



**Leibniz-Zentrum
Allgemeine Sprachwissenschaft**



Number agreement of coordinated subjects: Competing syntactic and semantic rules

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DFG ANAPIN: Anaphoric Potential
of Incorporated Nominals
and Weak Definites



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Two approaches to number agreement

- SynAGR: Number agreement as a syntactic phenomenon

- Singular case: I write VP instead of IP as tense is irrelevant

- $[[_{DP} \textit{the child}]_{SG} [_{VP} \textit{is}_{SG} \textit{in the kitchen}]]$

- Plural case: Number of subject DP and verb have to match

- $[[_{DP} \textit{the children}]_{PL} [_{VP} \textit{are}_{PL} \textit{in the kitchen}]]$

- SemAGR: Number agreement as a semantic phenomenon

- For agreement as a semantic phenomenon cf. e.g. Dowty & Jacobson 1988

- Singular case:

- $[[[_{DP} \textit{the child}] [_{VP} \textit{is in the kitchen}]]]$

= $[[[_{VP} \textit{is in the kitchen}]]]([[_{DP} \textit{the child}]])$

= $\lambda x: AT(x) [IN-K(x)] (\sigma C)$

= $IN-K(\sigma C)$

compositional interpretation

where $AT(C)$, hence $\sigma C = \iota x[C(x)]$

as $AT(\sigma C)$ is satisfied whenever σC is defined

- Plural case:

- $[[[_{DP} \textit{the children}] [_{VP} \textit{are in the kitchen}]]]$

= $[[[_{VP} \textit{are in the kitchen}]]]([[_{DP} \textit{the children}]])$

= $\lambda x: \neg AT(x) [IN-K(x)] (\sigma \sqcup C)$

= $IN-K(\sigma \sqcup C)$

as $\neg AT(\sigma \sqcup C)$ is satisfied if $\#C \geq 2$

Arguments for the syntactic approach

- Syntactic variations (even if motivated by semantics):
 - Grainy nouns: count nouns, mass nouns, plural classifier constructions
 - *The bean is / *are in the jar.* *bean* SG
 - *The beans *is / are in the jar.* *beans* PL
 - *The rice is / *are in the jar.* *rice* SG
 - *The grains of rice *is / are in the jar.* *grains* PL
 - Pluralia tantum and Singulare tantum nouns
 - *The scissors *is / are in the drawer.* *scissors* PL one or more pairs of scissors
 - *Die Schere ist / *sind in der Schublade.* *Schere* SG German
 - *Die Scheren *ist / sind in der Schublade.* *Scheren* PL more than one pair of scissors
 - *The furniture is / *are on the truck.* *furniture* SG
 - *Die Möbel *ist / sind auf dem Lastwagen.* *Möbel* PL
 - Collective nouns
 - *The police is / *are investigating the riots.* *police* SG in American English
 - *The police is / are investigating the riots.* *police* PL when referring to collective in British English
 - Cf. Bock et al. 2006 for experimental results for differences in the lexical specification

The case of coordination

- A conceptual problem for SynAGR as a morphosyntactic rule
- Plural interpretation of singular conjoined DPs
 - $[_{DP} [_{DP} \textit{The boy}]_{SG} \textit{ and } [_{DP} \textit{the girl}]_{SG}]_{PL} [*is_{SG} / are_{PL} \textit{ in the kitchen}]$
- Problem: Where does PL come from? Not projected from the subexpressions
- Proposal: Peterson 1986; ref. to Bresnan, Kaplan & Peterson 1982
- *and* blocks feature percolation, verb assigns number depending on semantic interpretation:
 - $[[\textit{Peanut butter}]_{SG} \textit{ and } \textit{jam}]_{\emptyset}$ no syntactic number feature
 - $[[[\textit{Peanut butter}]_{SG} \textit{ and } \textit{jam}]_{\emptyset}]_{PL} \textit{ taste}_{PL} \textit{ good.}$ conceived as plurality of substances
 - $[[[\textit{Peanut butter}]_{SG} \textit{ and } \textit{jam}]_{\emptyset}]_{SG} \textit{ tastes}_{SG} \textit{ good.}$ conceived as mixture of substances
- Problem: Agreement in disjunctions
- Disjunctions allow for PL agreement (in addition to SG agreement)
 - *The boy or the girl is / are in the kitchen.*
- Foppolo & Staub 2020 discuss possible semantic conditions for SG/PL agreement, like availability of inclusive readings favoring plural agreement, but dismiss this with experimental evidence

More on number agreement in coordination

■ Conjunction of Quantifiers

— Observation: Hoeksema 1983

- *A man and a woman were / *was arrested.*
- *Every day and every night was spent in bed.*
- *Every man but no woman was upset.*
- *No peasant and no pauper was ever president.*

— Hoeksema 1988, Footnote:

2. In many of these cases, **both plural and singular agreements are possible**. Exactly what causes this variation is not clear to me, but it would seem that **the singular agreement is caused by the Boolean nature of the conjunction in these cases (hence semantically motivated) and the plural agreement is due to the formal analogy of these conjunctions with the much more common non-Boolean variety (hence syntactically-driven)**. In the area of agreement, such variation is not uncommon, and usually hard to account for in a rigorous manner. To be sure, the existence of this variation is often taken to be evidence for a syntactic account of number agreement, since there appear to be no semantic differences. However, the position that number agreement is a purely syntactic phenomenon, a position commonly taken in GPSG-studies of agreement and conjunction, such as Sag, Gazdar, Wasow, and Weisler (1985), seems unnecessarily weak. My position is that **most facts about number agreement can only be explained (as opposed to described) semantically, but that there remains some arbitrariness which must be ascribed to syntactic encoding**. This general position is also taken in Sadock (1983).

Experiment on coordinated subject agreement



- Goal of experiment:
 - Agreement pattern in conjunction and DP type:
Definite entity-denoting **D&D** vs. universally quantified **Q&Q**
 - Agreement pattern and coordination type with entity-denoting DPs (D):
Conjunction **D&D** vs. disjunction **DvD**
 - Agreement pattern in mixed conjunction: **D&Q** vs. **Q&D**
- Execution of experiment
 - carried out in German – more distinctive number agreement than English
 - on online platform Clickworker
 - as a rating experiment with Likert scale 1 (very good) to 5 (very bad)
 - as part of another rating experiment using the same Likert scale (Krifka & Modarresi 2023)
 - 133 participants rated 7 experimental items presented in 6 different lists with 2 versions
 - One additional item on Boolean conjunction **D∧D** in a later experiment with 88 participants
 - Each participant rated an item only under one condition (SG or PL agreement),
i.e. comparisons between SG and PL agreement for the same item were avoided
 - Two filler items with violations of other agreement patterns (auxiliary choice)

Experimental items: List 1 (of 6 lists in total)



1	Experimental lists
2	List 1
3	Der Student und die Dozentin haben die Sendung über den Klimawandel angeschaut.
4	Der Pianist und der Posaunist sind das Einsatz verpasst.
5	Die Sekretärin hat beim Mann, der mit Marta bekannt ist, angerufen.
6	Der Mieter oder der Gast hat einen Geruch in der Küche wahrgenommen.
7	Der Detektiv hat einen Mann von Olga ausfindig gemacht.
8	Jeder Student und jede Studentin haben einen Brief von der Universität erhalten.
9	Die Schülerin hat beim genau in der Mitte des Kreises liegenden Punkt ein Kreuz gemacht.
10	Der Verkäufer und die Kundin hat einen Dieb am Obststand beobachtet.
11	Die Sekretärin hat einen Bekannten von Marta erkannt.
12	Der Hausmeister und der Passant sind den Unfall an der Ecke bemerkt.
13	Der Detektiv hat beim Mann, der mit Olga verheiratet ist, angerufen.
14	Jeder Tourist und die Reiseleiterin hat ein Freigetränk bekommen.
15	Die Sekretärin hat bei einem mit Marta bekannten Mann angerufen.
16	Der Mittelstürmer oder der Verteidiger haben ein Foul begangen.
17	Die Schülerin hat einen Mittelpunkt des Kreises identifiziert.
18	Die Erzieherin und jedes Kind ist über eine Hängebrücke gegangen.

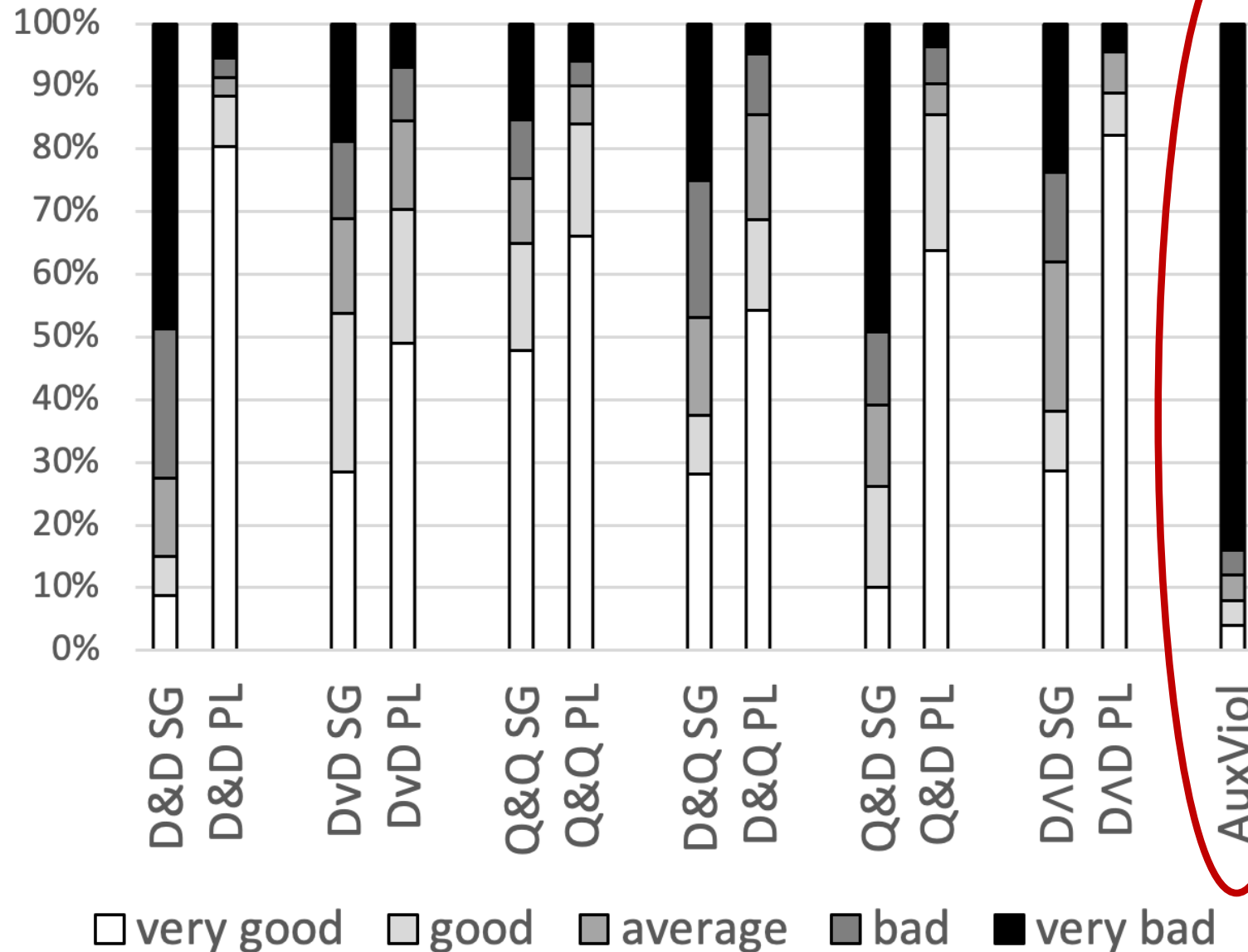
Experimental items, List 1, Version a



D&D PL	Der Student und die Dozentin haben die Sendung über den Klimawandel angeschaut.
	The student and the lecturer watched the feature about climate change.
*AUX PL	Der Pianist und der Posaunist sind das Einsatz verpasst.
	The pianist and the posaunist missed the entry. (correct AUX: haben)
DvD SG	Der Mieter oder der Gast hat einen Geruch in der Küche wahrgenommen.
	The tenant or the guest noticed a smell in the kitchen.
Q&Q PL	Jeder Student und jede Studentin haben einen Brief von der Universität erhalten.
	Every male student and every female student received a letter from the university.
D&D SG	Der Verkäufer und die Kundin hat einen Dieb am Obststand beobachtet.
	The seller and the customer observed a thief at the fruit stand.
*AUX PL	Der Hausmeister und der Passant sind den Unfall an der Ecke bemerkt.
	The caretaker and the passer-by noticed the accident at the corner. (correct AUX: haben)
Q&D SG	Jeder Tourist und die Reiseleiterin hat ein Freigetränk bekommen.
	Every tourist and the tour guide got a free drink.
DvD PL	Der Mittelstürmer oder der Verteidiger haben ein Foul begangen.
	The centre forward and the defender committed a foul.
D&Q SG	Die Erzieherin und jedes Kind ist über eine Hängebrücke gegangen.
	The teacher and every child went over a hanging bridge.

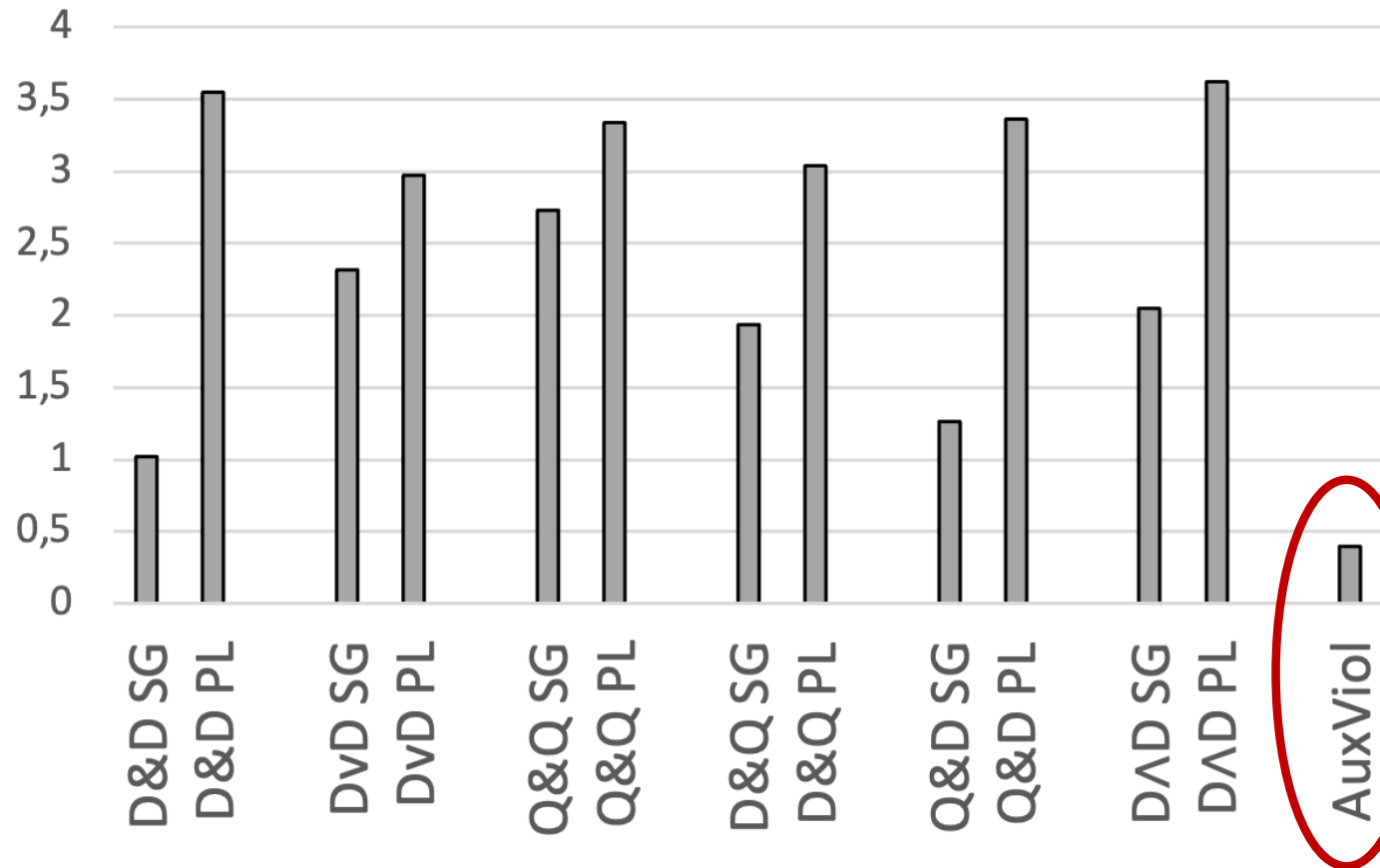
Overall Results of Rating Experiment

Acceptability Ratings



Average Ratings

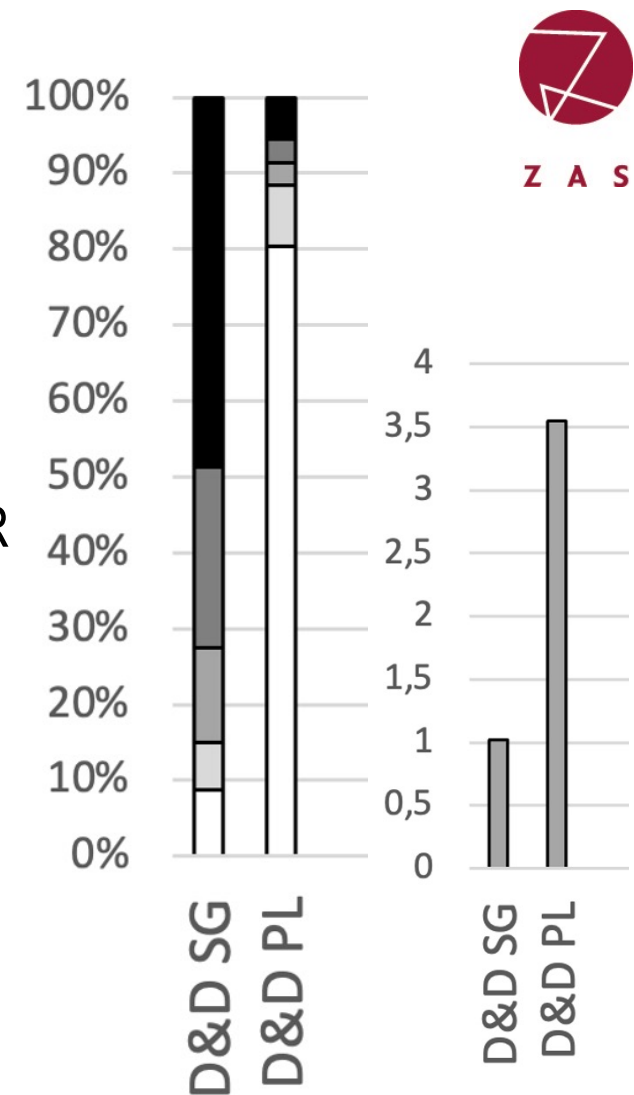
Average Ratings, 4: Very good, 0: very bad,
transformed from scale 1: very good, 5: very bad



- Plural always rated better than singular
- But with large variations between items

Findings: D&D *SG / √PL

- D&D clearly prefers PL agreement
- Semantic explanation of agreement
- Conjunction is interpreted as sum formation (Link 1983)
- Verb agreement can be interpreted semantically: SemAGR
- Example PL:
 - *The tenant and the guest are in the kitchen*
 - $\llbracket \llbracket \text{DP}[\textit{the tenant}] \textit{and} [\textit{the guest}] \rrbracket \llbracket \text{VP} \textit{are}_{\text{PL}} \textit{in the kitchen} \rrbracket \rrbracket$
 - = $\llbracket \llbracket \text{VP} \textit{are}_{\text{PL}} \textit{in the kitchen} \rrbracket \rrbracket (\llbracket \llbracket \text{DP}[\textit{the tennant}] \textit{and} [\textit{the guest}] \rrbracket \rrbracket)$
 - = $\lambda x: \neg \text{AT}(x) [\text{IN-K}(x)](\sigma \text{T} \sqcup \sigma \text{G})$
 - = $\text{IN-K}(\sigma \text{T} \sqcup \sigma \text{G})$, as $\neg \text{AT}(\sigma \text{T} \sqcup \sigma \text{G})$ is satisfied
 - $\Rightarrow \text{IN-K}(\sigma \text{T}) \wedge \text{IN-K}(\sigma \text{G})$ distributive for non-collective predicates
- PL agreement presupposes subject to be non-atomic
conjunction leads to non-atomic sum individual
- Example SG:
 - *The tenant and the guest *is in the kitchen.*
 - $\lambda x: \text{AT}(x) [\text{IN-K}(x)](\sigma \text{T} \sqcup \sigma \text{G})$, $\text{AT}(\sigma \text{T} \sqcup \sigma \text{G})$ not satisfied



What about Q&Q?



- Hoeksema's footnote
- Discussion on Social Media

A screenshot of a Quora page. At the top is the Quora logo and navigation icons: home (with a red notification bubble containing '1'), a list icon, a pencil icon, a group of people icon, and a bell icon. A search bar contains the text 'Search Quora'. Below the navigation is a question: 'Is it, every boy and girl, and every man and woman 'has' or 'have come'?'. Under the question are buttons for 'Answer', 'Follow · 2', and 'Request'. To the right are icons for information, comments, a share arrow, and a menu. Below the question is a filter 'All related (37) v' and a 'Sort' dropdown menu set to 'Recommended v'. The first answer is from David Emil Henderson, a newspaper editor/publisher, with a 'Follow' link and a close button. His answer explains that 'has' is correct because 'every boy and girl' is a singular reference. At the bottom of the answer are buttons for 'Upvote · 3', a share arrow, a comment icon, a refresh icon, and a menu icon.

Discussion of Q&Q on social media



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Subject and Verb agreement

Every boy and every girl is given the admission ticket to the show. In this sentence, the Subject is 'Every boy and every girl'. Although this Subject ...



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Subject Verb Agreement

Every boy and every girl is good in our class. Here is the reason why: "Every" is ALWAYS followed by a singular verb. For example: Correct: "Every student ...



Brainly.in

<https://brainly.in> › question · [Diese Seite übersetzen](#) ⋮

Every boy and every girl _____ present in the class.

08.08.2021 — Answer: **every boy and every girl is** present in the class. Explore all similar answers. [arrow right](#).

Agreement with Q&Q in German

■ Duden

— *Grammatik* 2006: 1017:

Recommends singular agreement with conjunctions of singular quantified DPs
jeder ‘every’, *kein* ‘no’, *mancher* ‘some (proportional, distributive)’

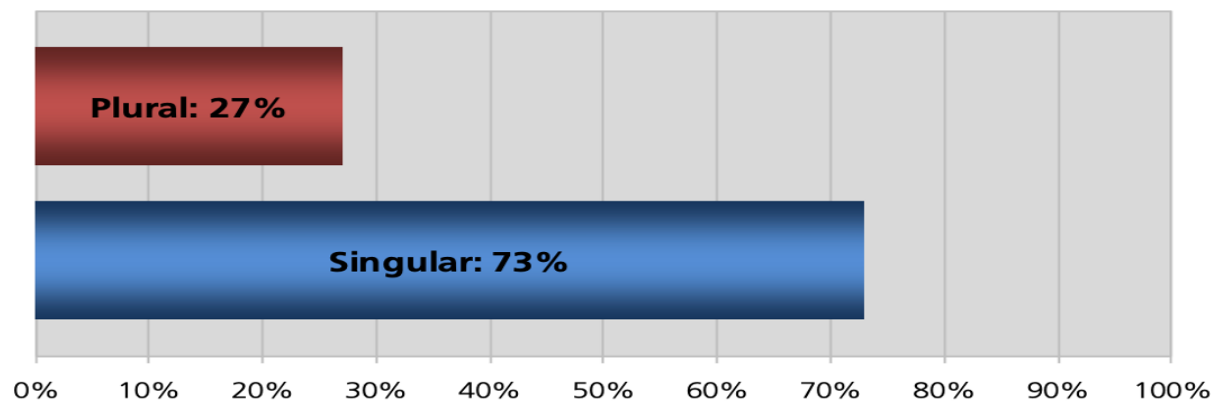
— Duden *Zweifelsfälle* (difficult cases) 2007: 551:

Allows for either singular or plural agreement in these cases.

■ Empirical investigation

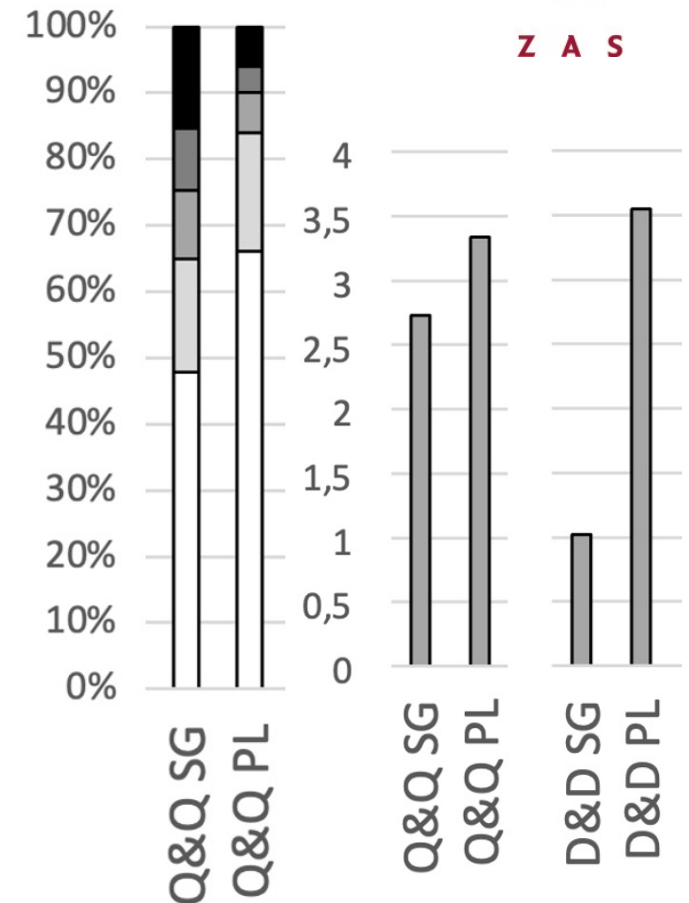
— Wegerer 2012, written questionnaire on agreement in German in general, 2098 participants, forced choice SG / PL, one sentence of type Q&Q, with reflexive pronoun:

- *Jeder Ehemann und jede Ehefrau kann / können darüber selbst entscheiden.*
‘Every husband and every wife can_{SG} / can_{PL} decide on that him-/herself’



Findings: Quantifier Q&Q %SG / %PL

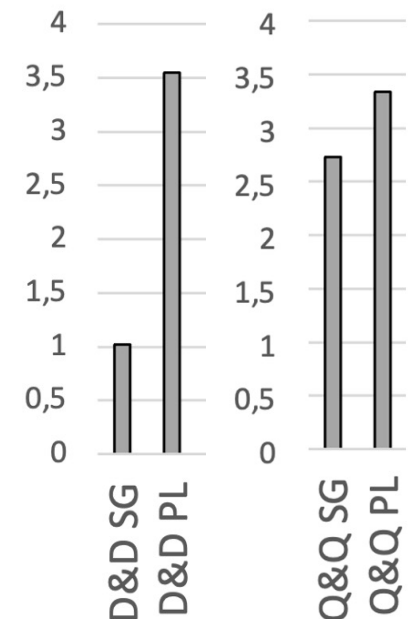
- Q&Q with singular universal quantifiers allow for both SG and PL agreement
- SG agreement as SemAGR
- Quantifier coordination, Keenan & Faltz 1985
 - *Every tenant and every guest is in the kitchen.*
 - $\llbracket \llbracket \llbracket \text{DP}[\text{every tenant}] \text{ and } [\text{every guest}] \rrbracket \llbracket \text{VP is}_{\text{SG}} \text{ in the kitchen} \rrbracket \rrbracket \rrbracket$
 - $= \llbracket \llbracket \text{DP}[\text{every tenant}] \text{ and } [\text{every guest}] \rrbracket \rrbracket (\llbracket \llbracket \text{VP is}_{\text{PL}} \text{ in the kitchen} \rrbracket \rrbracket)$
 - $= \llbracket \llbracket \text{every tenant} \rrbracket \wedge \llbracket \text{every guest} \rrbracket \rrbracket (\lambda x: \text{AT}(x) [\text{IN-K}(x)])$
 - $= \llbracket \text{AP}[\text{T} \subseteq \text{P}] \wedge \text{AP}[\text{G} \subseteq \text{P}] \rrbracket (\lambda x: \text{AT}(x) [\text{IN-K}(x)])$
 - $= \llbracket \text{AP}[\text{T} \subseteq \text{P} \wedge \text{G} \subseteq \text{P}] \rrbracket (\lambda x: \text{AT}(x) [\text{IN-K}(x)])$
 - $= \llbracket \text{T} \subseteq \lambda x: \text{AT}(x) [\text{IN-K}(x)] \rrbracket \wedge \llbracket \text{G} \subseteq \lambda x: \text{AT}(x) [\text{IN-K}(x)] \rrbracket$
- Presupposition satisfied, as **T**, **G** consist of atomic entities, as they are singular count nouns
- Explanation of PL agreement?
 - Plural agreement is not justified semantically
 - Assuming semantically unmarked plural interpretation (Sauerland 2013) is problematic, as it predicts optional plural agreement in
 - **The tenant are in the kitchen.*



Semantic and syntactic agreement

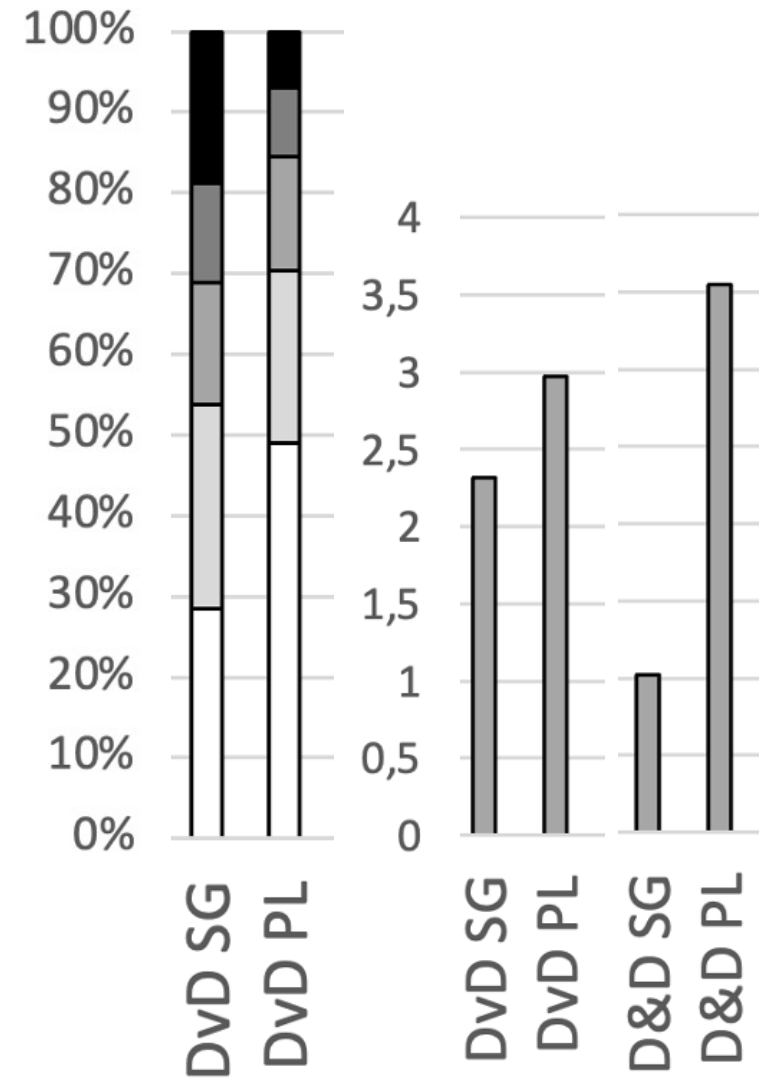
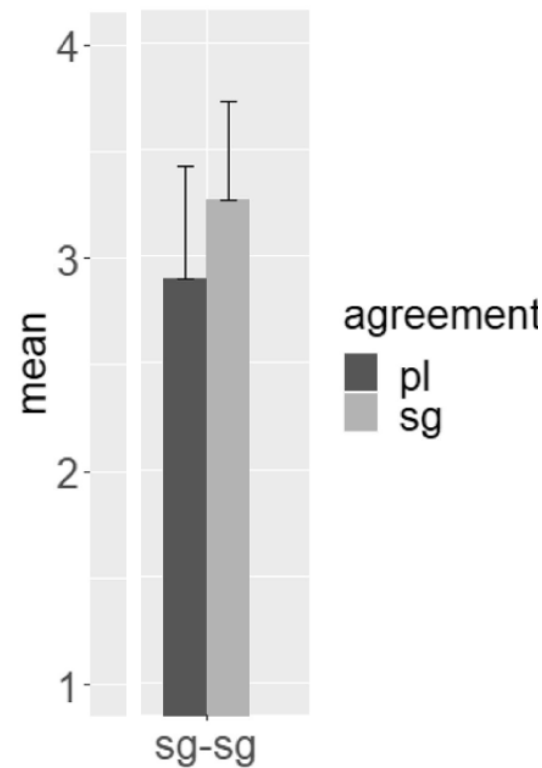


- Proposal: Assume two subject agreement rules
 - Semantic rule SemAGR:
SG / PL as presuppositional specifications of number features of verbal predicates
 - Syntactic rule SynAGR:
Interpret coordination structures $[[_{DP} \alpha] C [_{DP} \beta]]$ as PL, regardless of the number features of $[_{DP} \alpha]$ and $[_{DP} \beta]$, let number of finite verbal predicate agree with subject via feature unification
- Explanation of preferred PL agreement for D&D:
 - [D & D] interpreted as sum, satisfying PL via SemAGR
 - [D & D] has a PL feature, satisfying PL via SynAGR
- Explanation of mixed SG / PL for Q&Q:
 - [Q & Q] interpreted as boolean conjunction, satisfying SG via SemAGR
 - [Q & Q] has a PL feature, satisfying PL via SynAGR
 - Generally somewhat reduced judgements due to rule conflict
Prediction: noticeable in processing.



Findings: Disjunction DvD, %SG, %PL

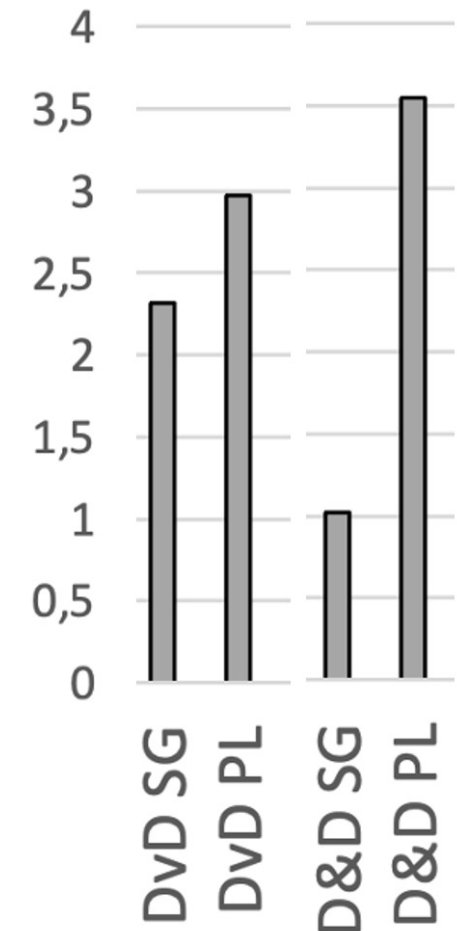
- DvD allow for both SG and PL agreement
- Result in Himmelreich & Hartmann 2023
- Online rating study on a 1–4 scale
- SV and VS word order, here: SV
- Overall rating slightly better, Plural rated slightly lower than SG



Findings: DvD, %SG, %PL



- DvD allow for both SG and PL agreement
- SG agreement as SemAGR
- Disjunction cannot be interpreted for expressions of type e
- **Type shift** from e to quantifier type (et)t, cf. Partee 1987
- Disjunction of shifted items leads to SG agreement
 - *The tenant or the guest is in the kitchen*
 - $\llbracket \llbracket \llbracket \text{DP}[\textit{the tenant}] \textit{or} [\textit{the guest}] \rrbracket \llbracket \text{VP} \textit{is}_{\text{SG}} \textit{in the kitchen} \rrbracket \rrbracket \rrbracket$
 - = $\llbracket \llbracket \text{DP}[\textit{the tenant}] \textit{or} [\textit{the guest}] \rrbracket \rrbracket (\llbracket \llbracket \text{VP} \textit{is}_{\text{SG}} \textit{in the kitchen} \rrbracket \rrbracket)$
 - = $\llbracket \lambda P[P(\sigma T)] \vee \lambda P[P(\sigma G)] \rrbracket (\lambda x: AT(x) [IN-K(x)])$
 - = $\lambda P[P(\sigma T) \vee P(\sigma G)] (\lambda x: AT(x) [IN-K(x)])$
 - = $\lambda x: AT(x) [IN-K(x)](\sigma T) \vee \lambda x: AT(x) [IN-K(x)](\sigma G)$
 - = $IN-K(\sigma T) \vee [IN-K(\sigma G)]$, as $AT(\sigma T)$, $AT(\sigma G)$ satisfied
- PL agreement as SynAGR
 - $\llbracket \llbracket \text{DP}[\textit{the tenant}] \textit{or} [\textit{the guest}] \rrbracket \rrbracket_{\text{PL}} \llbracket \llbracket \text{VP} \textit{are}_{\text{PL}} \textit{in the kitchen} \rrbracket \rrbracket$
- Overall result:
 - Mixed agreement pattern, reduced judgements



A problem for D&D?

■ A potential problem

— We allowed for type lifting of D to quantifier type:

- $\llbracket \llbracket_{DP} \textit{the tenant} \rrbracket \rrbracket = \sigma T \rightsquigarrow \lambda P[P(\sigma T)]$

— This predicts a derivation for D&D with singular agreement via type-lifting and Boolean conjunction

- $\llbracket \llbracket \llbracket_{DP} [\textit{the tenant}] \textit{ and } [\textit{the guest}] \rrbracket \rrbracket \llbracket \llbracket_{VP} \textit{is}_{SG} \textit{ in the kitchen} \rrbracket \rrbracket \rrbracket$
- $= (\llbracket \llbracket_{DP} [\textit{the tenant}] \textit{ and } [\textit{the guest}] \rrbracket \rrbracket) (\llbracket \llbracket_{VP} \textit{is}_{SG} \textit{ in the kitchen} \rrbracket \rrbracket)$
- $= [\lambda P[P(\sigma T)] \wedge \lambda P[P(\sigma G)]] (\lambda x: AT(x) [IN-K(x)])$
- $= \lambda P[P(\sigma T) \wedge P(\sigma G)] (\lambda x: AT(x) [IN-K(x)])$
- $= [IN-K(\sigma T)] \wedge [IN-K(\sigma G)], \text{ as } AT(\sigma T), AT(\sigma G)$

■ Solution

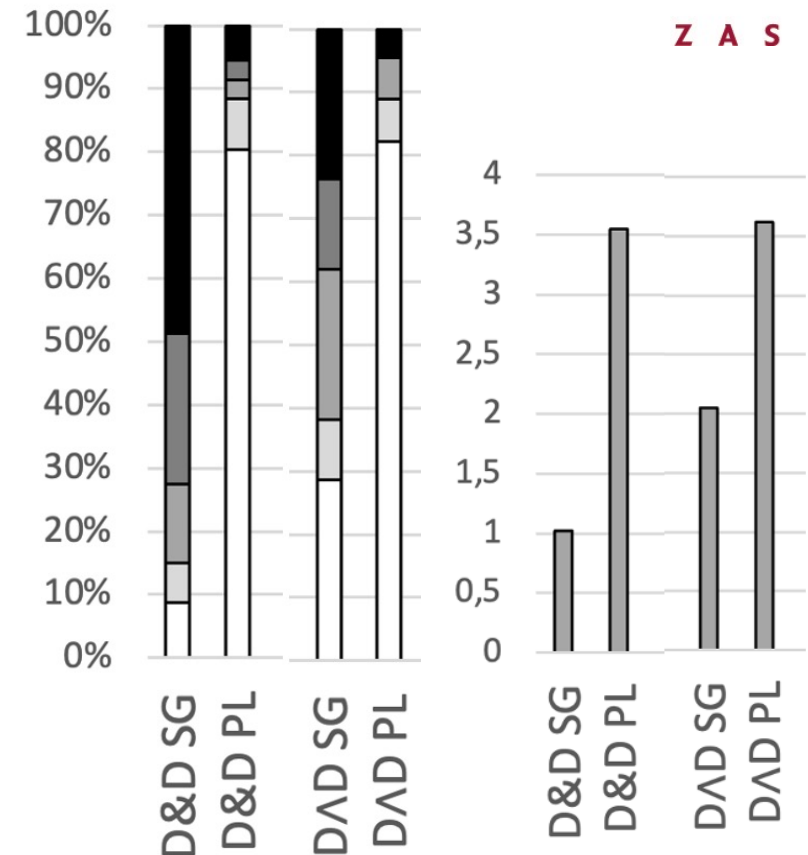
— Assume that interpretation of conjunction by sum formation $\sigma T \sqcup \sigma G$ is simpler

— Or rather: Sum formation \sqcup and Boolean conjunction \wedge are equally complex, but Boolean conjunction requires type lifting, a costly operation that should be avoided when possible

— For disjunction: As Boolean disjunction is the only option, type lifting cannot be avoided

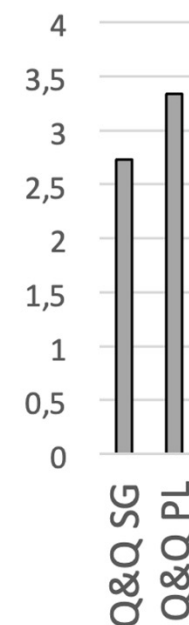
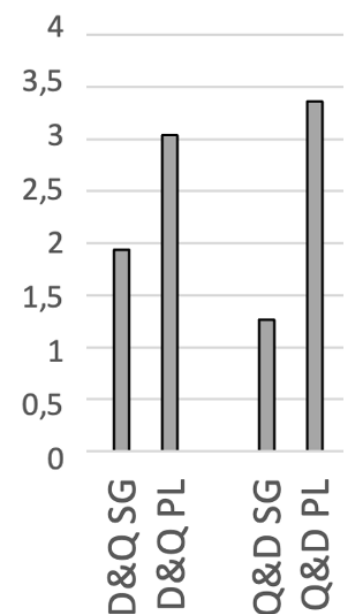
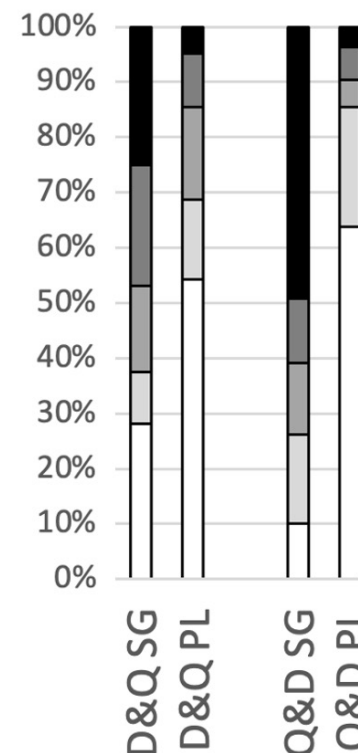
Forced Boolean conjunction $D \wedge D$

- Boolean conjunction with *both...and*
- Enforced Boolean conjunction
 - *John and Bill know each other.*
 - **Both John and Bill know each other.*
- Additional experiment as part of another experiment:
 - Rating of *sowohl ... als auch* 'both ... and ...'
 - 87 participants, 1 item
 - *Sowohl der Mieter als auch der Gast hat / haben einen Geruch in der Küche wahrgenommen.*
'Both the tenant and the guest noticed a smell in the kitchen'
- Prediction
 - SG agreement should be enhanced, as this is required by SemAGR
 - PL agreement also possible, due to SynAGR



Findings: D&Q and Q&D

- Mixed conjunctions
- Sum formation not possible, Boolean conjunction requires type-shift of D
- $\llbracket \llbracket \llbracket \text{DP}[\textit{the tenant}] \textit{and} [\textit{every guest}] \rrbracket \llbracket \text{VP} \textit{is}_{\text{SG}} \textit{in the kitchen} \rrbracket \rrbracket \rrbracket$
- = $\llbracket \llbracket \text{DP}[\textit{the tennant}] \textit{and} [\textit{every guest}] \rrbracket \rrbracket (\llbracket \llbracket \text{VP} \textit{is}_{\text{SG}} \textit{in the kitchen} \rrbracket \rrbracket)$
- = $\lambda P[P(\sigma T)] \wedge \lambda P[G \subseteq G] (\lambda x: AT(x) [IN-K(x)])$
- = $\lambda x: AT(x)[IN-K(x)](\sigma T) \wedge G \subseteq \lambda x: AT(x)[IN-K(x)]$
- Prediction: Similar agreement pattern as with Q&Q: Semantic SG agreement and syntactic PL agreement
- Finding: SG is rated worse than with Q&Q, in particular with the order Q&D
- Tentative proposal: SynAGR is preferred due to the complexity of the configuration
- SynAGR especially preferred for Q&D due to pattern of closest conjunct agreement, (Nevins et al. 2019) as [...&D] is reminiscent of [D&D], which triggers PL, whereas [...&Q] reminiscent of [Q&Q], allowing for SG



Forced plural agreement with Q&Q

- Singular quantifiers with reciprocal predicates
- Branching quantifiers: Barwise 1979, Westerståhl 1987
 - *Every circle and every star *is / are connected with each other.*
 - *No circle and no star *is / are connected with each other.*
- Collective (reciprocal) predicate enforces plural agreement
- Interpretation by complex shift operation (cf. Krifka 1990)
 - $\llbracket \llbracket \llbracket \text{DP } [\text{every dot}] \text{ and } [\text{every star}] \rrbracket \llbracket \text{VP } \text{are}_{\text{PL}} \text{ connected with each other} \rrbracket \rrbracket \rrbracket$
 - $= \llbracket \llbracket \text{DP } [\text{every dot}] \text{ and } [\text{every star}] \rrbracket \rrbracket (\llbracket \llbracket \text{VP } \text{are}_{\text{PL}} \text{ connected with each other} \rrbracket \rrbracket)$
 - $= \llbracket \llbracket \text{every dot} \rrbracket \rrbracket \sqcup \llbracket \llbracket \text{every star} \rrbracket \rrbracket (\lambda x: \neg \text{AT}(x) \forall y \forall z [y, z \sqsubseteq x \wedge \text{AT}(y) \wedge \text{AT}(z) \wedge y \neq z \rightarrow \text{CN}(y, z)])$
 - $= \lambda P [D \sqsubseteq P] \sqcup \lambda P [S \sqsubseteq P]$
 - $= \lambda P [\llbracket D \sqcup S \rrbracket \sqsubseteq P]$ lifting – quantification over sum individuals
 - $= \lambda P [\lambda x \exists y \exists z [x = y \sqcup z \wedge D(y) \wedge S(z)] \sqsubseteq P] (\lambda x: \text{SUM}(x) \forall y \forall z [y, z \sqsubseteq x \wedge \text{AT}(y) \wedge \text{AT}(z) \wedge y \neq z \rightarrow \text{CN}(y, z)])$
 - $= \lambda x \exists y \exists z [x = y \sqcup z \wedge D(y) \wedge S(z)] \sqsubseteq \lambda x: \neg \text{AT}(x) \forall y \forall z [y, z \sqsubseteq x \wedge \text{AT}(y) \wedge \text{AT}(z) \wedge y \neq z \rightarrow \text{CN}(y, z)]$
- Availability of shift
 - This shift operation is enforced by the collective (reciprocal) interpretation of the predicate, not available in simple cases like *every circle and every star is blue*.

Additional evidence for SynAGR and SemAGR



■ Conjunction of mass nouns

— Recall Bresnan et al. 1982 (also, Sauerland 2003)

- *Peanut butter and jam tastes_{SG} / taste_{PL} good.* -- alleged semantic difference

— However, with conjoined mass nouns both versions appear to exist independently (Peter Sutton, pers. comm.)

— Google Ngram data:

- *oil and vinegar are* \approx 1.5x *oil and vinegar is*
- *salt and pepper are* \approx 2x *salt and pepper is*
- *tea and coffee are* \approx 4x *tea and coffee is*
- *salt and sugar are* \approx 4x *salt and sugar is*

— Evidence for Bresnan et al. 1982 for mixtures

— But also: Plural agreement is dominant

■ Reinterpretation of data

— SemAGR: *Tea and coffee is served.*

— SynAGR: *Tea and coffee are served.*

2016

● oil and vinegar are	0.0000000498%
● oil and vinegar is	0.0000000332%
● salt and pepper are	0.0000001304%
● salt and pepper is	0.0000000696%
● tea and coffee are	0.0000004944%
● tea and coffee is	0.0000001284%
● salt and sugar are	0.0000001713%
● salt and sugar is	0.0000000401%

Additional evidence for SemAgree



- Dual agreement in Arabic (Himmelreich et al. 2024):
 - [al-walad-u wa-r-radgul-u] **jarkuḏaani**.
the-boy-NOM and-the-man-NOM **run.3DU**
'The boy and the man run.'
- Paucal agreement in Biak
(Austronesian, Irian Jaya / Indonesia, Harbour 2020)
- Paucal agreement of conjunctions is variable but can lead to plural when referring to larger groups
 - Reference to 3 girls and 3 boys: Inai sko- ya ma roma sko i sko- fnak kayame.
girl 3PAU-DET and boy 3PAU-DET **3PAU**-play together
'The girls and the boys play together.'
 - Reference to 9 girls and 9 boys: Inai sko- ya ma roma sko- i si fnak kayame.
girl 3PAU-DET and boy 3PAU-DET **3PL.AN**-play together
'The girls and the boys play together.'

Taking stock: SemAGR and SynAGR in coordination



- Step 1: Coordination has no plural feature
 - Coordination does not contribute agreement features
 - $[[DP [DP \dots]_{NUM-a} C [DP \dots]_{NUM-b}]_{\emptyset} VP_{NUM-v}]$
 - Number form of verb only determined by semantic interpretation: SemAGR
- Step 2: Coordination acquires optional PL
 - Most cases of coordination are conjunctions of non-quantified expressions: D&D, leading to PL agreement due to SemAGR
 - Plural agreement gets generalized from D&D to DvD, Q&Q, D∧D, as D&D the most frequent exemplar of [DcD]:
 - $[[DP [DP \dots]_{NUM-a} C [DP \dots]_{NUM-b}]_{PL} [VP V_{PL} \dots]]$
- Step 3:
 - Both SemAGR and SynAGR are operative
 - Modelled by optional SemAGR or stochastic ranking of SemAGR and SynAGR
 - Conflicting rules may lead to decreased grammaticality judgements

Example: Google NGrams

2016

- the man and the woman 0.0000136359%
- the man or the woman 0.0000023011%
- every man and every woman 0.0000012379%
- *the man and the woman*
≈ 6x *the man or the woman*
≈ 11x *every man and every woman*

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