Negation and dependencies: a dynamic approach to dependent numerals in Turkish

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Link for the handout

Introduction

- Dependent indefinites/numerals force a distributive reading.

(1) a. Xeqatij **ox-ox** wäy.
we-eat three-three tortilla
"We each ate three tortillas." (Kaqchikel Mayan Henderson, 2014)
b. BOYS IX-arc-a read **one-arc-a** BOOK.
"The boys read one book each." (American Sign Language Kuhn, 2017)

- Dependent indefinites/numerals can occur under the scope of a quantifier.

(2) a. Chikijujunal ri tijoxela' xkiq'etej **ju-jun** tz'i'.
each the students hugged one-one dog
"Each of the students hugged a dog." (Kaqchikel Mayan Henderson, 2014)
b. EACH-EACH-a PROFESSOR NOMINATE **ONE-redup-a** STUDENT.
"Each professor nominated one student." (American Sign Language Kuhn, 2017)

- Dependent indefinites/numerals are incompatible with a singular argument.

(3) a. * Xe'inchäp **ox-ox** wäy.
I-handle three-three tortilla
"I took (groups of) three tortillas." (Kaqchikel Mayan Henderson, 2014)
b. * JOHN-a READ **ONE-arc-a** BOOK.
"John read one book (each time).' (American Sign Language Kuhn, 2017)

Dependent numerals in Turkish

Turkish has a suffix "(ş)Ar" that attaches to a numeral (Kornfilt, 1997; Özyıldız, 2017).

- NUM-şAr forces a distributive reading when it occurs below a plural argument.

(4) Yedi çocuk üç-**er** oyuncak seç-ti.
seven child three-şAr toy choose-past
"Seven children picked three toys each."

- NUM-şAr has to occur below a plural argument.

(5) a. * Bir çocuk üç-**er** oyuncak seç-ti.
One child three-şAr toy choose-past
"{A / one} child picked three toys each."
b. ?? Yedi-**şer** çocuk üç oyuncak seç-ti.
Seven-şAr children three toy choose-past
(Intended) "Each group of seven children picked three toys."

- NUM-şAr can occur under the scope of a quantifier without being redundant.

(6) Her çocuk üç-**er** oyuncak seç-ti.
Every child three-şAr toy choose-past
"Every child picked three toys each."

Dependencies and co-variation

- An information state is modelled as a variable assignment g.
- *Discourse referents* (drefs) $u_1, u_2, \ldots$ are members of the domain of variable assignments.
- A *plural information state* G is a set of information states.
- A formula denotes a relation between sets of plural information states.

I adopt a set-theoretic interpretation of the classical theory of plurals (Link, 1983, *et seq*).

(7) a. $a+b=\{a,b\}$, $a \subseteq a+b$ and $b \subseteq a+b$ b. $[\![\text{atom}(x)]\!] \Leftrightarrow \forall y[y \subseteq x \rightarrow y = x]$

Non-atomic individuals are obtained by summing the values of G, i.e. $G(u) = \{g(u) : g \in G\}$.

Dref introduction (or assignment extension) is defined as follows.

(8) a. $g[u_n]h \Leftrightarrow \forall u[u \neq u_n \rightarrow g(u) = h(u)]$
b. $G[u]H \Leftrightarrow \forall g \in G\, \exists h \in H\, [g[u]h] \,\&\, \forall h \in H\, \exists g \in G\, [g[u]h]]$

Dependencies are defined as (9b) (van den Berg, 1996): u_m is dependent on u_n iff they **co-vary**.

(9) a. $G_{u_n=d} = \{g : g \in G \,\&\, g(u_n) = d\}$
b. In G, u_m is dependent on u_n iff $\exists d, e \in G(u_n)\,[G_{u_n=d}(u_m) \neq G_{u_n=e}(u_m)]$

G	u_1
g_1	x_1
g_2	x_2
g_3	x_3

$\xrightarrow{G[u_2]H}$

H	u_1	u_2
h_1	x_1	y_1
h_2	x_2	y_2
h_3	x_3	y_3

Table: Total co-variation

G	u_1
g_1	x_1
g_2	x_2
g_3	x_3

$\xrightarrow{G[u_2]H}$

H	u_1	u_2
h_1	x_1	y_1
h_2	x_2	y_2
h_3	x_3	y_2

Table: Partial co-variation

G	u_1
g_1	x_1
g_2	x_2
g_3	x_3

$\xrightarrow{G[u_2]H}$

H	u_1	u_2
h_1	x_1	y_1
h_2	x_2	y_1
h_3	x_3	y_1

Table: No variation

The dynamic distributivity operator δ may create new dependencies.

(10) $[\![\delta_{u_n}(\phi)]\!] = \{\langle G, H\rangle \mid G(u_n) = H(u_n) \,\&\, \forall d\,[d \in G(u_n) \rightarrow G_{u_n=d}[\![\phi]\!]H_{u_n=d})]\}$

Negation discards the plural information states in which ϕ is true and keep other things the same.

(11) $[\![\neg\phi]\!] = \lambda G \lambda H\,[G = H \,\&\, \neg\exists K\,[G[\![\phi]\!]K]]$ (i.e. $[\![\phi]\!](G)(H) = 0$)

Dependency-based accounts (Brasoveanu and Farkas, 2011; Henderson, 2014; Kuhn, 2017, a.o.).

- Brasoveanu and Farkas (2011); Kuhn (2017) require co-variation, but Henderson (2014) does not.
- Brasoveanu and Farkas (2011) need a covert distributivity operator to derive (1) and (4).
- Henderson (2014); Kuhn (2017) need a mechanism to evaluate the distributivity condition of dependent indefinites above the scope of quantifiers.
- Henderson (2014) adopts *post-suppositions*, i.e. not-at-issue contents that are evaluated after all the at-issue contents have been evaluated, and Kuhn (2017) adopts Q(uantifier) R(aising).

Dependent numerals under negation

(12) a. Bu yedi öğrenci^x üç-**er** müze^y(-ye) git-me-di.
this seven student three-şAr museum(-dat) visit-neg-past
"These seven students did not visit three museums each."
b. Her öğrenci^x üç-**er** müze^y(-ye) git-me-di.
Every student three-şAr museum(-dat) visit-neg-past
"Every student did not visit three museums each."

- Typical cases to use (12a) and (12b) are exemplified below.

(13) Context: seven students took a seminar of modern art. The lecturer told them that they should visit at least three museums in the city to see the general art style here. Now, it is the end of the semester and the lecture is asking about the students' visiting to museums.
a. Scenario 1: four of the seven students visited three museums during the semester, but the other three just visited one or two museums. → (12a) and (12b) are **true**
b. Scenario 2: three of the seven students visited three museums, but the other four didn't visit any museums. → (12a) and (12b) are **true**

- Less typical cases are degraded due to independent factors (see the handout.)

Intermediate scope of indefinites

- All the three accounts assume that dependent indefinites introduce a new value to a dref.
- This dref introduction is done in-situ in Brasoveanu and Farkas (2011); Henderson (2014), but it is done at the landing site of QR in Kuhn (2017).
- The former is compatible with $\forall > \exists > \neg$ scope order, but the latter is not because **dependent indefinites have to outscope a quantifier** in Kuhn (2017).

(14) Scenario 3: seven students took a seminar of modern art. The lecturer told them that they should visit several museums in the city to see the general art style here. This city has seven museums and the students may visit any of them. Now, it is the end of the semester and the lecture is asking about the students' visiting to museums. Interestingly, all the seven students visited exactly four museums. → (12a) and (12b) are **true**

- The scope relation $\forall > \exists 3 > \neg$ is possible. → **problematic for** Kuhn (2017)
- Also, discourse anaphora is possible only if 3–şer outscopes negation (see the handout.)

Co-variation

- If a co-variation condition is evaluated above negation, it results in infelicity because dependent variable is not accessible to it.
- If it is evaluated below negation, absence of co-variation should suffice to verify (12a)-(12b).

(15) Scenario 4 (accidental absence of co-variation): all the seven students independently visited the same three museums. → (12a) and (12b) are **false**

- Absence of co-variation does not verify (12a)-(12b), but informants reported that their judgements are not crisp.
- It is still possible that the weaker requirement of possible co-variation might work.
- In (16), co-variation is contextually ruled out, i.e. there are only three LOR films.

(16) Scenario 5 (co-variation impossible): three students watched all the Lord of the Rings films.
a. Her öğğrenci üç-er yüzüklerin efendisi filmi izle-me-di.
every student three-şAr lord of the rings film watch-neg-past
"Every student did not watch three LOR films each." → **infelicitous**
b. Bu üc öğğrenci üç-er yüzüklerin efendisi filmi izle-me-di.
this three student three-şAr lord of the rings film watch-neg-past
"These three students did not watch three LOR films each." → **infelicitous**

- This suggests that the output context has to entertain at least one possibility with co-variation.
- i.e. this has to be a constraint on the context, instead of individual output plural information states → **problematic for** Brasoveanu and Farkas (2011); Kuhn (2017).
- Also, this condition has to be a not-at-issue content that is evaluated in-situ.
- See the handout for more data and discussion.

Distributivity

- All the three accounts force distributivity in different ways.
- Brasoveanu and Farkas (2011): the co-variation condition requires a (c)overt quantifier.
- Henderson (2014): the plurality condition + distributive evaluation of numerals.
- Kuhn (2017): the co-variation condition + distributive evaluation of numerals.
- Note that the plurality condition in Henderson (2014) is 'discharged' under negation due to the definition of post-supposition (see also Law, 2022).

(17) Scenario 6 (collective action): three children collaborated to carry desks, e.g., they each hold a part of a desk to lift, carry and put down, and they carried five desks in this way.
a. O üç çocuk beş-er masa taşı-dı.
that three child five-şAr table carry-past
'Those three children carried five tables (each).' → **false** or **infelicitous**
b. O üç çocuk beş-er masa taşı-ma-dı.
that three child five-şAr table carry-neg-past
'Those three children did not carry five tables (each).' → **true** or **infelicitous**

- Brasoveanu and Farkas (2011): no obvious way to target only distributivity with negation.
- One may claim that the oddness of (17b) is due to absence of co-variation.
- Its validity depends on whether the anomaly in (16) differs from the anomaly in (17b).
- Kuhn (2017): right predictions if QR lands below negation (it contradicts with (14), though.)
- Henderson (2014): right predictions, modulo the definition of post-suppositions.

Selected References

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