The child's "or" construction: it's all about choice

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"Or" is associated, in Gricean approaches, with the readings Inclusive ("at least one, and possibly both, options are true") and Exclusive ("exactly one option is true"). Empirical findings show adults favoring Exclusive readings; but for children, the literature yields puzzling results. Laboratory comprehension tasks suggest children favor Inclusive, but naturalistic evidence suggests children's "or" productions are overwhelmingly Exclusive. We first identify problems with previous research. Methodologically, asking children to provide truth judgements (the dominant experimental task) is not a child-friendly task. And theoretically, Inclusive and Exclusive are not optimal categories for classifying "or" readings. To resolve the comprehension-production puzzle, we adopt Ariel and Mauri's richer analytic classification of "or" constructions, where Inclusive and Exclusive as such are not speaker-intended readings, and there are several, rather than one, "single-option" (Exclusive) readings. We apply this framework in analyzing the Berman corpus of Hebrew child language; and in designing a new, more ecologically valid, experimental task. Study 1 shows that in child-directed-speech, one specific Exclusive "or" construction, Choice Immediate (e.g., ↗Chocolates? Or ↘jelly beans?), is (i) the single dominant "or" function addressed to children, (ii) the one "or" reading children consistently respond appropriately to, and (iii) virtually the only "or" construction children produce. In Study 2, we present young children with a task involving this familiar "or" construction. The children respond with adult-like mastery even in the absence of a supporting context. These empirical findings argue for a usage-based account of how children acquire "or".

KEYWORDS

disjunction, Exclusive, Inclusive, language acquisition, usage-based model, construction grammar, corpus evidence, Hebrew

1 Introduction

How do we know we know a piece of language? If we ourselves produce it and get an appropriate response from our interlocutor, we know it. If our interlocutor produces it and our response is appropriate, we know it. Appropriate conversational action is the ultimate test of linguistic competence. Children often fail experimental tests on connective "or", which was taken to suggest that they do not interpret *or* correctly until an older age. But we here argue that they do pass the gold standard, conversation test for one very salient "or" construction, Choice Immediate questions (as in ↗*Want chocolates? or* ↘*jelly beans?*), which call for an immediate addressee choice between the alternatives. Children's comprehension rate is adult-like, and they also produce these "or" constructions at an early age. This production finding is compatible with Morris (2008) and Jasbi et al.'s (2022) findings that children mostly produce

Exclusive "or" constructions ("one, but not both alternatives"). Indeed, they would no doubt count Choice Immediate as Exclusive. But ours is a more precise claim, because there are several other Exclusive readings (see section 2.2), which children do not have command of. Our argument is that children first acquire specifically Choice Immediate "or" constructions, as testified by their behavior in natural conversations.

This introduction first presents previous findings on children's competence with "or" constructions, as well as our criticisms of this research. Next, while many previous studies tried to account for their findings where children diverge from the adult pattern, our goal is to find evidence for an adult-like behavior of children with respect to one specific "or" construction, Choice Immediate. Our account crucially builds on two theories, usage-based approaches to language learning and Ariel and Mauri's (2018) analysis of "or" readings. We therefore introduce these below. We end with an outline of the paper.

1.1 Previous findings

The acquisition of "or" has been the focus of much research and debate as a testing ground for contrasting views about the role of semantics and pragmatics in sentence interpretation, and specifically, in language learning.[1] This is because the semantic meaning of "or" is claimed to differ from its everyday usage. Following Grice (1989) and Horn (1972), the semantic meaning of a sentence like *Fiona ate an apple or a banana* is assumed to be Inclusive, namely, compatible with Fiona having eaten an apple, having eaten a banana, or having eaten both an apple and a banana. However, the assumption is that although semantically Inclusive, "or" is routinely used in its Exclusive reading in adult speech, that is, to describe situations where only one disjunct is true. This Exclusive meaning arises through a pragmatic (or grammaticized—Chierchia et al., 2012) "not both" implicature, which rules out the possibility that Fiona ate both fruits. Under these accounts, the Exclusive reading is more challenging to derive than the Inclusive meaning (because it involves an extra step), and is consequently predicted to be harder to acquire (Chierchia et al., 2001).

But previous findings detected two types of non-adult interpretations, which have given rise to two different developmental accounts of the acquisition of "or". The dominant account is based on findings that unlike adults, children also accept "or" sentences as true descriptions of scenarios where *both* options hold (Chierchia et al., 2001; Crain, 2012; Jasbi and Frank, 2017; Jasbi and Frank, 2021; Tsakali and Mastrokosta, 2022). This is taken to show that children interpret "or" Inclusively. According to this account, children fail to derive the "not both" implicature the way adults do, and treat "or" as logical disjunction (Crain, 2012). The predicted developmental trajectory is that children start out with an Inclusive interpretation, and only gradually, as their pragmatic skills develop, they begin interpreting "or", like adults.

Recently, a second account has been proposed following studies showing that at least some children accept "or" descriptions as true only for scenarios where both disjuncts are true (i.e., *Fiona ate an*

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1 We use 'or' to refer to any token with this meaning in any language. We reserve *or* for English tokens

apple or a banana was considered true only when Fiona ate both). These findings were taken as evidence that children may interpret "or" Conjunctively (like "and") (Singh et al., 2016; Tieu et al., 2017). Although the two accounts differ with respect to children's actual interpretations, they share the developmental prediction that children start out with a non-Exclusive interpretation, and only later learn to interpret "or" Exclusively.

Importantly, however, the prediction that children start out non-Exclusive is not entirely supported by the developmental data, not even by all the experimental data. Using an imperative instruction (*give me the green things, or, the round things*), Suppes and Feldman (1971) found that children mostly gave Exclusive responses. Johansson and Sjölin (1975) too presented children with an imperative task (*put up the picture of the car or the doll!*), as well as an implied choice task (*Richard wants to drink lemonade or milk. Show me what he drank!*), and found that even 4-year olds were Exclusive in their responses. And based on a task-effect difference between an imperative task and a Truth Value Judgment task, Braine and Rumain (1981) proposed that children acquire the Exclusive reading for commands first.

One possible explanation for these incompatible results is that the experimental paradigm commonly used in the lab is not appropriate for discovering children's true competence with "or" constructions. Much of the experimental evidence pointing to Inclusive and Conjunctive interpretations comes from one particular method, the Truth Value Judgment Task (henceforth TVJT, Crain and Thornton, 1998). In this task, participants see pictures, hear descriptions of those pictures, and need to say whether the sentence is a true or false description of the picture. This task differs greatly from the way sentences are used in natural conversation, and may not reflect the interpretation of "or" in real language use. In particular, the task's metalinguistic requirement (assessing whether a sentence is true/right or not) may be difficult for young children. Indeed, Skordos et al. (2020) propose that children's Conjunctive responses in the lab actually reflect a pragmatic *confusion* regarding the task (TVJT) at hand, rather than their linguistic competence. It is just as likely that this may also account for children's seemingly Inclusive results. Children do better on other tasks, such as picture matching for *some* (Katsos and Bishop, 2011; Olson and Astington, 2013). In fact, there is evidence that the use of the TVJT inflates the amount of non-Exclusive responses for adults too (Singh et al., 2016; Jasbi and Frank, 2017; Fishman et al., 2023). Moreover, when children's comprehension responses are examined more closely, they do show evidence for more Exclusive interpretations than previously thought (Jasbi and Frank, 2017): Even when they accepted an *or* sentence as an accurate description of a situation where both conjuncts are true, children tended to add a Conjunctive description (e.g., "cat AND dog"), suggesting they thought there was a better way to describe the picture.

Corpus studies, now available, support our suspicion that lab experiments showing children's nonadult comprehension of "or" may be due to methodological issues. Morris (2008) found that while not very frequent overall in child- or child-directed speech, children are primarily exposed to Exclusive uses, and these are also the ones they produce at an early age. That is, children's early input and early productions involve the "more difficult" Exclusive interpretation. Taken together, the findings present a rather peculiar developmental trajectory: children produce the adult-like meaning before they can comprehend it, unlike the more common trajectory whereby comprehension precedes production (e.g.,

Clark and Hecht, 1983), and they show Inclusive or Conjunctive interpretations in the lab, despite the fact that the Exclusive meaning is more common in their input and in their own productions.

Jasbi et al. (2022), independently carried out at the same time as our research, propose that CDS can guide children on distinguishing between Exclusive and nonExclusive readings. Exclusive readings are associated (to various extents) with several cues (sometimes in combination). The most important cues are: logical (in)consistency between the alternatives, questions and rise-fall intonation. Thus, inconsistency (e.g., *Is this small or large*) is associated more with Exclusive readings, but consistency can point to either Exclusive or nonExclusive readings. Rise-fall prosody and questions also tend to be associated with Exclusive readings. Their solution to the comprehension/production puzzle is that Exclusive readings are much more strongly cued in CDS, which is why children produce them early. Presumably, because the target "or" utterances normally tested in experiments lack these Exclusive-biasing cues, children interpret those targets as Inclusive (Jasbi et al. do not state this explicitly).

Our resolution of the comprehension/production puzzle is not identical. Like Morris (2008) and Jasbi et al. (2022), we adopt a usage-based approach to language, according to which learning is sensitive to children's experience with the relevant linguistic forms. But we also adopt Construction grammar (Goldberg, 1995), so we expect that what the children need to learn is a set of form/function correlations between various "or" utterances and specific readings. To the extent that some of these constitute conventional constructions they should be easier to acquire. Most importantly, our analytic framework is different. We hypothesize that the functions relevant for analyzing the use, as well as the acquisition of "or" constructions, are quite different from the canonical Exclusive versus Inclusive distinction. We therefore adopted a different and much richer classification of "or" readings (Ariel and Mauri, 2018) – see below. Indeed, we identified a specific reading, Choice Immediate, which is expressed by a specialized "or" construction (e.g., ↗ *Want chocolates? Or* ↘ *jelly beans?*) as an initial "or" construction acquired by children. This construction (introduced by Mauri, 2008) has not been recognized in the theoretical literature and consequently not been directly tested with children. Finally, we suspected that the conclusions regarding Inclusive and Conjunctive comprehension patterns rather reflect children's difficulty with TVJ task. This is why we rejected TVJT. Instead, we examined children's spontaneous productions and responses to "or" utterances in a child-directed speech (CDS) corpus (Study 1), and elicited dialogically relevant responses to "or" targets in an experiment (Study 2). We did not find any lag of comprehension behind production for Choice Immediate "or".

2 Theoretical background and goals

We next briefly introduce the usage-based approach and the classification of "or" readings we adopted.

2.1 Usage-based approaches

Usage-based approaches to language assume that linguistic representations (grammar as well as the lexicon) constitute abstractions over specific instances of use. Linguistic representations are constantly emerging on the basis of the aggregate of tokens speakers are exposed to. High frequency then facilitates language learning for children, who should acquire the most frequent constructions they are exposed to first (Tomasello, 2003; Abbot-Smith and Tomasello, 2006; Goldberg, 2006; Lieven and Tomasello, 2008). Hence, a usage-based approach can explain why children may acquire some (Exclusive) constructions before others, depending on their frequency. This turns out to be the case for "or" constructions.

2.2 Defining "or" readings

Linguists mostly classify "or" readings as if the natural language connective were the counterpart of the logical disjunction ∨. "or" functions which do not correspond to logical disjunction, nondisjunctive tokens, are then typically excluded from discussion, analyses overwhelmingly focusing on a distinction between Exclusive and Inclusive readings. According to Ariel and Mauri (2018), this account suppresses both the main feature of "or" constructions, namely the "alternativity" relation they necessarily invoke, and the rich variety of readings these constructions give rise to. Based on all 1,053 American English *or*s found in The Santa Barbara Corpus of Spoken American English (SBC) (Du Bois and Englebretson, 2005), Ariel and Mauri argued for an altogether different analysis, which we find much more appropriate for analyzing natural language 'or's in general, and child-directed 'or's specifically. First, Ariel and Mauri analyze any and all "or" constructions, nonlogical disjunctions uses included, since linguistic analysis is accountable for all linguistic forms. A child acquiring her natural language "or" connective too has to come to terms with all of its functions.

Next, according to Ariel and Mauri (2018), "Inclusivity" (i.e., "at least one of the options and possibly both") is neither the semantic meaning of the natural language "or" nor one of its contextual readings. Ariel and Mauri propose that a "possibly both" function is only encoded by an "and/or" connective. To the extent that participants judge a nonConjunctive "or" (see below) proposition (e.g., *Fiona ate an apple or a banana*) true against a "both" state of affairs (where Fiona ate both fruits) this judgment is based on an inference defined by Ariel (2002) as a Truth-Compatible Inference. A Truth-Compatible Inference is an inference that the addressee can (but does not have to) derive in order to construe the proposition and the state of affairs sufficiently *compatible* that the statement need not be judged false. In this case, the participant may reason that the state of affairs in which Fiona ate both fruits is compatible with a statement that she ate one of the fruits. But a Truth-Compatible Inference (TCI) must be sharply distinguished from both semantic meaning and conversational implicature. The latter two are *speaker-intended messages*. TCIs are not. The statement about Fiona does not *say* that "Fiona ate one of the fruits and possibly both", it says that she ate one of the fruits, although it may be taken as compatible with a "both" state of affairs. Fishman et al. (2023) presented experimental evidence showing that Inclusive *readings* are not derived even when context would support such a reading (when what's at stake is whether "at least one of the options" holds). The great majority of their participants nonetheless opted for a "one option" (Exclusive) reading. At the same time, due to the application of TCIs, these statements were judged by the same participants as true in close to half of the cases. These differential results regarding a "both" state of affairs support the distinction between an Inclusive *reading* (not attested) and Truth-Compatibility *Inferences* (inconsistently attested, only in truth judgments). The important

implication of this assumption is that if we use a task which taps into the speaker-intended reading, we should not find any Inclusive responses.

Instead of an Inclusive semantic meaning, Ariel and Mauri proposed a procedural meaning for natural language "or", an "alternativity" relation between the disjuncts. They define alternativity as an unresolved competition between multiple options over a single slot, i.e., a single context-specific role. For example, in *Fiona ate an apple or a banana* "apple" and "banana" compete for the single slot of "what Fiona ate" and this competition is not resolved in the utterance. "Alternativity", however, need not hold in the factual world of real apples and bananas. It can be evaluated at a metalinguistic (speech act) level (see below) (e.g., *soda or pop*). We note that the "alternativity" analysis also better accounts for various readings we introduce below, such as Conjunctive uses of "or", where the speaker actually commits to both alternatives (and not only as a possibility), as well as cases where the speaker does not necessarily commit to any of the alternatives as her speaker-intended message.

Finally, Ariel and Mauri have a very limited use for so-called Exclusive readings. Of course, they too recognize that speakers often enough intend a "single-option" reading. But they distinguish between a speaker-intended "single option" and Exclusive readings. The latter add a specific meaning layer which rejects "both", on top of the "single-option" message (Ariel and Mauri do not need to assume a default "not both" implicature, because unlike the classical analysis, they do not start out with a "possibly both" meaning which needs to be cancelled in order to make a "single-option" reading possible). Consider the following "single-option" (Exclusive) case. For ease of reading we present the originally Hebrew examples in a fairly literal translation into English. Where the differences between the languages are relevant we make a note of that: [2]

> 1. Adult: And what shall we buy Hagari on the way?
>   Child: Uh an ice cream bar!
>   Adult: Ice cream bar?
>   No,
>   We do not eat ice cream bar in the morning.
>   A bagel **or** a cake,
>   what shall we buy Hagari on the way?
>   Child: No…
>   Adult: A bagel **or** a cake?
>   Child: A cake. (Hagar, 2;8).

While the adult definitely expects Hagar to pick only one of "bagel" and "cake", he has no intention to also actively communicate "not both" (recall that implicatures are speaker-intended meanings, even if indirect ones). The relevant implicature here is, rather, a rejection of another alternative, namely, "an ice cream bar". Note that adding an explicit *not both* to the "or" construction here is odd (?? *bagel or cake, not both*), while adding *not an ice cream bar* is acceptable (*Bagel or cake, not an ice cream bar*). According to Ariel and Mauri, a "both rejection" only functions as a Particularized Conversational Implicature, derived when the specific context renders a "both options"

state of affairs relevant or expected, but the speaker nonetheless chose "or", rather than "and". This is only very rarely the case. Readers are invited to verify this point by trying to add *not both* to each of the single-option (Exclusive) cases below. It's odd in all of them.

Moreover, the category of Exclusive is not informative enough, because although several constructions commit the speaker to a single option, they are not all of one stripe. This is why Ariel and Mauri's distinction between various single-option readings is crucial in explaining children's initial acquisition of natural language "or". If Ariel and Mauri are correct, children may not acquire all "single-option" (Exclusive) readings in one step.

Since we are not using the conventional classification of "or" readings we must define the Ariel and Mauri "or" readings we adopted in our corpus analysis. Moreover, as we'll see below, CDS differs from nonCDS adult conversations quite dramatically, on as many as 10 of the following 12 readings. But in order to not overwhelm the reader we here define only the disjunctive readings (8). The nondisjunctive readings (4) are defined in Appendix B. We divide the disjunctive readings into three groups in order to roughly compare them to the three-way distinction between: Exclusive, Inclusive and Conjunctive. According to current assumptions, each cluster of readings should pattern similarly with respect to the children's acquisition of "or".

Narrowed, Choice Immediate and Choice potential would all count as Exclusive readings. We do distinguish between them, because of the different messages they are associated with.

Narrowed "or" constructions are interpreted as "one of X and Y". They reflect Grice's (1989) intuition that when a speaker is unable to zero in on the one true alternative, she issues an "or" construction, because all she can do is narrow down the viable options to the ones she explicitly lists as disjuncts. Naturally, the proposed alternatives are fairly similar to one another (relative to the context). Here's such a case:

> 2. Child: What's this?
>   Adult$_1$: Mobile homes.
>   Adult$_2$: A model of mobile homes **or** a picture of mobile homes
>   (Lior, 2;7).

Adult$_2$ cannot determine exactly what it is they are seeing, and therefore proposes that it's one of the two options she lists. We note that such classical Exclusive "or" cases are the leading "or" targets in experiments, but as we'll see below, they are extremely rare in natural conversations.

Choice Immediate "or" constructions highlight the potential interactional difference between the alternatives (unlike Narrowed constructions). The speaker here profiles some unresolved choice among a number of options, intending her addressee to choose among them right there and then. Naturally, these take the form of direct alternative questions (although they need not be syntactically so). We note, however, that Hebrew direct questions have no formal marking except for a rising pitch, but, as we discuss below, Choice Immediate "or" constructions typically end with a falling pitch: [3]

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3. Adult: And it moves fast **or** slowly?
    Child: It goes fast.
    Adult: No, it moves slowly (Leor, 2;2).

The next example is Choice Immediate too, but it is at the same time an incremental construction, where the "or" construction results from an added afterthought. Having uttered a syntactically, semantically and prosodically complete first utterance, the speaker goes on to add a syntactically and semantically fitting increment, but within a separate intonation unit (an intonation unit is "a stretch of speech uttered under a single coherent intonation contour," Du Bois et al., 1993, p. 47). The adult in (4) starts by asking an open question, then shifts to a polar question. She then increments the polar question, retroactively turning it into a Choice Immediate question:

4. Adult: Whose game is it, Lior?
    Yours?
    Or Nitzan's? (Lior, 1;6).

Choice Potential "or" constructions (after Mauri, 2008) too highly profile a choice between alternatives. Unlike Choice Immediate constructions, Choice Potential ones mostly (but not invariably) involve embedded indirect questions, and crucially, they do not prompt an immediate addressee choice:

5. Adult: So how will we know if she's home **or** not? (Lior, 2;7).

Next, Separative conjunction is a Conjunctive reading.
Separative conjunction "or" constructions (after Jennings, 1994) are the opposite of Exclusive "or" constructions, because they commit the speaker to both alternatives (just like "and"), except that the two conjuncts also constitute alternatives to one another at the same time: [4]

6. Adult: It's blue **or** white more than black specifically. (Hagar, 2;1).

Note that "or" is here substitutable by "and" ("It's blue and (it's) white more than black specifically").
Finally, the next four readings do not fit comfortably into an Exclusive/Conjunctive division. They are not Inclusive ("at least one, possibly both"), but they may sometimes be taken as compatible with an Inclusive reading (via TCI).
Free Alternative "or" constructions (which carry a similar, but not identical reading to that of Free Choice) allow for the possibility of "both". Indeed, a "bird's eye view" would reveal both plastic and wooden shutters:

7. Adult: Shutters is something that covers the curtain against the sun.
    It's made of plastic **or** wood (Hagar, 2;4).

But at the same time, any single shutter is made of only one of these materials, which is what an "ant's eye view" would reveal. Free Alternative cases then combine a Conjunctive reading (all options

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4   While they are compatible with the so-called Inclusive reading, Conjunctive cases are a stronger reading than Inclusive. The latter only specify *'possibly* both'.

may be realized) with a single-option reading, according to which any single shutter is made of only one of these materials. The reading associated with such constructions is "*any* one of the alternatives". This is also true for Free Alternative permission cases:

8. Adult: Maybe (=how about) you bring a story and I'll tell you **or** you'll tell me? (Lior, 1;7).

Note that although in principle, this suggestion is compatible with a resulting event in which mother *and* daughter each tell the other a story, this is so only with the help of a Truth-Compatible Inference (TCI). The mom's expectation is that only one of these events will take place. This is why we do not classify such cases as Inclusive.
Indifference 'or' constructions show a (Free) Alternativity relation between the introduced options, but in addition, the speaker strongly implicates that the objectively real difference between the alternatives (here "he likes it", "he does not like it") makes no argumentative difference:

9. Adult: Nathan…, must,
    whether he likes it **or** not,
    perform something convincing (Lior, 2;7).

These tend to be factually Exclusive (they introduce opposite alternatives), but this is irrelevant, for together, the two alternatives are meant to cover "*any* circumstance".
Raised options "or" constructions do not commit the speaker to even one of the explicit alternatives. Having made a few suggestions for what Smadar might do, the adult proceeds with:

10. Adult: So you want to tell a story to Dolly **or** to the Teddy bear maybe?
    Child: No. (Smadar, 1;10).

Note that the speaker does not commit to even one of the alternatives as necessarily expected to be the case. In other words, the mother does not indicate an expectation of a choice between the alternatives on the child's part. Indeed, Smadar's "no" is the natural response in such cases (as is a "yes" response). "Exclusivity" may, but need not be a TCI here.
Exhaustive "or" constructions may be either Exclusive or Conjunctive. The crucial message in the following Conjunctive case is that the explicit alternatives are the only relevant ones. No other alternative, such as a walk, should be considered:

11. Adult: But you cannot go for a walk with a bathing suit.
    With a bathing suit you go to the swimming pool **or** to the beach (Lior, 1;11).

Summing up, according to Ariel and Mauri, all "or" constructions profile some alternativity relation between the explicitly mentioned disjuncts. But, unlike the traditional analysis, this relation (i) may apply only at a metalinguistic level (consider *soda or pop*). Moreover, (ii) in addition to the "alternativity" aspect, each reading is associated with various alternativity-related messages: How many alternatives does the speaker commit to? (0, 1, 2); Why are the alternatives relevant to the discourse? (e.g., because the speaker cannot zero in on a single option, or because the addressee needs to make a choice right there); How different or similar are the alternatives? (similar, different, or the

difference between them does not matter); Are additional (implicit) alternatives ruled out? (absolutely yes for Exhaustive, absolutely not for some nondisjunctive readings – see Appendix B). Additionally, "or" readings are not accompanied either by an Exclusive "not both" implicature, or by an Inclusive "possibly both" interpretation. At best, these are TCIs. Readers are referred to Ariel and Mauri (2018, 2019) for more information and argumentation.

2.3 Overall goals and structure of the paper

Three different proposals have been made regarding early "or" acquisition. If what's considered an Inclusive reading is indeed the first "or" reading to emerge then we should find early acquisition of readings where Truth-Compatibility with a "both" state of affairs is potentially inferable (all the "single-option" readings, plus Free Alternative and Raised Options). If the Conjunctive-first proposal is correct, then Separative Conjunction tokens should be acquired early. Finally, since researchers do not recognize differences between different "single-option" readings, all equally Exclusive, these (Choice Immediate, Choice Potential, Narrowed, some Exhaustive cases, and some nondisjunctive readings) should emerge first according to an Exclusive-first proposal.

We propose altogether different predictions. We see a marked difference between Choice Immediate and all other readings (be they Exclusive, Inclusive or Conjunctive), because we hypothesize that Choice Immediate "or" constructions are prosodically very salient, they are useful for adults addressing children, and they are highly conventional. If we are correct, they should be very frequent in CDS, and if so, based on usage-based theories, we predict an early child acquisition of this construction specifically.

We present two studies, both conducted in Hebrew, which is similar to English with respect to "or" constructions. Study 1 is a corpus investigation of child and child-directed speech, addressing three research questions: (1) which "or" constructions are most common in CDS (Study 1a), (2) which are appropriately comprehended by children (Study 1b), and (3) which are produced by children (1c). Study 2 then tests young children's (three to four year-olds) comprehension on the most frequent "or" construction found in child-directed speech: Choice Immediate.

3 Study 1: hearing, responding and producing "or" constructions

The goal of Study 1 is to test the usage-based hypothesis that children acquire "or" constructions according to the linguistic input they receive in child-directed speech (CDS). We analyzed the "or" constructions used by caregivers to children and by children to caregivers in the Berman corpus.[5] The Berman corpus (henceforth the child corpus) consists of longitudinal naturalistic data collected on a weekly basis from four Hebrew-speaking children, three girls (Hagar, Smadar, and Lior) and one boy (Leor) in the late 1980"s. All four children are native speakers of Hebrew, raised in monolingual, highly

educated Hebrew-speaking homes, with both parents professionals, in urban communities of central Israel (age 16–39 months, depending on the child).

For comparison purposes, we examined two adult-adult conversational Hebrew corpora, The Haifa corpus and CoSIH (henceforth, the adult corpus). We opted for the earlier recordings within these corpora (Haifa 1993–2001, CoSIH 2000–2001), because the Berman corpus was recorded in the late 1980"s.[6] The Haifa Corpus includes audio recordings of informal spontaneous Hebrew interactions between students, their friends and relatives, collected during the years 1986–2018. Most interactions took place face-to-face. CoSIH (Corpus of spoken Israeli Hebrew) contains recordings made between August 2000 and October 2002, all natural conversations of CoSIH's volunteers and informants. CoSIH is an open-source corpus, and can be found at http://cosih.com/english/index.html.[7]

Our corpus study posed three research questions: Study 1(a) compares CDS (in the Berman corpus) (henceforth, CDS) to nonCDS adult conversations (the adult corpus), in order to find out whether there are specific "or" constructions which are especially frequent in CDS. Since Study 1(a) revealed that Choice Immediate "or" constructions are the single overwhelmingly frequent "or" construction in CDS, the next two studies tested the usage-based claim about acquisition mirroring caregivers' use. Study 1(b) examined whether children's responses to this construction are more appropriate than to other "or" questions. Study 1(c) examines whether children's production of Choice Immediate constructions is more frequent than their production of other "or" constructions.

3.1 Study 1a: CDS "or" constructions

3.1.1 Hypotheses and predictions

The purpose of this study was first, to identify the "or" readings children hear. Following Huttenlocher et al. (2007), we wanted to find out if there are differences between CDS and the adult corpus with respect to the readings and/or their frequencies. We were especially interested in identifying relatively salient, dedicated "or" constructions (as defined by Goldberg, 1995). We therefore coded the "or" utterances for their prosody. Previous research found that Choice Immediate "or" constructions introduce a specific division into intonation units, whereby each alternative preferably occupies a separate intonation IU

TABLE 1 "Or" productions by caregivers in each child sub-corpus of the child corpus.

Child (age)	CDS "or" (addressed to child)
Hagar (1;7–3;3)	157 (154)
Lior (1;5–3;1)	132 (122)
Leor (1;9–3)	45 (45)
Smadar (1;4–2;4)	13 (13)
Total	347 (334)[a]

[a]13 adult or's were addressed to another adult or to a baby.

— 78% in the American English SBC (Ariel and Mauri, 2018). This prosodic pattern was verified for Hebrew specifically in a production experiment of Choice Immediate "or" utterances by Yeverechyahu and Asherov (2016), who found not only a strong tendency to use two-IU constructions, but also a specific melody: a rising pitch on the first IU and a falling pitch on the second IU (Pruitt and Roelofsen, 2013). We predicted a high correlation between this prosodic pattern and the CDS Choice Immediate tokens.

3.1.2 Methods

We extracted all 352 "or" hits produced by caregivers in the Berman corpus, but 5 hits had to be discarded for various reasons, which brings us to a total of 347 cases.[8] Two research assistants, Israela Becker and Itai Kuperschmidt, both experts on Ariel and Mauri's (2018) classification of "or" constructions, first created the "or" corpus, and then independently manually coded its "or" tokens for the children and the caregivers according to that classification. Incremental cases (a total of 41) were classified according to the reading they created with the increment. Reading disagreements (~7%) were resolved by the first author. In the adult corpus, 140 hits were found for the Hebrew counterpart of "or", o (72 from the Haifa corpus, 68 from CoSIH), but only 131 were relevant (noninterjections) and codable (not truncated and clear enough). The first author coded these "or" readings, and were checked by the third author (no disagreements were found). The third author identified the prosody of the "or" constructions in the Berman corpus, and Ittamar Erb coded the prosody of the adult corpus "or" constructions. The first author checked all prosodic codings, only few of which (~5%) were amended following discussion.

3.1.3 Results

Table 1 presents the breakdown of the CDS "or" utterances in each child sub-corpus. These constitute 95.9% of all "or" constructions in the Berman corpus. The rest were produced by the children, and will be discussed in Study 1c:

Table 2 specifies the distribution for each of the 8 disjunctive readings, as well as the nondisjunctive readings (pulled together), defined above in each child sub-corpus (see Appendix B Table 9 for data on the nondisjunctive readings as well). These can be compared to the 8 readings analyzed by Jasbi et al. (2022, Table 4).

Table 3 compares the findings from the adult and the CDS corpora, combining the 4 children's sub-corpora presented in Table 2.

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8   Hebrew o is also an interjection, and some os were false starts.

TABLE 2   Breakdown of caregivers' "or" readings in each child sub-corpus.

Child reading	Hagar	Leor	Smadar	Lior	Total
Narrowed	0	0	0	1 0.8%	1 0.3%
Choice immediate	123 78.3%	43 95.6%	6 46.1%	83 62.9%	255 73.5%
Choice potential	6 3.8%	1 2.2%	0	6 4.5%	13 3.7%
Raised options	10 6.4%	1 2.2%	2 15.4%	7 5.3%	20 5.8%
Free alternative	8 5.1%	0	1 7.7%	19 14.4%	28 8.1%
Exhaustive	2 1.3%	0	0	2 1.5%	4 1.1%
Indifference	0	0	0	2 1.5%	2 0.6%
Separative conjunction	1 0.6%	0	0	1 0.8%	2 0.6%
Nondisjunctive (various)	7 4.5%	0	4 30.8%	11 8.3%	22 6.3%
Total	157 100%	45 100%	13 100%	132 100%	347 100%

Again, Appendix B Table 6 compares the nondisjunctive readings as well.

Our first interesting finding is that all but one rare nondisjunctive reading were produced in both corpora. A Fisher exact test for proportions revealed significant differences in the frequencies of the readings (overall, the difference between the corpora is significant, $p < 0.001$). First, as expected, nondisjunctive uses are rather common in the adult corpus (38.2%), but quite rare in CDS (6.3%). Second, Narrowed, Exhaustive, Indifference and Separative Conjunction are rare in both corpora. Third, the readings potentially compatible with Inclusive (that are not Exclusive), namely, Raised Options, Free Alternative, Exhaustive and Indifference are more frequent in adult use than in CDS (35.9% all together versus 15.6%). Fourth, comparing all unequivocally Exclusive tokens combined (Narrowed, Choice Immediate and Choice Potential), CDS shows much more of those than the adult corpus (77.5% versus 23.7%). Fifth, Free Alternative tokens are significantly more frequent in the adult corpus than in CDS.

But these differences do not tell the whole story. Our most important finding is that one reading stands out in CDS: Choice Immediate. Although but one of twelve readings in general, and one of 3 Exclusive readings, Choice Immediate constructions constitute the majority of "or" readings (73.5%) in CDS, with almost 3 times as many instances (255) as all other "or" readings combined (92). This is 4.2 times more than in the adult corpus. Other readings are quite rare, ranging between 0.3 and 8.1%. Thus, compared to the second most frequent CDS reading — Free Alternative (28, 8.1%) — Choice Immediate cases are almost 9 times more frequent. In the adult corpus, on the other hand, the frequent "or" readings are much more evenly divided among 5 types: Free Alternative, Choice Immediate and 3 nondisjunctive readings (X Or Similar, HLC, Repair – see

TABLE 3 Breakdown of "or" readings in CDS and the adult corpora.

Reading	Adult (Haifa and CoSiH)	CDS (Berman)
Narrowed	5 3.8%	1 0.3%
Choice immediate	23 17.6%	255 73.5%
Choice potential	3 2.3%	13 3.7%
Raised options	6 4.6%	20 5.8%
Free alternative	29 22.1%	28 8.1%
Exhaustive	7 5.3%	4 1.1
Indifference	5 3.8%	2 0.6%
Separative conjunction	3 2.3%	2 0.6%
Nondisjunctive (various)	50 38.2%	22 6.3%
Total	131 100%	347 100%

Appendix B). None of these has the predominant status enjoyed by Choice Immediate "or" in CDS. All five range between 11.4 and 22.1%. Figures 1A,B illustrate these different distributional patterns (see Appendix B Figures 2A,B, which presents a breakdown of the nondisjunctive readings as well).

Next, our prediction about the prosodic signature of the conventional Choice Immediate constructions was confirmed for both corpora. Of the Choice-Immediate constructions in the adult corpus, 19/23 (82.6%) received the signature prosody (2 IUs with a rise and a fall). The 4 additional cases also spanned across two IUs, but did not meet one or both pitch conditions. We only have access to recordings of about 2/3 of the CDS constructions (242/362).[9] 232 of these were uttered by the caregivers. Hence, the following statistics are based only on these cases. The results are as expected. Of the CDS Choice Immediate cases we have recordings for, 133/182 (69.3%) spanned across two IUs. Of these, 130 (97.7%) met both pitch conditions as well, and the remaining 3 cases only met the rise condition on the first alternative. Interestingly, all 49 single- intonation-unit Choice Immediate constructions also showed a rise-fall melody, albeit within a single IU (John DuBois p.c. proposes that grammaticization may lead to compacting of the construction into a single IU). Thus, all in all, 179/182 Choice Immediate cases (98.4%) met at least one prosodic feature, and as many as 130/182 (71.4%) manifested all three prosodic features. These findings are in line with Jasbi et al. (2022), who note a

frequent rise-fall intonation contour with Exclusive constructions (no information provided about IU boundaries).

The difference between the prosody of Choice Immediate constructions and that of the other readings is quite dramatic. Only 26/136 nonChoice Immediate constructions spanned across two intonation units (19.1%), and almost half of these (12, 46.2%) introduced readings that obligatorily span across two IUs (Incremental and Repair constructions). Crucially, however, none of these two-IU constructions showed the rise-fall prosody of the Choice Immediate construction.

Thus, upon hearing a two-IU "or" construction with a rise-fall melody (133 cases) children could very confidently predict that the reading would be Choice Immediate (127, 95.5%). The rise-fall melody of single IU "or" constructions is highly informative too: 48/55 of these cases received Choice Immediate readings (87.3%). In other words, the specific prosodic patterns are not only highly salient, they are also extremely consistent with one specific reading, namely Choice Immediate. We could even generalize across one and two-IU constructions carrying a rise-fall melody, and say that as many as 175/188 of all rise-fall melody cases are interpreted as Choice Immediate (93.1%). [10]
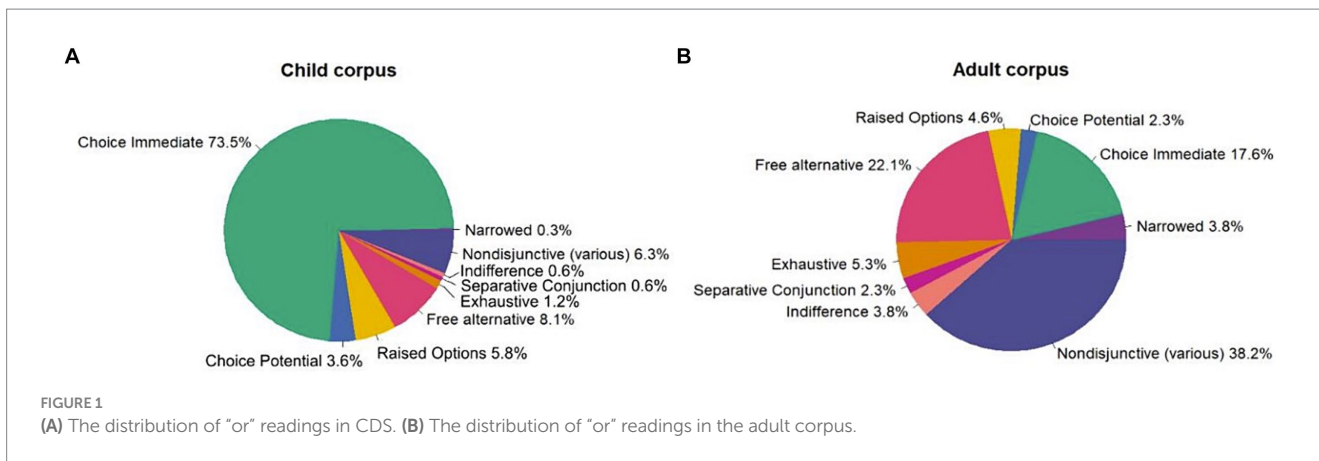
3.1.4 Discussion

While all types of readings appeared in the adult and the CDS corpora, there was a frequency difference in the distribution of readings. We suggest that two main motivations lie behind the adapted CDS. The first is a general attempt to reduce the use of more cognitively complex types of alternativity relations. Indeed, according to Zufferey (2010), the cognitive complexity of linguistic functions delays language acquisition. This is true for the nondisjunctive readings (6.1 times less), as well as for Free Alternative (2.7 times less), which combines a "single-option" component (the addressee is expected to pick only one alternative at a time) with a "both" relation (both alternatives are endorsed by the speaker).

More importantly, and much more dramatic is the increase in CDS in only one of the three Exclusive reading, namely, Choice Immediate, which is also prosodically highly salient. The highly inflated use of Choice Immediate constructions is strongly functionally motivated, we suggest. Cognitively, both Choice "or" introduce a most salient instantiation of the rather abstract alternativity relation, i.e., where multiple options compete for a single slot. But Choice Immediate makes alternativity more concrete, because the addressee is expected to resolve the competition right there and then by choosing exactly one of the alternatives. An additional motivation for the frequent use of Choice Immediate is interactional.

Choice Immediate "or" constructions constitute an especially salient Goldbergian construction, we found, where a very marked form is consistently associated with a very specific discourse function: prompting the addressee to make an immediate choice among the explicitly presented alternatives. Interactionally, offering a choice among a restricted set of alternatives may facilitate interaction with children, because the enumerated alternatives draw the child's attention to the set of potential appropriate responses, while at the

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9   We counted both strong and weak IU boundaries (manifesting less cues) as boundaries. And we counted high pitches of second alternatives as falls provided their high pitch was lower than the one in the first IU. Needless to say, we applied this lenient definition across the board for all readings.

10   But for the adult corpus separate IUs for the alternatives holds for 100% of Choice Immediate cases, whereas the rise-fall melody only holds for 82.6% of the cases. The higher rate of rise-fall contour in CDS might be an effect of the exaggerated prosody of Motherese.

FIGURE 1
(A) The distribution of "or" readings in CDS. (B) The distribution of "or" readings in the adult corpus.

same time delimiting the range of options to the ones explicitly mentioned. Indeed, the use of such strategies is mentioned by various educational pedagogies (e.g., Montessori parental guidelines), pointing to their possible utility in conversing with children. We next exemplify where caregivers find it useful to help the children out with Choice Immediate questions. These functions only partially overlap with the 10 *or* discourse functions examined by Jasbi et al. (2022) (Appendix B Table 9).

Caregivers need to elicit and to clarify information from the child. The examples in (12) present three typical cases of Choice Immediate questions. First, these sometimes accompany open questions (as in 12a) or polar questions (as in 12b), all posed for the same elicitation purpose. What's special about Choice Immediate questions is that they offer a scaffolding for the child, making the set of relevant responses expected by the adult accessible to her, while suppressing less likely responses (according to the adult) (see Bolinger, 1978 about how alternative questions restrict the range of options even more than polar questions). In addition, 12 (b and c) initiate an other-repair, a recognized, but dispreferred, interactional move in adult conversations (Koshik, 2005). The caregivers use these alternative questions to avoid a direct correction of the child (the correction in ex. 3 is rare), while at the same time alerting her to an option she did not consider (see Chouinard and Clark, 2003 for a similar strategy). Interestingly, Koshik also finds that this strategy is more common in teacher-student interactions:

> 12. a. Adult: Who lives there at the edge of the tower?
>   A rabbit **or** a fox?
>   Who lives at the end of the tower, Hagar?
>   Child: A tall tree, a tall tree. (Hagar, 1;10).
>   b. Adult: Is the ladder low?
>   Child: Yes.
>   Adult: Low **or** high?
>   Child: It's high. (Leor, 2;4).
>   c. Child: I want a cup in – a cup in water.
>   Adult: You want a cup in water, **or** water in a cup?
>   Lior: Water in a cup (Lior, 2;7).

Since Study 1a found an overwhelming frequency of specifically Choice Immediate constructions in CDS, the next two studies focus on this construction, in order to test the usage-based claim that children's comprehension (Study 1b) and production (Study 1c) should favor Choice Immediate uses.

3.2 Study 1b: comprehending choice immediate "or" constructions

Corpus data does not straightforwardly testify to comprehension. But (in)appropriate responses can show which constructions are (im) properly understood by interlocutors. Now, Choice-Immediate "or" constructions are direct (alternative) questions, and as such, form part of an adjacency pair (Schegloff, 2007), where a first speaker issues the first part of the sequence (a question in our case), thereby making the second part (a response) eminently relevant. Indeed, Stivers (2010) found that questions were properly answered by adults 80% of the time, and very quickly so (most of the remaining cases introduced an acceptable response even if not the expected one). Rossano (2010) found only 16% of "no response" to questions in adult Italian conversations. Now, it's well-established that questions play an especially important role in adult-child conversations (Forrester, 2015; Liu, 2022). Although even 4–8 years old children's response rate to questions is lower than that of adults, and they are also slower to respond (Stivers et al., 2018), children tend to respond to questions starting at an early age (2–3 years old, Lieven, 1978). The appropriate response for Choice Immediate questions is for the addressee to pick one of the explicit alternatives mentioned in the question. But Choice Immediate "or" constructions are not the only questions containing an "or". Unlike Choice Immediate questions, polar "or" questions prompt "yes"/"no" responses, as in (10) above, where the child responded with "no."

3.2.1 Hypotheses and predictions

Given the adjacency-pair pressure to respond to questions, all questions containing "or" should be appropriately responded to by children at a similar rate. But if we are correct in assuming that Choice Immediate constructions emerge earlier than other "or" constructions then a higher rate of appropriate responses is to be expected for Choice Immediate questions, as compared with other "or" questions. Jasbi et al. (2022) discuss such responses, but they do not provide a breakdown of their children's responses to alternative versus to polar questions containing *or*.

TABLE 4 Children's responses to Choice Immediate constructions.

Appropriate response (single option)	No response	Irrelevant response	Different conversationally acceptable responses	"Both"	Total
148	13	31	46	2	240
61.7%	5.4%	12.9%	19.2%	0.8%	100%

TABLE 5 Children's responses coded nonapplicable.

Adult continued	Response made redundant	Indecision	Choices challenged	Total
28	15	2	1	46
60.9%	32.6%	4.3%	2.2%	100%

3.2.2 Methods

The (non)responses to all "or" constructions within questions in the Berman corpus (both caregivers and children) and in the adult corpus were tabulated by the same coders specified in Study 1a.

3.2.3 Results

Starting with the adult corpus, out of 23 Choice Immediate constructions, as many as 21 were appropriately responded to with a single option by the adult addressee (91.3%).[11] In the Berman corpus, 16 Choice Immediate questions were addressed to caregivers by children or by other adults. Of these, 7 showed the predicted response, but 3 received inappropriate responses (one of these prefaced the single option with a "yes"). In 4 additional cases, the response asked for a clarification from the child, or explained why the adult wasn't in a position to respond appropriately, or guided the child on how to come up with the answer herself. In two cases the turn was not relinquished by the child after producing the question. Discounting these last 6 cases, where avoidance of a single option is interactionally acceptable, CDS caregivers responded to Choice Immediate cases as expected 70% of the time.

249 Choice Immediate "or" constructions were addressed by a caregiver to a child in CDS, but 8 produced unclear responses and 1 case was truncated. Table 4 provides the breakdown of the children's responses to the 240 questions.

Children responded appropriately to the caregiver's Choice Immediate questions in the majority of cases (61.7%, see examples 1,3, 12b). Here's one No response case:

13. Adult: Golgi, you want to eat,
         Or you only want to play?
      Hagar: (mumbling to herself).
      Adult: Is it tasty? (Hagar, 1;8).

12 (a) above exemplifies a child's irrelevant response.

Table 5 details the nonsingle-option responses we counted as conversationally acceptable. These were different from the counterpart CDS responses above.

A major reason for the child's failure to respond is that the adult did not relinquish her turn. Next, consider the following, where the child responds to the first question before the adult increments their

first question with a second alternative. Responding to the alternative question is then rendered redundant if the child does not wish to change her mind. These are incremental or overlap cases (14/15):

14. Adult: Would you like to look at the book?
      Child: Yes.
      Adult: **Or** would you like to draw a picture? (Hagar, 1;11).

We note that Rossano (2010) finds this very pattern of responses among adult Italians too.

In two cases the original transcriber (not one of the current authors) added a comment that the child was having a hard time deciding, which means that s/he did realize a choice was expected. One case (see again example 1) shows the child responding with "no" in an attempt to object to the undesirable set of choices she's being offered. Indeed, once the adult insists that this *is* the set of alternatives the child proceeds to respond appropriately.

Once we remove the conversationally acceptable nonsingle-option responses, we see that the children provided the predicted response in 148/194 cases, 76.3%. This is quite similar to their caregivers' rate of single-option responses (70%).

Now, let us compare the children's appropriate response rate to Choice Immediate questions to their appropriate response rate for nonChoice Immediate "or", where the appropriate response is "yes"/"no." There were 25 such cases, as seen in Table 6.

Excluding the 6 cases where the adult did not relinquish her turn, the children's responses were inappropriate in more than half of the cases (10/19, 52.6%). They were fully appropriate in less than a third of the cases (5/19, 26.3%). Four other responses (21%) can be counted as partially appropriate. In these cases, the child failed to provide the expected "yes"/"no" response, and instead, proceeded to make a single-option choice, based on a reasonable inference that choice is here discourse-relevant anyway. Even so, these two response types together make up under half of the responses (9/19, 47.3%), which is clearly lower than the rate of appropriate responses to Choice Immediate cases (76.3%). A chi-square goodness of fit test was calculated to compare the proportion of responding appropriately to Choice Immediate "or" and non-Choice Immediate "or", and confirmed the difference to be significant ($\chi2(df = 1) = 8.79$, $p = 0.003$).

There is another potential difference between the responses to the two "or" question types. Responses to Choice Immediate questions showed a very consistent pattern overall, as well as for each of the four children – a majority of appropriate responses, ranging from 69.5 to

TABLE 6 Children's responses to nonChoice Immediate questions.

Appropriate response	Partly appropriate	Inappropriate response	Adult continued	Total
5	4	10	6	25
20%	16%	40%	24%	100%

100%. In contrast, each child showed a different response pattern to the polar "or" questions: one child (Hagar) consistently gave inappropriate responses (6/7), another (Smadar) gave only partly (2) or fully (1) appropriate responses (3/3), and the third was in-between (3 appropriate, 2 partly appropriate and 4 inappropriate responses) (there were no relevant cases for the fourth child).

3.2.4 Discussion

Study 1b shows that only Choice Immediate constructions consistently prompted an appropriate, adult-like response from all the children. The children's comprehension of Choice Immediate "or" constructions as single-option constructions is, then, remarkably high, which provides evidence that their acquisition of this specific construction is quite advanced.

A note is here in order about the two "both" responses in Table 4, which seem to attest to an Inclusive or possibly a Conjunctive interpretation. Recall that our prediction was that since natural responses address the speaker-intended "what is said", rather than a Truth-Compatible Inference, which is not intended by the speaker, no "both" responses should have been observed. Indeed, we are not sure that the cases we counted as "both" above should be so counted:

> 15. a. Adult: Some more bread?
>   Child: More, and more beets.
>   Adult: More beets **or** more cabbage?
>   Child: More cabbage, more cabbage. Want more beets (Hagar 2;2).
>   b. Adult: A big or a small circle?
>   Child: Small **and** big. I made you a small and big circle, big (Lior, 2;3).

15(a) is not an unequivocal "both" response because the child's second request for beets comes in a separate IU and clause, and under a separate predicate. In fact, the request for beets could be a Repair. In 15(b) the child seems unsure whether the single circle she drew counts as big or small. But to be extra careful, we counted these responses as inappropriate.

3.3 Study 1c: producing choice immediate "or" constructions

Children's comprehension often precedes their production. Still, if the children's first "or" construction is Choice Immediate, their "or" productions too should reflect this preference. Study 1c asks whether the usage-based approach can account for the children's specific pattern of "or" construction productions.

3.3.1 Hypotheses and predictions

Both Morris (2008) and Jasbi et al. (2022) found that children mostly produced what they call Exclusive' *or*'s. But our prediction is that children would not produce just any Exclusive constructions. Rather, we expect them to initially produce specifically Choice

TABLE 7 Children's "or" productions.

Child	Raised options?	Choice immediate	Other readings	Total
Hagar	0	7	0	7
Lior	0	4	0	4
Leor	0	0	0	0
Smadar	1	3	0	4
Total	1	14	0	15

Immediate "or" constructions, even if these are rare among the questions posed by children (Stivers et al., 2018). Since Choice Immediate is a conventional construction, the children's productions should show the typical prosodic signature as well.

3.3.2 Methods

We examined the frequency and the prosody of Choice Immediate constructions versus the other "or" readings produced by the children.

3.3.3 Results

Table 7 shows that the children only produced 15 "or" constructions.

As expected, 14/15 (93.3%) are specifically Choice Immediate cases (One construction was a doubtful Raised Options case). Consider:

> 16. Child: It was funny **or** scary? (Smadar, 2;1).

The signature prosody was more frequently associated with the children's Choice Immediate than with the caregivers'. All 10 children's "or" utterances for which we have recordings are Choice Immediate ones, and all of them manifest the prototypical Choice Immediate prosody: They span across two IUs, where the first one ends with a rise and the second one ends with a fall. The caregivers' rate for this prototypical prosodic signature is 71.4%.

3.3.4 Discussion

The results of Study 1c support the usage-based acquisition of "or" constructions in that children overwhelmingly produced the most frequent "or" construction in CDS, namely Choice immediate. They also invariably used the signature prosody associated with such constructions. For both these measures the children turned the adult dominant patterns into even more absolute patterns.

3.4 General discussion of studies 1a-c

Summing up the corpus data, we see that Choice Immediate "or" constructions are the single dominant "or" construction used by caregivers addressing children (Study 1a). As predicted by usage-based accounts of language acquisition, children successfully understand these particular constructions, as testified by their

appropriate responses to them at an adult-like rate (Study 1b). Children also produce Choice Immediate constructions overwhelmingly more often than other "or" constructions. The fact that they invariably use the signature prosody here shows that they recognize Choice Immediate as a wholistic construction (Goldberg, 1995). Recall that previous findings seemed to point to a peculiar trajectory, where production preceded comprehension. Our corpus findings show that children's comprehension does not lag behind their production, in line with other acquisition trajectories.

We note that our corpus findings for Choice Immediate "or" are theoretically quite different from those in Morris (2008) and in Jasbi et al. (2022), because we used a different analytic frame for the readings. At the same time, our findings seem compatible with their raw data. Thus, Morris and Jasbi et al. found that CDS *or*s frequently occur specifically in questions. It is quite likely that a majority of these English questions, especially those with a rise-fall contour, introduce specifically Choice Immediate "or" constructions (although, as we have seen, not all questions do!). But our different analytic framing allows us to offer a much more precise claim. While we agree with Jasbi et al. that children make their way into single-option interpretations via a context-dependent cued strategy, we analyze this strategy differently. We underscore the fact that our children's very successful one-option responses and productions are restricted to one specific form/function Goldbergian *construction* (the Choice Immediate "or" construction), rather than to any single-option (Exclusive) pattern. Goldbergian constructions are conventional, and the Choice Immediate' one specifically practically *encodes* the Choice Immediate reading. It is not merely a favored discourse profile, where some features are only optional (Jasbi et al., 2022). This issue is taken up in Study 2.

4 Study 2: responding to choice immediate "or" questions in the lab

Previous lab experiments have found that up to age 7, children interpreted "or" Inclusively or Conjunctively (Chierchia et al., 2001; Singh et al., 2016). The findings of Study 1 with much younger children, showed that Choice Immediate is the one dominant construction children hear (1a), interpret appropriately (1b) and produce (1c). Study 2 aims to test children's interpretation of Choice Immediate constructions in the lab, without any supporting context. We used a child-friendly task, responding to a Choice Immediate question.

4.1 Hypotheses and goals

If children start out with an Inclusive interpretation of "or" (e.g., Jasbi and Frank, 2017; Tieu et al., 2017), they should pick a both-options response in at least some of the trials. If children start out with a Conjunctive interpretation of "or" (Singh et al., 2016; Tieu et al., 2017), they should interpret a sentence such as *You want chocolates or jelly beans*? as "you want chocolates *and* jelly beans?", the proper answer being either "yes" or "no." But if children's non-adult like behavior in previous studies is related to the metalinguistic truth judgment task used, and/or to the unfamiliar Narrowed "or" constructions they were tested on, then they should show adult-like

behavior once they are presented with "or" constructions that are frequent in their input and are part of a child-appropriate task. For example, other linguistic constructions (e.g., relative clauses) show children manifesting adult-like behavior when tested on the kind of constructions that they are familiar with Tomasello (2003), Arnon (2010), Ambridge et al. (2015), and Goldberg (2019).

Now, Study 1b already supported this hypothesis, but the Berman corpus is perhaps not large enough. Moreover, after many experimental studies showing that children are Inclusive/Conjunctive, a major goal of our experiment was to show that given the right constructions and the right task, children do behave like adults. In addition, we wanted to support our analysis of Choice Immediate as a Goldbergian construction, easily identified by its salient prosodic signature. We here ask whether this prosody is sufficient by itself to elicit a single-option response, in the absence any discourse context, and specifically, in the absence mutual exclusivity between the explicit alternatives (e.g., *big or small*) (as proposed by Jasbi et al., 2022).

4.2 Methods

4.2.1 Participants

21 Hebrew speaking children, visitors of The Living Lab in the Bloomfield Science Museum in Jerusalem, participated in the study. Children were between 2;11 and 4;8 years old (Mean = 3;9, 5 females). None of the children had any learning or language difficulties. Parental consent was obtained before participation.

4.2.2 Stimuli and design

Children were presented with 18 Choice Immediate "or" questions, such as Y*ou want chocolates or jelly beans?*, pronounced with the signature prosody. These were accompanied by 18 pictures, all photographs shot in their natural environments.[12] All the target questions introduce alternatives that are neither mutually exclusive nor is it explicitly or implicitly indicated that only one option is expected. Each picture showed a character with two objects (e.g., a child holding chocolates and jelly beans, see Figure 2), and we noted their responses to the experimenter's question.

We made sure all the objects presented in the pictures were recognizable, by pretesting picture identification with a separate group of seven children (ages 3;0–4;0, 92% correct identification). All the nouns and verbs used were frequent words familiar to children at the tested ages. On each trial, a picture appeared on the screen. The experimenter described the picture to the participant (e.g., "the child is holding jelly beans and chocolates"), and then asked the child a Choice Immediate "or" question: *You want chocolates or jelly beans?* We note that the two alternatives were mostly both attractive to children, as in the case above, but they sometimes listed options which were not particularly attractive to children ("a phone or keys", "plates or cups", "a spoon or a fork"). No example targets were provided, in order to avoid biasing the children toward a single-option response.

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12   We thank John DuBois for patiently shooting the stimulus pictures. Parental consent was obtained for the stimulus pictures with children. The English translations of the 18 target sentences are listed in Appendix D.

Children's responses were classified into: 1. "Picked one" option of the two, the expected response for a single-option (Exclusive) interpretation. 2. "Both options" or "neither option". These responses are appropriate for an Inclusive interpretation (although we note that even children who understood that they were supposed to pick only one option could nonetheless opt for more – see below). 3. Repeating both options (e.g., "chocolates and jelly beans"). This response is compatible with the Inclusive interpretation, and possibly with the Conjunctive one. 4. An irrelevant option. 5. "Yes"/"no." This is the expected response for a Conjunctive interpretation.

4.2.3 Procedure

Children were seated next to an experimenter in front of a computer. The experimenter told the child that she was going to show her pictures and ask her questions about them. The experiment took 10 min to complete.

FIGURE 2
An example trial. In this example, the question asked was "You want chocolates or jelly beans?"

4.3 Results

As predicted, children showed an overwhelming preference for choosing only one option (see Figure 3): they picked just one option on 92.1% of the trials.

There was only one "yes" response, which means that the children did not interpret the construction Conjunctively. The paucity of "both" responses alongside the extremely frequent "picked one" responses shows that the children are not Inclusive either.[13]

We used a mixed-effect logistic regression model, predicting children's response (as a binary dependent variable: choice of one option as opposed to any other response) from trial number and children's age (both as centered continuous variables), with by-participant slopes for trial number and random intercepts for participants (see Table 8 for full model). We found a significant positive intercept, suggesting that the preference to choose one option was above chance ($\beta = 6.34$, SE = 2.04, $p = 0.002$).[14] We found no effect for age, nor for trial.

To further understand children's behavior, we also analyzed their individual interpretation patterns for Choice Immediate "or"

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13   Masoud Jasbi (p.c.) suggests that it might be a social norm of "take less rather than more" that prompts children to pick just one option. But we note that in a full third of the targets (6/18) each of the options contained multiple items (see, e.g., *chocolates or jelly beans* in Figure 3). Since, moreover, all the NPs were indefinite, there is no reason to assume that the options offered were necessarily interpreted as *all* the chocolates and *all* the jelly beans (Hebrew does not have an equivalent for the English determiner *some*). Two additional targets contained one option where only a subset might very well be expected (*keys, cake*). But children's responses were faithful to the plurality (or singularity) of the target constructions (e.g., "jelly beans"). They never selected, e.g., a singular 'key' in their responses.

14   In the conservative coding we used, a correct response is a one-option response and an incorrect response is anything else. Hence, the apriori chance of being correct is certainly lower than 50%, because the children could choose not only "X" or "Y", but also "both", "yes", "no" and a variety of other responses we actually received.
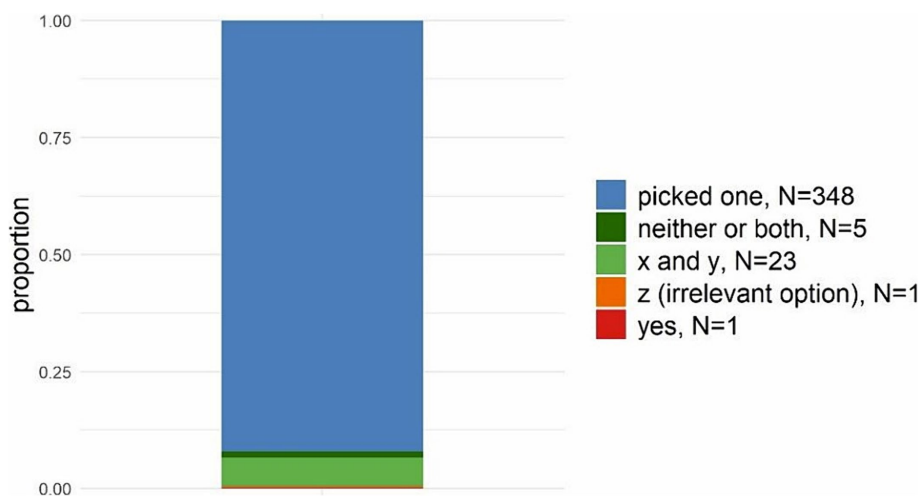

FIGURE 3
Children's different responses for Choice Immediate "or" constructions in Study 2.

constructions, as was done in several previous studies (Singh et al., 2016; Jasbi and Frank, 2017; Tieu et al., 2017). When we examine the individual children's profiles, this finding becomes even more striking: Out of 21 participants, 14 chose only one option 100% of the time, and 7 responded to some of the questions with "X and Y," "both," or "can I have both?" Note that the latter two responses, which deviate from the expected "pick one" response, are still appropriate responses given a Choice Immediate "or" reading. These children did understand that they should pick only one option, but they tried to claim more. Crucially, they specifically marked their deviant choice of two options by explicitly mentioning both alternatives (rather than using "yes"), or by asking permission to choose both. However, to be extra conservative, we treated each trial in which a participant did not pick one option as a wrong (non-Exclusive) interpretation for a Choice Immediate "or". We calculated the proportion of times each child interpreted "or" as single-option vs. a wrong interpretation. Children were classified as having distinct interpretation profiles according to their dominant interpretation. This was determined using the binomial distribution: given that we had 18 responses from each child, interpreting "or" as single option more than 72% of the time was classified as having a dominant single-option (Exclusive) interpretation (significantly different from having no preference, $p = 0.03$). This classification is presented in Figure 4. In line with the group-level results, the vast majority of children showed a single-option response pattern for the target "or" questions. Even when treating other — arguably legitimate — responses as wrong (non-exclusive) interpretations for Choice Immediate "or"

TABLE 8 Regression model for experiment (significant *p*-values in bold).

	Estimate	Std. error	z-value	p-value
(Intercept)	6.344	2.044	3.104	**0.002****
Trial number (centered)	−0.362	0.247	−1.463	0.144
Age (centered)	−0.308	1.404	−0.22	0.826

constructions, only 2 children did not show a single-option (exclusive) response pattern.

To make sure that the results obtained in fact reflect an adult-like interpretation of "or", we ran an online version of the same experiment on adults (see Appendix E for full details on the adult version). In line with our predictions, adults showed an overwhelming preference for choosing only one option (99%). Thus, children and adults alike interpreted the specific Choice Immediate' "or" constructions as single-option (exclusive) utterances.
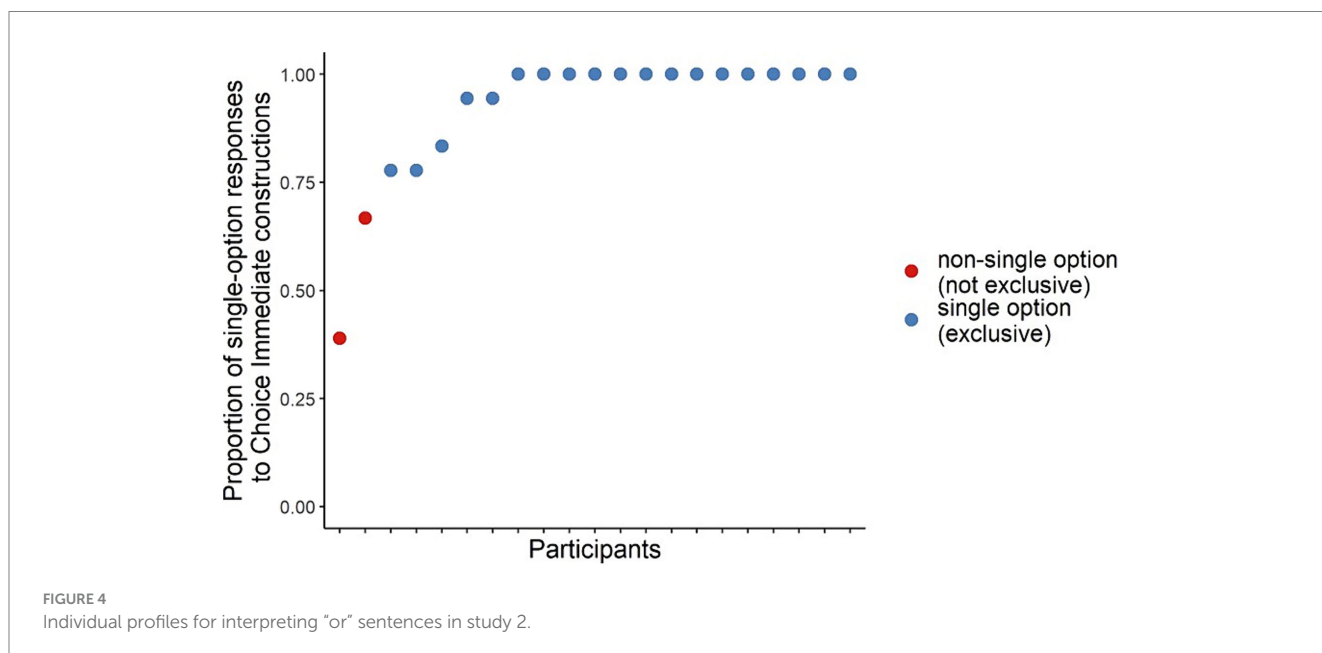
4.4 Discussion

Study 2 revealed a perfectly adult-like pattern of responses to "or" targets among 3- to- 4 year old children. Unlike previous findings supporting Inclusive-first or Conjunctive-first acquisition, the pattern we found is predominantly single-option (Exclusive). To the best of our knowledge, this is the first time that 3-year olds have been found to overwhelmingly show single-option (Exclusive) interpretations of "or" in an experimental setting. This finding is not surprising given our different methodology and our different analytical framework. We avoided the Truth Value Judgment Task, because it does not necessarily target the speaker-intended reading, and it is moreover not a child-friendly task. We chose an ecologically natural test instead – responding to an adult's question. In addition, instead of the usual Narrowed "or" targets, which are rare in general and even rarer in CDS (0.3%), we used Choice Immediate "or" constructions, which we have established to be highly familiar to children in Study 1a. This explains the difference between our single-option results and Tsakali and Mastrokosta's (2022) inclusive results. While they too avoided TVJT, they used Narrowed targets.

Thus, just like the corpus results in Studies 1bandc, the results from Study 2 support a usage-based account for "or" constructions, where given a child-appropriate task, the frequent "or" construction in CDS leads to an adult-like response pattern. In addition, the results from Study 2 support our proposal that it is the Choice

FIGURE 4
Individual profiles for interpreting "or" sentences in study 2.

Immediate "or" *conventional construction* that is responsible for the children's success. The children here identified it even in the absence of general contextual support and in the absence of mutual exclusivity between the alternatives.

5 General discussion

Based on lab experiments, two developmental theories have been proposed for children's initial interpretations of "or" constructions: an Inclusive-first account, and a Conjunctive-first account. Both accounts assume that children start out with non-adult interpretations, which are then modified during development. However, the findings supporting these different accounts come predominantly from a specific task —TVJT, and a single, infrequent "or" construction (narrowed "or"). Indeed, as discussed above, much earlier experiments with children actually showed a much higher rate of single-option responses in nonTVJT (Suppes and Feldman, 1971; Johansson and Sjölin, 1975; Braine and Rumain, 1981). A third, corpus approach, found that the majority of CDS 'or's have an Exclusive interpretation (Morris, 2008; Jasbi et al., 2022). Based on the usage-based account, children are then predicted to start out Exclusive (in general). We share this usage-based assumption that children's acquisition should mirror CDS, but crucially, our analytical categories are quite different. This is why we predicted that children would indeed start out with adult-like single-option interpretations, but that these would be restricted to Choice Immediate "or" constructions.

Based on our richer reading classification, we found remarkable differences between adult conversations and CDS (Study 1a). These difference pointed out that caregivers are selective in their use of "or" constructions when addressing children. One difference stood out above all. Choice Immediate is the single dominant "or" construction in CDS. We therefore tested the usage-based prediction that children would acquire this construction early on because they are so frequently exposed to it. Indeed, we found that children show adult-like patterns of comprehension for these constructions, as testified by their consistently single-option responses both to the caregivers in the corpus (Study 1b) and to the experimenter in Study 2. Study 1c in addition showed that children also virtually always produced Choice Immediate "or" constructions, rather than other "or" constructions, including other Exclusive constructions.

We emphasized that Choice Immediate is not only extremely frequent among CDS "or" constructions, but also has many of the properties of a dedicated and prosodically salient construction (Goldberg, 2006). Interestingly, typological findings show that while no language has a dedicated Exclusive or Inclusive "or", some languages do have a dedicated Choice "or" connective (e.g., Polish *czy*, Finnish *vai*, and Georgian *tu*, Mauri, 2008; Mauri and Van der Auwera, 2012). The availability of a grammaticized construction dedicated to the choice attests to its prominent discourse role, which is then mirrored in its early acquisition. We propose that it is the high frequency and the salient discourse function associated with this highly conventionalized construction that account for our results in Study 2: Even in the absence of contextual support, and in the absence of mutual exclusivity between the alternatives, children as young as three years of age showed a clear preference for a single-option (Exclusive) interpretation.

Our results challenge many existing accounts of the acquisition of "or", since children do show adult-like interpretations under the right conditions. We propose that initially, children do not necessarily associate a specific *lexical* meaning or meanings with "or". Instead, their interpretation is closely related to one specific usage pattern, reflecting the common use of "or" in CDS. We're therefore tentatively proposing that initially, children do not actually acquire an abstract "or" connective. The abstraction they form is not for the lexical item "or", but rather, for the wholistic Choice Immediate construction with its distinct shape. Such partial acquisitions have been noted for other aspects of language (Tomasello, 1992, 2003; Abbot-Smith and Tomasello, 2006; Goldberg, 2006; Lieven and Tomasello, 2008). Children then need to work their way gradually to the very many readings associated with "or". Future research is needed to examine how children later expand their understanding and production to various other "or" constructions which are not as cognitively simple, not as formally salient nor unambiguous, and above all, not as frequent as Choice Immediate is in CDS.

We note that that our findings lend support to recent challenges to a more general claim about the initial logicality of children, based on scalar expressions, such as *some* (e.g., Noveck, 2001; Musolino and Lidz, 2006; Huang and Snedeker, 2009). Here too, previous conclusions were mostly based on TVJT. When other tasks are used, children's interpretation of *some* seems more adult-like (see review in Eiteljoerge et al., 2018), and a recent corpus study shows that children start producing *some* in an adult-like fashion as early as two years of age, mimicking the input they receive (Eiteljoerge et al., 2018). Across a range of constructions, then, the claim that children start out "logical" is undermined when children's actual productions are examined, and when more ecologically valid experimental tasks and items are used. More broadly, our results support usage-based accounts of language learning, where children initially do not master the full range of "or" readings, because their interpretation depends on a specific familiar and salient construction.

We end with a plea for researchers to base their conclusions on converging evidence from multiple sources, ones which are suitable for testing children's competence. Indeed, our conclusion that young children are quite adult-like with respect to the use of Choice Immediate "or" constructions is based on a natural corpus, as well as a lab experiment.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Hebrew University human rights committee. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin. Written informed consent was obtained from the individual(s), and minor(s)' legal guardian/next of kin, for the publication of any potentially identifiable images or data included in this article.

Author contributions

MA: Conceptualization, Writing – review & editing, Funding acquisition, Data curation, Investigation, Methodology, Project administration, Supervision. IA: Methodology, Supervision, Writing – review & editing, Conceptualization, Funding acquisition, Resources. NK: Investigation, Data curation, Formal analysis, Validation, Writing – review & editing. ST: Data curation, Investigation, Methodology, Writing – original draft.

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Conflict of interest

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fcomm.2024.1364230/full#supplementary-material

References

Abbot-Smith, K., and Tomasello, M. (2006). Exemplar-learning and schematization in a usage-based account of syntactic acquisition. *Ling. Rev.* 23, 275–290. doi: 10.1515/TLR.2006.011

Ambridge, B., Kidd, E., Rowland, C. F., and Theakston, A. L. (2015). The ubiquity of frequency effects in first language acquisition. *J. Child Lang.* 42, 239–273. doi: 10.1017/S030500091400049X

Anwyl-Irvine, A. L., Massonnié, J., Flitton, A., Kirkham, N., and Evershed, J. K. (2019). Gorilla in our midst: an online behavioral experiment builder. *Behav. Res. Methods* 52, 388–407. doi: 10.3758/s13428-019-01237-x

Ariel, M. (2002). Privileged interactional interpretations. *J. Pragmat.* 34, 1003–1044. doi: 10.1016/S0378-2166(01)00061-3

Ariel, M., and Mauri, C. (2018). Why use or? *Linguistics* 56, 939–993. doi: 10.1515/ling-2018-0020

Ariel, M., and Mauri, C. (2019). An 'alternative' core for or. *J. Pragmat.* 149, 40–59. doi: 10.1016/j.pragma.2019.06.004

Arnon, I. (2010). Rethinking child difficulty: the effect of NP type on children's processing of relative clauses in Hebrew. *J. Child Lang.* 37, 27–57. doi: 10.1017/S030500090900943X

Bolinger, D. (1978). "Yes-No Questions are not Alternative Questions" in Questions. ed. H. Hiz (Dordrecht, Holland: Reidel Publishing Company).

Braine, M. D. S., and Rumain, B. (1981). Development of comprehension of "or": evidence for a sequence of competencies. *J. Exp. Child Psychol.* 31, 46–70. doi: 10.1016/0022-0965(81)90003-5

Chierchia, G., Crain, S., Guasti, M. T., Gualmini, A., and Meroni, L. (2001). The acquisition of disjunction: evidence for a grammatical view of scalar implicatures paper presented at the the 25th annual BUCLD. 157–168.

Chierchia, G., Fox, D., and Spector, B. (2012). Scalar implicature as a grammatical phenomenon. In C. Maienborn, HeusingerKlaus von and P. Portner (eds.), Semantics: an international handbook of natural language meaning, *III*. Berlin: Mouton de Gruyter.

Chouinard, M., and Clark, E. V. (2003). Adult reformulations of child errors as negative evidence. *J. Child Lang.* 30, 637–669. doi: 10.1017/S0305000903005701

Clark, E. V., and Hecht, B. F. (1983). Comprehension, production, and language acquisition. *Annu. Rev. Psychol.* 34, 325–349. doi: 10.1146/annurev.ps.34.020183.001545

Crain, S. (2012). The emergence of meaning. Cambridge: Cambridge University Press.

Crain, S., and Thornton, R. (1998). *Investigations in universal grammar: A guide to experiments on the acquisition of syntax and semantics.* Cambridge, MA: MIT Press.

Du Bois, J. W., and Englebretson, R. (2005). Santa Barbara Corpus of spoken American English, part 4. Philadelphia: Linguistic Data Consortium, University of Pennsylvania.

Du Bois, J. W., Schuetze-Coburn, S., Paolino, D., and Cumming, S. (1993). "Outline of discourse transcription" in Talking data: Transcription and coding methods for language research. eds. J. A. Edwards and M. D. Lampert (Hillsdale, NJ: Lawrence Erlbaum Associates).

Eiteljoerge, S. F. V. P., Pouscoulous, N., and Lieven, E. V. M. (2018). Some pieces are missing: Implicature roduction in cGricehildren. *Front. Psychol.* 9:1928. doi: 10.3389/fpsyg.2018.01928

Fishman, A., Asherov, D., Katzir, N., and Ariel, M. (2023). Discourse context cannot make 'or' inclusive (only experimental task can). *J. Pragmat.* 217, 7–16. doi: 10.1016/j.pragma.2023.08.017

Forrester, M. A. (2015). Early social interaction: A case comparison of developmental pragmatics and psychoanalytic theory. Cambridge: Cambridge University Press.

Goldberg, A. E. (1995). Constructions: A construction grammar approach to argument structure. Chicago: University of Chicago Press.

Goldberg, A. E. (2006). Constructions at work. Oxford: Oxford University Press.

Goldberg, A. E. (2019). Explain me this: Creativity, competition, and the partial productivity of constructions. Princeton: Princeton University Press.

Grice, H. P. (1989). Studies in the way of words. Cambridge, MA: Harvard University Press.

Horn, L. R. (1972). On the semantic properties of the logical operators in English. Distributed by IULC: Mimeo.

Huang, Y. T., and Snedeker, J. (2009). Online interpretation of scalar quantifiers: insight into the semantics-pragmatics interface. *Cogn. Psychol.* 58, 376–415. doi: 10.1016/j.cogpsych.2008.09.001

Huttenlocher, J., Vasilyeva, M., Waterfall, H. R., Vevea, J. L., and Hedges, L. V. (2007). The varieties of speech to young children. *Dev. Psychol.* 43, 1062–1083. doi: 10.1037/0012-1649.43.5.1062

Jasbi, M., and Frank, M. C. (2017). The semantics and pragmatics of logical connectives: adults' and children's interpretations of and and or in a guessing game

paper presented at the proceedings of the 39th annual conference of the cognitive science society.

Jasbi, M., and Frank, M. C. (2021). Adults' and children's comprehension of linguistic disjunction. *Collabra Psychol* 7:27702. doi: 10.1525/collabra.27702

Jasbi, M., Jaggi, A., Clark, E. V., and Frank, M. C. (2022). Context-dependent learning of linguistic disjunction. *J. Child Lang.* 51, 1–36. doi: 10.1017/S0305000922000502

Jennings, R. E. (1994). The genealogy of disjunction. New York: Oxford University Press.

Johansson, B. S., and Sjölin, B. (1975). Preschool children's understanding of the coordinators "and" and "or". *J. Exp. Child Psychol.* 19, 233–240. doi: 10.1016/0022-0965(75)90087-9

Katsos, N., and Bishop, D. V. M. (2011). Pragmatic tolerance: implications for the acquisition of informativeness and implicature. *Cognition* 120, 67–81. doi: 10.1016/j.cognition.2011.02.015

Koshik, I. (2005). Alternative questions used in conversational repair. *Discourse Stud.* 7, 193–211. doi: 10.1177/1461445605050366

Lieven, E. V. M. (1978). "Turn-taking and pragmatics: two issues in early child language" in Recent advances in the psychology of language: Language development and mother-child interaction. eds. R. N. Campbell and P. T. Smith (New York: Plenum).

Lieven, E. V. M., and Tomasello, M. (2008). "Children's first language acquisition from a usage-based perspective" in Handbook of cognitive linguistics and second language acquisition. eds. P. Robinson and N. Ellis (New York: Routledge).

Liu, R.-Y. (2022). Guiding children to respond: prioritizing children's participation over interaction progression. *Res. Lang. Soc. Interact.* 55, 184–202. doi: 10.1080/08351813.2022.2075652

Maschler, Y., Polak-Yitzhaki, H., Fishman, S., Miller Shapiro, C., Goretsky, N., Aghion, G., et al. (2021). The Haifa Corpus of spoken Hebrew.

Mauri, C. (2008). Coordination relations in the languages of Europe and beyond. Berlin: Mouton de Gruyter.

Mauri, C., and Van der Auwera, J. (2012). "Connectives" in The Cambridge handbook of pragmatics. eds. A. Keith and K. Jaszczolt (Cambridge: Cambridge University Press).

Morris, B. J. (2008). Logically speaking: evidence for item-based acquisition of the connectives AND and OR. *J. Cogn. Dev.* 9, 67–88. doi: 10.1080/15248370701836600

Musolino, J., and Lidz, J. (2006). Why children aren't universally successful with quantification. *Linguistics* 44, 817–852.

Noveck, I. A. (2001). When children are more logical than adults: experimental investigations of scalar implicature. *Cognition* 78, 165–188. doi: 10.1016/S0010-0277(00)00114-1

Olson, D. R., and Astington, J. W. (2013). Preschool children conflate pragmatic agreement and semantic truth. *First Lang.* 33, 617–627. doi: 10.1177/0142723713508869

Pruitt, K., and Roelofsen, F. (2013). The interpretation of prosody in disjunctive questions. *Linguis. Inquiry* 44, 632–650. doi: 10.1162/LING_a_00141

Rossano, F. (2010). Questioning and responding in Italian. *J. Pragmat.* 42, 2756–2771. doi: 10.1016/j.pragma.2010.04.010

Schegloff, E. A. (2007). Sequence organization in interaction: A primer in conversation analysis. Cambridge: Cambridge University Press.

Schwarz, F., Romoli, J., and Bill, C. (2015). Scalar implicatures processing: Alowly accepting the truth (literally). *Proc. Sinn Und Bedeutung* 19, 573–590.

Singh, R., Wexler, K., Astle-Rahim, A., Kamawar, D., and Fox, D. (2016). Children interpret disjunction as conjunction: consequences for theories of implicature and child development. *Nat. Lang. Semant.* 24, 305–352. doi: 10.1007/s11050-016-9126-3

Skordos, D., Feiman, R., Bale, A., and Barner, D. (2020). Do children interpret "or" conjunctively? *J. Semant.* 37, 247–267. doi: 10.1093/jos/ffz022

Stivers, T. (2010). An overview of the question-response system in American English conversation. *J. Pragmat.* 42, 2772–2781. doi: 10.1016/j.pragma.2010.04.011

Stivers, T., Sidnell, J., and Bergen, C. (2018). Children's responses to questions in peer interaction: a window into the ontogenesis of interactional competence. *J. Pragmat.* 124, 14–30. doi: 10.1016/j.pragma.2017.11.013

Suppes, P., and Feldman, S. (1971). Young Children's comprehension of logical connectives. *J. Exp. Child Psychol.* 12, 304–317.

Tieu, L., Yatsushiro, K., Cremers, A., Romoli, J., Sauerland, U., and Chemla, E. (2017). On the role of alternatives in the acquisition of simple and complex disjunctions in French and Japanese. *J. Semant.* 34, 127–152. doi: 10.1093/jos/ffw010

Tomasello, M. (1992). First verbs: A case study of early grammatical development. Cambridge: Cambridge University Press.

Tomasello, M. (2003). Constructing a language: A usage-based theory of language acquisition. Cambridge, MA: Harvard University Press.

Tsakali, V., and Mastrokosta, M. (2022). Children's understanding of AND, or, Either-or and Neither-nor in Greek. Paper presented at the ISTAL

Yeverechyahu, H., and Asherov, D. (2016). Prosodic disambiguation of or constructions. The 2nd conference on usage based linguistics (UBL2). Tel Aviv University.

Zufferey, S. (2010). Lexical pragmatics and theory of mind: The Acquisition of Connectives. Amsterdam: John Benjamins.