Pre-exhaustification Creates Multifunctionality: Evidence from Tuvan *-daa*[*]

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1 Introduction

• Tuvan (ISO `tyv`) is an understudied Turkic language (South Siberian) spoken by ≈300K speakers primarily in Russia (Tyva Republic), western China, and western Mongolia. This talk investigates the semantics of the multifunctional particle *-daa* [daː].

• Depending on the host, *-daa* (a-b) forms polarity-sensitive indefinites, (c) marks additively or miratively focused nominals, (d) the predicate of a concessive structure, or (e) each head in a coordination.[1]

Category	Host	Function
Quantifiers	a. *čaŋgïs* 'one; a single' b. *wh*-interrogative	Minimizer NPI determiner (*čaŋgïs-**daa*** N) 'even$_{\text{NPI}}$ one N' i. NPI (*kïm-**daa*** 'anyone$_{\text{NPI}}$') ii. ∀GQ, upward entailing environs. (*kïm-**daa*** 'everyone') iii. ∀FCI 'any,' modal environs. (*kïm-**daa** (bolza)*, 'anyone$_{\text{FCI}}$')
Focus	c. focused nominal	i. mirative 'even' (N-***daa*** 'even N') ii. additive 'also; either' (N-***daa*** 'also N')
	d. verb	concessive 'even though' (p-***daa*** q, 'even though p, q')
Coordination	e. 2+ coordinated XPs	i. 'both...and,' affirmative environs. (*nom-**daa** čaγaa-**daa** nomčudum* , 'I read both a book and a letter') ii. 'neither...nor,' negated predicate (*nom-**daa** čaγaa-**daa** nomčuvadïm*, 'I didn't read a book or a letter')

Table 1: Distribution of Tuvan *-daa*. Focus of this talk highlighted in cyan.

• Basic descriptions of *-daa*'s distribution can be found in Iskhakov & Pal'mbakh (1961: 224, 249ff), Krueger (1977: 126-7), Anderson & Harrison (1999), Harrison (2000), Landmann (2017: 34-5), Baĭyr-ool (2012). The semantic properties of *-daa* have not been investigated in the literature.[2] The current study draws from elicitations with a native speaker of the Western dialect of Tuvan (Russia).

• *-Daa*'s functions significantly overlap with the well-studied Japanese particle *-mo*. *-Mo*'s exceptionally wide distribution has been investigated extensively (Kuroda 1965, Kratzer & Shimoyama 2002, Shimoyama 2006, 2011, Kobuchi-Philip 2009, Yatsushiro 2009, Szabolcsi 2015, Mitrović & Sauerland 2014, 2016, Mitrović 2021). Important, challenging, and exciting questions of morphosemantic typology are raised by the constellation of functions served by multifunctional particles cross-linguistically:

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[1]**Abbreviations:** ∀FCI= universal free choice item (*any*/wh-*ever* type FCIs, following Chierchia 2013), NPI=Negative polarity item, PPI=positive polarity item, WS∀=wide-scope universal NPI.
[2]Part of the current research project was presented by the author at *LSA 2022* (Kirby 2022), as well as a comparison of Tuvan with the cognates Turkish *DA* and Sakha *da(γanï)* at *Tu+7* (Kirby forthcoming)

(1) Do the roles of a multifunctional particle form a natural class with a stable semantics? Do additional elements (overt or covert) aid particles in fulfilling their various functions? (following Szabolcsi 2015: 161)

• Main focus of the current talk is *-daa*'s contribution in quantificational noun-phrases ((a,b) in Table 1), and its connection to the mirative focus reading (c-i).

• It is argued that *-daa* is an morphological realization of recursive exhaustification, more specifically, a 'pre-exhaustifier' (adopting the theory of Chierchia 2013).

- §2 considers *-daa*'s role in forming universal quantifiers and NPIs. Like Japanese wh-*mo*, Tuvan wh-*daa* with clause-mate negation is invariantly interpreted as an NPI, with no available narrow-scope universal [¬ > ∀] reading. On the basis of this, it is possible that so-called NPIs are not narrow-scope existential [¬ > ∃], but in fact wide-scope universals [∀ > ¬] (owing to the DeMorgan's equivalence ¬∃[p(x)] ↔ ∀x[¬p(x)]).
  However, unlike Japanese wh-*mo*, Tuvan wh-*daa* is grammatical in embedded clauses with negation on a matrix verb. Significantly, wh-*daa* is ambiguous here, between an NPI reading and a narrow-scope universal reading.
  An exhaustification-based approach to *-daa* is proposed.
- §3 examines why *čaŋgïs-daa* is a pure NPI, and examines a connection to pre-exhaustification.
- §4 explores the free-choice readings of *-daa*. It is argued that the difference between the ∀GQ function and the FCI function is that the former does not involve exhaustification of the scalar alternative, while the latter does.
- §5 Concludes

2 Forming quantifiers with *-daa*

2.1 The basic pattern

• There are two main types of *-daa*-based quantifiers:

(I) **čaŋgïs-daa**, a pure-NPI determiner (*čaŋgïs* 'one; a single; only (adjective)'

(II) **WH-daa**, interpreted as NPIs, ∀GQs in affirmative environments, and *any*-like free-choice items (FCIs) in the scope of a modal.

  – The free-choice reading can be optionally reinforced with the element *bolza* 'it be' (*bol-* 'there exists' *-ZA* conditional mood).

• *-daa* is crucial to these readings. Without *-daa*, *čaŋgïs* functions as a 'one'-like numeral and is in fact a positive polarity item (PPI) (2a).[3]

(2) a. Men **čaŋgïs nom** nomču-va-dï-m
I one book read-NEG-PST-1SG
(i) *'I didn't read any books' *[NEG > one]
(ii) 'There is one book that I didn't read' [one > NEG]

b. Men **čaŋgïs-daa nom** nomču-*(va)-dï-m
I one-*daa* book read-(NEG)-PST-1SG
(i) 'I didn't read any books' / 'I didn't read even one book' [NEG > one]
(ii) *'There is one book that I didn't read' *[one > NEG]
*'Of all the books I read, there is even one that I didn't read' *[even one > NEG]

• Similarly, bare WH-words in Tuvan do not form quantificational NPs outside of direct and indirect-WH questions. It is only when they are combined with a particle that they can used outside of questions.

[3] **Transcription conventions:** <ï> = [i∼ɯ], <ö> = [œ], <ü> = [ʏ], <š> = [ʃ], <ž> = [ʒ], <č> = [tʃ], <y> = [j]. Long vowels are transcribed through doubling (e.g. <aa> = [aː]), consistent with native orthography. Note that particles like *-daa* are written with a dash in Tuvan orthography (e.g. <кым-даа> *kïm-daa* 'anybody; everybody'), a practice I follow in transcriptions. I depart from native orthography in the transcription of the pronominal-based agreement morphemes—Tuvan orthography writes these as an orthographic word, while I transcribe them as clitics, e.g. <көрген мен> *kör-gen=men* (see-PST=1SG), 'I saw'.

• In plain, episodic affirmatives WH-*daa* is interpreted as a universal generalized quantifier (∀GQ) , while *čaŋgïs-daa* is flatly ungrammatical (4).

(3) WH-*daa* universals

a. Men düün **čünü-daa** nomču-dum
I yesterday what.ACC read-PST.1SG
'I read everything yesterday' (of a,b,c, yesterday I read a, b, and c)

b. **Kïm-daa** meni kör-dü
who-*daa* me.ACC see-PST
'Everybody saw me'

c. Men **kandïg-daa** **nom** nomču-dum
I what.kind-*daa* book read-PST.1SG
'I read$_{pst}$ all kinds of books' ('I read$_{pst}$ many different kinds of books')

(4) *čaŋgïs-daa* ungrammatical in positive episodics

a. *Men düün **čaŋgïs-daa nom** nomču-dum
I yesterday what-*daa* book read-PST.1SG
'*I read even one book yesterday'

b. ***čaŋgïs-daa kiži** meni kör-dü
one-*daa* person me.ACC see-PST
'*Even one person saw me'

• With clause-mate negation, WH-*daa* is exclusively interpreted as an NPI. No narrow-scope universal reading (the (ii) translations), nor a wide-scope existential reading (the (iii) translations).

(5) WH-*daa* unambiguously an NPI with clausemate negation

a. Men düün **čünü-daa** nomču-va-dïm
I yesterday what.ACC-*daa* read-NEG-PST.1SG
(i) 'I didn't read anything yesterday' [NEG > *anything*]
(ii) *'I didn't read everything yesterday' *[NEG > *everything*]
(iii) *'There is something I didn't read yesterday' *[*something* > NEG]

b. **Kïm-daa** meni kör-be-di
who-*daa* me.ACC see-NEG-PST
(i) 'Nobody saw me' (lit: 'anybody didn't see me' [NEG > *anybody*]
(ii) *'Everybody didn't see me' *[NEG > *everybody*]
(iii) *'There is somebody who didn't see me' *[NEG > *somebody*]

c. Men **kandïg-daa** **nom** nomču-va-dïm
I what.kind-*daa* book read-NEG-PST.1SG
(i) 'I didn't read any book' [NEG > *any*]
(ii) *'I didn't read all kinds of books' *[NEG > *all*]
(iii) *'There are some kinds of books of books I didn't read' *[*some* > NEG]

• *čaŋgïs-daa* NPIs are licensed by clausemate negation (6), where they function as an *even*-like NPI.

(6) *čaŋgïs-daa* licensed by clausemate negation

a. Men düün **čaŋgïs-daa nom** nomču-va-dïm
I yesterday one-*daa* book read-NEG-PST.1SG
'I didn't read even one book yesterday'

b. **čaŋgïs-daa kiži** meni kör-be-di
one-*daa* person me.ACC see-NEG-PST
'Not even one person saw me'

• WH-*daa* in a modal environment admits 'any'-like universal free choice (∀FCI) readings (7), while *čaŋgïs-daa* is ungrammatical (8). Further properties of free-choice WH-*daa* will be discussed in §4.

(7) Men daarta **čünü-daa** (**bolza**) nomču-p šïda-ar=men
I tomorrow what.ACC-*daa* (IT.BE) read-CVB can-NPST=1SG
'I can read anything tomorrow'

(8) *Men **čaŋgïs-daa nom** (**bolza**) nomču-p šïda-ar=men
I one-*daa* book (IT.BE) read-CVB can-NPST=1SG
*'I can read even one book'

2.2 Are *-daa* NPIs wide-scope universals?

• As was mentioned in §1, Tuvan *-daa* displays non-trivial overlap with Japanese *-mo*.

		Role		Tyv. *-daa*	Jpn. *-mo*
a.	i.	Mimimizer NPI	'even one N'	čaŋgïs-**daa** N	hito-ni-**mo**
	ii.	NPI pronoun	'anybody'	kïm-**daa**	dare-**mo**
	iii.	∀GQ pronoun	'everybody'	kïm-**daa**	da're-**mo**
	iv.	∀FC pronoun	'anybody; whoever'	kïm-**daa** (bolza)	dare-de**mo**
b.	i.	Additive	'X, too'; 'not X, either'	X-**daa**	X-**mo**
	ii.	Mirative	'(not) even X'	X-**daa**	X-**mo**; X-de**mo**
c.	i.	affirmative	'both X and Y'	X-**daa** Y-**daa**	X-**mo** Y-**mo**
	ii.	negative	'neither X nor Y' (w/ NEG vb.)	X-**daa** Y-**daa**	X-**mo** Y-**mo**

Table 2: Distribution of Tuvan *-daa* compared to Japanese *-mo*, *-demo* (Kuroda 1965, Kratzer & Shimoyama 2002, Shimoyama 2006, Szabolcsi 2015)

• NPIs like English *ever, any* are standardly analyzed as **existentials which obligatorily take scope below their licenser** (Linebarger 1987, Kadmon & Landman 1993, Chierchia 2013). There is, however, another family of approaches which holds that some NPIs which are **universal quantifiers scoping above their licenser**.[4]

• Japanese WH-*mo* are one such example of NPIs argued to be WS∀-NPIs (Kratzer & Shimoyama 2002, Shimoyama 2011).[5] Given that (I) Japanese WH-*mo* and Tuvan WH-*daa* are both interpreted as universals in positive episodic environments (9a), (10a), and (II) unambiguously as NPIs with clausemate negation (9b), (10b), it is possible that Tuvan WH-*daa* NPIs are actually WS∀s.

(9) Japanese
a. **Da're-mo** hanashi-ta
who-*mo* talk-PST
'Everyone talked' (Mitrović 2021: 7)

b. **Dare-mo** wakarimas-en
who-*mo* understand-NEG
(i) 'Nobody understands' (Mitrović & Sauerland 2016: 472)
(ii) *¬∀x[UNDERSTAND(x)]

(10) Tuvan
a. **Kïm-daa** meni kör-dü
who-*daa* me.ACC see-PST
'Everyone saw me'

b. **Kïm-daa** meni kör-be-di
who-*daa* me.ACC see-NEG-PST
(i) 'Nobody saw me'
(ii) *'Not everyone saw me'

• However, the similarity between Tuvan WH-*daa* and Japanese WH-*mo* breaks down in embedded clauses, namely when the WH+PTCL phrase is in an embedded clause with negation on the matrix verb. In Japanese (11), the NPI reading of WH-*mo* NPIs is entirely unavailable (11a), and the universal reading is extremely marginal (11b).

(11) */??Taro-wa [Yoko-ga **dare-(o)-mo** syootaisi-ta to] iwa-nakat-ta (Japanese)
Taro-TOP [YokoNOM who-(ACC)-*mo* invite-PST COMP] say-NEG-PST
a. *'Taro didn't say that Yoko invited anyone' (Shimoyama 2011: 418)
b. ??'Taro didn't say that Yoko invited everyone'

[4] ∀x[¬P(x)] and ¬∃x[P(x)] are equivalent.
[5] Other examples include Korean *-to* NPIs (Sells & Kim 2006, Kim & Sells 2007), Hungarian negative-concord items (Szabolcsi 1981), and Greek negative-concord items (Giannakidou 2000).

• Interestingly, as we see in (12) not only can WH-*daa* NPIs be licensed by negation across a clause-boundary (the (i) readings), but surprisingly the WH-*daa* phrases is ambiguous, admitting a narrow-scope universal reading (the (ii) readings).

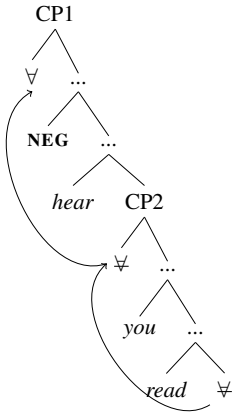
(12) a. Men [seni **čünü-daa** nomča-an dep] diŋna-va-dïm
I [you.ACC what.ACC-*daa* read-PTC COMP] hear-NEG-PST.1SG
(i) 'I didn't hear that you read anything' [¬ > ∃] ≡ [∀ > ¬]
(ii) 'I didn't hear that you read everything' [¬ > ∀]

b. Men [**kïmnï-daa** ol nomn-u nomča-an] di-ve-dim
I [who.ACC-*daa* that book-ACC read-PST] say-NEG-PST.1SG
(i) 'I didn't say that anyone read that book' [¬ > ∃] ≡ [∀ > ¬]
(ii) 'I didn't say that everyone read that book' [¬ > ∀]

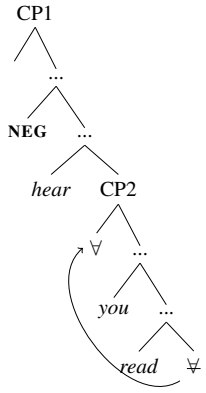
c. Men [**kïmnï-daa** čaraš dep] sana-va-in tur=men
I [who.ACC-*daa* beautiful COMP] consider-NEG-ASP stand.LT.VB=1SG
(i) 'I don't think any of them are beautiful' [¬ > ∃] ≡ [∀ > ¬]
(ii) 'I don't think they're all beautiful' [¬ > ∀]

• In order to maintain a WS∀-NPI account of the NPI readings in (12), the difference between the two readings would have to be captured by long-distance LF movement across the embedded clause boundary for the NPIs (13a), and movement to the edge of the embedded clause for the [¬ > ∀] reading (13b).

(13) a. NPI



b. ∀GQ



• On this approach, the evidence for QR in the embedded clause for the [¬ > ∀] readings (13b) is that when negation is in fact hosted on the embedded verb (14), WH-*daa* is read exclusively as an NPI (14a) (patterning with the pattern in embedded clauses).

(14) Men [seni **čünü-daa** nomču-va-an dep] diŋna-dïm
I [you.ACC what.ACC-*daa* read-NEG-PST COMP] hear-PST.1SG
a. 'I heard that you didn't read anything' [∀ > ¬] ≡ [¬ > ∃]
b. *'I heard that you didn't read everything' *[¬ > ∀]

• While a syntactic approach as in (13) would capture the right readings, there are good reasons to reject it for *-daa*.

• The first piece of evidence against a the WS∀ approach comes from symmetry with *čaŋgïs-daa* NPIs. As stated above, *čaŋgïs-daa* functions purely as an NPI, admitting no universal readings. Thus, there is no clear evidence that *čaŋgïs-daa* is a universal of any kind.[6] Indeed *čaŋgïs-daa* is licensed across clause boundaries as well (15):

[6]This would essentially be an NPI with a love-hate relationship with negation: it would simultaneously requires negation, but be required to scope above it. While this is indeed proposed in the literature for pure NPIs in some languages (e.g. Korean WH-*to* by Sells & Kim 2006, Kim & Sells 2007), it is difficult to explain the ungrammaticality of these elements in positive episodic contexts (and importantly, their lack of universal meanings

(15) a. Men [seni **čaŋgïs-daa nom** nomča-an dep] diŋna-va-dïm
I [you.ACC one-*daa* book read-PST COMP] hear-NEG-PST.1SG
'I didn't hear that you read even one book' / 'I didn't hear that you read any book'
b. Men [seni **čaŋgïs-daa katap** nom nomča-an] di-ve-dim
I [you.ACC one-*daa* again/once/yet book read-PST] say-NEG-PST
'I didn't even once mention that you read books'

• Japanese has a minimizer NPI *čaŋgïs-daa* which is built of a 'one' numeral like *hito* or *it*, a nominal classifier, and *-mo*. As we see in (16), it is ungrammatical in affirmative sentences.

(16) **Hito-ri-mo** {ko-na-katta / *ki-ta}
one-CL_{person}-*mo* {come-NEG-PST / come-PST}
'Not even one person came' (Nakanishi 2006: 150)

• Because *hito*-CL-*mo* is ungrammatical in positive sentences and moreover contains the numeral 'one', Nakanishi (2006), Shimoyama (2011) argue that it is indeed interpreted as a narrow-scoping existential NPI. Thus, on a WS∀ account of WH-*mo*, a salient piece of evidence comes from clauses containing both *it/hito*-CL-*mo* and a WH-*mo* NPI, where there is an asymmetry: if WS∀-NPI WH-*mo* c-commands the minimizer (17a), the sentence is fine. However, if the minimizer c-commands the WH-*mo* NPI, the judgment degrades (17b):

(17) a. **Dare-mo it-teku-mo** kobos-anakat-ta
who-*mo* one-CL_{drop}–*mo* spill-NEG-PST
'Noone spilled even a single drop'
b. ??**Hito-ri-mo** **dore-mo** taba-nakat-ta
one-CL_{person}-*mo* which-*mo* eat-NEG-PST
'Not a single person ate anything' (Shimoyama 2011: 435)

• Shimoyama (2011: 434-8) attributes the degraded status of (17b) to conflicting scope requirements: *hito-ri-mo* wants to scope below negation, while *dore-mo* wants to scope above it. Interestingly, no such conflict appears in Tuvan, where *čaŋgïs-daa* subjects happily occur alongside WH-*daa* objects (18b).

(18) a. [**Čaŋgïs-daa student**] **čünü-daa**
[one-*daa* student] what.ACC-*daa*
nomčuvadï
read.NEG.PST
'Not even one student read anything'

b. **Kïm-daa** [**čaŋgïs-daa nom**] nomču-va-dï
who-*daa* [one-*daa* book] read-NEG-PST
'Nobody read even one book'

• The final, and most significant, piece of evidence against a WS∀ analysis of Tuvan WH-*daa* comes from the embedding of clauses like (18b). Notably, with a *čaŋgïs-daa* subject, the reading of a WH-*daa* object is no longer ambiguous.

(19) Men [[**čaŋgïs-daa kiži-ni**] **čünü-daa** ašta-an dep] diŋna-va-dïm
I [[one-*daa* person-ACC] what.ACC-*daa* clean-PST COMP] hear-NEG-PST.1SG
a. 'I didn't hear that even one person cleaned anything' [¬ > *even one* > *anything*]
(**Context**: Belek works for a cleaning company. Whenever an employee cleans something they are assigned to, that employee is required to call Belek to report what they just cleaned. After not receiving any calls all day, Belek says (19).)
b. *'I didn't hear that even one person cleaned everything' ∗[¬ > *even one* > *everything*]
(**Context**: Belek works for a cleaning company. His employees are assigned to one area of a house, where they are required to clean everything in that area. At the end of the shift, employees are required to call Belek and say what they were assigned to clean and report whether they finished cleaning the area. After all of the employees said their area was not finished being cleaned, Belek says (19).)

therein). Considering the special case of NPI *even* readings cross-linguistically, while there are indeed arguments that NPI *even* obligatorily takes wide scope (Karttunen & Peters 1979) and is simply homophonous with non-NPI *even*, this relies on two stipulations: first that NPI *even* and non-NPI *even* are two distinct lexical items even in languages like English where they are phonetically identical, and that *even* obligatorily moves above negation (see Nakanishi 2006, Lahiri 1998 for additional arguments).

• In effect, what we see with (19) is that NPI *čaŋgïs-daa* fixes the reading of a potentially ambiguous WH-*daa*. If indeed embedded WH-*daa* were underlyingly a universal and *čaŋgïs-daa* an existential, we would expect that if any barrier to movement would be created in an example like (19), (19) should have only the narrow scope ∀ reading (19b), *not* the NPI reading (19a).

2.3 An alternative-based account of *-daa* universals and NPIs

• I propose an alternatives-and-exhaustification approach to the semantics of *-daa*, following Krifka (1995), Fox (2007), Chierchia et al. (2012), Chierchia (2006, 2013), Xiang (2020), Mitrović (2021).

• The particular implementation/notation I adopt is broadly similar to Chierchia (2013), and is driven by the following assumptions:

(20)
a. Ordinary (pragmatic) scalar implicatures are the result of active alternatives and are subject to Gricean relevance (hence any contradictions produced are not relevant, and can be pruned).
b. Polarity-sensitive items (e.g. Tuvan WH-*daa*, English *any, ever*) have active alternatives, but these alternatives are not subject to relevance and hence cannot be pruned. That is, these alternatives are obligatory.
c. If alternatives are active, they must be reckoned with. Non-entailed alternatives must be eliminated. (Chierchia 2013: 186)

• **Proposal:** Rather than WH-*daa* begin an underlying universal quantifier, it is an existential. *-Daa*'s main semantic contribution is impose a requirement that the alternatives of its host are active, and further, to require that the alternatives of these alternatives are active. That is to say, it is a morphological manifestation of a 'pre-exhaustification' operator.

• WH-words can reasonably be analyzed as existentials (Karttunen 1977, Chierchia 2013, Dayal 2016, Mitrović 2021). Similarly, numerals like Tuvan *čaŋgïs* 'one' are existentials.

• Moreover, assuming that *-daa* activates the alternatives of an existential has the potential to unify its quantifier-forming function with its focus particle usage, given that focus is an trigger of existential presuppositions (Abusch 2010, Szabolcsi 2017). The extension to mirative *even* focus is examined in §3.

• Much of the work in this theory is performed by covert exhaustifiers like O (21), a covert version of *only* ((21a) from Chierchia 2013: 31, (21b-ii) from Xiang 2020: 181-3).

(21) Non-recursive O(nly) exhaustifier

a. $[\![O_C(p)]\!] = p \wedge \forall q \in C[q \rightarrow p \subseteq q]$
('$\subseteq$'=*entails*; $O_C(p)$ asserts p is true and, for all alternatives q in p's alternatives ALT(p), if q is true if p entails q. If q does not entail p, q is false.)

b. (i) $\textsc{Excl}(p, C) = \{q \mid (p \not\subseteq q) \wedge (q \in C)\}$
(The excludable alternatives of p are all q such that q does not entail p ('$p \not\subseteq q$') and q is in the alternative set of p ('$q \in C$').)

(ii) $[\![O_C]\!] = \lambda p \lambda w : \underbrace{\exists q \in \textsc{Excl}(p, c)}_{\text{non–vacuity}} \wedge \underbrace{p(w) = 1}_{\text{prejacent}} . \underbrace{\forall q \in \textsc{Excl}(p, C)[q(w) = 0]}_{\text{exhaustivity}}$

Non-vacuity presupposition: The prejacent has at least one excludable alternative.
Prejacent presupposition: The prejacent is true.
Exhaustivity assertion: All the excludable alternatives are false.

(22) Tuvan

a. Men **čünü-daa** nomču-dum
I what.ACC-*daa* read-PST.1SG
'I read$_{pst}$ everything'

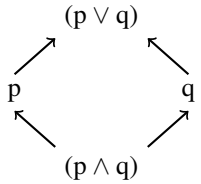
b. Men **čünü-daa** nomču-va-dïm
I what.ACC-*daa* read-NEG-PST.1SG
(i) 'I didn't read anything'
(ii) *'I didn't read everything'

(23) a. $[\![\text{čünü-daa}]\!] = \lambda P_{\langle e,t\rangle}.\ \exists x[x \in D \wedge P(x)]$

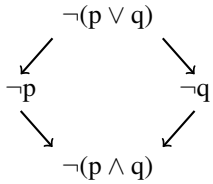
b. Where our Domain of things={a,b}, and R=READ,
$[\![(22a)]\!] = \exists x[x \in \{a, b\} \wedge R(I, x)]$

• For simplicity, we can use propositional logic, where 'p'=$\exists x[x \in \{a\} \wedge R(I, x)]$, 'q'=$\exists x[x \in \{b\} \wedge R(I, x)]$

(24)



(25)



• For the time being, I will not consider the scalar alternatives, though it will become relevant in §4.

NPI effect without pre-exhaustified subdomain alternatives (Sakha): in Sakha, a Northern Siberian Turkic language the particle *da* (cognate to Tuvan *-daa*) forms pure NPIs, as we see in (26). This can be captured by assuming that it is exhaustified non-recursively, yielding a contradiction (and hence ungrammaticality) in a positive sentence (26c) and entailment in a negative sentence (26d). See also Kirby (2020, 2021).

(26) a. *Min **tugu** **da** aax-tïm
I what.ACC *da* read-PST.1SG
*'I read$_{pst}$ everything'

b. Min **tugu** **da** aax-pa-tïm
I what.ACC *da* read-NEG-PST.1SG
'I didn't read anything'

c. • **Positive**
$O_{DA}(p \vee q) = (p \vee q) \wedge \underbrace{\neg p \wedge \neg q}_{\neg(p \vee q)}$
$\underbrace{\qquad\qquad}_{\bot\text{, contradiction}}$

d. • **Negative**
$O_{DA}(\neg(p \vee q)) = \neg(p \vee q) \wedge \underbrace{\neg p \wedge \neg q}_{\textbf{entailed}}$

• On this theory, existentials can be strengthened to universals through recursive exhaustification of the subdomain alternatives (Fox 2007, Chierchia et al. 2012). Chierchia (2013) proposes that free-choice indefinites have 'pre-exhaustified' subdomain alternatives ((27a) fron Chierchia (2013), (27b) from Xiang (2020)).

(27) Exhaustification of pre-exhaustified subdomain alternatives

a. $[\![O_{Exh-DA}(p)]\!] = p \wedge \forall q \in DA(p)[\neg O(q)]$

b. (i) Sub(domain) alternatives:
$\text{SUB}(p, C) = (C - \text{EXCL}(p, C)) - \{p\}$

(ii) $[\![O_{Exh-DA,C}]\!] = \lambda p \lambda w : \underbrace{\exists q \in \text{SUB}(p, C)}_{\text{non–vacuity}}.\ \underbrace{p(w) = 1}_{\text{prejacent}} \wedge \underbrace{\forall q \in \text{SUB}(p, C)[O_C(q)(w) = 0]}_{\text{anti–exhaustivity}}$

Non-vacuity presupposition: The prejacent has at least one subdomain alternative.
Prejacent assertion: The prejacent is true.
Anti-exhaustification assertion: The exhaustification of each sub-alternative is false.

(28) Men **čünü-daa** nomčudum
I what.ACC-*daa* read.PST.1SG
'I read everything'

(29) a. $\text{ALT}(p \vee q) = \{p \vee q, p, q, p \wedge q\}$

b. $\text{DA}(p \vee q) = \{p \vee q, p, q\}$
(i) $\text{DA}(p) = \{p, q\}$
(ii) $\text{DA}(q) = \{q, p\}$

c. $\text{Exh} - \text{DA}(p \vee q) = \{\underbrace{O(p)}_{p \wedge \neg q}, \underbrace{O(q)}_{q \wedge \neg p}\}$

• Exhaustifying w.r.t. the the set of pre-exhaustified subdomain alternatives (29c) leads to $(p \vee q)$ being strengthened to $(p \wedge q)$ (30a)-(30e):

(30) a. $O_{Exh\text{–}DA}(p \vee q) = \underbrace{(p \vee q)}_{\textbf{Prejacent}} \wedge \underbrace{\neg O(p) \wedge \neg O(q)}_{\textbf{negated pre-exhaustified subdomain alternatives}}$

b. $= (p \vee q) \wedge \neg(p \wedge \neg q) \wedge \neg(q \wedge \neg p)$

c. $= (p \vee q) \wedge (p \rightarrow q) \wedge (q \rightarrow p)$

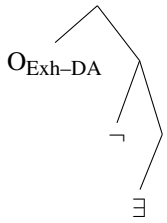
d. $= (p \vee q) \wedge (p \leftrightarrow q)$

e. $= (p \wedge q)$

• (31) shows the NPI effect.

(31) Men **čünü-daa** nomčuvadïm
I what.ACC-*daa* read.NEG.PST.1SG
'I didn't read anything'

a.



b. $O_{Exh\text{–}DA}(\neg(p \vee q)) =$

(i) $\neg(p \vee q) \wedge \neg O(\neg p) \wedge \neg O(\neg q)$

(ii) $= \neg(p \vee q) \wedge \neg(\neg p \wedge \neg\neg q) \wedge \neg(\neg q \wedge \neg\neg p)$

(iii) $= \neg(p \vee q) \wedge \neg(\neg p \wedge q) \wedge \neg(\neg q \wedge p)$

(iv) $= \neg(p \vee q) \wedge (q \rightarrow p) \wedge (p \rightarrow q)$

(v) $= \neg(p \vee q) \wedge (p \leftrightarrow q)$

(vi) $\equiv \neg(p \vee q)$

• The next puzzle concerns the unavailability of narrow-scope ∀ readings for NPIs with clause-mate negation, i.e. why can (31) not mean $\neg\forall x[x \in \{a, b\} \rightarrow R(I, x)]$? The most straightforward proposal is the exhaustifiers like $O_{Exh\text{–}DA}$ always take widest scope in their clause—that is, exhaustification is always at the top of the clause (see appendix for another approach).

• This immediately lends itself to facts in embedded clauses, particularly (32) where an embedded WH-*daa* is ambiguous between the NPI (32a) and ∀GQ reading (32b).

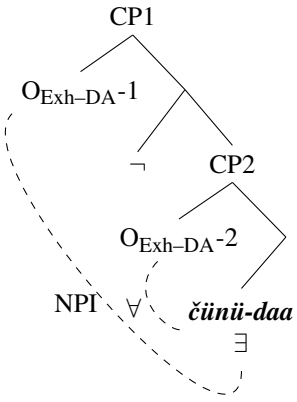
(32) Men [seni **čünü-daa** nomča-an dep] diŋna-va-dïm
I [you.ACC what.ACC-*daa* read-PST COMP] hear-NEG-PST.1SG

a. 'I didn't hear that you read anything' $[\neg > \exists] \equiv [\forall > \neg]$

b. 'I didn't hear that you read everything' $[\neg > \forall]$

• The exhaustifier can be generated at the edge of any clause. When it scopes at the edge of the embedded clause ($O_{Exh\text{–}DA}$-2 in CP2 in (33)), the ∃-meaning is strengthened to ∀ below negation as in (33a). When it scopes over the higher clause ($O_{Exh\text{–}DA}$-1 in CP1 in (33)), it produces an NPI reading (33b).

(33)



a. $\neg H(I, O_{Exh\text{–}DA}(\exists x[x \in \{a, b\} \wedge R(YOU, x]))$
$= \neg H(I, \forall x[x \in \{a, b\} \rightarrow R(YOU, x)]$

b. $O_{Exh\text{–}DA}(\neg H(I, \exists x[x \in \{a, b\} \wedge R(YOU, x)]))$
$= \neg H(I, \exists x[x \in \{a, b\} \wedge R(YOU, x)]$

• Thus, when *čaŋgïs-daa* is in an embedded clause (34), it is interpreted by the exhaustifier located above negation (O_{Exh-DA}-1).

(34) Men [seni **čaŋgïs-daa nom** nomča-an dep] diŋna-va-dïm
I [you.ACC one-*daa* book read-PST COMP] hear-NEG-PST.1SG
'I didn't hear that you read even one book' / 'I didn't hear that you read any book'

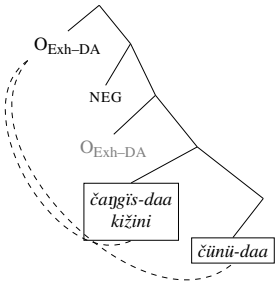
• Because *čaŋgïs-daa* cannot be interpreted by an exhaustifier above negation, we have an immediate solution to why it fixes the reading of a clause-mate WH-*daa* to an NPI like (35).

(35) Men [[**čaŋgïs-daa kiži-ni**] **čünü-daa** ašta-an dep] diŋna-va-dïm
I [[one-*daa* person-ACC] what.ACC-*daa* clean-PST COMP] hear-NEG-PST.1SG
a. 'I didn't hear that even one person cleaned anything' [¬ > *even one* > *anything*]
b. *'I didn't hear that even one person cleaned everything' *[¬ > *even one* > *everything*]

• Specifically, as shown in Table 3, all *-daa* marked elements in a clause are exhaustified by a single operator (a). In order for WH-*daa* to be strengthened to ∀, if a minimizer NPI is in the scope of the exhaustifier, it will be in a position where it is not interpretable (i.e. outside of an NPI context) (c).

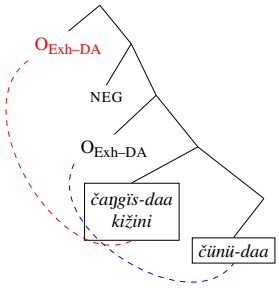
Table 3: Four possibilities

a. ✓



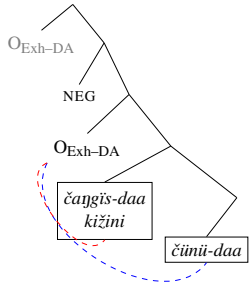
• Both *čaŋgïs-daa* and *čünü-daa* are exhaustified by O_{Exh-DA} in the matrix clause.

b. ✗



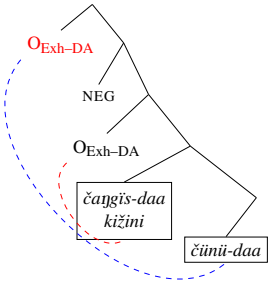
• The O_{Exh-DA} cannot pass over *čaŋgïs-* (intervention; Minimality)

c. ✗



• *čaŋgïs-daa* cannot be exhaustified below negation. If WH-*daa* is exhaustified below negation, the operator cannot skip *changis-daa*.

d. ✗



• Intervention, Minimality

(36) $O_{Exh-DA}(\neg(\text{HEAR}(I, \exists x[x \in \{a, b\} \wedge \exists y[y \in \{c, d\} \wedge \text{CLEAN}(x, y)]])))$

a. $DA(\neg H(I, \exists x[x \in \{a, b\} \wedge \exists y[y \in \{c, d\} \wedge C(x, y)]])) =$
   (i) $\neg H(I, \exists x[x \in \{a, b\} \wedge \exists y[y \in \{c, d\} \wedge C(x, y)]])$,
   (ii) $\neg H(I, \exists x[x \in \{a, b\} \wedge \exists y[y \in \{c\} \wedge C(x, y)]])$,
   (iii) $\neg H(I, \exists x[x \in \{a, b\} \wedge \exists y[y \in \{d\} \wedge C(x, y)]])$,
   (iv) $\neg H(I, \exists x[x \in \{a\} \wedge \exists y[y \in \{c, d\} \wedge C(x, y)]])$,
   (v) $\neg H(I, \exists x[x \in \{a\} \wedge \exists y[y \in \{c\} \wedge C(x, y)]])$,
   (vi) $\neg H(I, \exists x[x \in \{a\} \wedge \exists y[y \in \{d\} \wedge C(x, y)]])$,
   (vii) $\neg H(I, \exists x[x \in \{b\} \wedge \exists y[y \in \{c, d\} \wedge C(x, y)]])$,
   (viii) $\neg H(I, \exists x[x \in \{b\} \wedge \exists y[y \in \{c\} \wedge C(x, y)]])$,
   (ix) $\neg H(I, \exists x[x \in \{b\} \wedge \exists y[y \in \{d\} \wedge C(x, y)]])$

b. $O_{Exh\text{–}DA}(\neg H(I, \exists x[x \in \{a, b\} \wedge \exists y[y \in \{c, d\} \wedge C(x, y)]])) =$
   (i) $\neg H(I, \exists x[x \in \{a, b\} \wedge \exists y[y \in \{c, d\} \wedge C(x, y)]]))$
   $\wedge\neg$O(36a-ii)$\wedge\neg$O(36a-iii)$\wedge\neg$O(36a-iv)
   $\wedge\neg$O(36a-v)$\wedge\neg$O(36a-vi)$\wedge\neg$O(36a-vii)$\wedge\neg$O(36a-viii)$\wedge\neg$O(36a-ix)
   (ii) (*etc*)

3 Mirative focus and *čaŋgïs-daa*

• *čaŋgïs-daa* has two distinct properties from WH-*daa*: it is inherently emphatic, and it is ungrammatical outside of NPI contexts (admitting no free-choice or ∀GQ readings).

(37) a. Men düün **čaŋgïs-daa nom** nomču-va-dïm
I yesterday one-*daa* book read-NEG-PST.1SG
'I didn't read even one book yesterday'
b. **čaŋgïs-daa kiži** meni kör-be-di
one-*daa* person me.ACC see-NEG-PST
'Not even one person saw me'
c. Sen (ooda) **čaŋgïs-daa nom** nomču-du-ŋ be?
you (even) one-*daa* book read-PST-2SG Q
'Did you read even one book?'
d. **čaŋgïs-daa student** kel-ze, meni udavas kel-ir de-er=sen
one-*daa* student come-COND I.ACC soon come-NPST say-NPST=2SG
'If even one student comes, tell him/her that I'll be right back'

• Chierchia (2013: 143-168), following Lahiri (1998) on *bhii*-based minimizers in Hindi, analyzes minimizer NPIs as alternative-activated existentials with the twist that their alternatives are ranked along a rich scale (rather than a reduced scale of subdomain alternatives and the scalar alternative). Another exhaustifier, E(ven) (38), is used to interpret these alternatives (see also Crnič 2011, 2014).

(38) $E_{ALT}(p) = p \wedge \forall q \in ALT(p)[p <_{likely} q]$ (Chierchia 2013: 148, modification of Karttunen & Peters 1979)
($E_{ALT}(p)$ asserts p and is interpretable only if p is less likely that every distinct q in its alternative set)

• If we adopt a semantics for *čaŋgïs* 'one' as in (39a) and a set of alternatives like (39b), we automatically get the NPI effect if *-daa* marks the (subdomain) alternatives of *čaŋgïs* as obligatorily active.

(39) a. $[\![\text{čaŋgïs}]\!] = [\![\text{one}]\!] = \lambda P\langle e, t\rangle.\ \lambda Q_{\langle e,t\rangle}.\ \exists x[ONE(x) \wedge P(x) \wedge Q(x)]$
b. $ALT(\text{one}) = \{\lambda P.\lambda Q \exists x[n(x) \wedge P(x) \wedge Q(x)] : |n| \geq 1\}$
i.e. {*one, two, three, four,..,*}

• Note that in (39b), these are scalar alternatives, not subdomain alternatives. This makes sense, as *I read one book or I read two books* entails *I read one book* (You can't read two books without reading one book). That is, in affirmative sentences, all positive numerals entail all positive numbers below them.

(40) a. **Men (düün)* ***čaŋgïs-daa nom*** *nomčudum*
'*I read even one book yesterday'
(i) ⟦(40a)⟧ = ∃x[ONE(x) ∧ BOOK(x) ∧ READ(I, x)]
(ii) ALT(40a-i)= {*one book* ⇐ *two book* ⇐ *three books*, ...,}, where 'a⇐b' means 'a is entailed by b'
(iii) E_{ALT}(40a)= *one book*∧∀q ∈ ALT[*one book*<$_{likely}$ q]
(Unsatisfiable, because *one book* is entaile by all the alternatives: something cannot be less likely than something that entails it.)

b. *Men (düün)* ***čaŋgïs-daa nom*** *nomčuvadïm* (=(37a))
'I didn't read read even one book (yesterday)'
(i) ¬∃x[ONE(x) ∧ BOOK(x) ∧ READ(I, x)]
(ii) ALT(40b-i)={¬*one book*⇒ ¬*two books*⇒ ¬*three books*, ...,}, where 'a ⇒' means 'a entails b'
(iii) E_{ALT}(40b)= ¬*one book*∧∀q ∈ ALT[¬*one book*<$_{likely}$ q]
(Satisfied!)

• *-Daa*+ranked scale only produces NPIs with rich scales like the numeral 'one'—*-daa* functions also as a mirative focus marker (41), where it is not restricted to negative sentences (41). This is accounted for by the fact that the likelihood of these alternatives are ranked pragmatically ranked. That is, the positive sentence version (41a) is felicitious in a context where the book is considered more difficult for primary school students (41a-i), while the negative version (41b) is felicitious in a context where the book is considered to be something that primary school students are more likely to read than high school students (41b-ii).

(41) a. Ol nom-nu ööренikči-ler-**daa** nomču-du
that book-ACC student-PL-*daa* read-PST
'Even the [primary school students]$_F$ read that book'
(i) *likelihood*(*primary school students*) < *likelihood*(*high school students*)
(ii) #*likelihood*(*high school students*) < *likelihood*(*primary school students*)

b. Ol nom-nu ööренikči-ler-**daa** nomču-va-dï
that book-ACC studentPL-*daa* read-NEG-PST
'Even the [primary school students]$_F$ didn't read that book'
(i) #*likelihood*(*primary school students*) < *likelihood*(*high school students*)
(ii) *likelihood*(*high school students*) < *likelihood*(*primary school students*)

• What is the connection to pre-exhaustification? Xiang (2020: 200-1), in pursuit of a unified account of Mandarin *dōu* demonstrates that if the subdomain alternatives are inherently ranked along a probability scale, the switch from $O_{Exh–DA}$ to E(ven) is natural. This she does by defining the subdomain alternatives of a probability-ranked domain as in (42a) and proposing modified O operator for pre-exhaustification called JUST (42b), which affirms the prejacent and states that no true alternative is more likely, and then negate this (resulting in the same meaning as E(ven) (38)).

(42) a. **Sub(domain)-alternatives as more likely alternatives:**
SUB(p, ALT) = {q | q ∈ ALT(p) ∧ (q >$_{likely}$ p)}

b. $JUST_{ALT}$(p) = λw : p(w) = 1 ∧ ∀q ∈ ALT(p)[q(w) → (q ⊆$_{likely}$ p)]

c. When host has likeli-hood ranked subdomain alternatives...
⟦-daa_{ALT}⟧ = ⟦dou_{ALT}⟧ =
(i) λpλw : ∃q ∈ SUB(p, ALT).p(w) = 1 ∧ ∀q ∈ SUB(p, ALT)[$JUST_{ALT}$(q)(w) = 1]
(ii) = λpλw : ∃q ∈ SUB(p, ALT).p(w) = 1 ∧ ∀q ∈ SUB(p, ALT)∃r ∈ ALT[(r(w) = 1) ∧ (q >$_{likely}$ r)]
(iii) = λpλw : ∃q ∈ ALT(p)[q >$_{likely}$ p] ∧ ∀q ∈ ALT[(q >$_{likely}$ p)] → (∃r ∈ ALT[(r(w) = 1) ∧ (q >$_{likely}$ r)])
(iv) = λpλw : ∃q ∈ ALT[q >$_{likely}$ p].p(w) = 1
(For any proposition *p*, ⟦-daa_{ALT}/dou_{ALT}⟧(p) is defined iff *p* is less likely than at least one of the contextually relevant alternatives; when defined ⟦dou_{ALT}⟧(p) = ⟦-daa_{ALT}⟧(p) = p)
(v) ⟦= E_{ALT}⟧

(following Xiang 2020: 200-1)

• Essentially, when the subdomain alternatives are ranked among each other by a likelihood relation, pre-exhaustification

is able to more-or-less seamlessly link O(nly) to E(ven). Thus, the connection to mirativity in Tuvan is dictated by the nature of the subdomain alternatives the host has, and *-daa* can be seen as further support of this link.[7]

4 Free choice *-daa*

• §2.3 remained agnostic about whether WH-*daa* in its ∀GQ function possesses a scalar alternatives. So far, the analysis has relied exclusively on pre-exhaustification of subdomain alternatives. But if the scalar alternative is exhaustifed in a postitive, non-modal sentence, a contradiction emerges (43).

(43) For a proposition $(p \vee q)$, where $\text{ALT}(p \vee q) = \{p \vee q, O(p), O(q), p \wedge q\}$, $O_{ALT}(p \vee q)$ is a contradiction.

a. $O_{ALT}(p \vee q) = (p \vee q) \wedge \underbrace{\neg O(p) \wedge \neg O(q)}_{\text{negated pre–exhaustified domain ALTs}} \wedge \underbrace{\neg(p \wedge q)}_{\text{negated scalar alternative}}$

b. $= \underbrace{(p \vee q) \wedge (p \leftrightarrow q) \wedge \neg(p \wedge q)}_{\bot\text{, contradiction}}$

• Perhaps Tuvan-WH words belong to the crosslinguistic class of existentials which entirely lack scalar alternatives?[8] The alternatives-and-exhaustification theory makes predictions about the possible readings of such an element with a modal, which we shall soon see.

• Following Dayal (1998, 2004), universal free choice is derived as follows: for a sentence like (44), the basic, non-modalized meaning is as an existential like (44a). The existential scopes above the possibility modal (44a). Because *any* has active alternatives, and further, pre-exhaustified subdomain alternatives, its alternatives look like (44c). When these alternatives are exhaustified (44d), we eventually get something that looks like (44e).

(44) *Anybody can study Tuvan.*

a. Non-modalized: $\exists x[x \in \{a, b\} \wedge \text{STUDY\_TUVAN}(x)]$

b. $\exists x[x \in \{a, b\} \wedge \Diamond S(x)]$

c. $\left\{ \begin{array}{c} \exists x[x \in \{a, b\} \wedge \Diamond S(x)] \\ O(\exists x[x \in \{a\} \wedge \Diamond S(x)]) \quad O(\exists x[x \in \{b\} \wedge \Diamond S(x)]) \\ \forall x[x \in \{a, b\} \rightarrow \Diamond S(x)] \end{array} \right\}$

d. *exh*(44c)=

(i) $\exists x[x \in \{a, b\} \wedge \Diamond S(x)]$

(ii) $\wedge\neg O(\exists x[x \in \{a\} \wedge \Diamond S(x)])$
$= \neg(\exists x[x \in \{a\} \wedge \Diamond S(x)] \wedge \neg\exists x[x \in \{b\} \wedge \Diamond S(x)])$
$= \exists x[x \in \{a\} \wedge \Diamond S(x)] \rightarrow \exists x[x \in \{b\} \wedge \Diamond S(x)]$

(iii) $\wedge\neg O(\exists x[x \in \{b\} \wedge \Diamond S(x)])$
$= \exists x[x \in \{b\} \wedge \Diamond S(x)] \rightarrow \exists x[x \in \{a\} \wedge \Diamond S(x)]$

(iv) $\wedge\neg\forall x[x \in \{a, b\} \rightarrow \Diamond S(x)]$

e. $\Diamond(p \vee q) \wedge (\Diamond p \leftrightarrow \Diamond q) \wedge \neg\Diamond(p \wedge q)$

• (44e) is true in any world *w* such that it is possible for either of (*a* or *b*) to study Tuvan, *a* can study Tuvan iff *b* can study Tuvan, but it's not possible for both *a* and *b* to both Study Tuvan. This is satisfiable because the modal base of the negated scalar and the domain alternatives can be distinct.[9]

• If English *any* entirely lacked the scalar alternative, the reading would be stronger. Not only would *any* be grammatical in affirmative episodic sentence, with a modal its truth conditions would be equivalent to $[\Diamond > \forall]$:

(45) $\textit{exh}(\exists x[x \in \{a, b\} \wedge \Diamond S(x)]) = \exists x[x \in \{a, b\} \wedge \Diamond S(x)] \wedge (\exists x[x \in \{a\} \wedge \Diamond S(x)] \leftrightarrow \exists x[x \in \{b\} \wedge \Diamond S(x)])$

[7] For another unified approach O(nly)/E(ven), see Mitrović (2021: 146ff).

[8] See Bowler (2014), Singh et al. (2016), Bar-Lev & Margulis (2014), Davidson (2013), Wong (2017), Bassi & Bar-Lev (2016), Szabolcsi (2017), Mitrović (2021)

[9] Admittedly, this feels quite odd with only two alternatives, though it improves when you have two, where the reading is *a,b* or *c* can do X, *a* and *b* but not *c* can, (and any permutation), but not all of them. This oddness is caused by artificially restricting the example to two alternatives, which was done for space concerns.

equivalent to $\forall x[x \in \{a, b\} \rightarrow \Diamond S(x)]$

• Surprisingly, Tuvan WH-*daa* in the scope of a possibility modal displays mixed behavior. Specifically, it is actually ambiguous between the two readings: a free-choice *any* reading (46a), and a ∀GQ reading (46b):

(46) Ežik-ti **kïm-daa** sokta-p bol-ur
door-ACC who-*daa* knock-CVB can-NPST

a. 'Anyone can knock at the door' FCI
(Of {a,b,c}, $\Diamond K(a) \wedge \Diamond K(a) \wedge \Diamond K(c) \wedge \underbrace{\neg\Diamond(K(a) \wedge K(b) \wedge K(c))}_{\text{not possible all}}$)

b. 'Everyone can knock at the door' ∀GQ
$(\Diamond K(a) \wedge \Diamond K(b) \wedge \Diamond K(c) \wedge \Diamond(K(a) \wedge K(b) \wedge K(c)))$

• At the same time, if WH-*daa* is reinforced with *bolza* (47), only the free-choice reading survives (47a).

(47) Ežik-ti **kïm-daa bolza** sokta-p {bol-ur / *tur}
door-ACC who-*daa* IT.BE knock-CVB {can-NPST / stand.LT.VB}

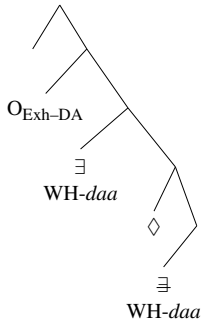
a. 'Anyone can knock at the door' FCI
b. *'Everyone can knock at the door' *∀GQ

• Given that the scalar implicature is optionally present (and obligatory if *bolza* is present), it makes sense to assume that WH-*daa* does, in fact, inherently have a scalar implicature, but that in some contexts, the scalar alternative is not exhaustified.

• Specifically, *-daa* only makes the SUBDOMAIN alternatives of the WH-word obligatory, while the scalar alternative is not always exhaustified, as shown in (48).

• Final proposal for WH-*daa* ∀GQs

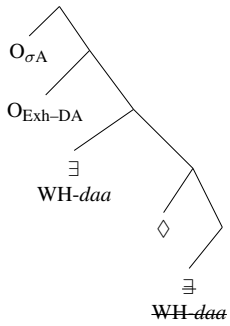
(48) a.



b. $O_{Exh-DA}(\exists x \in \{a, b\}[\Diamond p(x)]) =$
(i) $\exists x \in \{a, b\}[\Diamond p(x)]$
(ii) $\wedge\neg O(\exists x \in \{a\}[\Diamond p(x)])$
$=(\exists x \in \{a\}[\Diamond p(x)]) \rightarrow$
$(\exists x \in \{b\}[\Diamond p(x)])$
(iii) $\wedge\neg O(\exists x \in \{b\}[\Diamond p(x)])$
$=(\exists x \in \{b\}[\Diamond p(x)])$
$\rightarrow (\exists x \in \{a\}[\Diamond p(x)])$
(iv) $\wedge\exists x \in \{a, b\}[\Diamond p(x)]$
(v) $\Diamond(p \vee q) \wedge (\Diamond p \leftrightarrow \Diamond q) \wedge \Diamond(p \wedge q)$

• Final proposal for WH-*daa* FCIs

(49) a.



b. $O_{\sigma A}(O_{Exh-DA}(\exists x \in \{a, b\}[\Diamond p(x)])) =$
(i) $\exists x \in \{a, b\}[\Diamond p(x)]$
(ii) $\wedge\neg O(\exists x \in \{a\}[\Diamond p(x)])$
$=(\exists x \in \{a\}[\Diamond p(x)])$
$\rightarrow (\exists x \in \{b\}[\Diamond p(x)])$
(iii) $\wedge\neg O(\exists x \in \{b\}[\Diamond p(x)])$
$=\exists x \in \{b\}[\Diamond p(x)]$
$\rightarrow (\exists x \in \{a\}[\Diamond p(x)])$
(iv) $\wedge\neg\forall x \in \{a, b\}[\Diamond p(x)]$
(v) $\Diamond(p \vee q) \wedge (\Diamond p \leftrightarrow \Diamond q) \wedge \neg\Diamond(p \wedge q)$

5 Conclusion

• This paper has argued for a unified semantic account of *-daa*'s roles in NPIs, FCIs, ∀GQs, and mirative focus, in line with other approaches to multifunctional particles (Slade 2011, Szabolcsi 2015, 2017, 2018, Uegaki 2018, Xiang 2020, Mitrović 2021).

- *-daa* requires that its host has subdomain alternatives, and that the non-entailed subdomain alternatives are pre-exhaustified.
- *-daa* itself is not an exhaustifier (i.e. it does not itself exhaustify), but does induce the grammar to include an exhaustifier.
- *-daa* does not inherently activate the scalar alternative of its host, but a scalar alternative can figure in two situations:
  - If the subdomain alternatives are ranked along a probability scale (e.g. *čaŋgïs-daa* minimizers, *-daa*'s mirative focus function)
  - With a modal, the scalar alternative may be exhaustified (required if *bolza* is present).

• The straightforward connection to Japanese *-mo* breaks down in WH-*daa*'s behavior in embedded clause with matrix negation. WH-*daa* NPIs cannot reasonably be analyzed as wide-scope ∀GQs.

• The three other main functions of *-daa* were not discussed, though they can reasonably be accounted for within the current pre-exhaustification approach. These roles are *-daa*'s function as an additive focus marker (50a), a marker of concessive clauses (50b), and a marker of each element in a distributive coordination (50c).

(50) a. Men-**daa** nom ekkel-(be)-dim
I-*daa* book bring-(NEG)-PST.1SG
(i) Positive: 'I$_F$ brought a book, also'
(ii) Negative: 'I$_F$ didn't bring a book, either'

b. [Bud-um aarï-p tur-za-**daa**] azïl-ïm-če čoruptur=men
[foot-1SG.POSS ill-CVB AUX-COND-*daa*] work-1SG.POSS-ALL go.EVID.PST=1SG
'Even though my feet hurt, I (still) am going to work' (Anderson & Harrison 1999: 48)

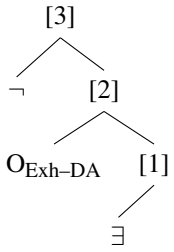
c. (i) Men kofe-**daa** šay-**daa** iš-(pe)-dim
I coffee-*daa* tea-*daa* drink-(NEG)-PST.1SG
Positive: 'I drank both coffee and tea'
Negative: 'I drank neither coffee nor tea'
(ii) Buyan-**daa** Mergen-**daa** iji metr uzun
Buyan-*daa* Mergen-*daa* two meter tall
Distributive: 'Buyan and Mergen are each 2 meters tall'
#Cumulative: 'Buyan and Mergen's combined height is 2 meters'

Appendix: Clause-mate negation and WH-*daa*

• **Question:** Why is WH-*daa* (51) not available on a wide-scope ∀GQ over clause-mate neagtion (51b)?

(51) Men **čünü-daa** nomču-va-dïm
I what.ACC-*daa* read-NEG-PST.SG
a. 'I didn't read anything' NPI
b. *'I didn't read everything' *∀GQ

(52)



• Whether (52) produces an interpretable (=non-contradictory) LF depends on how negation operates over node [2] in (52). How does the grammar handle the result of exhaustification (53c-iv)?

(53) a. Where $D_e = \{a, b, c\}$, $[1] = \exists x[x \in D_{\{a,b,c\}} \wedge R(I, x)]$
b. DA([1]) = $\{\exists x \in D' : D' \subseteq D_{\{a,b,c\}}\}$
(i) Where $[\![p]\!] = x[x \in \{a\} \wedge R(I, x)]$,
$[\![q]\!] = \exists x[x \in \{b\} \wedge R(I, x)]$,
$[\![r]\!] = \exists x[x \in \{c\} \wedge R(I, x)]$
(i) DA(p ∨ q ∨ r) =

	(p ∨ q ∨ r)	
(p ∨ q)	(q ∨ r)	(p ∨ r)
p	q	r

(iii) Exh-DA(p ∨ q ∨ r) =

O(p ∨ q)	O(q ∨ r)	O(p ∨ r)
O(p)	O(q)	O(r)

(iv) O(p ∨ q) = (p ∨ q) ∧ ¬(r)
O(q ∨ r) = (q ∨ r) ∧ ¬(p)
O(p ∨ r) = (p ∨ r) ∧ ¬(q)
O(p) = (p) ∧ ¬(q ∨ r)
O(q) = (q) ∧ ¬(p ∨ r)
O(r) = (r) ∧ ¬(p ∨ q)

c. [2] = $O_{Exh–DA}$(p ∨ q ∨ r)
(i) = {p ∨ q ∨ r, ¬O(p ∨ q), ¬O(q ∨ r), ¬O(p ∨ r), ¬O(p), ¬O(q), ¬O(r)}
(ii) = {p ∨ q ∨ r, ¬((p ∨ q) ∧ ¬r), ... , ¬(r ∧ ¬(p ∨ q))}
(iii) = {p ∨ q ∨ r, (p ∨ q) → r, r → (p ∨ q), (q ∨ r) → p, p → (q ∨ r), (p ∨ r) → q, q → (p ∨ r)
(iv) = {$\underbrace{p \vee q \vee r}_{\textbf{Prejacent}}$, $\underbrace{p \leftrightarrow (q \vee r), q \leftrightarrow (p \vee r), r \leftrightarrow (p \vee q)}_{\textbf{exhaustified subdomain alternatives}}$}

• If (53c-iv) is represented as the conjunction of the alternatives, i.e. the free-choice implicature, negation scoping over this would be compatible with the a [¬ > ∀] interpretation.

(54) a. $[\![\neg(\bigcap$ (53c-iv))$]\!]$ = ¬((p ∨ q ∨ r) ∧ (p ↔ (q ∨ r)) ∧ (q ↔ (p ∨ r)) ∧ (r ↔ (p ∨ q))
b. = ¬(p ∨ q ∨ r) ∨ ¬(p ↔ (q ∨ r)) ∨ ¬(q ↔ (p ∨ r)) ∨ ¬(r ↔ (p ∨ q))
c. = ¬(p ∧ q ∧ r)

• If, on the other hand, (53c-iv) is represented as a set of alternatives with negation applying pointwise over this set, the result is a contradiction:

(55) a. $[\![\bigcap(\neg$(53c-iv))$]\!]$ = {¬(p ∨ q ∨ r), ¬(p ↔ (q ∨ r)), ¬(q ↔ (p ∨ q)), ¬(r ↔ (p ∨ q))}
b. = ¬(p ∨ q ∨ r) ∧ ¬(p ↔ (q ∨ r)) ∧ ¬(q ↔ (p ∨ r)) ∧ ¬(r ↔ (p ∨ q))

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