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From Correlativization to Relativization: A View from Czech L1-Acquisition

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1. Introduction

A correlative clause, exemplified by the bracketed part of the Czech example (1), is a wh-clause (*co David uvidí*) matched by a demonstrative (*to*) in the matrix clause.

(1) [Co what.ACC David David uvidí], see.PFV to that.ACC sní. eat.PFV
'David eats what(ever) he spots.'

There has been a controversy about the syntax–semantics interface of correlative clauses, exemplified by the bracketed part of (1). According to the dominant **(free) relative analysis**, correlatives are simply (free) relative clauses located in the left periphery of their host clauses (Srivastav 1991, Dayal 1996, Bhatt 2003, Izvorski 1996, Pancheva Izvorski 2000, Lipták 2004).[1] Opinions are divided on some issues, like whether the correlative clause is base-generated in its surface position or moves there, or whether the (free) relative has quantificational, referential, or predicative semantics. But the underlining idea is still the same: a correlative clause is a type of a relative clause. According to the **conditional analysis**, on the other hand, correlative clauses are akin to conditional antecedents (Bittner 2001, Brasoveanu 2008). As such, they have propositional semantics.

Some structural and semantic aspects of the two competing analyses are illustrated below. It should be noted that the illustrations are simplified and intentionally abstract away from aspects in which individual analyses may differ. A plausible logical form of the correlative construction on the free relative analysis

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[1] Free relatives, sometimes also called headless relatives, are wh-clauses with nominal meaning. For surveys of their syntax and semantics, see van Riemsdijk (2017) and Šimík (2021), respectively.

is provided in (2a) and the corresponding semantic translation in (2b): the correlative clause involves wh-operator-movement, associated with lambda abstraction, which turns the open proposition [see(David, *x*)] into a property of entities seen by David. The property-denoting wh-clause is then selected by an (empty) determiner which turns it into the maximal entity that David sees (Jacobson 1995; Caponigro 2003). The correlative clause thus has the validity of a referential nominal phrase. The whole structure is then coindexed with the demonstrative in the host clause.

(2) **Free relative analysis**
   a. [D [what$_1$ David sees t_1]]$_i$, he eats that$_i$
   b. MAX(λx[see(David, *x*), eat(David, $\iota y\ y = \sigma x$ see(David, *x*))

In the conditional analysis, schematized in (3), the wh-movement does not necessarily correspond to operator movement, which is why we display the schematic analysis with wh-in-situ. This is in line with the fact that wh-movement in correlatives (as opposed to (free) relatives) is – from a crosslinguistic perspective – not obligatory (see, e.g., Demirok 2017).[2] The wh-word maps to a variable (Berman 1991) coindexed with the demonstrative. The two clauses correspond to an antecedent and consequent of a conditional, respectively. The whole complex open proposition is "closed" by a default operator (indicated here simply as OP; it could be existential or universal).

(3) **Conditional analysis**
   a. [David sees what$_i$], he eats that$_i$
   b. OPx[see(David, *x*) → eat(David, *x*)]

The free relative analysis involves more structural and semantic complexity than the conditional analysis. First, the wh-operator-movement has an obligatory semantic effect – it turns an open proposition into a property of entities.[3] Second, the property is further selected by an (empty) determiner D, which shifts the property to the maximal entity that satisfies it. Third, the wh-clause is located in a non-canonical left-peripheral position and thus corresponds either to a left-dislocated topic or a hanging topic (depending on whether it moves there or is base-generated there; see Bhatt 2003 or Lipták 2004 for relevant discussion).

The conditional analysis expects correlatives to be significantly simpler. First, the wh-word is treated as a mere restricted variable (Heim 1982), which does not change the semantic type of the proposition it appears in and which can be argued to correspond to the meaning of wh-words in wh-interrogatives

[2] There are other reasons than operator-hood/lambda abstraction for which the wh-word might move in correlatives, such as clause typing (Cheng 1991) or discourse properties (e.g. topicality; Grohmann 2003).

[3] If the correlative is a plain (headed) relative rather than a free relative (cf. Bhatt 2003), the derivation could stop at this point. Still, it would be more complex than the derivation in the conditional analysis.

(Berman 1991). Second, it does not involve a type-shifting operation, but rather just the closing of an open proposition. Last, the left-peripheral position can be considered the default for conditional clauses, which means that no advanced syntactic operation (such as topicalization) is required.

We aim to shed light at the analytical controversy by looking at L1-acquisition of correlatives in Czech. Using the sentence imitation task (Lust et al. 1996, Dye and Foley 2021), we ask whether children are better at imitating left-peripheral correlatives or string-identical right-peripheral light-headed relatives. We find that they score better at correlatives, suggesting that children can access an analysis of correlatives that is simpler than that of relative clauses.

The paper is structured as follows. We first provide some background on the existing findings in the field of L1-acquisition of correlatives, conditionals, and relative clauses (section 2). Our experiment is presented in section 3. Section 4 discusses the findings and concludes the paper.

2. L1-acquisition of correlatives, conditionals, and relatives

L1-acquisition of correlatives has not been studied in great depth. Sharma (1974) claims that correlatives in Hindi appear abundantly before the age three. In her sentence imitation study on Hindi, Somashekar (1999) found that children in the youngest group (2;6–3;5) can repeat correlatives in 13% of the cases, which is significantly better than their ability to repeat participial nominally headed relatives (3%), but worse than participial free relatives (20%). Results are mixed for Dravidian languages: Nirmala (1980) finds no evidence of correlatives in Telugu by the age of three-and-half, while Lakshmi-Bai (1989) observed correlatives in the production of her bilingual Tamil- and Telugu-speaking children. It should be noted, however, that correlatives in these Dravidian languages belong to the formal register and are thus rare in input. In their corpus study involving 1786 wh-words produced by six children (1;7–3;9), Matiasovitsová et al. (2022) find only a handful of instances of *bona fide* correlatives.

The acquisition of conditionals is comparatively better studied. English conditionals or temporal *when*-clauses are naturally produced from around 2;6 (Reilly 1986; Diessel 2004). Diessel (2004) observes that right-peripheral *when*-clauses appear earlier than left-peripheral ones. Conditionals (or temporals) are acquired even earlier – around the age of 2 – in Japanese and Korean (Akatsuka and Clancy 1993) and in Greek (Katis 1997). In these languages, these constructions are reported to appear in the left-peripheral position from the very start. Matiasovitsová et al. (2022) likewise show that conditionals/temporals in Czech appear early in some children's production (around the age of 2) and they do so in both the left-peripheral and right-peripheral position.

The acquisition of relative clauses is by far the best studied. It has repeatedly been noted that relative clauses get acquired comparatively late – typically after the age of 3, with some more complex types of relatives – such as those that involve wh-word as relative operators – as late as 5 years of age. See, for instance, Labelle (1990), Guasti and Shlonsky (1995), Diessel (2004), Diessel and

Tomasello (2005), or Friedmann and Reznick (2021). As far as subtypes of relative clauses are concerned, there is what Flynn and Foley (2004) call the "developmental primacy of free relatives": free relative clauses are acquired earlier than headed relative clauses, which is attributed to the complexity (whether grammatical or cognitive) of incorporating the nominal head into the relative clause. This primacy has been observed for a variety of languages, including English (Flynn and Lust 1980, Clauss 2017), Chinese (Packard 1988), Quechua (Courtney 2006), or Czech (Matiasovitsová et al. 2022).

In summary, conditionals (and temporal clauses) get acquired earlier than relative clauses. This is consistent with the view that the structure and meaning of conditionals is simpler than that of relative clauses (see section 1). There is relatively little evidence available about the acquisition of correlatives, but the little there is appears to be consistent with the view that correlatives are acquired earlier than relative clauses.

3. Experiment

The aim of our sentence imitation experiment is to test two competing hypotheses about the structure and meaning of correlative constructions.[4]

(4) **Hypothesis 1: correlatives as relatives**
Correlative clauses are a subtype of relative clauses. They are expected to be acquired *around the same time or later than the corresponding relative clauses*. A potential delay could be associated with their left-peripheral position.

(5) **Hypothesis 2: correlatives as conditionals**
Correlative clauses are a subtype of conditionals. As structurally and semantically simpler (by hypothesis; see section 1) and in line with previous findings, they are expected to be acquired *earlier than the corresponding relative clauses*.

3.1. Design and materials

Our main independent variable is the construction used – correlative (Cor) vs. light-headed relative (LHR). In terms of its structural properties, a light-headed relative is somewhere between free relatives and headed relatives (Citko 2004). They are headed by a pronominal (rather than nominal) head and the repertoire of their wh-operators typically matches the one of free relatives (Šimík 2021). We use light-headed relatives in our experiment because they provide a perfect match for the corresponding correlatives, the only apparent difference being the position of the wh-clause relative to its matrix host, as exemplified in (6): in the Cor-condition, the wh-clause is located in the left-periphery of its host and

[4] For materials, results, and analyses visit https://doi.org/10.17605/OSF.IO/HCD6B.

there is an anaphoric relationship between the wh-word (on the conditional analysis) or the wh-clause (on the relative analysis) and the demonstrative *tam* 'there'; in the LHR-condition, the wh-clause is, by hypothesis, embedded by the demonstrative, thus forming a complex nominal with it.

(6) a. **Correlative (Cor)**
Kde stojí policajt, tam čeká auto.
where stands policeman.NOM there waits car.NOM
'The car is waiting where the policeman is standing.'

b. **Light-headed relative (LHR)**
Auto čeká tam, kde stojí policajt.
car.NOM waits there where stands policeman.NOM
'The car is waiting where the policeman is standing.'

The construction variable was manipulated within items and within subjects and the stimuli were distributed on two lists based on the standard Latin Square design, which means that no child was exposed to one item in both conditions. We created 16 items like (6). Every child was thus exposed to 8 stimuli of each condition.

Besides the relative ordering of the wh-clause and its host clause, the two conditions also systematically differ in the word order used in the host clause: except for the cases where the demonstrative was the subject of the host clause (4 out of the 16 items), the LHR-condition involved clause-initial subjects, while the corresponding Cor-condition involved clause-final subjects (cf. the position of *auto* in (6)). In addition, clause-final subjects were used in the wh-clause (in both Cor and LHR) in most of the items. Given that Czech is an SVO language (see, e.g., Siewierska and Uhlířová 1998), this raises the concern that the Cor-condition – by often containing two instances of non-canonical subject-final order – is harder for children to process, which in turn could put our design at risk. The main reason why we designed our materials in this way is that Czech (and Slavic languages more generally) strongly avoids verb-final clauses (see, e.g., Jacennik and Dryer 1992). Since both the wh-word and the demonstrative must be clause-initial in the Cor-condition (for grammatical reasons; see Izvorski 1996), the optimal way to order the rest – the subject and the verb – is to place the subject in the final position. Moreover, there is evidence that Czech children can process non-canonical orders very early on, presumably thanks to omnipresent morphological case-marking (Smolík 2015).

The items varied in the wh-word (and the corresponding demonstrative) used: 8 out of the 16 items involved 'where' (4 *kde* 'where.LOC', 4 *kam* 'where to', matched by the demonstrative *tam* 'there'), 4 involved *kdo/koho* 'who.NOM/ACC' (2 subjects, 2 objects, matched by *ten/toho* 'that.MASC.NOM/ACC'), and 4 involved *co* 'what' (2 subjects, 2 objects, matched by *to* 'that.NEUT'). Within the 'who'/'what' items, we also varied the function of the demonstrative in the matrix clause (4 subjects, 4 objects). The stimuli were normalized in terms of length

(each had between 9 and 11 syllables) and the lexical items used were selected from a set of words that should be easily understood by the participants.

The experiment was complemented by 10 filler items, four of which involved wh-questions, four headed relatives, and two conditional/temporal *když* 'when'-clauses (one was left-peripheral and the other right-peripheral). Besides functioning as distractors, they constitute a useful background on which to interpret the experimental results. While wh-questions should be the easiest to repeat and headed relatives the hardest ones, conditionals should be somewhere in between (see section 2 and Matiasovitsová et al. 2022). Correlatives are expected to behave on a par with its hypothesized structural kin – either conditionals or relatives.[5]

3.2. Participants and procedure

30 monolingual Czech speaking children took part in the experiment – 20 girls and 10 boys, aged 2;10–4;3. They were recruited in a number of preschool facilities in Prague and North Bohemia, where the experiments also took place. Children were included as participants only if their parents previously signed a written consent form. The research was approved of by the Committee for Ethical Research at the Faculty of Arts of the Charles University.

The experiment took place in preschool facilities, in an environment familiar to the children. The participants were instructed to repeat pre-recorded utterances (altogether 26 – 16 experimental stimuli and 10 fillers), in the effort to assist a toy animal, who was introduced as having a hard time learning Czech. Responses were recorded and subsequently transcribed and analyzed. The experiment was preceded by a standardized receptive vocabulary test (Smolík et al. 2019) and an experimental receptive grammar test (similar to TROG; Bishop 2003). The results of the latter pretest was used in our analyses. The whole trial took up to an hour, including breaks. All participants were rewarded for their participation by small presents.

3.3. Results

Data from all 30 children entered the analysis, except in analyses that concerned grammar competence, where data are missing for one child due to a technical issue. Children's responses in the imitation experiment were analyzed for grammaticality and deviations and each response was scored from 2 to 0 in the following way:

- 2 = accurate imitation;
- 1 = grammatical imitation with 1 or 2 deviations;

[5] As it turned out, wh-questions are not a suitable type of construction for the sentence imitation task. The reason is that children cannot resist the urge to answer the question, yielding poor imitation scores even in children with otherwise good results. For this reason, we do not discuss the results for wh-questions below.

- 0 = ungrammatical imitation or one with more than 2 deviations.

We fitted a cumulative link mixed model (function clmm of the R package ordinal; Christensen 2013), including construction, grammar competence (operationalized as the score achieved in the grammar pretest), and their interaction as fixed effects and random intercepts for items and participants as random effects. The model estimated the effects on the dependent score variable. The construction variable was treatment-coded with Cor selected as the baseline. The details of the model are reported in Table 1 and the model output is visualized in Figure 1.

Table 1. Cumulative link mixed model

Random effects				
Groups	Name	Variance	SD	Correlation
participant	(intercept)	2.2424	1.4975	
	construction	0.0062	0.0786	–1.000
item	(intercept)	1.0441	1.0218	
	construction	0.0986	0.3140	–1.000

Coefficients				
	Estimate	SE	*z* value	*p* value
grammar	0.1608	0.0582	2.761	0.006
construction	–3.6242	1.6188	–2.239	0.025
gram*constr	0.0808	0.0435	1.859	0.063

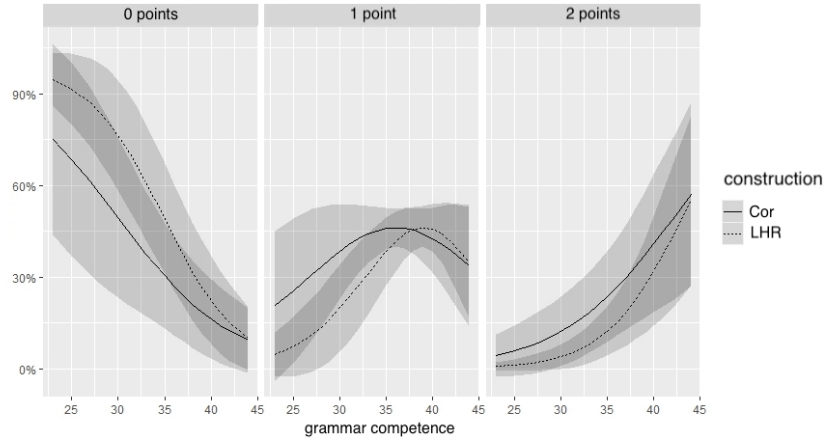

Figure 1. Effect of construction and grammar competence on the probability of a particular score

The model reveals a positive effect of grammar competence, a negative effect of construction, and a marginal effect of their interaction. More specifically, the score increased with increasing grammar competence (z = 2.761, p = .006) and decreased with the imitation of light-headed relatives (as compared to correlatives; z = –2.239, p = 0.025). The marginal interaction (z = 1.859, p = 0.063) means that the effect of construction decreased with grammar competence or, in other words, children with higher grammar competence were better at repeating light-headed relatives than children with lower grammar competence (although only marginally so).

For clarity and completeness, we also include a graph that illustrates the raw results. Figure 2 shows the proportions of the three scores for the two main experimental conditions – correlatives vs. light-headed relatives – surrounded by two conditions from the fillers – conditionals and headed relatives. It is visible with the naked eye that correlatives received 2 points more often than light-headed relatives and 0 points less often than light-headed relatives. In other words, children were better at imitating correlatives than light-headed relatives (the effect of construction revealed by the statistical model). At the same time, we see the performance on conditionals ('when'-clauses) comes very close to the one on correlatives. Numerically, conditionals are slightly better. On the other end of the scale are headed relatives, which turned out most complicated for the children.

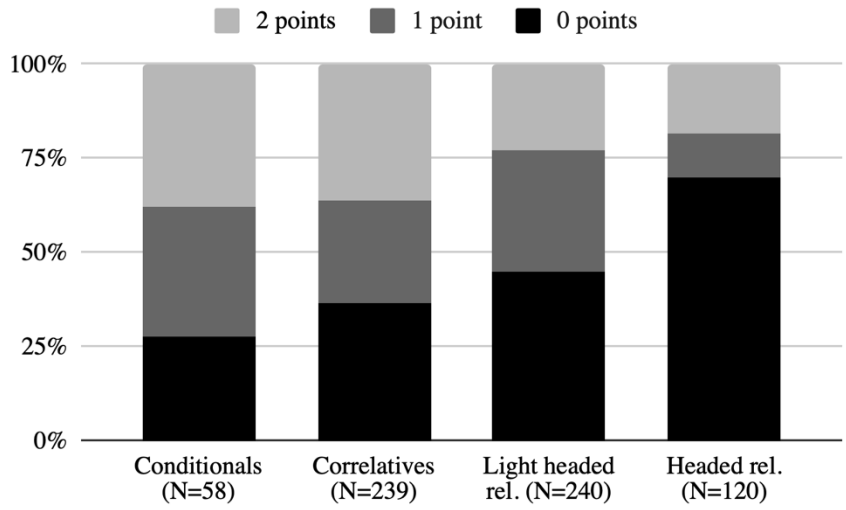

Figure 2. Proportions of scores per condition

It is also instructive to look at some selected deviation types that occurred in our data. Table 2 shows how often children switched from one construction type to the other. Only those imitations are included which led to producing a complex sentence, i.e., a sentence with two clauses. Although the result is not statistically significant (χ^2 = 2.45, p = 0.12; setting *other* aside), we can see that, numerically,

children switched more often from light-headed relatives to correlatives than conversely. This is consistent with correlatives being easier to produce for children than light-headed relatives.

Table 2. Mismatches between stimulus and produced construction

		STIMULUS			
		Cor		LHR	
PRODUCED	Cor	155	(95%)	11	(7%)
	LHR	5	(3%)	147	(91%)
	other	4	(2%)	4	(2%)

Table 3 shows how often the demonstrative in the host clause was retained/omitted in children's production, depending on the stimulus construction. Again, only complex sentence productions are included. Demonstratives were omitted significantly more often in light-headed relatives than in correlatives ($\chi^2 = 14.12$, $p < 0.001$). This could be interpreted as a tendency to simplify the light-headed relative to a free relative (cf. Matiasovitsová et al. 2022).

Table 3. Demonstrative retention/omission in production

		STIMULUS			
		Cor		LHR	
DEM IN PRODUCTION	retained	144	(88%)	115	(71%)
	omitted	20	(12%)	47	(29%)

4. Discussion and conclusion

We found that correlatives are significantly easier for Czech preschool children (2;10–4;3) to imitate than string-identical light-headed relatives. We take this to support our second working hypothesis, namely that correlatives are structurally and semantically akin to conditionals rather than relative clauses (Bittner 2001; Brasoveanu 2008); see (5) and the simplified analysis (3).

It is good to point out that the performance on correlatives is better despite two potentially complicating factors associated with the Cor-condition, namely the left-peripheral attachment of correlatives (cf. Diessel's 2004 finding that subordinate clauses are first acquired as right-peripheral in English, which, like Czech is head-initial) and the subject-final word order in the matrix clause (see section 3.1). One could hypothesize that if these factors have a negative effect on children's performance, the effect of construction is even stronger than the one we see in our data.

Our grammatical explanation of the observed effect is further supported by the marginal interaction with grammar score – the tendency for the effect of

construction to decrease with increasing grammar competence. In other words, children who scored well at the grammar pretest imitated both construction types equally well, suggesting that their grammar competence has matured enough for the light-headed relative to pose no additional issues when compared to correlatives.

A common analysis of correlatives and conditionals, implied in (3) above, receives support from the comparison of the two experimental conditions (Cor and LHR) with the filler items – conditionals and nominally headed relatives. While imitating conditionals is (numerically) the easiest for children, the score pattern of conditionals matches quite closely that of correlatives, which is consistent with them being analyzed similarly. Imitating nominally headed relatives, on the other hand, proved to be the biggest challenge for children – apparently even bigger than imitating light-headed relatives. To the extent that light-headed relatives correspond to free relatives (indeed, the two types are sometimes analyzed on a par under the label "headless relatives"; see Lehmann 1984 or Caponigro 2021), we can interpret this in terms of Flynn and Foley's (2004) developmental primacy of free (here: headless) relatives. Indeed, Flynn and Foley (and much previous literature) interpret the primacy by resorting to the lack of an overt nominal head, which is exactly what is at stake in our data: only headed relatives have a nominal head, light-headed ones only have a pronominal one.

It is a question to what extent our results can be interpreted as an argument for the structure of correlatives not just in child grammar, but also in adult grammar. Our results indicate that children can assign a simpler analysis to correlatives than to light-headed relatives. What we put forth in (3) is an example of that kind of analysis. Nevertheless, it would be problematic to assume that this simpler analysis remains (the only one) available in adult grammars. It cannot be ruled out that after acquiring the structure and meaning of relative clauses, language users start applying the relative analysis (see (2) above) to parse correlatives. This could explain the dominance of relative-based analyses of correlatives in the literature. Since these were proposed based on adult grammars, any developmental aspects could not have been uncovered.

Finally, we would like to point out that our results add a new piece into the puzzle of acquiring wh-constructions. The primacy of wh-interrogatives and the late acquisition of nominally headed relative have been richly documented (Flynn and Lust 1980; Labelle 1990; Diessel 2004; Friedmann et al. 2021; Matiasovitsová et al. 2022; among many others). The same holds for the primacy of free relatives over nominally headed relatives (Flynn and Lust 1980; Packard 1989; Somashekar 1999; Flynn and Foley 2004; among others). Our results suggest that correlatives, together with conditionals, might represent a development bridge between wh-interrogatives and free or light-headed (= headless) relatives. Needless to say, further research is needed to determine whether there is what one could call, following Flynn and Foley (2004), "developmental primacy of correlatives" (over free/light-headed relatives).

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