Incursions in infant and child grammar

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Going Romance
Université Paris 8, November 27th 2020

Much of the recent work reported has been carried out in collaboration with Julie Franck, Luigi Rizzi, and Jingtao Zhu.

Outline

Grammar after production starts: participle agreement

Some conflicting claims

Grammar before syntactic production starts

An experiment on Catalan SVO and CLLD

Grammar after production starts

(1) Les ha pintades.
cl.fem.pl has painted-fem-pl
Has painted them.

(2) Ha menjades. (Júlia, 2;05,10)
has eaten-fem-pl
S/he has eaten (them).

(3) Hai persi due. (2;00)
have-2s lost-masc-pl two
You have lost two (of them).

(Italian example from from Antinucci & Miller 1976)

Participle agreement: production

	no overt agreement	participle agreement
2-year-olds	72.2%	27.7%
3-year-olds	89.3%	10.7%
4-5-year-olds	71.1%	28.9%
total children	78.2%	21.8%
adults	69.3%	30.6%

Table 1: Percent overt participle agreement production, Catalan, from Gavarró, Torrens, & Wexler 2010

- We found no significant differences in the percentage of participle agreement in adult and child Catalan ($\chi^2 = 2 : 107; p > .05$).
- No Spanish-speaking child produced any instance of past participle agreement

Participle agreement: grammaticality judgment

- 40 Catalan-speaking children (age range: 2;02,12– 6;00,25) and 40 Spanish-speaking children (age range: 2;05,13–4;10,08) and 10 control adults
- Our task was designed to see whether participle agreement could be a constitutive feature of child Catalan grammar despite its optionality, and how it differed from Spanish.
- A grammaticality judgment task with subject-verb agreement mismatches was introduced as control, and children who could not detect them at all were excluded as unable to perform a grammaticality judgment task

Grammaticality judgment

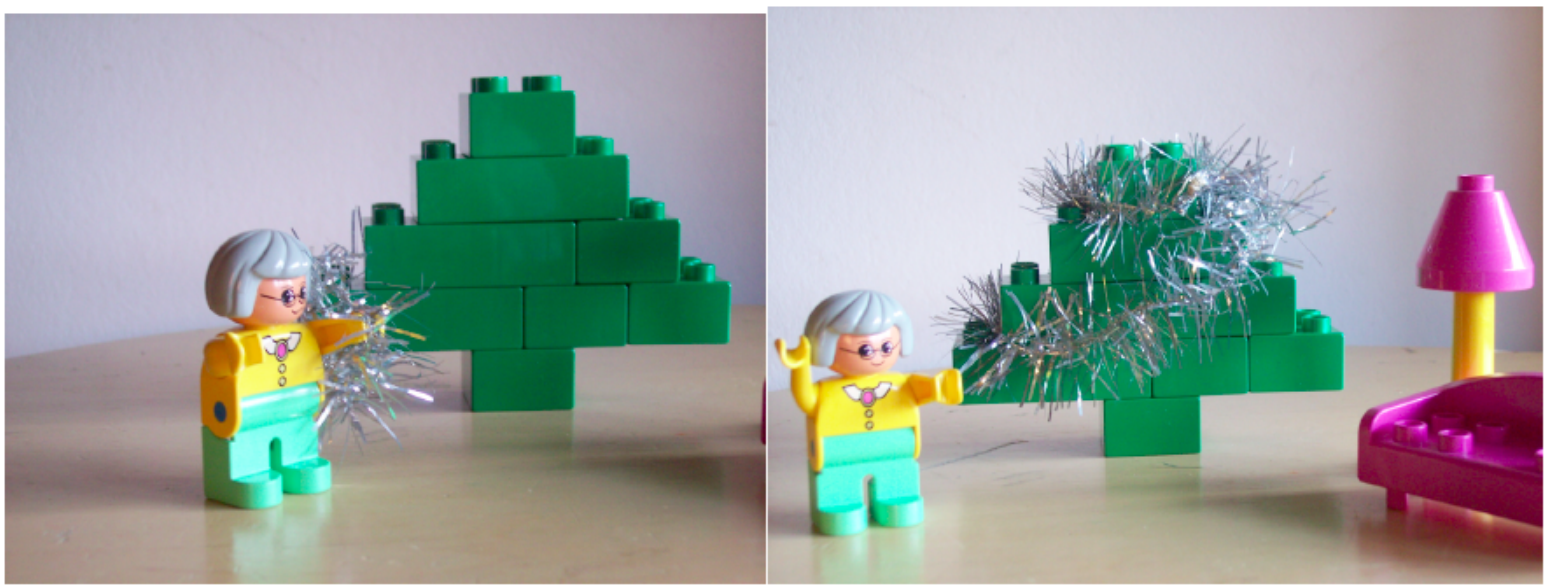
- The experimental items included sentences with participle agreement and sentences without participle agreement (but rather with 'default' morphology, that is, masculine singular morphology on the participle for a clitic that is not singular masculine).

(4) L'ha feta (la torre).
cl has done-fem (the tower)
'She has built it (the tower).'

(5) Les ha plantat (les pastanagues).
cl-fem-pl has planted (the carrots)
'She has planted them (the carrots).'

(6) Las ha colgadas (las decoraciones).
cl-fem-pl has hung-fem-pl (the trimmings)
'She has hung them (the trimmings).'

Grammaticality judgment



–*L'àvia té unes decoracions de Nadal.*
the grandmother has some x-mas decorations
–Aquí ja les ha penjades.
Here already cl-fem-pl has hung-fem-pl

Materials

Grammaticality judgment

	overt agreement	no overt agreement	*subject-verb agreement
2-year-olds	100%	100%	0%
3-year-olds	100%	100%	16.6%
4-year-olds	80%	93.3%	0%
5-year-olds	93.9%	100%	9%
total	92%	98%	4.7%

Table 2: Acceptance rate, Catalan, from Gavarró, Torrens, & Wexler 2010

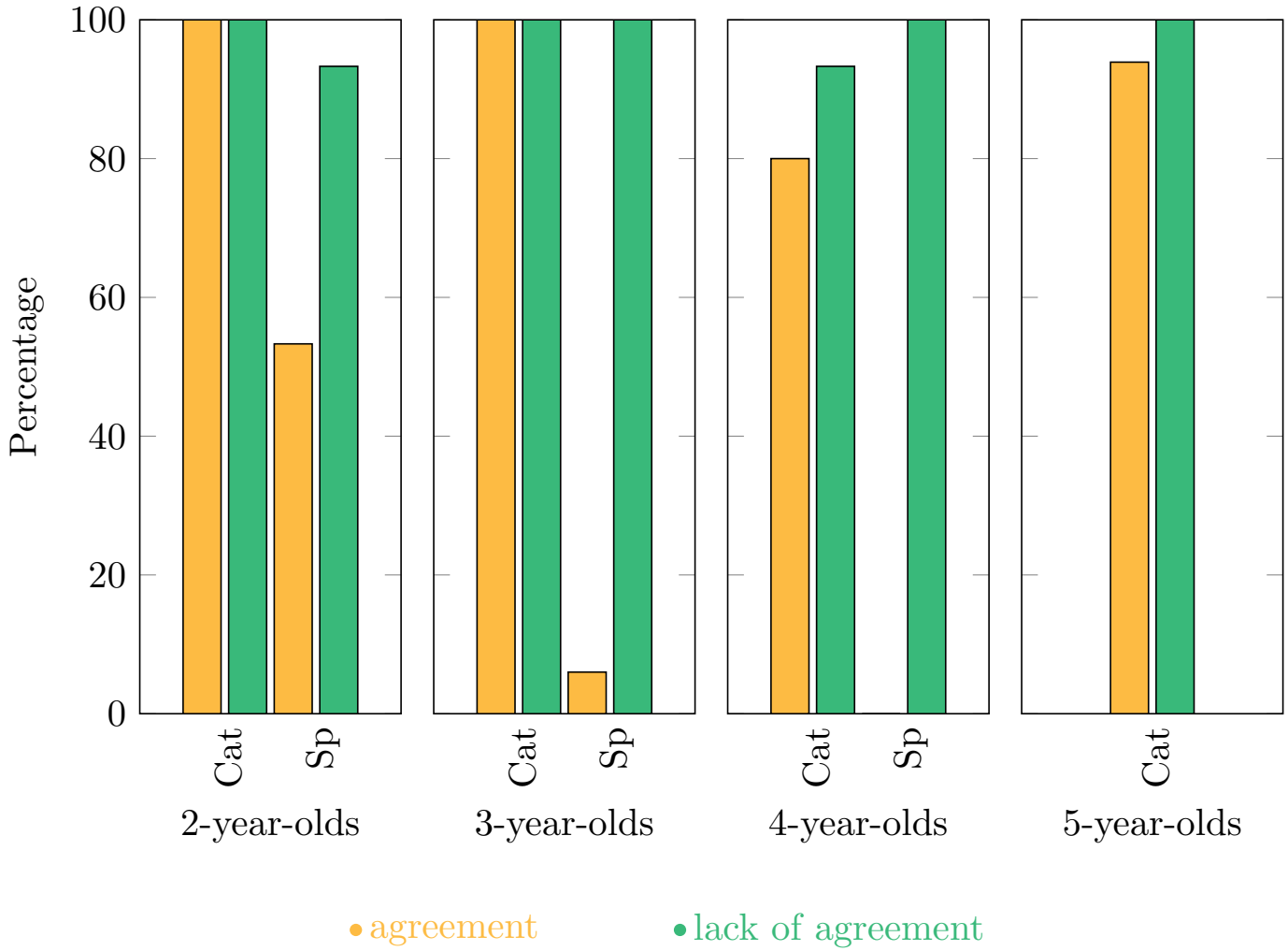
	*overt agreement	no overt agreement	*subject-verb agreement
2-year-olds	53.3%	93.3%	0%
3-year-olds	6%	100%	0%
4-year-olds	0%	100%	0%
total	13.3%	98.7%	0%

Table 3: Acceptance rate, Spanish, from Gavarró, Torrens, & Wexler 2010

Grammaticality judgment

- Statistically significant differences between Catalan and Spanish for the agreement condition, for two-year-olds ($\chi^2 = 5.93; p < .001$), for three-year-olds ($\chi^2 = 49.53; p < .001$), for four-year-olds ($\chi^2 = 40; p < .001$), and when all ages are collapsed ($\chi^2 = 84.51; p < .001$).

Grammaticality judgment



Acceptance rate, Catalan and Spanish

Past participle agreement: Québec French

Past participle agreement in Québec French

(7) la porte que Jean a peinte
the door.fem that Jean has painted.fem

(8) Jean l'a peinte.
Jean cl has painted.fem

Pirvulescu and Belzil 2008: a preference task in which participants had to choose between agreeing and non-agreeing participles

Past participle agreement: Québec French

	PP agreement	A agreement	subject-verb agreement
3-year-olds	29.5%	95%	95%
4-year-olds	27.7%	90%	95%
5-year-olds	43.3%	90%	100%
adults	60%	100%	100%

Table 4: Rate of selection of agreeing forms, Pirvulescu and Belzil 2008, exp 1

Past participle agreement is optional, both in child and adult Québec French.

Past participle agreement: Québec French

	PP agreement w/ cl	A agreement w/ DP	A agreement	subject-verb agreement
3-year-olds	42.8%	52.4%	88%	95.2%
adults	41.7%	13.9%	100%	100%

Table 5: Rate of selection of agreeing forms, Pirvulescu and Belzil 2008, exp 2

(9) Le père a ouverte la fenêtre.
the father has opened-fem the window

Past participle agreement: Italian

- Ungrammatical agreement with a postverbal object was first attested in child Italian spontaneous production (Antinucci & Miller 1976; Volterra 1976) – but see McKee and Emiliani (1992), and Schaeffer (2000).
- Participle agreement is found at different rates in different studies on Italian (Moscati and Tedeschi 2009).

Past participle agreement

- D'Alessandro and Roberts' (2008), agreement takes place when probe an goal are in the same Spell-Out domain, and their account for standard Italian can carry over to French and Catalan. The participle would raise to a position in which it would be in the same phase as the clitic, but no longer with the full DP object, which would be in lower phase.

(10) *He perdudes les claus.
have-1s lost-fem-pl the keys-fem
'I have lost the keys.'

Past participle agreement

- In varieties with participle agreement with a direct object DP, such as the variety of Quarna Sopra, the participle would remain lower, inside the complement of the same minimal head *v*, and agreement would be possible. The low position of the participle is apparent by its position relative to adverbs.

(11) T e ba dru'mi.
cl have-2s well slept
'You have slept well.'

Past participle agreement

- The analysis remains problematic for some other Romance varieties, including Majorcan Catalan, with full DP objects that give rise to participle agreement despite the fact that participles are high (see Salvà 2017).
- What is the proper analysis of the child varieties allowing agreement with a DP object when the adult variety does not allow it (should this be substantiated experimentally)?

Early word order

- Very Early Parameter Setting (Wexler 1998): Basic parameters are set correctly at the earliest observable stages, that is, at least from the time that the child enters the two-word stage, around 18 months of age.

Some conflicting claims

- Aguado-Orea, Witherstone, Bourgeois & Baselga (2019) tested Spanish-speaking children with two weird word orders (WWO) and argued for 'probabilistic constructivist learning models', as opposed to 'early access to advanced grammatical knowledge'.
- Under this theoretical approach, children learn schemas in the input associated with specific lexical items and until a later stage they do not built an abstract syntax.

Aguado-Orea et al. 2019

- Study 1 with adults: 21.95% SVO sentences; 4.85% of VSO, and no observed cases of SOV.
- Study 2: Children were trained with the SOV and VSO orders, and asked to describe short videos. The rationale of these experiments is that willingness to match WWO reflects lack of access to grammar (Akhtar 1999).

Aguado-Orea et al. 2019

The experiment combined verb frequency (high frequency/low frequency) and word order (SOV, VSO).

(12) mono perro besa/lame.
monkey dog kisses/licks

(13) besa/lame mono perro.
kisses/licks monkey dog

Aguado-Orea et al. 2019

The results showed

- no age effect: 3 and 4 year-olds performed the same way. This goes clearly against their expectations.
- an effect of verb frequency: more constructions matching the WWO with low-frequency verbs than with higher-frequency verbs, interpreted as indicating that only high frequency verbs are available to enter grammatical constructions, i.e. SVO.
- No adult results reported.

Aguado-Orea et al. 2019, methodological objections

- Of the two word orders tested, one is grammatical (VSO), the other one isn't (SOV), as indicated by study 1.
- In addition, the experimental items are nevertheless illformed across the board (for lack of Ds) (as in Matthews et al. 2007 on French and English).
- Lack of correction on the part of children cannot be taken as evidence that they lack grammatical knowledge, as not only grammatical knowledge is involved in the experiment: children also need to figure out how to meet the experimenter's expectations, etc. (See Franck & Lassotta 2012.)

Aguado-Orea et al. 2019, further data

- 'Even though the sentences the children heard during the training phase did not include clitic pronouns, the children often incorporated them during the test phase. Children were significantly more likely to use a clitic pronoun when reverting to the canonical SVO word order (74.49%), as compared to instances where they matched the WWO construction (30.73%) . . . '
- Children revert to grammatical sentences – although there's no analysis of the 'non-target' responses.

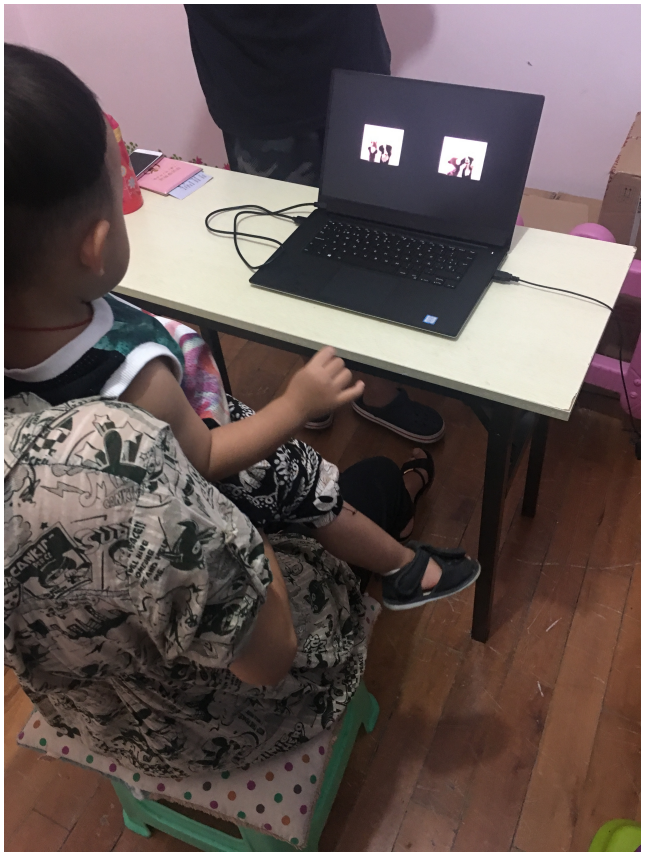
(14) El mono tira a la rana.
the monkey pulls DOM the frog

(15) El mono la tira.
the monkey cl-fem pulls

Grammar before production: Some landmarks

- Newborns are able to discriminate between native and nonnative languages, and between two nonnative languages
- Babies are sensitive to phonological distinctions up until age 6-to-8 months; from then onwards, they loose the ability to discriminate distinctions their mother tongue does not make.
- By 6 months, babies can associate certain words with meanings, and by 8-to-12 months they produce their first words.
  (See the work of Mehler, Jusczyk, Kuhl, Werker, a.o.)

The preferential-looking paradigm



Experimental set-up

Background: Lassotta et al. 2014

- Lassotta, Omaki, & Franck (2014) tested 40 French-learners aged 22 months (range 18-24) with Clitic Left Dislocations.

(16) Le garçon, la fille le dase.
the boy$_i$ the girl CL(him)$_i$ V
'The boy, the girl is dasing him.'

Lassotta et al. 2014

- OSV represents 8% of the input the children get, and 32% of non-canonical sentences.
- French-learners interpreted CLLD with pseudo-verbs by age 2.
- Cf. the results of Dittmar, Abbot-Smith, Lieven and Tomasello (2008) where evidence for comprehension of non-canonical word orders in German was found at 7.

Lassotta et al. 2014

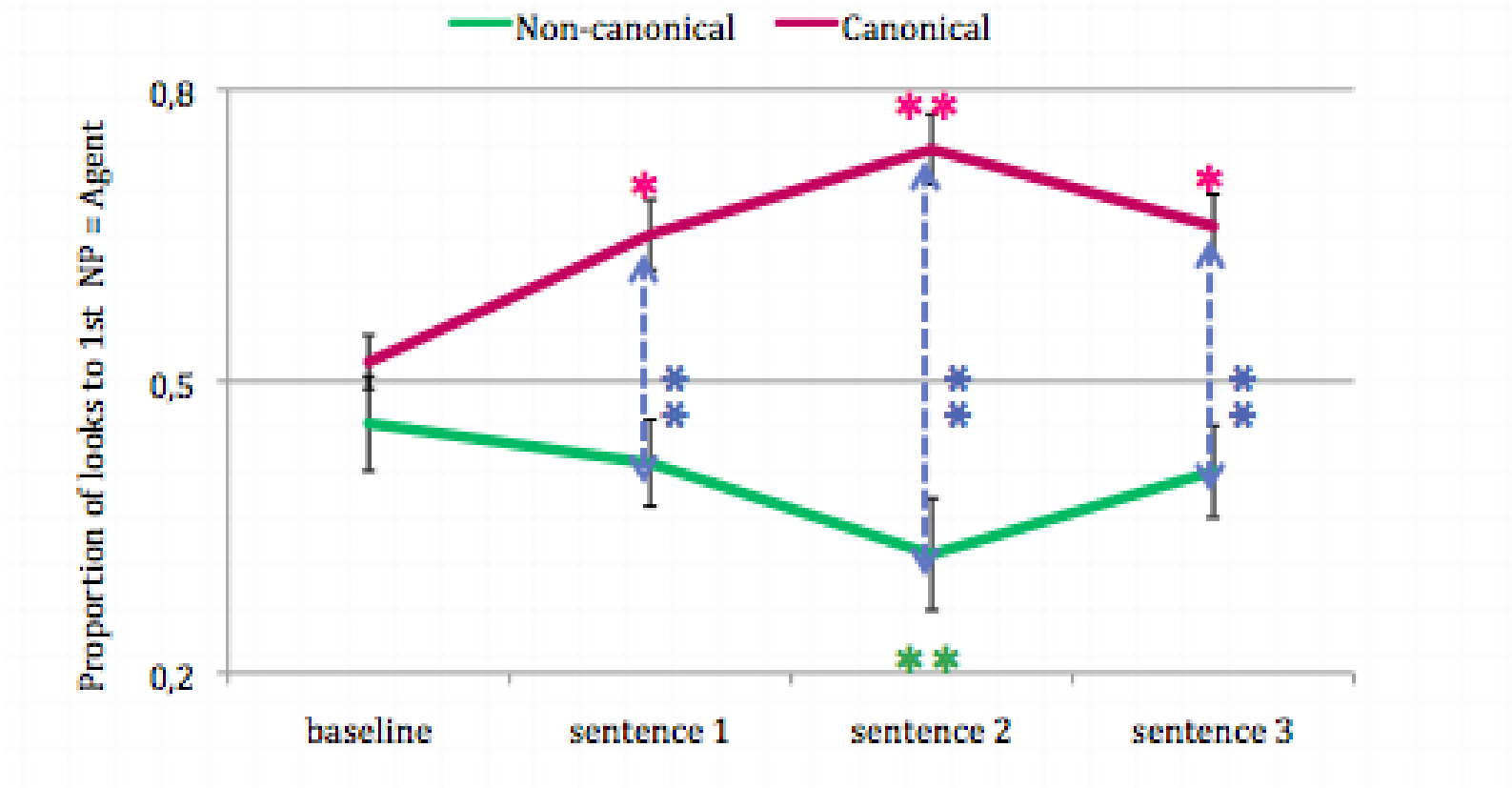


Figure: Proportion of looks to 1st AGENT

An experiment on Catalan SVO and CLLD

- We replicate the experiment of Lassotta et al. 2014 in Catalan
- Pseudo-verbs (following the phonological constraints of Catalan verbs):
  (i) *dimpa* 'to put a colander on someone's head.'
- The experimental items included 2 SVO sentences and 4 CLLD.

Experimental items

(17) El conill dimpa l'ànec.
the rabbit V-3s the duck

(18) El llop, el dimpa l'ovella.
the wolf cl.masc.sg V-3s the sheep

Although the presence of CLLD has not been quantified in Catalan, the order clVS represents 23% of transitive sentences with overt S and O in child-directed speech, and 10% in child production in the corpus study of Cabré (2007). Adults only produce 32% of sentences with overt subjects.

Experimental design

- Tobii Studio™(Version 3.4.5) was used as the platform for the recording and analysis of eye gaze data.
- Experimental sentences were pre-recorded with target intonation by a female native speaker.

Experimental materials

- In one scene, a transitive event is depicted.
- The other video depicts the same event with theta-role reversal.

Participants

- 11 typically-developing infants exposed to Catalan were tested.
- Mean age: 17,4 (age range: 16,4 – 23,0)
- 18 adults

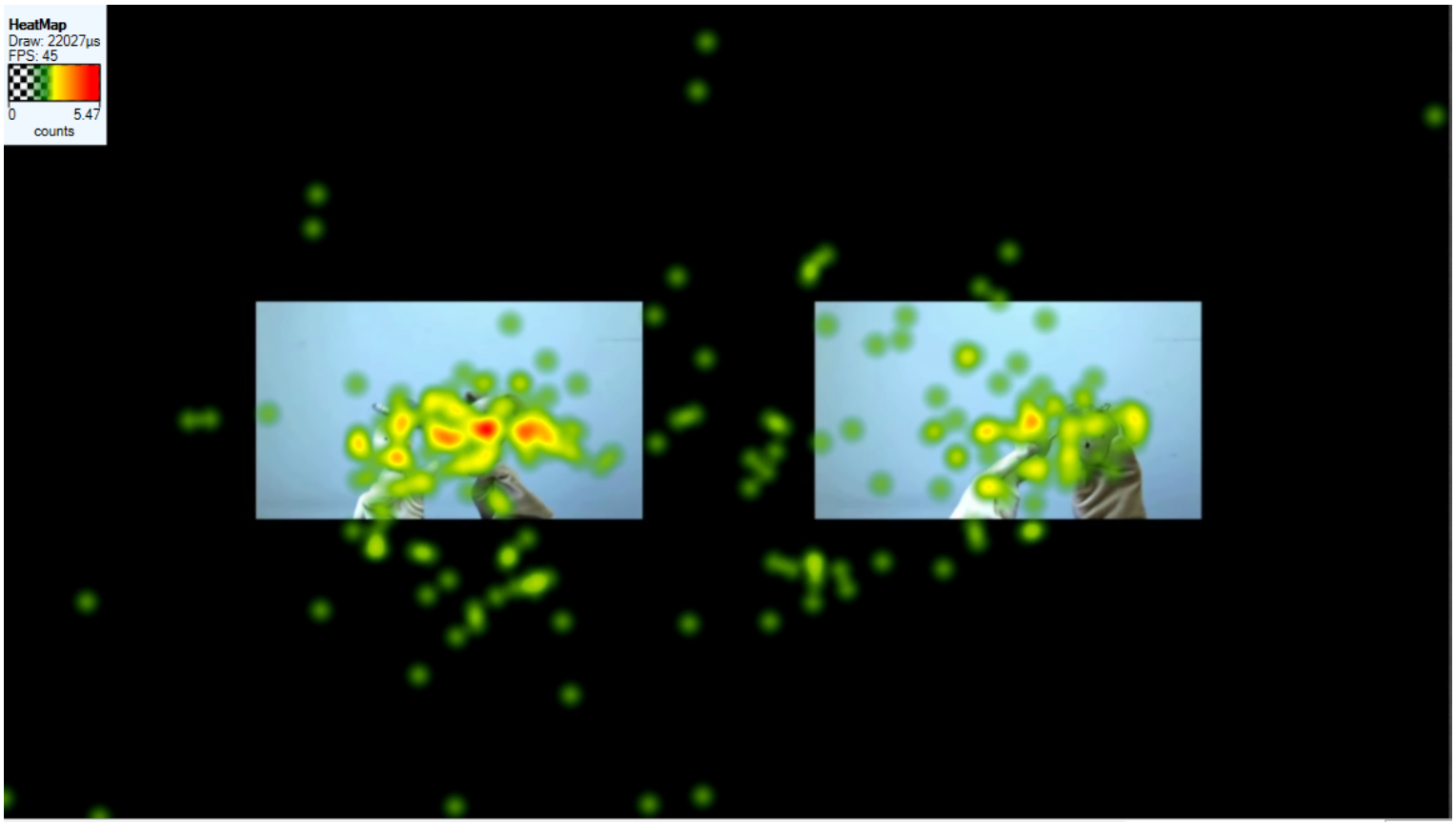
Predictions

- If able to parse a sentence, children will show a significant preference for the scene matching it, whether it is AGENT-first or not, etc.
- If unable to parse it, children will look at the two scenes randomly.

Analysis

- We analyse the gazing data in 4 Regions of Interest, one corresponding to the baseline ('Look, what happened?') and three corresponding to three consecutive exposures to the target sentence.
- For each of the four ROIs, only infants with more than 55% of detected signal and at least three good test sentences over the total of four (in the case of CLLD) were taken into account (#11).

Results

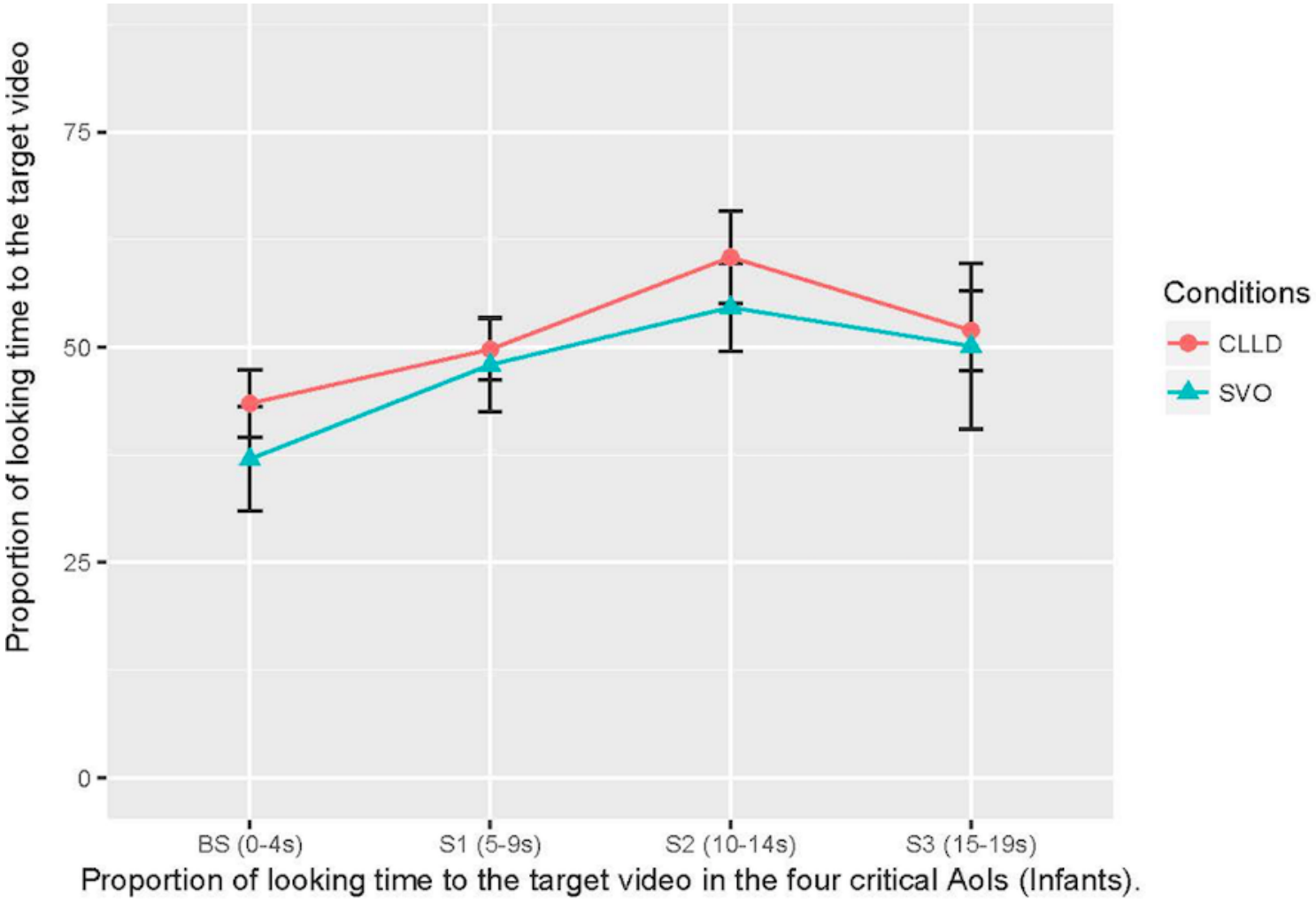


Results

	CLLD		SVO	
	Target	Reverse	Target	Reverse
Baseline (0-4s)	1553 (482)	2063 (685)	1419 (845)	2506 (1114)
Sentence 1 (5-9s)	2467 (860)	2495 (841)	2666 (1306)	2697 (887)
Sentence 2 (10-14s)	**2457 (884)***	**1700 (1019)***	2851 (717)	2616 (1295)
Sentence 3 (15-19s)	2148 (879)	2032 (962)	2379 (1548)	2615 (1956)

Table 6: Mean looking times (in ms, standard deviations in parentheses) across the four critical RoIs in the three conditions.
*$p < .05$ (in bold)

Results



(19) L'ovella la dimpa el llop.
the sheep$_i$ CL.fem$_i$ PS-V-s the wolf

Results

- Mixed models were performed on total fixation duration for each scene (target and reverse). The model used looking times in the baseline against which looking preferences in the following windows were estimated.
- In the SVO condition, the mixed models reveal that looking time to the target scene was significantly higher after hearing the second ($\beta = 1.32$, $t = 1.85$, $p = .047$) presentation of the test sentence.

Results

- In the CLLD condition, there was a significant interaction ($F = 2.44$, $df = 3$, $p = .49$) between Scene (target vs. reverse) and RoIs (BS, S1, S2, S3), showing that the preference for the target scene is not the same for each RoI. Considering each ROI separately using mixed models, the results showed that infants looked significantly longer at the target PATIENT-first scene after the second ($\beta = 1.19$, $t = 2.48$, $p = .01$) presentation of the sentence.

Results, adults

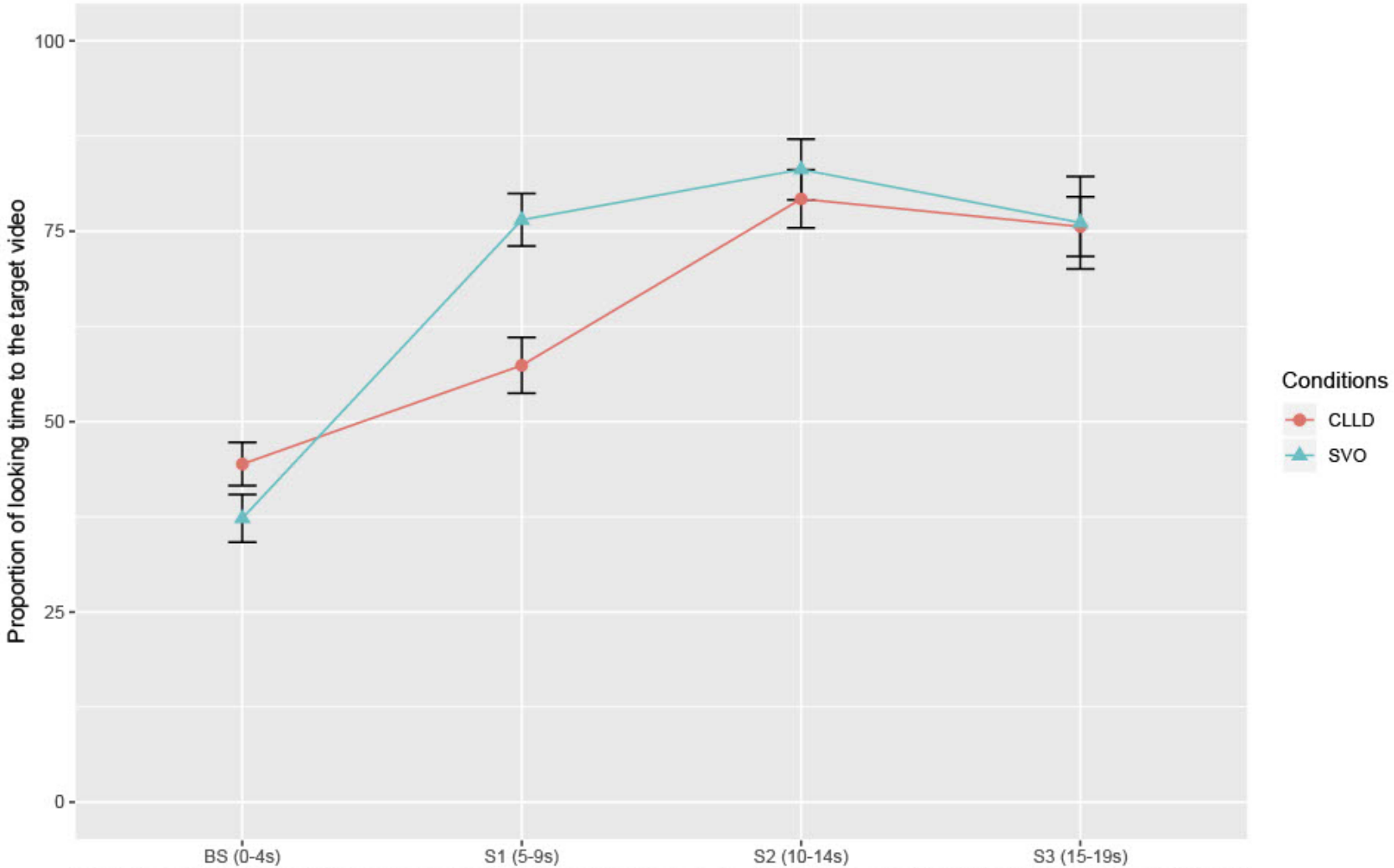


Fig.1 Proportion of looking time to the target video in the four critical AoIs in the SVO and the CLLD conditions (Adults).

Conclusions

Findings

- In the preliminary results presented children acquiring Catalan are sensitive to the target word order at a very early stage, before they start combining words in production, and before 18 months.
- This holds for SVO but also for CLLD, a result only available in the Romance languages for French (albeit for an older age group).

Conclusions

- The results are inconsistent with claims that abstract grammar is only operative at ages 3–4, or that frequency determines acquisition *at this stage*.
- This runs against the usage-based approach to language acquisition of Tomasello and colleagues, but also against the variational learning model of Yang et al. 2017 ('longitudinal trajectories of development show sensitivity to the quantity of specific patterns in the input')
- Rather, the syntactic properties of the target language would be established between 8 and 16 months.

Acknowledgements

- Project FFI2017-87699-P and 2017 SGR 634
- Children and adults who took part in the studies reported, in the metropolitan area of Barcelona

Thank you