



**Leibniz-Zentrum
Allgemeine Sprachwissenschaft**



Incorporation and Weak Definites in Persian and German: Their Interpretation and Anaphoric Potential

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Anaphoric Potential of
Incorporated Nominals
and Weak Definites
(AN APIN)

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Overview

- Results of the project ANAPIN:
Anaphoric Potential of Incorporated Nominals and Weak Definites
- Persian
 - Pseudo-Incorporated Nominals
 - Indefinites
 - Object marking
 - Prosodic phrasing and interpretation
- German
 - Interpretation of weak definites
 - Interpretation of incorporated nominals
- Experimental Results & Modeling
- Survey rather than in-depth
- Our theoretical proposals rather than alternatives



Bare object nominals in Persian

- The interpretation of bare nominal objects in Persian
- BN **objects**: indefinite, number-neutral:
 - *Maryam ketab kharid.*
M. book bought
'M. bought a book/books.'
- BN with **object marker –ra**: definite, singular.
 - *Maryam ketab-ra kharid.*
M. book-OM bought
'Maryam bought the book.'
- Our claims

Krifka, Manfred, & Modarresi, Fereshteh 2016. Number neutrality and anaphoric uptake of pseudo-incorporated nominals in Persian (and weak definites in English). *Semantics and Linguistic Theory (SALT)* 26, 874-891.

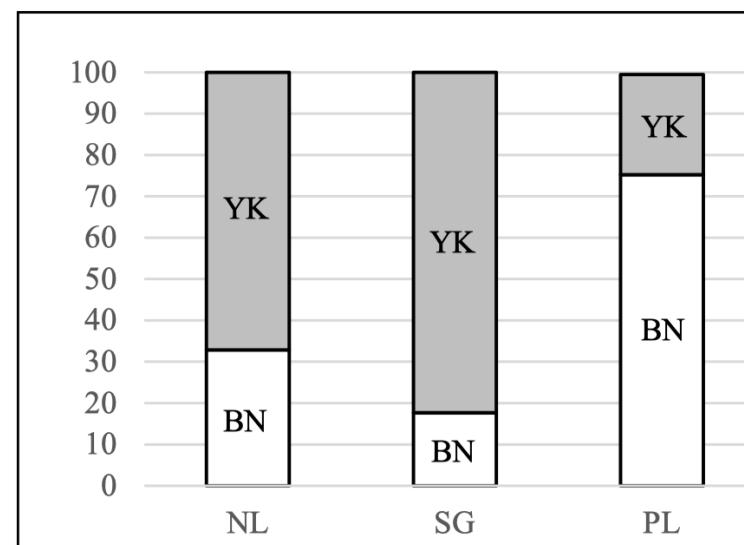
 - BNs are **always** definite, singular
 - Through syntactic position and scopal interaction with existential closure, BN objects get an **apparent** indefinite, number-neutral interpretation
 - BN objects can be taken up anaphorically (contrary to previous claims), but their **anaphoric potential** is diminished w.r.t. indefinites:
Maryam yek ketab kharid.
Maryam a/one book bought
'Maryam bought a book.'
 - The interpretation of BNs without *ra-* is similar to weak definites in English, German
Mary read the newspaper
on weak definite reading; newspaper not given, possibly more than one

Previous accounts on BN objects

- Rich literature on object marking with *-ra*:
 - topic / secondary topic (Ghomeishi 1997, Dabir-Moghaddam 1990)
 - definiteness marker (Ghomeshi 2003), but it may cooccur with indefinite
 - specificity marker (Karimi 2003), but it may occur in generic sentences (Krifka 2001)
 - prosodic and information-structural separation (Hincha 1961)
 - scrambling (Browning & E. Karimi 1994)
- BN objects without *-ra*
 - non-referential (Ghomeshi 2003)
 - non-specific / non-referential (Karimi 2003)
 - kind-referring (Ghomeshi 2008)
 - part of predicate (Windfuhr 1979)
 - non-salient, cannot be picked up by anaphora (Ganjavi 2007, Megerdooonian 2012)
- Experimental results:
 - Modarresi, Fereshteh, & Manfred Krifka. 2021. Pseudo Incorporation and Anaphoricity: Evidence from Persian. *Glossa* 6.
 - Modarresi, Fereshteh, & Krifka, Manfred. 2023. Anaphoric potential of pseudo-incorporated bare objects in Persian. Ed. Simin Karimi, Narges Nematollahi, Roya Kabiri, & Jian Gang Ngui, *Advances in Iranian Linguistics II*. Amsterdam: John Benjamins, 12–43.

Anaphoric potential of bare nominal objects

- Anaphoric potential is a controversial topic
 - Often denied to exist (Ganjavi 2007, Megerdooomian 2012)
 - But even proponents of anaphoric island view point out examples, like Megerdooomian 2012
 - *Man diruz khiar khordam va poost-esh-o endakhtam tu satl-e-ashghal*
 I yesterday cucumber bought and skin-its-ra threw-1sg in bucket-of-garbage
 ‘Last night I bought a cucumber and threw its skin in the trashcan.’
- Experimental evidence:
 - Self-paced reading with anaphora to *yek*-N vs. BNs, no significant results (different from Syrett & Law 2018 on Mandarin)
 - Acceptability study: Anaphora to BNs only slightly worse than anaphora to *yek*-N
 - Choice of antecedent
 - Anaphors NL (null), SG (*-esh*) and PL (*-eshoon*)
 - based on 30 items, 6 fillers, 153 participants
 - *yek*-N make better antecedents, but BN are selected as well



Anaphoric potential of bare nominal objects

■ Experiments:

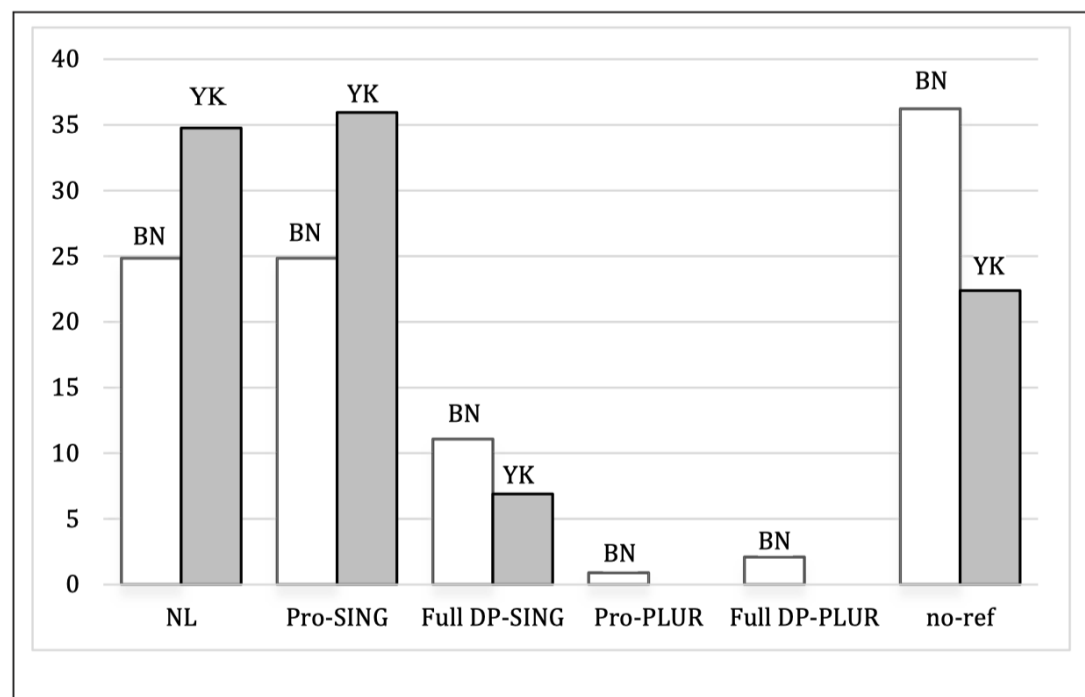
— Sentence completion contrasting *yek-N* and BN:

- *Madar-bozorg* *haftey-e-pish* *kolah / yek-kolah* *baft* *va* *baad* _____
 mother-big week-of-last hat / yek-hat knitted and then.....
 ‘Grandma knitted hat / a hat last week and then...’

— 24 items with two conditions, 252 participants

— Results:

- BN objects can be taken up by anaphors quite easily,
- *Yek-N* make better antecedents when anaphoric uptake is intended



Modeling of the phenomena

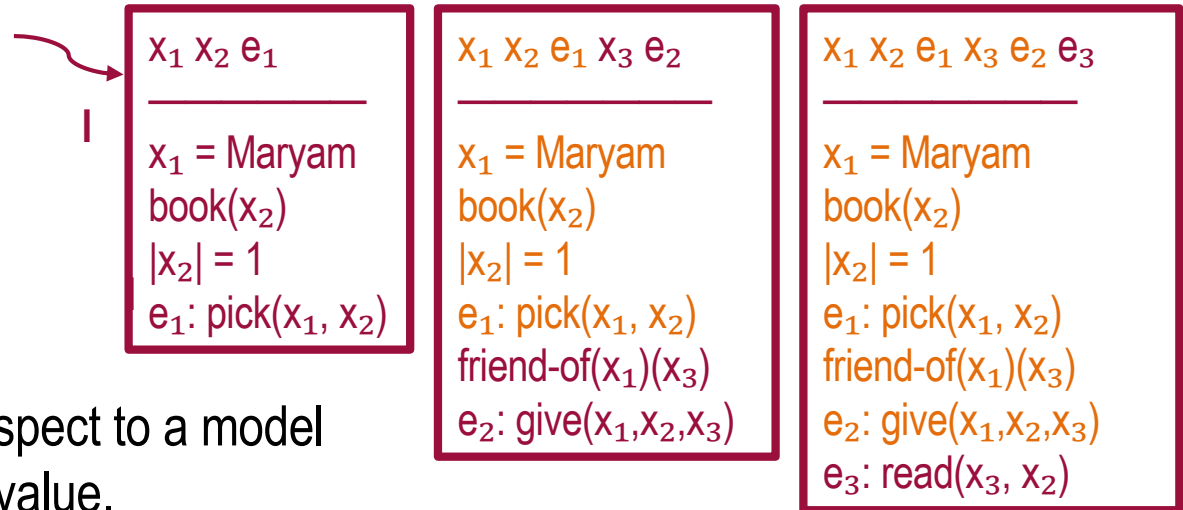
- To be explained:
 - number-neutral interpretation of BN
 - singular interpretation of *yek*-N
 - Both BN and *yek*-N can be taken up by anaphora, but this is more straightforward for *yek*-N
 - definite singular interpretation of *ra*-marked N (uncontroversial assumption, not tested experimentally)
- Modeling within Discourse Representation Theory (DRT)
 - Minimal change of an existing framework (Kamp & Reyle 1993)
 - Krifka, Manfred, & Modarresi, Fereshteh 2016. Number neutrality and anaphoric uptake of pseudo-incorporated nominals in Persian (and weak definites in English). *Semantics and Linguistic Theory (SALT)* 26, 874-891.



Semantic representation format: DRT

- Discourse Representation Theory (DRT, Kamp & Reyle 1993)
- Incremental interpretation **I** of sentences in discourse representation structures (DRSs) which represent discourse referents (DRs) and conditions on them

- *Maryam yek ketab-ra bardasht.*
'Maryam picked a book.'
- *va be yek doost-i daad.*
'and she gave it to friend.'
- *Foran khoond-esh.*
'He/she read it immediately.'



- Interpreted by function **g** with respect to a model (possible world) yielding a truth value.

- Domain of **g**: $\{x_1, x_2, e_1, x_3, e_2\}$

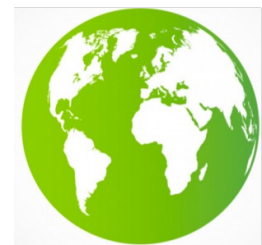
$g(x_1) = \text{Maryam}$, $g(x_2) \in \{x \mid x \text{ is one book}\}$

$\langle g(e_1), g(x_1), g(x_2) \rangle \in \{\langle e, x, y \rangle \mid e \text{ is an event of } x \text{ picking up } y\}$

$\langle g(x_1), g(x_3) \rangle \in \{\langle x, y \rangle \mid y \text{ is a friend of } x\}$

$\langle g(e_2), g(x_1), g(x_2), g(x_3) \rangle \in \{\langle e, x, y, z \rangle \mid e \text{ is an event of } x \text{ giving } y \text{ to } z\}$

- If such **g** exist, sentence / discourse is true in the model / possible world



Semantic representation format: DRT

- DRT treatment of “donkey anaphora”

- *Har vaght Maryam yek ketab mi-kharid, oon-o be yek doost-i mi-dad.*

‘Whenever Maryam bought a book, she gave it to a friend.’ (*mi-*: durative)

- Conditional interpreted

by a complex condition $DRS_1 \Rightarrow DRS_2$

- Satisfied by a function g with $g(x_1) = \text{Maryam}$ if and only if:

Every extension g' of g such that

$g'(x_2) \in \{x \mid x \text{ is one book}\}$

and $\langle g'(e_1), g'(x_1), g'(x_2) \rangle \in \{\langle e, x, y \rangle \mid e \text{ is an event in which } x \text{ picks } y\}$

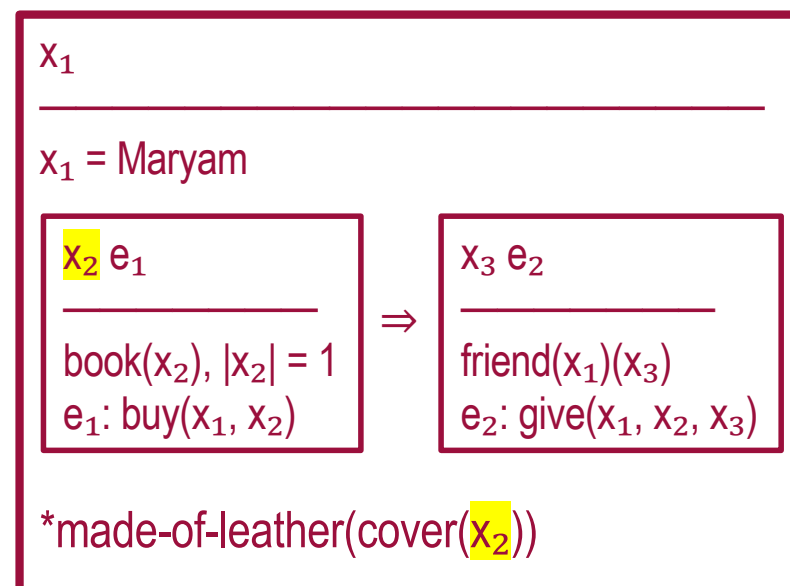
can be extended further to a g'' such that

$\langle g''(x_1), g''(x_3) \rangle \in \{\langle x, y \rangle \mid y \text{ is a friend of } x\}$ and

$\langle g''(e_2), g''(x_1), g''(x_2), g''(x_3) \rangle \in \{\langle e, x, y, z \rangle \mid e \text{ is an event in which } x \text{ gives } y \text{ to } z\}$

- DR x_2, x_3 not directly accessible for anaphoric uptake:

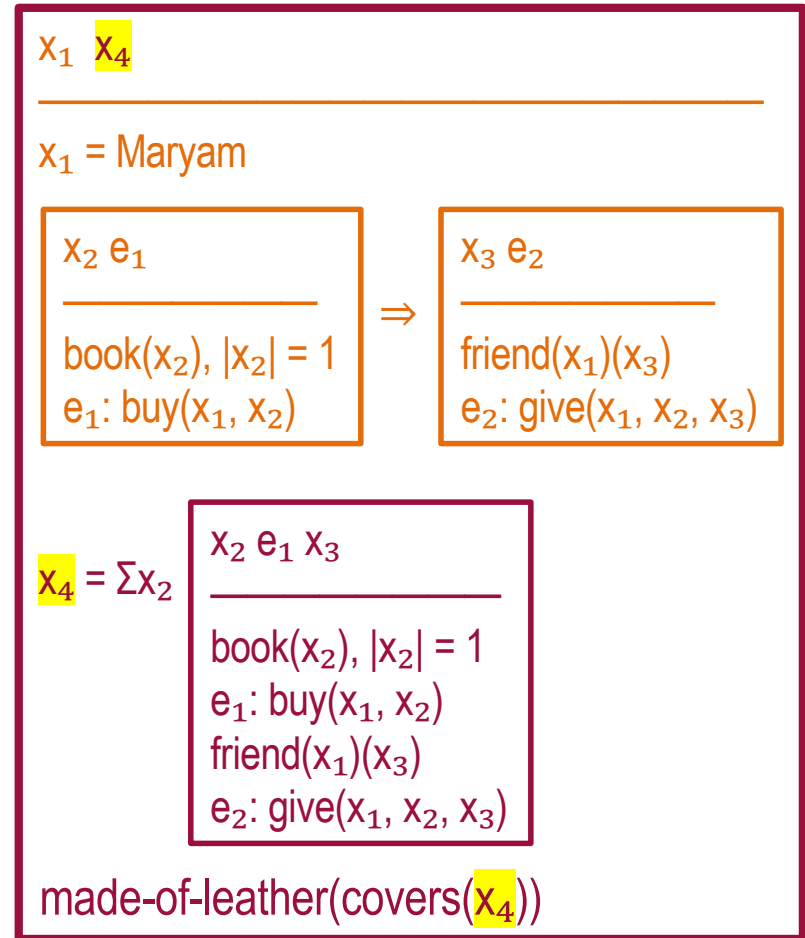
- *#Jeld-esh charmi bood.* ‘Its cover was of leather.’





Anaphoric uptake by abstraction & summation

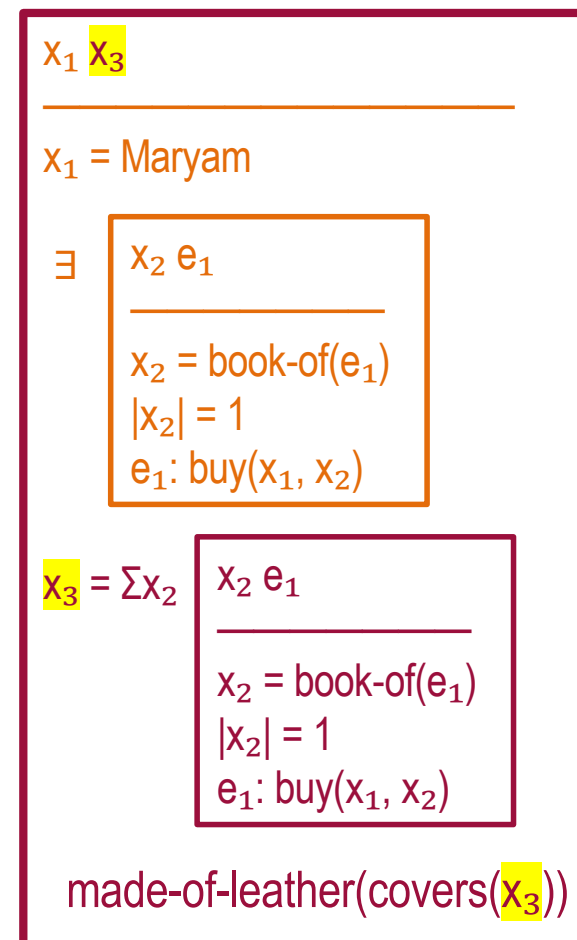
- Reference to inaccessible discourse referents
- *Har vaght Maryam yek ketab mi-kharid oon-o be yek doost-i mi-dad.*
'Whenever Maryam bought a book, she gave it to a friend.'
Jeld-eshoon charmi bood.
'Their covers were of leather.'
- Kamp & Reyle 1993:
Abstraction and summation
- From a complex condition, e.g. $DRS_1 \Rightarrow DRS_2$ introduce a DR referring to the **sum** Σ of a DR in the conjoined condition $DRS_1 \cup DRS_2$
- **g** satisfies $x_4 = \Sigma x_2$ DRS iff **g**(x_4) = the sum of all entities **x** such that **g** can be extended to **g'** with **g'**(x_2) = **x** and **g'** makes DRS true.
- x_4 may be a plural DR, if there are multiple truthful extensions **g'**
- x_4 is introduced in the main box, hence accessible





Anaphoric uptake of BN objects

- *Maryam ketab kharid. Jeld-esh/-eshoon charmi bood.*
'Mary bought book(s). Their/its cover was green.'
- Krifka & Modarresi (2016), taking up a suggestion of Yanovich (2008)
 - Existential closure over object box, existential DRS
 - Abstraction and Summation over this existential DRS
 - **g** satisfies $x_3 = \Sigma x_2$ DRS iff
g(x_3) = the sum of all entities **x**
such that **g** can be extended to **g'**
with **g'**(x_2) = **x** and **g'** makes DRS true.
- Interpretation of BN
 - As an event- or situation-dependent **singular definite**:
book-of(e): the **unique single** book in **e**
- Anaphoric uptake
 - is possible, but via a more complex process than with DRs already introduced, hence: reduced anaphoric potential.
- Number neutrality
 - Uptake with singular, plural or zero (number-neutral)
 - Naturalness of singular / plural depends on how many ways x_2 can be plausibly mapped to an entity **x**.
- New prediction: Maximality effect
 - The anaphor refers to the **sum** of all entities, i.e. all books that Mary bought in the situation under consideration.



Maximality

- Maximality of anaphoric uptake
- Maximality operator stipulated in Dayal 2011, Schwarz 2014, follows from general interpretation framework (Yanovich 2008, Krifka & Modarresi 2016)
- *Ali yek khaneh dareh. Khane-ye-digari ham dareh ke ejareh mideh.*
A. a house has house-EZ-other also has that rent gives
'Ali owns a house. He also owns another house that he rents out.'
- *Ali khaneh darad. #Khane-ye-digari ham dard ke ejareh mideh.*

Naturalness of SG / PL uptake

- Naturalness of singular / plural uptake depending on world knowledge
- Modarresi, Fereshteh 2014. *Bare nouns in Persian: Interpretation, Grammar, and Prosody*. Humboldt Universität.
- Modarresi, Fereshteh. 2015. Discourse properties of bare noun objects. Ed. Olga Borik & Berit Gehrke, *The syntax and semantics of pseudo-incorporation*. Leiden: Brill, 189–221.
- *Maryam mashin kharid va too parking park-esh kard.*
'Maryam car bought and she parked it in the parking garage.'
- *Maryam havij kaharid va baad poost-eshoon ro kand.*
'Maryam carrot bought and then he peeled them.'
- Experiments:
- Modarresi, Fereshteh, & Krifka, Manfred 2021. Pseudo-Incorporated Antecedents and Anaphora in Persian: The Influence of Stereotypical Knowledge. *Proceedings of ELM (Experiments in Linguistic Meaning)* 1, 224-236.
- Test with stimuli that were designed to have a singular or plural bias or were neutral (null).



Naturalness of SG / PL / Null uptake

- Forced choice of antecedent
- 36 items, 9 conditions (singular, neutral, plural bias X uptake by SG, Null, PL), 8 fillers, 357 participants

Ali □ { television / ketāb / havij } / □ yek { television/ ketāb / havij } kharid va
 Ali TV book carrot} IDF TV book/ carrot} bought and

{ gozasht-esh / gozasht-Ø / gozasht-eshoon } rooy-e-miz.
 put-it put-Ø put-them on-EZ-table

- Results
 - Plural bias favor BN antecedents
 - PL anaphora favor BN antecedents
 - No clear difference between Singular and Neutral bias.

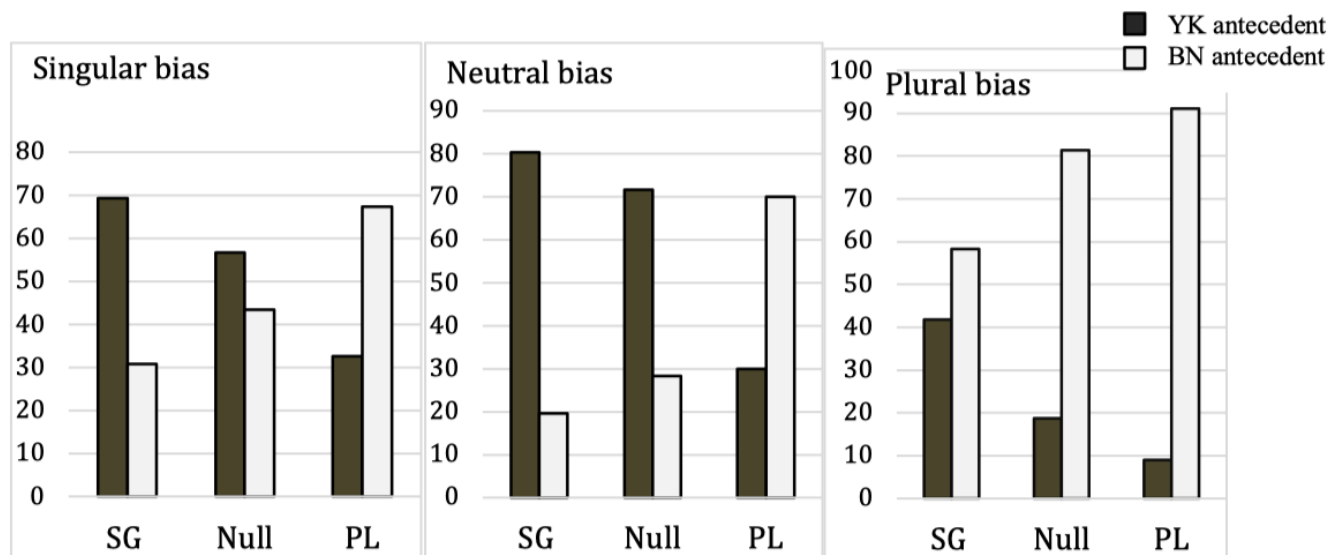


Figure 2: Forced choice of *yek*-marked antecedent of BN antecedent with SG, null and PL anaphora and singular, neutral and plural bias. Y-axis specifies number of items.

Kind reference?

- An alternative proposal for BNs: Kind reference, Ghomeshi (2008) (also Hinch 1961; Dayal 2011 for Hindi)
- Example:
 - *Maryam ketāb kharid* $\lambda y \exists x [\text{specimen-of}(x,y) \wedge \text{bought}(m, x)](\text{liber})$
'Mary bought a book / books' = $\exists x [\text{specimen-of}(x, \text{liber}) \wedge \text{bought}(m, x)]$
- Explains number-neutrality
- Likens cases to *They filmed the grizzly in Alaska* (Krifka et al. 1995)
- Anaphoric uptake unclear – variable x must be made accessible
- As kinds are names, we expect ra-marking, as with other names, including kinds
 - *Razi alkohol-rā kash kard*
Razi alcohol-OM discover did
'Ali discovered alcohol.'



rā-marking in characterizing sentences

■ rā-marking in characterizing sentences

Modarresi & Krifka (2023): Generic sentences in a differential object marking language: The case of Persian, Workshop Indefiniteness and Genericity across languages, Yale. See <http://bit.ly/persgen>

— Observed by Dabir-Moghaddam 1992, Krifka 2001, Karimi 2003; Dayal 1992: Hindi

— Example (Dabnir-Maghaddam 1992):

• [Tell me something about cats]

gorbeh mosh shekar mi-koneh

cat mouse hunt DUR-do

‘Cats hunt mice.’

• [You cannot keep your cat with your pet mouse.]

gorbeh mosh-rā shekar mi-koneh

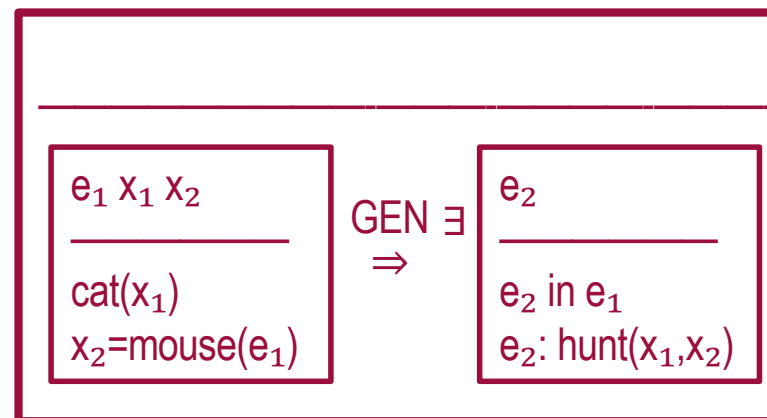
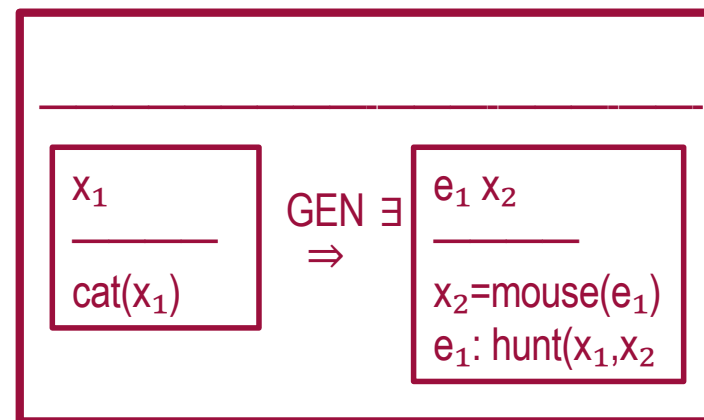
cat mouse-OM hunt DUR-do

‘Cats HUNT mice.’

‘When there is a situation in which

there is a cat and a mouse,

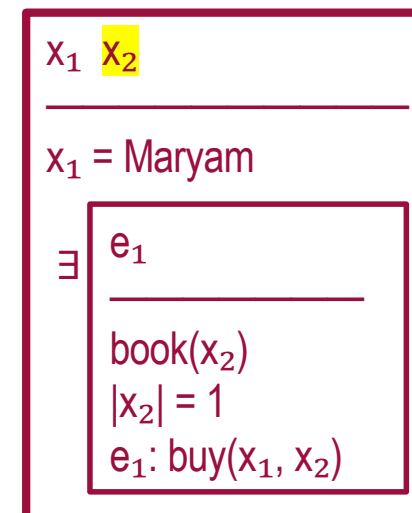
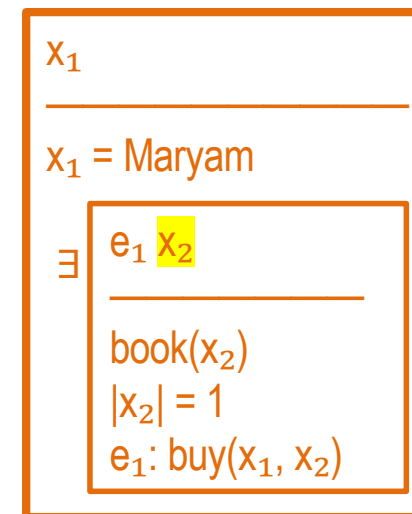
the cat hunts the mouse’





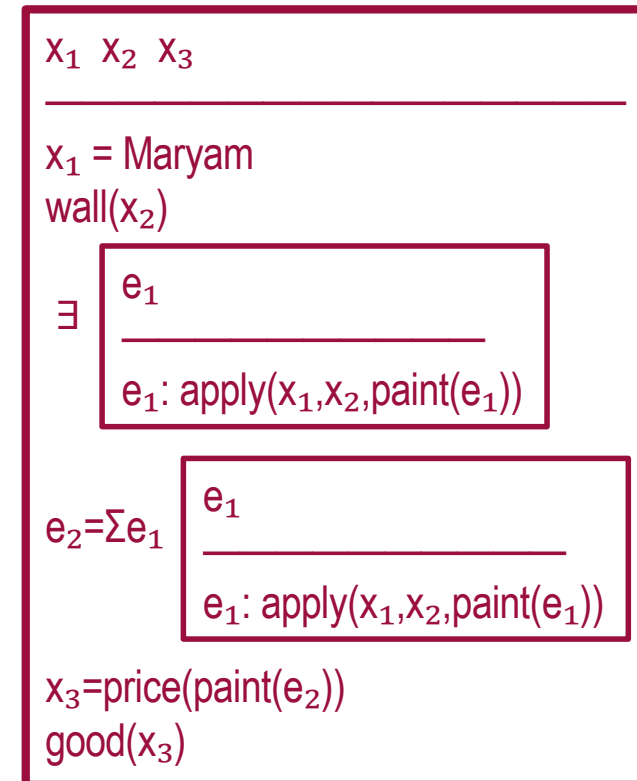
Yek-marked objects within VP

- Scope of indefinite DPs
 - Wide-scope possible from syntactically narrow scope, Fodor & Sag 1982:
Every girl thinks that every boy wants to talk to a soccer star.
Reading: ‘There is a particular soccer star such that every girl...’
- yek-marked DP in existentially closed VP
 - *Maryam* \exists [_{VP} *yek ketab khoond*].
‘Maryam read a/one book.’
 - *yek*: indefinite, non-functional interpretation, specifies number as 1
 - DR introduced in embedded **or** maximal DRS
 - DR in embedded DRS is **blocked** by BN:
explicit restriction $|x_2| = 1$ by *yek*
is uninformative due to \exists with ‘at least’ meaning.
- yek-DR in maximal DRS
 - Singular interpretation, no number neutrality
 - Easy anaphoric uptake of DR
 - No maximality effect
 - alternative to other number words:
Maryam do-ta ketab khoond..
‘Maryam read two books.’



Complex predicates

- Bare object nouns also as objects of complex predicates:
 - Example of transparent complex predicate
 - *Maryam divar-ra rang zad.* # *Gheimat-e-sh / Gheimat-e rang geroon bood.*
 M. wall-RA color hit price-of-it price-of color expensive was
 ‘Mary painted the wall. *It’s price was good. / The price of the paint was good’
- Analysis:
 - *rang* ‘color’ dependent definite,
 - does **not introduce** local DR
 - but can be picked up by **associative anaphora**
- Non-transparent complex predicate:
 - No reference to object,
no discourse referent introduced
 - *Ali chune zad.*
 Al chin hit.
 ‘Ali negotiated (for the price)’



What about BN Subjects?

- Typical case: Singular definite interpretation
 - Follows if subjects are **outside** of existential closure

Pesar bacheh geryeh kard
 boy child cry did.
 ‘the boy cried’
- But indefinite interpretation of BN subjects possible, reflected by prosody
 - *ketab oftad* *ketab khærid.æm*
 ‘some book fell’ ‘I bought books.’
 - *ketab oftad* *ketab-ra khærid.æm.*
 ‘the book fell’ ‘I bought the book.’
- Explanation: existential closure over **vP**,
 nuclear stress on left edge of vP
 - $[_{TP} \exists[_{VP} \textit{ketab oftad}]]$ $[_{TP} \textit{Maryam}_1 \exists[_{VP} t_1 [_{VP} \textit{ketab kharid}]]]$
 - $[_{TP} \textit{ketab}_2 \exists[_{VP} t_2 \textit{oftad}]]]$ $[_{TP} \textit{Maryam}_1 \textit{ketab}_2\textit{-rā} \exists[_{VP} t_1 [_{VP} t_2 \textit{kharid}]]]$
- Further treatment:
 Modarresi (2023), Syntax-prosody mapping and bare singular subjects in Persian, CLS 60
 see https://bit.ly/modarresi_cls2023

What about BN subjects?

- When are vP-internal subjects possible?
- Diesing (1992): vP-internal position for non-agentive subjects
- Kahnemuyipour (2003): Internal subjects with unaccusative verbs.
- Problem:
 - A: *chi shod?* ‘what happened?’
 - B: *sag ghaza-ro* [_{vP} *khord*] ‘the dog ate the food’
 - B: *ghaza-ra* [_{vP} *sag* *khord*] (indefinite reading, unidentified subject)
‘some dog ate the food’

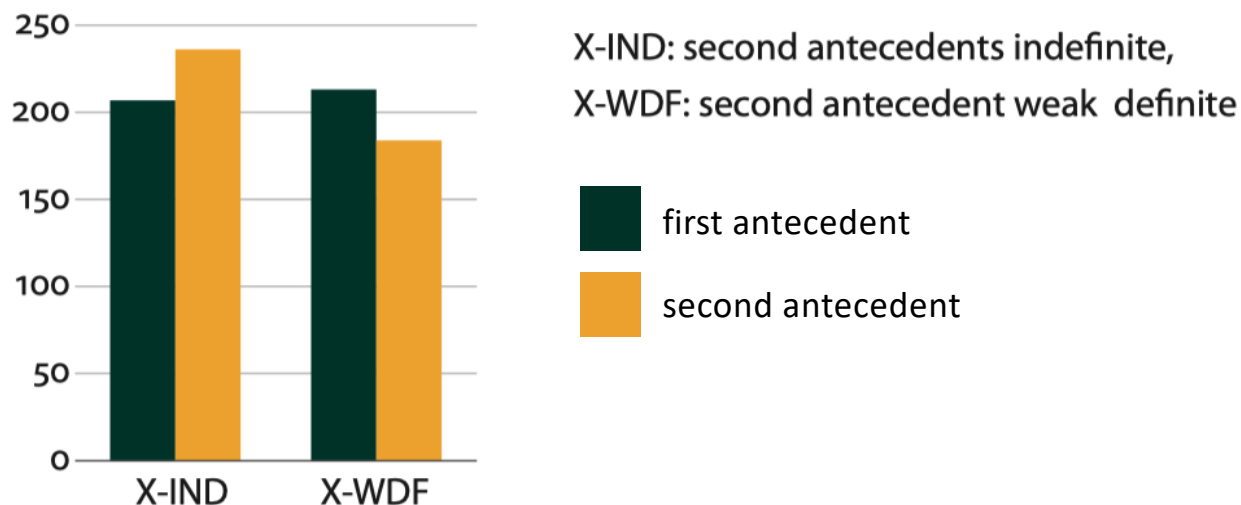
BNs in Persian and Weak Definites in German

- Similarity and differences
 - Weak definites in German (cf. Schwarz 2009, 2014)
 - *Maria hat heute morgen die Zeitung gelesen.*
 - *Maria hat heute morgen die Zeitung gelesen und Peter auch.* (possibly different newspapers)
 - *Maria ist gestern ins Kino gegangen.*
 - *Maria ist gestern ins Kindo gegangen und Peter auch* (possibly different cinemas)
 - Similarity to Persian BNs
 - Proposed dependent definite interpretation, reflected in German definiteness marking.
 - To be tested:
 - Anaphoric potential of weak definites similar to German weak definites?
 - References:
 - Modarresi, Fereshteh, & Krifka, Manfred 2022. Anaphoric potential of pseudo-incorporated nominals in comparison with compounds and implicit objects. *Proceedings of Linguistic Evidence 2020: Linguistic Theory Enriched by Experimental Data*, 585-565.
 - Krifka, Manfred, & Modarresi, Fereshteh. 2023. Anaphoric potential of bare nominals, incorporated objects and weak definites in German. Ed. Laure Gardelle, Laurence Vincent-Durroux, & H el ene Vinckel-Roisin, *Studies in Language Companion Series: Reference*. Amsterdam: John Benjamins Publishing Company, 27–51.



Anaphoric potential of weak definites

- Experiment: Antecedent choice indefinites vs. weak definites
- Experimental items:
Nora hat sich gestern ein Museum angeschaut, bevor sie {ins Kino / in ein Kino} gegangen ist. Es war gerade neu eröffnet worden.
'Nora went to a museum yesterday before going {to the cinema / to a cinema}.
It was newly opened.
- Experimental task: What was newly opened: the cinema / the museum
- 14 items, 60 participants
- Result: Weak Definites have a slightly reduced anaphoric potential





Anaphoric potential of weak definites

- Experiment: Free sentence completion

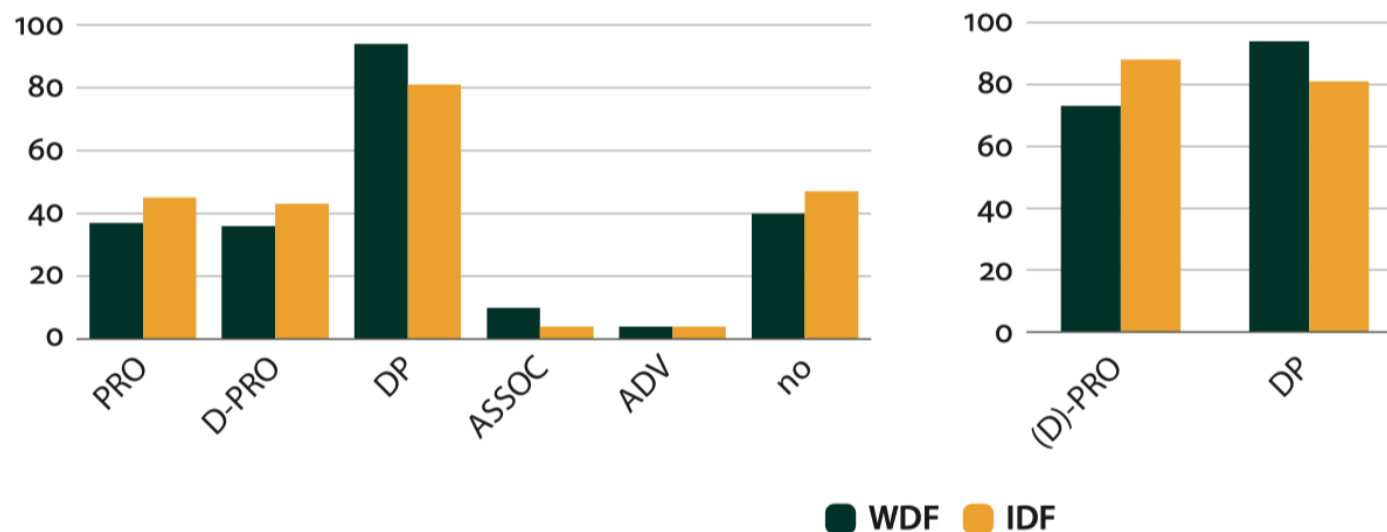
- Experimental items:

Sophie ist wegen starker Bauchschmerzen { zu einem Arzt }
zum Arzt } gegangen.

Als erstes fragte _____

‘Sophie went {to a doctor / to the doctor} because of strong belly ache. At first
_____ asked _____’

- 15 items, 30 participants
- Result: Weak Definites have a slightly reduced anaphoric potential, more often picked up by full DPs – reduced saliency



Anaphoric potential of bare plurals, incorporations, implicit objects

■ Additional experiments:

a. Samuel hat heute wieder { viele Schuhe gekauft.
Schuhe gekauft. }

'Samuel has bought today again {many shoes / shoes.}'

b. Samuel { hat
war } heute wieder { Schuhe gekauft.
am Schuhekaufen. }

'Samuel {has bought shoes / was buying shoes} again today.'

c. Samuel war heute wieder { am Schuhekaufen.
beim Schuhkauf. }

'Samuel {was buying shoes / did shoe-purchases} again today.'

d. Samuel { war
hat } heute wieder { beim Schuhkauf.
groß eingekauft. }

'Samuel {was buying shoes / was buying intensely} again today.'

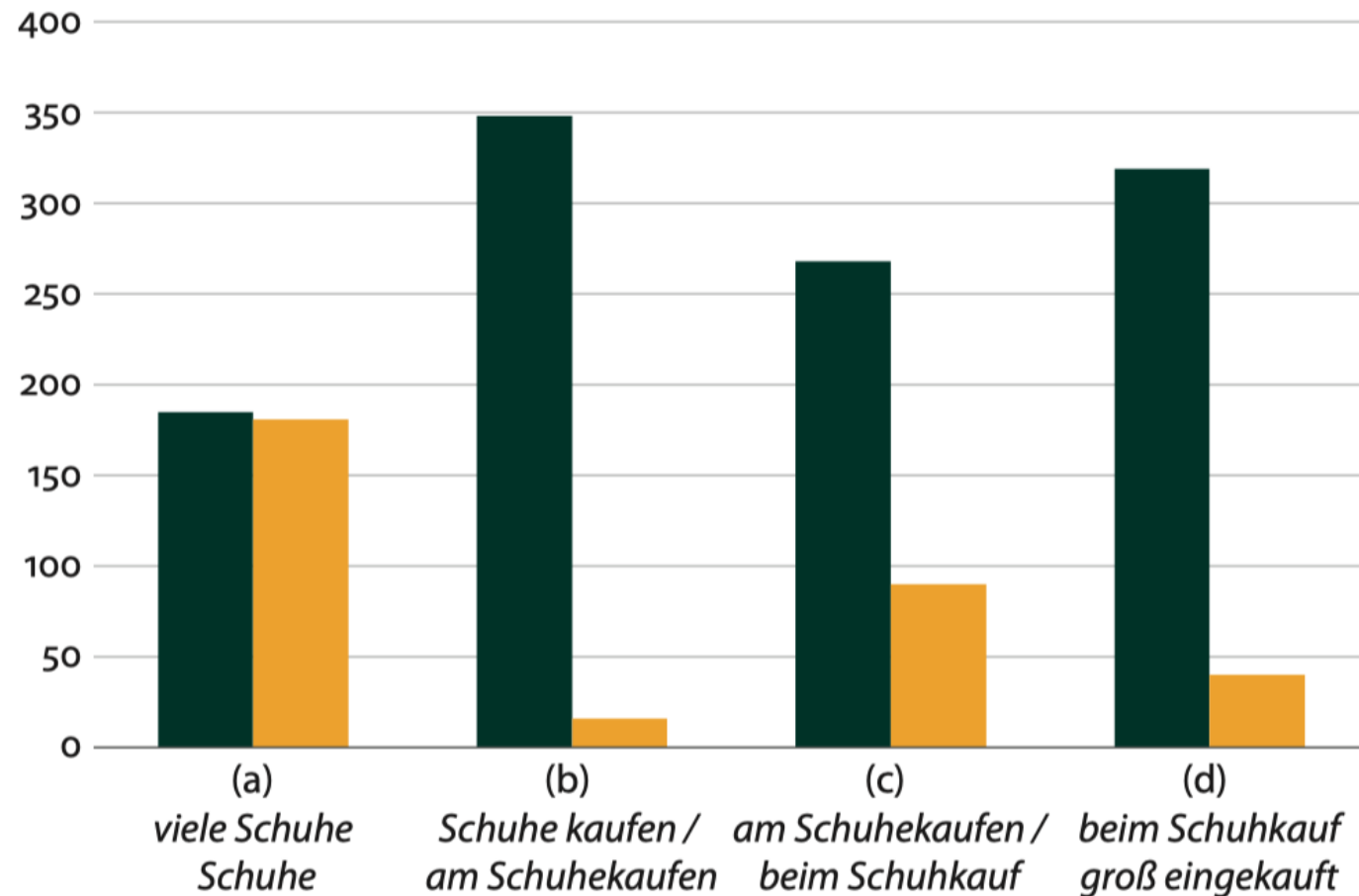
Er hat sie sich nach Hause liefern lassen.

'He had them delivered to his home.'

Anaphoric potential of bare plurals, incorporations, implicit objects



- Pairwise antecedent choice
- Notice: DP *viele Schuhe* and bare plural *Schuhe* have the same anaphoric potential





Anaphoric potential of indefinites vs. bare nouns

- Bare nouns in German

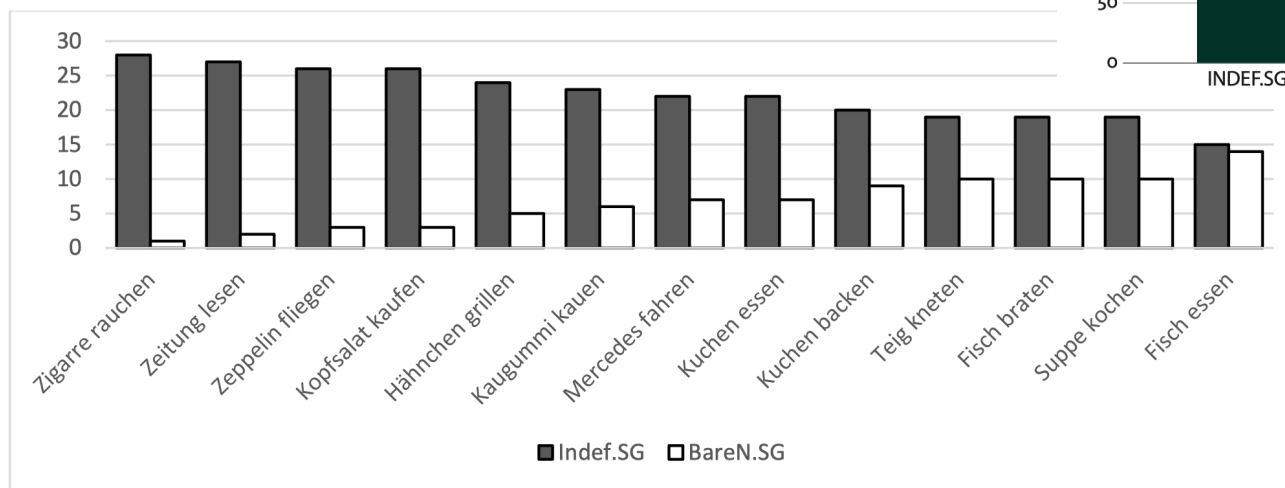
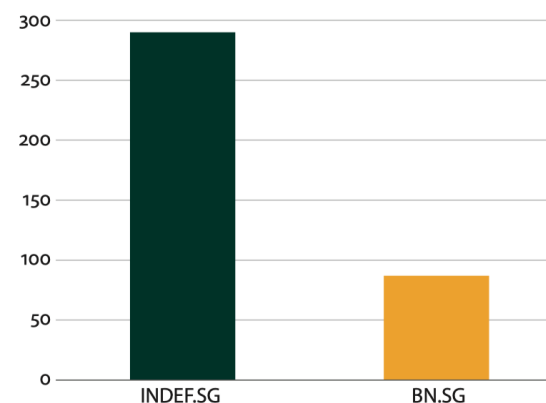
- Experimental items:

Meine Großmutter hatte viel Geld und ist { einen Mercedes / Mercedes } gefahren.

Sie hat ihn täglich mit dem Gartenschlauch abgespritzt.

‘My grandmother had a lot of money and drove {a Mercedes / Mercedes}. She hosed it down every day with the garden hose.’

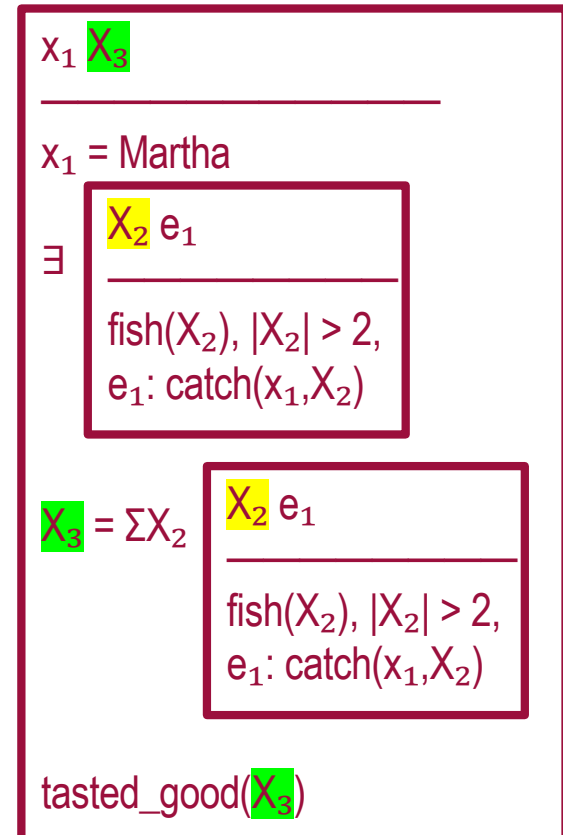
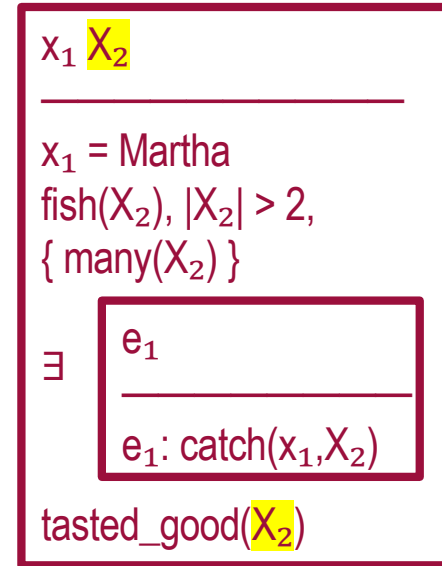
- 29 participants, 13 items, Antecedent choice
- Result: Indefinites make better antecedents.
- However, the items differ in interesting ways





Modeling proposals

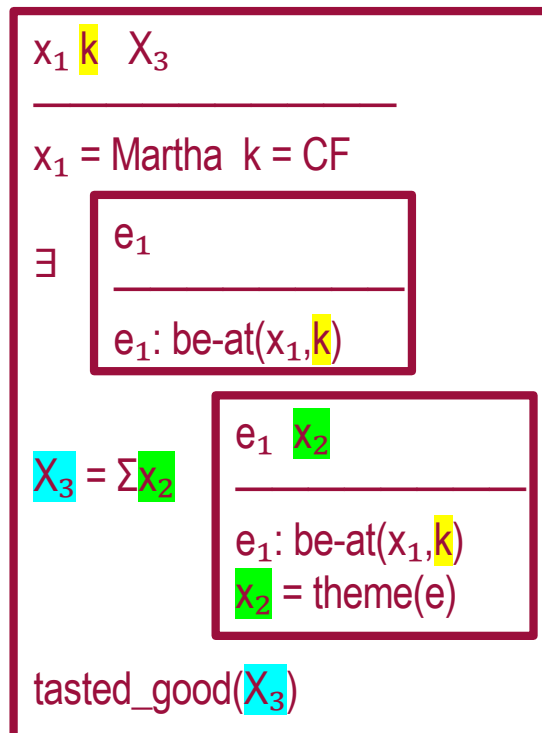
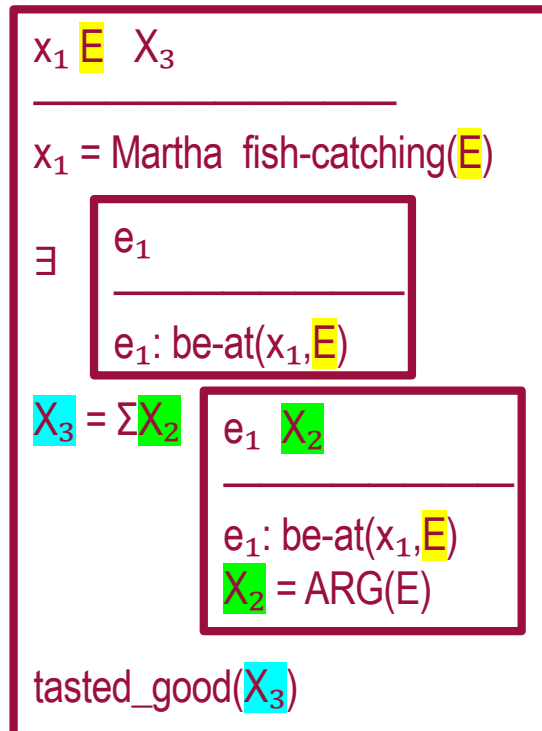
- Complex or bare plural DPs
- *Martha hat* $[_{DP} \text{ viele Fische}] / [_{DP} \emptyset \text{ Fische}] \exists$ *[gefangen].*
Sie haben gut geschmeckt.
- Possible structure for bare plural NPs
- *Martha hat* \exists $[_{NP} \text{ Fische}]$ *gefangen.*
reduced: *Sie haben gut geschmeckt.*
Requiring abstraction and summation
- But string-identical to above, hence not degraded)





Modeling proposals

- Incorporated objects of infinitival nouns
 - *Martha war am Fischfangen.*
strongly reduced: *Sie haben gut geschmeckt.*
 - Grimshaw (1990): *fangen* event noun
with argument structure
 $E = \langle y, e \rangle$, where y : the object of the event
 - Reference to the arguemt: $ARG(E) = y$
- Incorporated objects of deverbal nouns
 - *Martha war beim Fischfang*
very strongly reduced: *Sie haben gut geschmeckt.*
 - Reference to the activity kind ‘catching fish’
 $CF = \lambda e \lambda x \exists y [e: catch(x,e) \wedge fish(y)]$
 - Involvement in activity kind:
 $e: be-at(x,k) = \lambda y k(e)(x)$
 - Associative anaphora to patient of exemplar
of the event of that kind: $theme(e)$
- Similar with implicit objects:
 - *Martha hat gefischt.*
#Sie / Die Fische haben gut geschmeckt.



Conclusion

- For Persian:
 - Uniform treatment of BN as dependent singular definites, even though often apparent indefinite, number-neutral interpretation
 - *ra*-marked BNs and non-accented subjects in referential interpretation (deictic or anaphoric definite) and in generic interpretation (part of restrictor of generic quantifier)
 - Anaphoric potential of BNs and *yek*-marked BNs
 - Difference between BN objects and complex predicates, kind predicates
- For Persian and German
 - Weak definites / BNs without object marking as comparable phenomena (event-dependent definites)
- For German
 - Treatment of full DPs, bare plurals, incorporations and implicit objects