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

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1. Introduction

This paper examines the particle *-daa* [daː] found in Tuvan, a Turkic language spoken in Siberia.[1] Among its wide array of functions, we focus on the semantics of two broad functions of *-daa*: (i) its role as a marker of additive 'also; either' and mirative 'even' focus, and (ii) its role in forming polarity-sensitive indefinites.[2] Of particular interest within the latter function is the interpretational fluctuation observed when *-daa*'s host is an interrogative pronoun, e.g. *kïm-daa* 'who-PTCL.'[3] Depending on the polarity and modality of the sentence a WH-*daa* indefinite like *kïm-daa* appears within it is interpreted as: a negative polarity item (NPI) in the scope of negation, an *any*-like universal free-choice item (∀FCI) in the scope of a modal, and as a universal generalized quantifier (∀GQ) in episodic (i.e. non-modal) affirmative sentences.

We adopt an exhaustification-based approach to focus and and polarity-sensitivity, following especially Chierchia (2006, 2013). It is argued that *-daa* is a morphosyntactic correlate of the presence of a 'pre-exhaustification' operator in the structure, following Chierchia's (2013) approach in deriving free-choice items through recursive exhaustification of the subdomain alternative of an existential. Crucially, *-daa* only requires that its prejacent has subdomain alternatives, and the principal differences among the readings are a result of the nature of the subdomain alternatives and the logical properties of the polarity/modality they appear embedded within. It is further argued that *-daa* is compatible with the presence of a scalar alternative, and, following Xiang (2020), it can induce an *even*-like inference if the scalar alternatives are ranked by a probability metric.

The structure of this paper is as follows. §2 introduces the main data and *-daa*'s key logical properties. §3 provides our analysis. §4 concludes the paper.

2. Data

2.1. As a focus marker

In (1), we see an example of an affirmative (1a) and a negative (1b) sentence containing a *-daa* marked subject pronoun *men* 'I.' As we see in the (i) and (ii) translations, *-daa* is compatible with a plain additive 'too; either' interpretation (i) and a scalar, counter-expectational 'even' interpretation (ii).

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[1] Tuvan (ISO: tyv), also known as *Tyvan*, is a Turkic language (Turkic > Common > Siberian > South Siberian > Sayan) spoken by around 300,000 native speakers, primarily in the Tyva Republic in Russia, with smaller populations in western China and Mongolia. Uncited data in this paper comes from elicitations with a native speaker of the western dialect of Tuvan (Russia).

[2] See Baĭyr-ool (2012) for a description of additional functions of *-daa*. See also Iskhakov & Pal'mbakh (1961: 224, 249ff), Krueger (1977: 126-7), Anderson & Harrison (1999).

[3] Transcription conventions follow Turkological practices: <ï>=[ɯ~ɨ], <ö>=[ø~œ], <ü>=[y~ʏ], <š>=[ʃ], <ž>=[ʒ], <č>=[ʧ], <y>=[j]. Long vowels transcribed through doubling (e.g. <aa>=[aː]), consistent with native orthography.

(1) a. Men-daa nom ekkel-dim.
I-*daa* book bring-PST.1SG
(i) 'I$_F$ brought a book, too.'
(ii) 'Even I$_F$ brought a book.'

b. Men-daa nom ekkel-be-dim.
I-*daa* book bring-PST.1SG
(i) 'I$_F$ didn't bring a book, either.'
(ii) 'Even I$_F$ didn't bring a book.'

In (2) we see the object *nom* 'book' being focused by *-daa*, allowing for similar types of focus readings as the subjects in (1).

(2) a. Men nom-daa ekkel-dim.
I book-*daa* bring-PST.1SG
(i) 'I also brought a book$_F$.'
(ii) 'I even brought a book$_F$.'

b. Men nom-daa ekkel-be-dim.
I book-*daa* bring-NEG-PST.1SG
(i) 'I didn't bring a book$_F$, either.'
(ii) 'I didn't even bring a book$_F$.'

Focus is a type of pragmatic requirement imposed by the context in which a sentence is uttered, wherein there are salient pragmatic alternatives of the prejacent (i.e. the truth-conditional, non-focused version of the sentence; e.g. for (2a) 'I brought a book') bearing a certain shape. This requirement is typically encoded in the literature as a presupposition (see Szabolcsi 2017). The focus alternatives are identified by substituting the focused phrases with other contextual alternatives of the same semantic type, e.g. for (2a) $\lambda P_{\langle e,t\rangle}.\ bring_{w*}(I, P)$, the set of focus alternatives is the set of predicates type $\langle e, t\rangle$ such that they are true in $w*$. Plain additive focus operators (e.g. English *too*) require that the ordinary value is not unique among its substitutable alternatives in the world $w*$—that is, *I also brought a book*$_F$ is only felicitous if *I brought something other than a book* (e.g. a lawn chair) is true in $w*$. Mirative 'even' focus has an additive requirement, as well as a scalar requirement that the ordinary value is less likely than the substitutable alternatives, and thus is sometimes referred to as 'scalar additive focus.' Thus, if (2a) is uttered in a context where it is unexpected that the speaker would bring a book (e.g. on a long hike where one wants to not have a heavy pack), the 'even' interpretation of *nom-daa* is salient. Under negation (1b), (2b) the likelihood expectation flips, and the scalar requirement of (2b) is that it is expected that the speaker *would* bring books (e.g. 'When I moved offices to start my new tenure-track job, I decided to start afresh. I didn't bring a computer or plants. I didn't even bring books.')

As established by studies like König (1991: 62-87), Haspelmath (1997: 157-8), Mitrović (2021: 139-146), particles which fluctuate between a plain additive 'also' reading and a mirative 'even' reading are cross-linguistically very common. While some languages require an additional scalar morpheme to co-occur with the additive particle for the mirative reading (e.g. Hungarian *még Mari is* [even Mary also] 'even Mary,' Serbo-Croatian *čak i Marija* [even also Mary] 'even Mary;' see Szabolcsi 2017, Gast & van der Auwera 2013, Mitrović 2021: 139-46), in Tuvan the plain additive and mirative reading of *-daa* are largely distinguished by context. Nevertheless, there are means of distinguishing these two readings, such as by adding emphatic stress to the particle itself:

(3) Men [{seni-daa / seni-daa-DAA} ol nom-nu nomča-an] di-ve-dim.
I [{you.ACC-*daa* / you.ACC-*daa*} that book-ACC read-PST] say-NEG-PST.1SG
a. (unstressed *seni-daa*): 'I didn't say you read the book too (I didn't know you did).'
b. (stressed *seni-DAA*): 'I say even say that you$_F$ read that book.' / 'I didn't even mention you.'

When the particle bears stress (3b), it has the effect of drawing attention to the scalar, emphatic function that the particle is compatible with.

Another means of disambiguating the two potential readings of *-daa* is observed *-daa*'s host is pragmatically associated with a scale, the 'even' reading is readily available in out-of-the-blue situations. For example, Tuvan distinguishes two types of student: *ööренikči* 'pupil; schoolchild' refers to younger students, whereas the Russian loan *student* refers to older (e.g. post-secondary) students (c.f. German *Schüler* vs. *Student*). Thus, focusing *ööренikčiler* 'schoolchildren' with *-daa* in a sentence like (4) readily contrast the scale relating these two 'student' words:

(4) Ol nomn-u ööренikči-ler-daa nomču-du.
that book-ACC schoolchild-PL-*daa* read-PST
'Even the schoolchildren$_F$ read that book.'

(4) has the reading that the speaker does not consider *ol nomnu* 'that book' to be something that schoolchildren would read, e.g. if the book is considered especially difficult and something commonly read by older students.

2.2. Indefinites

2.2.1. Interrogative-based indefinites

The first type of polarity-sensitive indefinite that *-daa* participates in are those where the particle appears immediatley to the right of a WH-interrogative pronoun like *kïm* 'who,' *čüü* 'what,' *kayï* 'which.' In non-modal episodic sentences (5), WH-*daa* is interpreted as a universal generalized quantifier (∀GQ). We see in (5a) the resulting meaning is a distributive universal: 'of $\{a, b, c\}$, I read a, b, and c.'

(5) a. Men düün {čünü-daa / kayï-daa nom-nu} nomču-dum.
I yesterday {what.ACC-*daa* / which-*daa* book-ACC} read-PST.1SG
(i) *čünü-daa*: 'I read everything yesterday.' (ii) *kayï-daa*: 'I read all of the books yesterday.'

b. {Kïm-daa / čüü-daa} meni kör-dü.
{who-*daa* / what-*daa*} me.ACC see-PST
(i) *kïm-daa:* 'Everybody saw me.' (ii) *čüü-daa:* 'Everything saw me.'

Given the presence of *düün* 'yesterday' in (5a), this sentence is not covertly modal. Thus, in this context WH-*daa* functions as a ∀GQ.

With clause-mate negation, WH-*daa* is exclusively interpreted as a Negative Polarity Item (NPI). that is, we see in (6a) that the only reading of *čünü-daa* is an NPI 'anything' reading (6a-i): neither a narrow-scope universal (6a-ii) nor a wide-scope existential (6a-iii) reading is available with clause-mate negation.

(6) a. Men düün čünü-daa nomču-va-dïm.
I yesterday what.ACC read-NEG-PST.1SG
(i) 'I didn't read anything yesterday.' [NEG > *anything*]
(ii) *'I didn't 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
'Nobody saw me.' (lit. 'Anybody didn't see me.')

Due to the DeMorgan's equivalence of $\forall x[\neg P(x)]$ and $\neg\exists x[P(x)]$ the data in (6) is compatible with an analysis where WH-*daa* with clause-mate negation is interpreted as a wide-scope universal. This has been proposed for some NPIs in Korean (Sells & Kim 2006) and Japanese (Shimoyama 2011), in contrast to the common analysis of NPIs like English *any* as narrow-scope existentials (Kadmon & Landman 1993, Chierchia 2013). As I argue in Kirby (2022), data from embedded NPIs where an intervention effect is observed strongly suggest that Tuvan WH-*daa* scopes below negation, and is hence underlyingly an existential.

Under a possibility modal like *šïda-* 'to be able to,' WH-*daa* can be interpreted as a universal free-choice item (∀FCI). Here WH-*daa* may be optionally reinforced with the element *bolza*:[4]

(7) Men daarta čünü-daa (bolza) nomčup šïda-ar=men.
I tomorrow what.ACC-*daa* (it.be) read-CVB can-NPST=1SG
'I can read anything tomorrow.'

Interestingly, without *bolza* WH-*daa* is ambiguous between a ∀GQ and a ∀FCI reading:

(8) Ežik-ti kïm-daa sokta-p bol-ur.
door-ACC who-*daa* knock-CVB can-NPST
a. 'Anyone can knock at the door.'

[4] *Bolza* is transparently derived from *bol-* a copula for generics, and the conditional mood suffix *-zA*. Thus, it may be more accurate to translate *čünü-daa bolza* as 'whatever it be.'

b. ‘Everyone can knock at the door.’

The difference between readings (8a) and (8b) concerns whether or not it is acceptable for all contextually relevant entities to knock at the door at the same time. Thus, the ∀FCI reading (8a) asserts that of *a*, *b*, it is possible for *a* to knock at the door and it is possible for *b* to knock at the door, but it is not possible for *a* and *b* to knock at the door together. The ∀GQ reading is more permissive, and is acceptable in contexts where *a* and *b* knock together. In the theory adopted in §3, this difference will be encoded through the presence of a negated scalar alternative for the ∀FCI reading, and its absence in the ∀GQ reading. In (9), we see further that the presence of *bolza* fixes the reading to the ∀GQ reading, and the resulting meaning is that ‘anyone, but not everyone, can knock at the door.’ Finally, in (10) the main verb is replaced with *tur* a light verb used in converbial clauses which indicates episodicity of the event. We see two key things: first, *bolza* is totally unavailable with a non-modal predicate, and second, the ∀FCI reading (10a) is unavailable.

(9) Ežikti kïm-daa bolza soktap bolur.
door.ACC who-*daa* it.be knock can
a. ‘Anyone can knock at the door.’
b. *‘Everyone can knock at the door.’

(10) Ežikti kïm-daa (*bolza) soktap tur.
door.ACC who-*daa* (IT.BE) knock stand
a. *‘Anyone is knocking at the door.’
b. ‘Everyone is knocking at the door.’

2.2.2. ‘Even one’ indefinites

A second class of *-daa* indefinites are emphatic, minimizer NPIs formed by attaching *-daa* to *čaŋgïs* ‘one; a single; only (adj).’ *Čaŋgïs-daa* functions syntactically like a determiner. Without *-daa* (11a) the word *čaŋgïs* obligatorily outscopes negation (11b-ii), i.e. it is a positive polarity item (PPI), whereas *čaŋgïs-daa* is a minimizer NPI (11b-i), ungrammatical on a wide-scope reading (11b-ii).

(11) a. Men čaŋgïs nom nomču-va-dïm.
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)-dïm.
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 even one book that I didn’t read’ *[one>NEG]

Unlike WH-*daa*, *čaŋgïs-daa* is a pure NPI. It is totally ungrammatical in positive episodic sentences (12), and admits no free-choice readings (13).

(12) *Men düün čaŋgïs-daa nom nomčudum.
I yesterday one-*daa* book read.PST.1SG
int. ‘I even read one book$_F$ yesterday.’

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

In (13), we see not only is *čaŋgïs-daa* ungrammatical in a positive modal environment, but also the element *bolza* ‘it be’ does not improve the judgment unlike with WH-*daa bolza*, which (9) shows induces an FCI reading.

3. Analysis

Tuvan *-daa* displays an intricate profile of logical properties. In this section, we provide an analysis which captures *-daa*’s function as a plain additive and mirative focus marker and its role in forming various indefinites, under a unified contribution of the particle across functions. We adopt the so-called

GRAMMATICAL THEORY OF SCALAR IMPLICATURES from Chierchia et al. (2012) and Chierchia (2013), as well as some more recent developments from Xiang (2020) and Mitrović (2021).

As described in Chierchia (2013: 186), the Grammatical Theory as it relates to focus and polarity-sensitivity makes the following three assumptions: (i) ordinary (pragmatic) scalar implicatures are the result of active alternatives and are subject to Gricean relevance (hence any contradiction produced is not relevant, and *can* be ignored); (ii) polarity-sensitive items (e.g. English *any, ever*) have active alternatives, but these alternatives are not subject to relevance (and hence *cannot* be ignored). That is, their alternatives are obligatory; and (iii) if alternatives are active, they must be reckoned with. Non-entailed alternatives must be eliminated.

In this theory, reasoning about the alternatives of certain logical words is part of the grammar itself. Much of the work is performed by operators which exhaust the alternatives of a proposition. Chief among these is O (14), a covert counterpart to *only*:

(14) $[\![O_{ALT}(\phi)]\!] = \phi(w) = 1 \wedge \forall\psi \in ALT(\phi)\ [\psi \rightarrow (\phi \subseteq \psi)]$, where '$\subseteq$'='entails'[5]

(14) asserts that a proposition ϕ (=the 'prejacent') is true and, for every ψ in the alternative set of ϕ ($ALT(\phi)$), ψ is true if ϕ entails ψ. If ϕ does *not* entail ψ, ψ is eliminated (i.e. negated).

On Chierchia's (2013) theory, pure NPIs (i.e. those licensed exclusively in the scope of a negative-like operator like sentential negation, e.g. English *ever*) and FCIs share a lexical property of having obligatorily active alternatives, with their main difference being that the latter further have PRE-EXHAUSTIFIED alternatives—that is, the alternatives of the alternatives are exhaustified. However, we follow Szabolcsi (2017) and Mitrović (2021) in assuming that making alternatives obligatory can be delegated to individual morphemes: more explicitly, we contend that part of Tuvan *-daa*'s semantic contribution is to mark that its host has obligatory pre-exhaustified alternatives. The interpretational differences, we contend, are the result of differences in the types of alternatives of its host. In particular, we argue that *-daa* does not necessarily activate a stronger scalar alternative of its host, though it can if either (i) a scalar alternative is present in the context, or (ii) the host itself inherently has scalar alternatives.

3.1. -daa *is a pre-exhaustification operator*

We define an operator in (15) which is able to interpret the alternatives generated by Tuvan *-daa*; this operator is defined in analogy to Chierchia's O_{Exh-DA} (2013: 115-42), and Xiang's denotation for Mandarin *dōu* (2020: 183). *-Daa* takes a proposition ϕ with a set of alternatives $ALT(\phi)$, asserts that ϕ is true, and denies the exhaustification of each of ϕ's subdomain alternatives.

(15) $[\![\text{-daa}(\phi, ALT)]\!] = [\![O_{Exh-Sub}(\phi, ALT)]\!] = \phi(w) = 1 \wedge \forall\psi \in Sub(\phi)\ [O_w(\psi) = 0]$

Straightforwardly, we can adopt (15) to account for the NPI data. We follow Karttunen (1977) and Mitrović (2021) in analyzing WH-words like *čünü* 'what' as existential quantifiers (16a). Thus, the prejacent of (16) is an existential (16b), and the subdomain alternatives that *-daa* signals exhaustication with respect to are the individual members of the domain (Sauerland 2004). Thus, if our domain contains two entities $\{a, b\}$ the subdomain alternatives are $\{\exists x[x \in \{a\} \wedge read_{w*}(I, x), \exists x[x \in \{b\} \wedge read_{w*}(I, x)]\}$. In (16c), we recursively exhaustify with respect to these alternatives. Exhaustification is shown in (16c). Note, crucially, that *-daa* itself is *not* the exhaustifier. Rather, by activating the subdomain alternatives' alternatives, it requires that an exhaustifier appear to interpret these alternatives.

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

a. $[\![\text{čünü}]\!] = [\![\text{what}]\!] = \lambda P_{\langle e,t\rangle}.\ \exists x[x \in D \wedge P(x)], \qquad D_e = \{a, b\}$
b. $[\![(16)]\!]^o = \neg\exists x[x \in \{a, b\} \wedge read_{w*}(I, x)]$
c. $[\![O_{Exh-Sub}(16\text{b})]\!] =$

[5] Note that here, and throughout the paper, when defining exhaustifiers we omit the NON-VACUITY presupposition, which is the requirement that the prejacent has at least one non-entailed alternative. We refer the reader to Xiang (2020: 181-3).

(i) $\neg\exists x[x \in \{a, b\} \wedge read_{w*}(I, x)]$
(ii) $\wedge\neg O(\neg\exists x[x \in \{a\} \wedge read_{w*}(I, x)])$
$= \neg(\neg\exists x[x \in \{a\} \wedge read_{w*}(I, x)] \wedge \exists x[x \in \{b\} \wedge read_{w*}(I, x)])$
$= \exists x[x \in \{b\} \wedge read_{w*}(I, x)] \rightarrow \exists x[x \in \{a\} \wedge read_{w*}(I, x)]$
(iii) $\wedge\neg O(\neg\exists x[x \in \{b\} \wedge read_{w*}(I, x)])$
$= \exists x[x \in \{a\} \wedge read_{w*}(I, x)] \rightarrow \exists x[x \in \{b\} \wedge read_{w*}(I, x)]$
(iv) $\equiv \neg\exists x[x \in \{a, b\} \wedge read_{w*}(I, x)]$

The results of exhaustification in (16c-i)-(16c-iii) is a restatement of the prejacent. However, if we follow the same process absent of negation or a modal operator, we see how a sentence like (17) is able to strengthen the underlying existential meaning of *čünü* 'what' to a universal.

(17) Men čünü-daa nomču-dum
I what-*daa* read-PST.1SG
'I read everything'

a. $[\![(17)]\!]^o = \exists x[x \in \{a, b\} \wedge read_{w*}(I, x)]$
b. $[\![O_{Exh-Sub}(17a)]\!] =$
(i) $\exists x[x \in \{a, b\} \wedge read_{w*}(I, x)]$ (prejacent assertion)
(ii) $\wedge\neg O(\exists x[x \in \{a\} \wedge read_{w*}(I, x)])$ (exhaustification of $O(a)$
$= \neg(\exists x[x \in \{a\} \wedge read_{w*}(I, x)] \wedge \neg\exists x[x \in \{b\} \wedge read_{w*}(I, x)])$
$= \exists x[x \in \{a\} \wedge read_{w*}(I, x)] \rightarrow \exists x[x \in \{b\} \wedge read_{w*}(I, x)]$
(iii) $\wedge\neg O(\exists x[x \in \{b\} \wedge read_{w*}(I, x)])$ (exhaustification of $O(b)$
$= \neg(\exists x[x \in \{b\} \wedge read_{w*}(I, x)] \wedge \neg\exists x[x \in \{a\} \wedge read_{w*}(I, x)])$
$= \exists x[x \in \{b\} \wedge read_{w*}(I, x)] \rightarrow \exists x[x \in \{a\} \wedge read_{w*}(I, x)]$
(iv) $\equiv \forall x[x \in \{a, b\} \rightarrow read_{w*}(I, x)]$

We see in (17b-i)-(17b-iv) that recursive exhaustification without a scalar alternative is able to strengthen an existential meaning to a universal one. More straightforwardly in propositional logic, if our prejacent is a disjunction $p \vee q$ with the subdomain alternatives p, q, recursive exhaustification results in the sequent $(p \vee q) \wedge (p \rightarrow q) \wedge (q \rightarrow p)$, which is equivalent to $(p \wedge q)$.

Before moving onto derivations where a scalar alternative is present in §3.2, we can conclude this section by considering the plain additive focus reading of *-daa* (18). This we can implement via recursive exhaustification by denying the exhaustification of the prejacent, following Szabolcsi (2017), Mitrović (2021), and Fălăuş & Nicolae (2022). This is shown in (18c).

(18) Men-daa nom ekkel-dim.
I-*daa* book bring-PST.1SG
'I_F brought a book, too.'

a. $[\![(18)]\!]^o = B_{w*}(I)$, where '$\lambda x_e B(x)$'$= \lambda x_e.[x\ brings\ a\ book]$'
b. $Focus\_ALT(18) = \{w : B_w(I), w : B_w(buyan)\}$
c. $O_{Exh-Sub}(B_{w*}(I)) =$
(i) $B_{w*}(I)$ (prejacent assertion)
(ii) $\wedge\neg O(B_{w*}I)$
$= \neg(B_w(I) \wedge \neg B_w(buyan))$
$= (B_w(I) \rightarrow B_w(buyan))$
$= (B_w(I) \wedge B_w(buyan))$
(iii) $\equiv B_{w*}(I) \wedge B_{w*}(buyan)$

Note that in (18c-ii), because the prejacent does *not* entail the exhaustification of the prejacent, there is no conflict with the definition of O_{ALT} as presented in (14). We see in (18c-iii) that the result of exhaustification is an enriched proposition where not only the prejacent is true, but also another proposition from the set of focus alternatives (18b), namely that 'Buyan brought a book,' is too. Crucially, this latter proposition *must* be true in the world for it to be present in the alternative set. This, we contend, is how the basic additive reading is induced by *-daa*.

3.2. The scalar alternative is not always present

We contend that the scalar alternative is not inherently present, and in fact, its absence is crucial to produce the ∀GQ reading from a basic existential (17). If there were a scalar alternative $\lambda P_{\langle e,t\rangle} \forall x[x \in \{a, b\} \rightarrow P(x)]$ present in the alternative set, it would have to be exhaustified, and *-daa* would be incorrectly predicted to be unavailable in non-modal affirmative sentences. This, we argue, is because *-daa* is not lexically encoded to require a stronger scalar alternative, only subdomain alternatives. However, for the final three readings, i.e. *čaŋgïs-daa* NPIs, ∀FCI WH-*daa* (*bolza*), and the mirative focus reading, the presence of a scalar alternative is indeed necessary. This is *not* due to a difference in the semantics of *-daa*, but rather a difference in the alternatives present. In particular, we argue that WH-*daa* ∀FCIs can obtain a scalar alternative pragmatically, and that there is a further round of exhaustification after $O_{Exh-Sub}$ which excludes it. This is the topic of §3.2.1. However, in the case of *čaŋgïs-daa* and mirative 'even' focus, the subdomain alternatives which are fed into $O_{Exh-Sub}$ are themselves ranked along a probability scale. Following Xiang's (2020) approach for Mandarin *dōu* in deriving *even* from recursive *only*, we derive this through the same semantics for *-daa* as proposed above.

3.2.1. The universal FCI reading

As we saw in §2.2.1, without *bolza* WH-*daa* in the scope of a modal is ambiguous between the ∀FCI reading (19a) and the ∀GC reading (19b).[6]

(19) Ežikti kïm-daa soktap bolur.
door.ACC who-*daa* knock.CVB can.NPST
a. 'Anyone can knock at the door.'
(i) $\Diamond(K(a) \vee K(b) \vee K(c)) \wedge (\Diamond K(a) \leftrightarrow \Diamond K(b) \leftrightarrow \Diamond K(c)) \wedge \neg\Diamond(K(a) \wedge K(b) \wedge K(c))$
b. 'Everyone can knock at the door.'
(i) $\Diamond(K(a) \vee K(b) \vee K(c)) \wedge (\Diamond K(a) \leftrightarrow \Diamond K(b) \leftrightarrow \Diamond K(c))$

Assuming a subdomain with three alternatives $\{a, b, c\}$, where '$\lambda x_e.K(x)$'='x knocks at the door,' the ordinary value of (19) is $\Diamond(K(a) \vee K(b) \vee K(c))$. That is, there is some possible world in which a, b, or c is capable of knocking at the door. If we exhaustify with respect to this set of alternatives using $O_{Exh-Sub}$ (15), we would yield the LF in (19b-i). This, however, does not exclude the possibility of all of a, b, c knocking at the door at the same time (i.e. in the same world). (19a-i), where the possibility of all three knocking in the world is excluded, explicitly denies this possibility. This is because it has denied the stronger scalar alternative of the prejacent. We believe that this is the result of another round of pragmatic exhaustification, wherein the stronger scalar alternative is denied by virtue of its contextual irrelevance (see Bar-Lev & Margulis 2014: 69-70 for a similar argument concerning Hebrew *kol*). To state this somewhat differently, the difference in interpretation between (19a) and (19b) is *not* a difference in the contribution of *-daa* (i.e. it is not the result of a truth-conditional difference), but is rather the result of further, pragmatic exhaustification.

On the other hand, as we saw in (9), (10) (reproduced in (20)), the presence of *bolza* has the effect of fixing WH-*daa* to a ∀FCI reading. This, we contend, is because *bolza* itself marks the stronger scalar alternative of its prejacent as obligatory. In the scope of a modal, this results in (20) having the same reading sketched in (19a-i).

(20) Ežikti kïm-daa bolza soktap {bolur / *tur}.
door.ACC who-*daa* it.be knock.CVB {can.NPST / stand.LTVB}
a. With *bolur*: 'Anyone can knock at the door.'
b. With *tur*: '*Anyone is knocking at the door.'

With an active scalar alternative as, (20) will be ungrammatical in affirmative, non-modal sentences because its alternatives end up contradicting each other. (21) demonstrates this, with an alternative set

[6] For further discussion of the semantics of FCIs within this theory, the reader is referred to Dayal (1998, 2004), Chierchia (2013: 245-372), Mitrović (2021: 132-6), and Fălăuş & Nicolae (2022).

containing two subdomain alternatives $\{K(a), K(b)\}$. (21a) shows the first round of exhaustification with $O_{Exh-Sub}$, while (21b) adds in the second round of denying the scalar alternative (where 'σA'='scalar alternative):

(21) $O_{\sigma A}(O_{Exh-Sub}(K(a) \vee K(b)))$
$ALT(K(a) \vee K(b)) = \{K(a) \vee K(b), K(a), K(b), K(a) \wedge K(b)\}$

a. $O_{Exh-Sub}(K(a) \vee K(b)) \wedge \neg O(K(a)) \wedge \neg O(K(b))$
$= (K(a) \vee (K(b)) \wedge (K(a) \leftrightarrow K(b)$

b. $O_{\sigma A}(K(a) \vee K(b)) = (K(a) \vee (K(b)) \wedge (K(a) \leftrightarrow K(b) \wedge \neg(K(a) \wedge K(b)) \quad \perp$

Because (21b) is not modalized, its truth conditions require it to be true in $w*$. But this is impossible, given the result of (21a) is equivalent to a conjunction of '*a* knocked' and '*b* knocked,' which is explicitly denied by the negated scalar alternative. A modal, on the other hand, is able to save this from reaching a contradiction (19a-i) by virtue of the fact that the the modal in $\Diamond(K(a) \wedge K(b)...)$ scopes over the entire conjunction. Thus, so long as there is *some* world in which any of *a*, *b*, etc. can knock, it is interpretable.

3.2.2. From recursive O to E, following Xiang (2020)

Chierchia's original (2013) formulation of exhaustification includes a second discrete exhaustifier E, a covert version of *even*.

(22) $[\![E(\phi, ALT)]\!] = \phi \wedge \forall \psi \in ALT(\phi)[\phi <_{likely} \psi]$ (Chierchia 2013: 148, following Karttunen & Peters 1979)

E (22) takes a proposition ϕ with alternatives $ALT(\phi)$, asserts that ϕ is true, and requires that, of each ψ such that ψ is an alternative of ϕ, ϕ is less likely than ψ. On Chierchia's (2013: 153) theory, O(nly) and E(ven) are discrete operators, and the choice between them is mitigated by an economy principle called Optimal Fit, which induces the grammar to exhaustify with E if the prejacent's alternatives are either (i) ranked pragmatically by a probability metric in the context, or (ii) ordered along a rich scalar of entailment (roughly, for numerals). While we do accept that the heurstic behind this approach is useful, we believe that data like Tuvan *-daa*, where the switch from forming weak (i.e. non-emphatic) NPIs in WH-*daa* and non-emphatic plain additive 'also' focus to minimizer NPIs (i.e. *čaŋgïs-daa*) and mirative 'even' focus is relatively seamless calls out for a unified explanation. Following Mitrović (2021: 139-46) and Xiang (2020: 196-201), we believe E(ven) as it pertains to particles like Tuvan *-daa* is not a primitive operator, but is rather the result of exhaustifying with respect to probability-ranked subdomain alternatives. In what follows, we summarize Xiang's (2020) approach to Mandarin *dōu*, then show how it accounts for Tuvan *-daa* in *čaŋgïs-daa* NPIs and mirative 'even' focus.

Xiang's insight begins with the assumption that subdomain alternatives may be ranked along a probability metric. This is shown in (23), which picks out alternatives of ϕ which are more likely than the some proposition ϕ.

(23) $Sub(\phi, ALT) = \{\psi | \psi \in ALT(\phi) \wedge (\psi >_{likely} \phi)\}$

Xiang's next move is to rephrase the O-exhaustifier in terms of likelihood as a special exhaustifier $Just$, a logical consequence of redefining the subdomain alternatives in terms of likelihood (2020: 200, fn 28. In (24a), $Just$ is defined, with O in (24b) for the reader's convenience.

(24) a. $[\![Just_{ALT}(\psi)]\!] = \psi(w) = 1 \wedge \forall \chi \in ALT(\psi)\ [\chi(w) = 1 \rightarrow (\psi \leq_{likely} \chi)]$

b. $[\![O_{ALT}(\psi) \quad]\!] = \psi(w) = 1 \wedge \forall \chi \in ALT(\psi)\ [\chi(w) = 1 \rightarrow (\psi \subseteq \chi)]$

As we see in (24a), $Just$ asserts a proposition ψ, and for every proposition χ in the alternatives of ψ, χ is true only if its likelihood is greater than or equal to the likehood of the prejacent ψ. In order to derive E from O, Xiang's method is to assert $Just_w(\psi) = 0$ for every ψ in ϕ's alternative set. This is shown in (25):

(25) $[\![dou_{ALT}]\!]$

a. $\lambda\phi\lambda w : \exists\psi \in Sub(\phi, ALT).\phi(w) = 1 \wedge \forall\psi \in Sub(\phi, ALT)[Just_{ALT,w}(\psi) = 0]$
b. $\lambda\phi\lambda w : \exists\psi \in Sub(\phi, ALT).\phi(w) = 1 \wedge \forall\psi \in Sub(\phi, ALT)[\exists\chi \in ALT[\chi(w) = 1 \wedge (\psi >_{likely} \chi)]]$
c. $\lambda\phi\lambda w : \exists\psi \in ALT[\psi >_{likely} \phi].\phi(w) = 1 \wedge \forall\psi \in ALT[(\phi >_{likely} p) \rightarrow \exists\chi \in ALT[\chi(w) = 1 \wedge (\psi >_{likely} r)]]$
d. $\lambda\phi\lambda w : \exists\psi \in ALT[\phi >_{likely} \psi].\phi(w) = 1$
(For any proposition ϕ, $[\![dou_{ALT}]\!](\phi)$ is defined only if ϕ is less likely than at least one of its contextually relevant alternatives; when defined, $[\![dou_{ALT}]\!](\phi) = \phi$)
e. $\equiv [\![even_{ALT}]\!]$ (Xiang 2020: 200-1)

What (25) is doing is affirming the prejacent and stating that no true subdomain alternative of the prejacent is more likely, and then denying this. As we see in (25b)-(25d), this ultimately arrives at the same meaning as E (22).

Tuvan *-daa*'s seamless fluctuation between *also* and *even* functions is good evidence for this approach. When the alternatives are pragmatically ranked along by a salient probability metric, *-daa* includes the probability ranking in the process of recursive exhaustification, yielding an interpretable utterance wherein the prejacent is the least likely of these alternatives.

For reasons of space, we will discuss this only as it pertains to *čaŋgïs-daa* NPIs (26). We define *čaŋgïs* as a cardinality predicate (26a), with a set of alternatives as in **??**.

(26) Men čaŋgïs-daa nom nomču-*(va)-dïm.
I one-*daa* book read-(NEG)-PST.1SG
'I didn't read even one book yesterday.'
a. $[\![$čaŋgïs$]\!] = [\![one]\!] = \lambda P_{\langle e,t\rangle}.\lambda Q_{\langle e,t\rangle}.\exists x[one(x) \wedge P(x) \wedge Q(x)]$
b. ALT(26a)= $\{\lambda P.\lambda Q.\exists x[n(x) \wedge P(x) \wedge Q(x)] : |n| \geq 1\}$
i.e. $\{one, two, three, four, ...,\}$

Crucially, the alternatives in (26b) are inherently scalar alternatives. Any attempt at construing the alternatives as subdomain alternatives is moot, given that every (positive) numeral entails all non-negative numbers less than or equal to it. Given this entailment, we can further conclude a likelihood relationship: given that a numeral like *two* entails *one*, but *one* does not entail *two*, the likehood of *one* is inherently entailed by the likelihood of *one* (see Crnič 2011, 2014). Thus, if *-daa* makes the alternatives of *čaŋgïs* obligatory in (26), the enhanced O-to-E exhaustification as proposed in (25) will yield a contradiction: *I read even one book* with an obligatory scalar alternative is impossible to satisfy. On the other hand, under negation, the entailment patterns get reversed (i.e. *I didn't read one books* entails *I didn't read two books*), and thus *čaŋgïs-daa* 'one$_{NPI}$' is now less likely than its alternatives. Hence, exhaustification with E is permitted, and the result is a minimizer NPI.

4. Conclusion

This paper has examined novel data from the Turkic language Tuvan, and argued that the particle *-daa* is a morphological realization of pre-exhaustification. This particle has gone largely unnoticed by semantic work, though in many ways it fits seamlessly into the predictions made by Szabolcsi's (2017) and Mitrović's (2021) position that activating alternatives can be delegated to a function of an individual morpheme, in that we have shown that pre-exhaustifying the subdomain alternatives of an alternative-bearing prejacent can be delegated to an individual morpheme as well.

While it was not a major focus of the current paper, this paper has also argued for another case of a language where subdomain alternatives can be activated without a stronger scalar alternative, resulting in a distributive universal reading in affirmative contexts. Thus, Tuvan *-daa* joins the ranks of Hebrew *kol* (Bar-Lev & Margulis 2014), Japanese *-mo* (Mitrović 2021), Warlpiri *manu* (Bowler 2014), Malay *pun* (Wong 2017), among others.

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