals and Numeral NP complements to AI verbs can also take wide scope, while bare NPs cannot. In the next section, we discuss a second contrast between TA/TI complements and AI+O complements: TA/TI complements are felicitous in cumulative contexts, while AI+O complements are not.

3.2.2 Availability of cumulative interpretations

Cumulative readings are a type of scopeless reading which relate one total to another (Scha 1981). In Blackfoot, cumulative readings are possible for DP complements to TA/TI verbs. Example (42) involves a plural animate DP complement to a TA verb, while example (43) involves a plural inanimate DP complement to a TI verb. Both sentences are valid in cumulative contexts.

(42) Context: There is a box of pens, but when someone goes to get one, they discover it is empty. So they ask, "Where are the pens?" There are two girls holding the pens; one has five and one has three.

ómiksi	aakííkoaiks	áyakááyinniiya	ómiksi
om–iksi	aakiikoan–iksi	**ayak**–a–yinn–ii–yi=aawa	om–iksi
DEM–AN.PL	girl–AN.PL	**both**–IPFV–hold.TA–DIR–PL=PRX.PL	DEM–AN.PL

iihtáísínaakio'piks
iihtaisinaakio'p–**iksi**
pen–**AN.PL**

'Those girls are both holding those pens.'

(43) Context: The kids at school are going on a fieldtrip, and the teachers have all of them wear a blue shirt so that they look like they are in a group.

ómiksi	pookáíks	(iihkaná)ísapskaohsatoomya	ómistsi
om–iksi	pookaa–iksi	(**iihkana**)–isapskaohsi–yi=aawa	om–istsi
DEM–AN.PL	child–AN.PL	(**all**)–wear.AI–PL=PRX.PL	DEM–IN.PL

ótsskoinattsi	asóka'simists
otssko–inattsi–wa	asoka'sim–**istsi**
blue–appear.II–PRX	shirt–IN.PL

[10]The reverse pragmatic avoidance strategy is not predicted to occur. That is, speakers will not avoid bare plurals or Numeral NPs in narrow scope contexts, even though there is an alternative unambiguously narrow-scoping construction (a bare NP). Using a bare NP instead of a bare plural or a Numeral NP would convey less semantic content (i.e. it would not include information about plurality).

'Those childre are (all) wearing those blue shirts.'

At this time, we have not systematically tested DP complements in cumulative contexts. However, we assume in the following discussion that all types of complements to TA/TI verbs are felicitous in cumulative contexts.

In contrast to TA/TI complements, plural AI+O complements are not valid in cumulative contexts. For example, (32) above is rejected if the girls are at separate desks, holding one pen each, and (33) above is rejected if Piitaakii made two tables and Saako made one, for a total of three tables.

A summary of the facts from the previous two sections is given in 6 below.

Table 6: Available interpretations of complement types

Complement	Wide scope?	Narrow scope?	Cumulative?
TA complements	✓	✘	✓
TI complements	✓	✘	✓
AI+O complements	✓/✘	✓	✘

In the next section we present our formal analysis of the facts presented here. We first discuss TA/TI complements and then AI+O complements.

4 Analysis

4.1 TA/TI complements are widest-scope choice functions

We argue that all complements to TA and TI verbs – normal DP complements, specific indefinite 'certain' NPs, and Numeral NPs – introduce widest-scope variables over choice functions.

A choice function is a function which applies to a non-empty set (in this case, the set denoted by the nominal predicate) and returns one individual from that set (Reinhart 1997). The entire DP is thus of type *e*, denoting one (possibly plural) individual. Depending on the way in which the choice function variable is resolved, different scopal properties are predicted. According to the analyses of Reinhart (1997) and Winter (1997), for example, indefinite noun phrases interpreted via choice functions may have variable scope. On the other hand, Kratzer (1998) and Matthewson (1999) have argued for English and St'át'imcets, respectively, that some indefinite noun phrases are interpreted via choice functions which are obligatorily either left as free variables, or existentially closed with widest scope. Both Kratzer's and Matthewson's analyses predict that the relevant noun phrases can escape from islands and will display widest-scope behavior with respect to quantifiers. This is exactly the behavior we have reported above for the complements to TA/TI verbs, and we therefore adopt such an analysis (to be precise, Kratzer's version, whereby the choice function variables are left free and assigned a value by the contextually given assignment function).

Example (44) repeats (26) from above, and its analysis is given in (45). We assume that the 'certain' demonstrative introduces a variable over choice functions, and that the verbal stem morphology presupposes that the verb's complement is of type *e*. (The subject in (45) is a null *pro*, so a more literal translation would be 'Both of them read a certain set of books.')

(44) áyakokstoomya [anístsisskayi sináákia'tsists] [=(26)]
ayak–okstoo–m–yi=aawa **ann**–istsi–hka=ayi sinaakia'tsis–istsi
both–read.**TI**–DIR–PL=PRX.PL **DEM**–IN.PL–INVS=OBV.SG book–IN.PL
'They both read those certain books.'
✓They read the same books.
#They each read a different set of books.

(45) $[\![$*á'tsootokstoomya pro$_3$ anístsisskayi sináákia'tsists*$]\!]^g$ is defined only if $|g(3)| = 2$.
If defined, $[\![$*á'tsootokstoomya pro$_3$ anístsisskayi$_4$ sináákia'tsists*$]\!]^g$
$= \forall x\,[\, x \in g(3) \rightarrow \text{read}\,(x, g(4)(\text{books}))\,]$

The sentence in (45) asserts that for each individual x included in the denotation of the subject pronoun, x read the element which is chosen from the set of book pluralities by the choice function g(4). Since there is just one function, and it receives the same input set for each x (the set of books), we correctly predict that they both read the same set of books.

Our analysis makes a further prediction, again inherited from the analysis of Kratzer (1998) and its variant in Matthewson (1999): if there is a bound pronoun inside the relevant complement, apparent narrow scope will arise. This is because the choice function can apply to a different set for each individual in the subject denotation, and as a result can choose a different object for each individual. This is Kratzer's (1998) 'pseudo-scope'.

This prediction is borne out, as illustrated in (46). The sentence asserts that each girl x is holding the pen that is chosen from the set of x's pens by the contextually salient choice function. Since there is a different set of x's pens for each value of x, there can be different pens. The logical form of (46) is given in (47). As explained in footnote 7, we assume that the phrase 'two girls' introduces universal quantification over a particular set of two girls.[11]

(46) ómiksi náátsitapiks aakííkoaiks (áyak)ááyinniiya
om–iksi naat–itapi–iksi aakiikoan–iksi (ayak)–a–yinn–ii–yi=aawa
DEM–AN.PL two–person–AN.PL girl–AN.PL (both)–IPFV–hold.TA–DIR–PL=PRX.PL
(ómiksi) otó'ohtaisinaaki'ihpowai(ks)
(om–iksi) **ot**–ohtaisinaakiyihp–**owaa**–yi/–iksi
(DEM–AN.PL) **3**–pen–**3PL**–OBV/–IN.PL
'Those two girls are (both) holding **their own** pen(s).'
Non-widest scope available: for each girl x, x is holding x's pen(s)

(47) $[\![$*ómiksi náátsitapiks aakííkoaiks (áyak)ááyinniiya pro$_3$ (ómiksi$_4$) otó'ohtaisinaaki'ihpowai(ks)*$]\!]^g$
$= \forall x\,[\, x \in g(3) \rightarrow \text{hold}(x, g(4)(x\text{'s pen(s)}))\,]$

Further cases of pseudo-scope are given in (48) and (50). The example in (48) is true if for each teacher x, x will be fired if the student of x selected by the contextually salient choice function

[11]Possessed nominals in Blackfoot mark plurality for both the possessor and possessum. The third person plural *-owaa* is obligatory in (46) because a plural set of girls are involved in this example. The pens can be marked by the singular suffix *-yi* in the case that each girl is only holding a single pen. However, the plural suffix *-iksi* is also valid in this context, and our consultant prefers examples with a plural suffix. This requires further research, but preliminary investigation suggests that the morphological plurality here is a dependent plural effect (cf. de Mey 1981).

is pinched. The complement in (48) is morphologically plural, but it is not the case that for each teacher, we consider only situations where more than one of their students get pinched. Again, the morphological plurality here is most likely a dependent plural effect.

(48) noohkíítsimmi áíssksinimaatstohkiiks ákohkanaisstssaya
nookiitsim–yi aissksinimaatstohki–iksi aak–ohkana–isstss–aa–yi=aawa
different–AN.PL teacher–AN.PL FUT–all–fire.TA–DIR–PL=PRX.PL
[[ómiksi otáísskinimaatsaiks] kamohkoisstskino'towahsi]
om–iksi **ot**–aissksinimaatsaa–iksi kam–ohko–isstskino'to–aa–hsi
DEM–AN.PL **3**–student–AN.PL if–someone–pinch.TA–DIR–CNJ
'Different teachers will all be fired if one of their students gets pinched.'

✓Intermediate: for each teacher, there is a student for whom, if he gets pinched, that teacher will be fired
#Narrowest: if any student gets pinched, all the teachers will be fired

(49) $[\![(48)]\!] = \forall x\,[\,\text{teacher}(x) \rightarrow [\,\text{get.pinched}\,(\text{g}(4)(x\text{'s student})) \rightarrow \text{fired}(x)\,]\,]$

In (50), the choice function picks out, for each member x of {Bryan, Lisa, Joel}, a plural individual consisting of two children from the set of x's two children. Since it happens in the fieldwork context that Bryan, Lisa and Joel each have exactly two children, the choice function picks out both their children in each case. In cases of complements introduced by numerals as in (50), we remain agnostic on whether the choice function variable is introduced via a null determiner, or whether the choice function can be thought of as a type-shifter, as in Chung and Ladusaw (2004).

(50) Context: Bryan, Lisa, and Joel each have two children.

aná Bryan kainá Lisa kii aná Joel
ann–wa Bryan–wa ki=ann–wa Lisa–wa kii ann–wa Joel–wa
DEM–PRX Bryan–PRX CONJ=DEM–PRX Lisa–PRX CONJ DEM–PRX Joel–PRX
ikákomimmiiya [náátokami óko'sowawaiks]
ik–akomimm–ii–yi=aawa naatokam–yi **w**–oko's–**oaawa**–iksi
DEG–love.TA–DIR–PL=PRX.PL two.AN–PL **3**–offspring–**3PL**–AN.PL
'Bryan and Lisa and Joel love their two children.'

✓Intermediate: for each person x, there is a particular set of two children who x loves
#Narrowest: for each person x, x loves two children, any two children

(51) $[\![(50)]\!] = \forall x\,[\,\text{x} \in \{\text{b}, \text{l}, \text{j}\} \rightarrow \text{love}\,(x,\, \text{g}(4)(x\text{'s two children}))\,]$

The analysis also correctly allows a *widest*-scope reading of complements which contain possessive pronouns. These readings are felicitous in contexts where the possessive pronoun is construed as referential rather than as a bound variable. The widest-scope reading is allowed in example (50), for example, if Lisa and Henry's two children are being discussed; it then claims that Bryan and Lisa and Joel all love Lisa and Henry's two children.

Finally, the proposal that TA/TI complements are referential opens the way to correctly allowing non-scopal cumulative readings. Space considerations prevent us from spelling out the

cumulative analysis here, but see Davis (2010), who adapts Beck and Sauerland's (2000) analysis to deal with cumulative readings in St'át'imcets.

The pattern exemplified by these data, whereby noun phrases display widest-scope effects which are mitigated in the case of bound variable pronouns, mimics very precisely the patterns discussed by Kratzer (1998) and Matthewson (1999). The Blackfoot data provide strong support for a free-variable choice function analysis of TA/TI complements.

4.2 AI+O complements are non-referential, but not all predicative

Recall that unlike TA/TI complements, AI+O complements cannot semantically escape islands. We can therefore conclude that no AI+O complements are of type *e*. Because complements to AI+O verbs show two different behaviors with respect to scoping around clause-mate quantifiers, we propose that AI+O complements come in two types. On the one hand, bare NPs must take narrow scope with respect to quantifiers; this is shown in (52), repeated from (29).

(52) iihkanáókstakiiya [sináákia'tsis] [=(29)]
iihkana–okstaki–yi=aawa sinaakia'tsis
all–read.**AI**–PL=PRX.PL book.IN
'They all read a book.'
#They all read the exact same book.
✓Each of them read a different book.

Like Bliss (2013), we propose that bare NP complements are pseudo-incorporated and are of type <*e,t*>. They compose with the verb via Restrict, and Existential Closure then applies (Chung and Ladusaw 2004). The final result is shown in (53). As discussed by Chung and Ladusaw, composition via Restrict correctly derives narrow scope for these complements.

(53) $[\![$*iihkanáókstakiiya pro*$_3$ *sináákia'tsis*$]\!]^g = \forall x\,[x \in \mathrm{g}(3) \rightarrow \exists y\,[\mathrm{read(x,y)}\ \&\ \mathrm{book(y)}\,]\,]$

Plural NP AI+O complements, with or without numerals, display a different behavior in that they may scope either above or below clause-mate quantifiers. One example is repeated in (54).

(54) áyakohpommayaa [sópa'tsists] [=(31)]
ayak–ohpommaa–yi=aawa sopa'tsis–**istsi**
both–buy.**AI**–PL=PRX.PL chair–**IN.PL**
'They both bought some chairs.'
✓The shopowner dishonestly (re)sold the same chairs to two people.
✓Two people each bought some chairs separately.

This dual scoping behavior is explained by analyzing plural complements as introducing existential quantifiers (of type <<*e,t*>,*t*>). This correctly predicts that plural NPs can scope either above or below clause-mate quantifiers, but cannot escape the clause to take exceptionally wide scope. For concreteness we assume that a type shift operates to convert a predicative plural NP to an existential generalized quantifier. The wide-scope reading is calculated in (55), using a Heim and Kratzer (1998)-style notation; for convenience we use English lexical items.[12]

[12] As noted earlier, we are setting aside the interesting and as-yet uninvestigated question of how Blackfoot surface morpho-syntax relates to a standard logical form which feeds into semantic composition.

(55) $[\![(54)]\!] = [\![\text{chairs}]\!]^g ([\![2 \text{ both } pro_3 \text{ buy } t_2]\!]^g) =$
$[\lambda Q . \exists y [\text{chair}(y) \,\&\, Q(y)]] (\lambda x . [\![\text{both } pro_3 \text{ buy } t_2]\!]^{g/2\rightarrow x}) =$
$[\lambda Q . \exists y [\text{chair}(y) \,\&\, Q(y)]] (\lambda x . \forall z [z \in g(3) \rightarrow [\text{buy}(z,x)]]) =$
$\exists y [\text{chair}(y) \,\&\, \forall z [z \in g(3) \rightarrow [\text{buy}(z,y)]]$

To summarize, all AI+O complements are of non-saturated semantic types. Bare NPs are pseudo-incorporated predicates, while bare plurals and Numeral NPs introduce existential quantifiers which exhibit scope ambiguities with other clause-mate quantifiers and modals. This analysis of AI+O complements successfully captures the available readings, and correctly distinguishes the behavior of AI+O complements from that of TA/TI complements. For Numeral NPs (the one type of complement which is grammatical with both types of verb stem), our analysis correctly predicts differential scope behavior, depending on whether the Numeral NP appears as complement to a TA/TI verb, or an AI+O verb.

5 Conclusion

In this paper we have argued that the choice of Blackfoot verb stem must be semantically, not syntactically driven (contra Ritter and Rosen 2010). A primary piece of evidence for this proposal comes from the behavior of Numeral NPs, which can occur as complements to both TA/TI and AI+O verbs, but with different semantic behavior. We also argued that complements to AI+O verbs are semantically non-uniform, and that only bare NP complements are pseudo-incorporated (contra Bliss 2013). Although our analysis posits a non-uniform semantic type for AI+O complements, their semantic type is still restricted: AI+O complements are never of type *e*.

The data from Blackfoot add an interesting dimension to the typology of languages which encode the semantic type of verbal complements. There are many languages in which property-denoting complements are treated differently in the grammar than other types of arguments. For example, in Chamorro (Chung and Ladusaw 2004) and Inuktitut (Van Geenhoven 1998), noun-incorporation is limited to property-denoting NPs. Properties in Māori are marked with a different determiner than other arguments (Chung and Ladusaw 2004). In Spanish, animate properties do not participate in Differential Object Marking, unlike other animate complement types (Bleam 2005). Furthermore, in some languages there is evidence that properties are treated differently than quantificational arguments. Nez Perce has two classes of indefinite objects: quantificational and property-type. The quantificational indefinite objects have canonical morpho-syntax, such that they are marked with case and co-occur with verbal agreement marking. Complements which are properties have neither case nor verbal agreement (Deal 2007). In contrast, Blackfoot morpho-syntax for properties and quantificational complements is the same (both occur with AI+O verb stem morphology), in contrast to referential complements (which occur with TA or TI stem morphology). Existential quantifiers and predicates have in common that neither are of a saturated semantic type. This shows that morpho-syntax does not have to reflect whether or not the complement is a property, but can also reflect whether arguments are saturated or not.

References

Barrie, Michael. 2014. Pseudo scope marking constructions in Blackfoot. Ms., Sogang University.

Beck, Sigrid, and Uli Sauerland. 2000. Cumulation is needed: a reply to Winter 2000. *Natural Language Semantics* 8:349–371.

Bleam, Tonia. 2005. The role of semantic type in differential object marking. *Belgian Journal of Linguistics* 19:3–27.

Bliss, Heather. 2005. Formalizing point-of-view: The role of sentience in Blackfoot's direct/inverse system. Ma thesis, University of Calgary.

Bliss, Heather. 2012. A split DP analysis of Blackfoot nominal expressions. In *Proceedings of the 2012 Canadian Linguistic Association*, ed. P. Cajax. Waterloo: Wilfred Laurier.

Bliss, Heather. 2013. The Blackfoot configurationality conspiracy: Parallels and differences in clausal and nominal structures. Phd dissertation, University of British Columbia.

Bloomfield, Leonard. 1946. Algonquian. *Linguistic structures of native America* 6:85–129.

Bruening, Benjamin. 2008. The scope fieldwork project. URL http://udel.edu/~bruening/scopeproject/, materials available online.

Carlson, Greg Norman. 1977. A unified analysis of the English bare plural. *Linguistics and Philosophy* 1:413–457.

Chung, Sandra, and William A Ladusaw. 2004. *Restriction and saturation*, Vol. 42. MIT Press.

Davis, Henry. 2010. Salish languages lack generalized quantifiers after all! Paper presented at Semantics and Linguistic Theory XX.

Dayal, Veneeta. 2011. Hindi pseudo-incorporation. *Natural Language & Linguistic Theory* 29:123–167.

Deal, Amy Rose. 2007. Antipassive and indefinite objects in Nez Perce. In *SULA 4: Proceedings of the Fourth Conference on the Semantics of Under-Represented Languages in the Americas*, ed. A.R. Deal, 35–47. Amherst: GLSA.

Enç, M. 1991. The semantics of specificity. *Linguistic Inquiry* 22:1–25.

Farkas, Donka, and Henriëtte de Swart. 2003. *The semantics of incorporation*. Stanford Monographs in Linguistics. Stanford: CSLI Publications.

Fodor, Janet D., and Ivan A. Sag. 1982. Referential and quantificational indefinites. *Linguistics and Philosophy* 5:355–398.

Frantz, Donald G. 1978. Abstractness of phonology and Blackfoot orthography design. In *Approaches to language, anthropological issues: Papers written for the IXth International Congress of Anthropological and Ethnological Sciences, Chicago, 1973*, ed. W. McCormack and S.A. Wurm, 307–325. Mouton Publishers.

Frantz, Donald G. 2009. *Blackfoot grammar*. University of Toronto Press, 2nd edn edition.

Frantz, Donald G., and N.J. Russell. 1995. *Blackfoot dictionary of stems, roots, and affixes*. University of Toronto Press.

Glougie, Jennifer. 2000. Topics in the syntax and semantics of Blackfoot quantifiers and nominals.

Heim, Irene, and Angelika Kratzer. 1998. *Semantics in generative grammar*. Oxford: Blackwell.

Horn, Laurence R. 1989. *A natural history of negation*. Chicago: University of Chicago Press.

Kratzer, Angelika. 1998. Scope or pseudoscope? Are there wide-scope indefinites? In *Events in grammar*, ed. Susan Rothstein, 163–196. Dordrecht: Kluwer Academic Publishers.

Massam, Dianne. 2001. Pseudo incorporation in Niuean. *Natural Language & Linguistic Theory* 19:153–197.

Matthewson, Lisa. 1999. On the interpretation of wide-scope indefinites. *Natural Language Semantics* 7:79–134.

Matthewson, Lisa. 2001. Quantification and the nature of cross-linguistic variation. *Natural Language Semantics* 9:145–189.

Matthewson, Lisa. 2004. On the methodology of semantic fieldwork. *International Journal of American Linguistics* 70:369–415.

de Mey, S. 1981. The dependant plural and the analysis of tense. In *Proceedings of NELS 11*, ed. V. Burke and J. Pustejowsky. Amherst: GLSA.

Reinhart, Tanya. 1997. Quantifier scope: How labor is divided between QR and choice functions. *Linguistics and Philosophy* 20:335–397.

Ritter, Elizabeth, and Sara Thomas Rosen. 2010. Animacy in blackfoot: Implications for event structure and clause structure. In *Syntax, lexical semantics and event structure*, ed. Malka Rappaport Hovav, Edit Doron, and Ivy Sichel. Oxford: Oxford University Press.

Roberts, Craige. 1989. Modal subordination and pronominal anaphora in discourse. *Linguistics and Philosophy* 12:683–721.

Scha, Remko. 1981. Distributive, collective and cumulative quantification. In *Formal methods in the study of language*, ed. J. Groenendijk, M. Stokhof, and T.M.V. Janssen. Amsterdam: Mathematisch Centrum.

Van Geenhoven, Veerle. 1998. *Semantic incorporation and indefinite descriptions*. Stanford: CSLI Publications.

Weber, Natalie, and Lisa Matthewson. 2013. The semantics of Blackfoot arguments. Paper presented at the 45th Algonquian Conference, University of Ottawa, 18–20 October 2013. To appear in the *Papers of the 45th Algonquian Conference*.

Weber, Natalie, and Lisa Matthewson. 2014. The non-uniformity of Blackfoot argument. Paper presented at Semantics of Under-represented Languages of the Americas (SULA) 8, University of British Columbia, 16–18 May 2014.

Wharram, Douglas. 2003. On the interpretation of (un)certain indefinites in Inuktitut and related languages. Doctoral Dissertation, University of Connecticut.

Winter, Yoad. 1997. Choice functions and the scopal semantics of indefinites. *Linguistics and Philosophy* 20:399–467.