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How children talk about their desires: A corpus study of 'want'

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Abstract

Children's production of mental state verbs can reveal evidence of their theory of mind and general cognitive development. Children produce a certain class of mental state verbs, namely desire verbs such as *want*, *wish*, and *hope*, early in development. Among these desire verbs, they produce *want* the most frequently. We report on a corpus study of 450+ instances of *want* as gathered from children's dialogues with caretakers in the CHILDES database. We developed a novel coding scheme to measure children's use and understanding of *want* utterances: i.e., we sought to track the contents of their desires and the agents children predicated desires about. We report on the frequencies of these features across the ages of 2-4, and highlight noteworthy trends in the way children learn to use *want*. Children appear to talk about their own desires most often; they primarily use questions to talk about second person desires; and they desire more complex objects as they mature. We describe how these patterns of linguistic competency may serve as an index of a developing theory of mind.

Keywords: desire, child language, CHILDES, corpus study, theory of mind

Introduction

Children begin talking about their desires early in speech production: they use desire verbs, e.g., *want*, *like*, and *love*, before belief verbs, e.g., *know*, *think*, and *forget*. Researchers often compare desire and belief verbs with one another, because they are two of the basic kinds of *propositional attitude* verbs, which are the verbs that are used to express dispositions towards statements describing what's true and false, and what's real, necessary, and possible. The mastery of propositional attitude verbs – also known simply as *attitude* verbs or *mental state* verbs – can indicate a maturing theory of mind (Astington, 1993; Astington & Baird, 2005; Baron-Cohen, 1995; Baron-Cohen et al., 2000; Carruthers & Smith, 1996; Flavell & Miller, 1998; Gopnik & Meltzoff, 1997; Leslie, 1994; Perner, 1991; Wellman, 1990). Of the various desire verbs, children use *want* the most often, and they start to produce it around age 2 (Ferres, 2003). In contrast, belief verbs don't emerge in their vocabulary until around 3.5 years of age (Bartsch & Wellman, 1995; Hughes & Dunn, 1999; Jenkins et al., 2003; Lee & Rescorla, 2002; Moore et al., 1994; Ruffman et al., 2002; Shatz et al., 1983; Tardif & Wellman, 2000). Likewise, children seem to understand *want* in an adult-like way around age 3, but lack a similar mastery of *think* until age 4 (Hacquard & Lidz, 2018; Perner et al., 2013).

Not only do children use and understand desire verbs before belief verbs, but they also – up to age 3 – use desire verbs more frequently than all other mental state verbs (Bartsch & Wellman, 1995; Ferres, 2003; Moore et al., 1994). The reason for this bias is unknown, but perhaps it is utilitarian: children desire things like food and comfort, yet they are unable to provide for themselves, and so they may discover that speaking about what they want is more effective than crying, gesturing, or other forms of nonverbal communication. In contrast, talking about their beliefs may not yield any obvious advantage in achieving immediate goals.

This paper thus focuses on how children learn to use *want*, as the verb can offer a window into the way children learn to consider hypothetical possibilities. Children develop proficiency of the full meaning of *want* and other expressions of desire as they use them, and mature usage of *want* expresses desire but not intention (Malle & Knobe, 2001; for a theory that distinguishes the two, see Harner & Khemlani, 2021, 2022). Yet children generally do not distinguish desire from intention until around age 5 (Perugini & Bagozzi, 2004).

Despite the importance of desire verbs and their early emergence, there are few empirical analyses on what young children desire and how their usage of desire language develops. Ferres (2003) studied *querer* 'want' in a corpus of Spanish-speaking children, following a coding scheme developed by Bartsch and Wellman (1995). In particular, the analysis focused on genuine references to desire, i.e., usage of the verb that unequivocally indicated some psychological state of wanting that was experienced by the speaker or somebody else. More than half of the children's utterances of *querer* were marked as expressing genuine desires (61%), with the remainder being coded as non-genuine. For instance, some utterances were coded as requests for an object or action: "want that doll", for instance, constituted 9% of usage. Bartsch and Wellman (1995) argue that such utterances do not express a genuine desire, but rather a request "to hand that doll to me". Utterances such as *no quiero* '(I) don't want to/it' were marked as idiomatic, accounting for 7% of the *querer* utterances. Other utterances were direct repetitions of adult's *querer* utterances (11%) and were likewise coded as non-genuine. Ferres thus concluded that children appear to use the verb to express a genuine desire as early as 23 months. And by 23 months, the children used *querer* with subjects other than themselves, demonstrating that 2-year-olds recognize that other people have desires.

Pascual and colleagues (2008) likewise studied *querer*, along with a range of other mental state verbs, in a longitudinal corpus they generated by recording 25 Spanish children in their homes from ages 3-5. About half of the utterances that contained mental state verbs used desire verbs,

specifically *querer*: *querer* accounted for 50% of all utterances containing mental state verbs, and for 99% of all utterances that contained desire verbs. They coded all instances of *querer* for whether it was genuine or idiomatic (in line with Bartsch & Wellman, 1995; Ferres, 2003); whether the subject of the utterance was the child or another person; the complexity of syntax, e.g., whether *querer* was complemented by something like a relative subordinate clause or a complement clause; and the linguistic diversity of *querer* utterances, e.g., the count of unique words in *querer* utterances. Their notable findings concern the subject of *querer*: similar to previous work, Pascual and colleagues found that children expressed their own desires at a stable rate from ages 3 to 5, while their expression of others' desires increased from ages 3 to 5. But contrary to previous work, the children in their dataset expressed other people's desires more often than they did their own. Unsurprisingly, children learned to use more complex structures for *querer* over time, e.g., around 3.5 years, they began to complement *querer* with a clause rather than just a nominal. In contrast, the children learned more complex syntactic structures for belief verbs around ages 4 to 4.5 years. Together, these trends underscore previous claims that children's understanding of desire develops earlier than their understanding of belief.

The literature on *want* and *querer* raises several questions, both theoretical and methodological. The primary theoretical question concerns the constructs tracked in previous analyses. Ferrer (2003) and Pascual et al. (2008) examined whether children talk about their own desires or others', and the complexity of their *want* utterances, as proxies for the development of a mature understanding of desire, but these metrics leave open gaps in the development of the semantics of desire. That is because the coding scheme developed by Bartsch and Wellman (2005) does not provide any guidance on how to consider the objects of desire utterances. As a result, research using their scheme does not reveal what children desire most often. Their desires may be physical, such as for food or toys, or they may be events and actions, whether realistic (e.g., "I want to go to the beach"), imagined (e.g., "I want to see Santa's home"), social (e.g., "I want to be friends with Stacey"), or remembered (e.g., "I want to watch more *Paw Patrol*"). Indeed, children may desire events that they engage in, or else they may desire things for other people to do. Likewise, while the aforementioned coding scheme helped researchers evaluate the "matrix subject" of *want*, i.e., who is doing the wanting in *want* utterances, it does not identify the complement subject of *want*. The two may not be identical: in the sentence, "Max wants Jean to record him", the matrix subject is Max, and the complement subject is Jean. Tracking complement subjects can help assess how often children direct their desires onto actions they can perform versus those that another person must perform. This sophistication may be acquired incrementally, such that the usage of complement subjects increases steadily over early development, or it may come online at a discrete stage.

The semantics of desire may mature alongside its syntax. For instance, children may have difficulty producing utterances in which *want* is negated. Negation is a complex syntactic and semantic construct (see, e.g., Horn, 2001; Khemlani et al., 2012), which can pose difficulties even in adult comprehension (Wason, 1965). Children's comprehension of negation continues to develop after age 3 (e.g., Cameron-Faulkner et al., 2007; Klima & Bellugi, 1966). The role of negation in desire predicates can be subtle: for instance, if it's true that *Ayesha doesn't want a cookie*, then it may be because she wants some cake instead, or it may be because she doesn't like cookies, or it may because she is so full that she doesn't want anything more. These complexities suggest that children might incrementally acquire their understanding of negation and begin to produce it in tandem with desire predicates at an early age. At early stages, the usage of negated desire predicates may be idiomatic, as in *no quiero* '(I) don't want to/it', i.e., an immutable set of words with a simple, fixed, rapidly interpreted meaning. Alternatively, they may avoid producing negation and desire predicates until later in development, once the concept has matured.

Likewise, previous work has not examined when *want* occurs in interrogative expressions. The usage of desire verbs in questions may serve as a marker for when children are capable of encoding other people's desires, and when they recognize that they do not have direct access to those desires. When a child asks, e.g., "Do you want to play with me?" it may be because the child recognizes that their caretaker's desires may conflict with their own. Here, too, it may be that children begin to produce desire questions at a young age, and increase in their productions as they mature, indicating evidence of the incremental acquisition of the semantics of desire. Or, they may avoid interrogatives until their ability to encode other agents' desires has matured.

In this paper, we report on an analysis of instances of children's *want* utterances to address whether they incrementally acquire the semantics and syntax of desire, or whether their understanding of the verb *want* matures in discrete steps. We conducted a corpus analysis of child-produced utterances of *want* in the CHILDES database, and we developed a novel coding scheme to explore the flexibility and the semantic properties of their usage. We describe how we gathered the data, the methodology we used to code *want* utterances, and discoveries on how usage of *want* develops over time. For instance, we find that children shift from saying *want* + [nominal] to *want* + [clause]. We show how the results provide evidence for the incremental acquisition of the semantics, but not certain syntactic properties, of desire; that is, we show which precursor notions of the meaning of *want* grow more sophisticated over early years of language production. We conclude by discussing what the discovered patterns suggest about children's theory of mind and mastery of linguistic features, and the directions these patterns provide for experimental work.

Corpus analysis

Conventional corpus analyses – of *want* utterances as well as of other sorts of utterances – often use coding schemes that

focus on the features of a singular utterance devoid of its conversational context. To analyze *want* utterances properly, however, it was necessary to conduct an analysis, not on single utterances, but on lines of dialogue in a conversational context. Hence, we extracted instances of *want* utterances from the CHILDES database (MacWhinney, 2000), a growing collection of over 230 corpora of conversations with children in a number of languages, environments, situations, and with a variety of interlocutors. To obtain a diverse set of transcripts of *want,* we sampled 625 utterances in CHILDES containing an instance of *want* or *wanna* (another token for *want;* see Boas, 2004) as produced by English-speaking children using the R package `childesr` (Braginsky et al., 2020, version 0.1.2,), via its function `get_tokens()`. By default, the function samples a single utterance, and so we adapted it to collect the surrounding context, i.e., the 7 lines before and after a child-produced *want* utterance. We used these dialogues to code for specific properties of the utterance that the child expressed. Consider the following example output produced by the modified `childesr` function:

```
-7 SI1  ready
-6 CHI  yyy go up
-5 SI1  no William ya don't go up the slide
-4 SI1  William
-3 CHI  what
-2 SI1  we don't go up the slide we go down the slide
-1 SI1  okay
00 CHI  wanna jump
+1 SI1  good job
+2 CHI  wanna jump
+3 SI1  ya jump off the slide good jump
+4 SI1  ready
+5 CHI  wanna jump
+6 CHI  yyy wanna jump
+7 SI1  ready
```

The numbers mark each conversational turn relative to the coded utterance (highlighted in bold). The labels `SI1` and `CHI` refer to speakers in the conversation: `SI1` is a label given by the original researchers who recorded the conversation; this paper's authors do not know their identity; `CHI` is used in every transcript across CHILDES to identify the child of study whose age and other features were recorded by the original researchers. Unintelligible speech is marked by "xxx" or "yyy", as in lines −6 and +6.

There are two main reasons to extract conversational contexts from the database. First, (at the time the transcripts were culled), the level of transcription in the R-accessible version of CHILDES is coarse-grained: it lacks markers such as punctuation or pauses in conversation, both of which can disambiguate utterances. For instance, a question mark or period in line `00` of the given example could easily disambiguate the clause type of the child's utterance. Or, pauses in an utterance, such as, "I want [pause] open the door" can mark that a child rephrased a desire as a simple, grammatical command; absence of a pause renders the utterance unambiguously ungrammatical. Second, the nature of child speech necessitates a large context size: many conversational turns in child conversation are single words, repetitions, nonsense syllables, or off-topic. Thus a generous

context size helped us to code along many dimensions of *want* utterances. It was not a perfect solution, however: we deemed 123 of the 625 gathered instances of child-produced *want*s uninformative because they either consisted simply of the word *want*, seemed interrupted, e.g., "I want you hey", or else contained unintelligible speech, e.g., "I want some yyy". We coded the remaining 502 instances along the rubric described below. Analysis scripts and data are available through the Open Science Framework: https://osf.io/mkpt5/.

Coding methodology and rubric

Each informative instance of *want* was coded based on the child's year of age, which gave us 19 uses of *want* produced by children less than 2 years old; 239 uses by 2-year-olds; 120 uses by 3-year-olds; 95 uses by 4-year-olds; and 29 uses by 5+ year-olds. We thus dropped data from children outside the ages of 2-4, leaving us with 454 instances of child-produced *want*.

We developed a novel coding rubric to have a clear way to analyze what children speak of when they use *want*, namely along the following three semantic categories: the subject of *want* (matrix subject); the subject of *want's* complement (complement subject); and the semantics of the child's desire, e.g., whether the child desired an object or an action to be performed. In addition to these semantic analyses, we coded for structural, syntactic properties of each utterance, i.e., for whether the utterance was grammatical or not; for whether the child asked a question; and for whether *want* was negated, though we omit their detailed analyses for brevity. We review the three semantic coding categories below.

1. The matrix subject. Utterances describing desires can concern the desires of the speaker (as in, e.g., "<u>I</u> want to go home"), or else desires of another individual (e.g., "<u>Jack</u> wants to go home.") We tracked the individuals whose desires children talk about, namely whether the child was talking about: a) the child ("I", i.e., first person singular); b) the child and at least one other person ("we", i.e., first person plural); c) another person in the conversation (second person); d) a real person outside the conversation (third person); e) a fictitious character, such as when the child voices a toy in play; or f) unclear, when there was more than one possible interpretation of who the subject was, or the utterance was too underspecified to discern.

2. The subject of the embedded clause. *Want* can be complemented with a clause (as in, e.g., "I want <u>you to take Jack home</u>") so we marked each utterance for the subject of the complement. Most labels were identical to those we used for the matrix subject: a) child, i.e., first person singular; b) we, i.e., first person plural; c) second person; d) third person; e) fictitious character; and f) unclear. We introduced two additional labels, namely: g) object, given when children talk about wanting something to be done to some object, e.g., "I want <u>that dust bin</u> away". We coded the balance of the utterances as having no embedded clause; these cases included utterances in which *want* was complemented with a noun, as in "want <u>a pretzel</u>".

3. The semantic type of the complement. To understand what kinds of things children desire, we marked each complement either as a) an action, e.g., "I want to hear me singing"; b) a state/location, e.g., "yeah but maybe I don't want it <u>in my purse</u>

anymore"; c) an object, when *want* was complemented by a nominal, i.e., it had no complement subject, e.g., "want <u>a pretzel</u>"; d) a person, used when the complement was a person's name, e.g., "I want <u>Diane</u>"; or e) unclear.

Interannotator reliability analysis

We assessed the reliability of the novel coding scheme described above. The first author of this paper reviewed the automatically collected data and eliminated 123 entries that were unsuitable for coding, for reasons such as overly sparse *want* utterances or contexts. This annotator and another (the second author of this paper) independently marked the first 100 suitable entries for all six coding categories. We calculated Cohen's kappa between the two sets of codes as a measure of inter-annotator reliability, and found high inter-annotator agreement scores for all coding categories, except for grammaticality. This low score was the result of an earlier unclear definition, so the annotators refined the definition of the category and independently recoded the set of 100 instances of *want* for grammaticality. Table 1 provides inter-annotator agreement scores for the semantic coding categories. Both annotators then adjudicated each instance of disagreement for all coding categories. The first annotator coded the rest of the utterances.

Coding category	Cohen's kappa
Matrix subject	.76
Complement subject	.93
Complement type	.71

Table 1. Inter-annotator reliability scores, as measured by Cohen's kappa, for the semantic coding categories.

Results and discussion

We report patterns in children's usage of *want* based on each coding category. For each code, we tested systematic increases in the production of, e.g., grammatical sentences, from age 2 to 3 to 4. A monotonic (increasing or decreasing) trend in the production of one of the coded categories (such as matrix subject) across these ages serves as evidence for incremental acquisition along that particular category, because it suggests gradual and age-indexed refinements to the coded category. Alternatively, a non-significant trend is consistent with at least three possibilities: the first is that the category is fixed at the ages analyzed such that the category does not develop during ages 2-4. The second is that the category shifts over time, but in an unpredictable way (e.g., such as if children produce 20% grammatical utterances at age 2, 100% grammatical utterances at age 3, then 50% grammatical utterances at age 4); the third is that the category reveals a qualitative and permanent shift (e.g., 20%, then 20%, then 100% grammatical from ages 2, 3, and 4, respectively). The latter two scenarios may occur in the absence of incremental acquisition, i.e., when a particular concept isn't refined gradually, but rather exhibits a discrete jump in development, such as during the linguistic explosion that occurs around age 4. We analyze the frequencies of coded semantic patterns by subjecting them to Wilcoxon nonparametric tests (following recommendations by Lijffijt et al., 2016). And we report on developmental trends by subjecting the coded data to a series of Jonckheere-Terpstra trend tests for independent samples (see, e.g., Hollander & Wolfe, 1973). We used permutation analyses (B = 100,000 permutations) to estimate the *p*-values reported below.

Matrix subject. Table 2 shows the proportion of different matrix subjects used in children's *want* utterances. Across the studied ages, children mostly talked about their own desires, i.e., their matrix subjects were in the first person singular. From ages 2-4, these self-referencing desires constituted 85% of their utterances, and far exceeded the next most commonly produced matrix subject, i.e., second-person desires, which occurred in 8% of utterances (Wilcoxon test, *z* = 16.9, *p* < .001). The utterances revealed no reliable trend over time (Jonckheere-Terpstra trend test, *p* = .61), i.e., children described self-referencing desires at a stable rate over time. The result coheres with Bartsch & Wellman's (1995) and Ferres' (2003) findings that children predominantly produce self-referencing desires, but it conflicts with Pascual and colleagues' (2008) results. This discrepancy may result from the topics discussed or the conversational needs specific to Pascual and colleagues' transcriptions.

As we note above, the second most common matrix subject produced by children expressed second person desires. We tested a post-hoc hypothesis that second person matrix subjects occurred most often in the context of a question. As hypothesized, for all children aged 2–4 , the use of interrogatives was primarily limited to when the second person, i.e. *you*, was the matrix subject of *want*, and so the two codes correlated significantly (Spearman rank correlation, ρ = .91). Together, the findings suggest a primary usage of *want*, i.e., to describe a desire experienced by the child, as well as a secondary usage of want, i.e., to ask whether a listener wants something. When children do report on the listener's desire, the utterance seems idiomatic and confirmatory (as in, e.g., "you got chocolate tea but it is whatever you want") or else in the form of a conditional (e.g., "if you wanna go to the art you have to pick a yellow ticket"); reports of what a person wanted tended to be limited to the other subject types. The results suggest further work on whether children genuinely understand how to talk about a second person's desires: it is unclear when children become competent in using the phrase "you want" in declaratives.

Complement subject. Children produced complements with no subjects, i.e., non-clausal, nominal complements, in 44% of the utterances analyzed, and they produced clausal complements whose subjects were the child 41% of the time; these two most frequent patterns did not differ reliably from one another (Wilcoxon test, *z* = .71, *p* = .51), and they were both produced reliably more often than the third-most common complement subject type, i.e., second person complement subjects (7% of utterances; Wilcoxon tests, *z*s > 10.33, *p*s < .001). Table 2 shows the percentage of all responses, and Figure 1 shows the percentages of the two

	Subject	Example utterance	% of utterances
Matrix subject			
	child	"I want cup"	85.0%
	second person	"do you want medicine"	8.4%
	third person	"her wanna rock the baby"	3.1%
	fictitious character	"Superman want some oxygen"	2.6%
	unclear	"wanna go outside"	0.7%
	we	"we don't want the monsters"	0.2%
Complement subject			
	none	"I want hankies"	44.1%
	child	"I want play with that"	41.0%
	second person	"Mommy you want ta try"	7.3%
	third person	"she doesn't wanna"	4.2%
	object	"I want it to be on a piece of paper"	1.3%
	unclear	"wanna go outside"	1.1%
	fictitious character	"rabbit want to hold it"	0.9%
	we	"I want come on let's make a square"	0.2%

Table 2. Percentages of children's *want* utterances as a function of the matrix subjects (top rows) and complement subjects (bottom rows).

primary responses as a function of age: children's utterances yielded reliably more self-referencing complements as they developed (Jonckheere-Terpstra trend test, *p* = .003) and they produced reliably fewer non-clausal complements as they developed (Jonckheere-Terpstra trend test, *p* < .001); and hence, the two patterns are negatively correlated (Spearman rank correlation, ρ = -.74). Together, these patterns show that as children grew older, they used the *want + [nominal]* construction less and instead expressed desires saying *want + [clause]*. These trends likely reflect online refinement in children's understanding of the semantics of *want*: a primitive notion of *want* is to express a desire for an object, perhaps an object that can be perceived but is out of reach (as in, e.g., "want bottle"). A more complex notion of desire is to desire some outcome that includes other agents and abstract relations. The data from childrens' production of complement subjects may reveal how the cognitive system incrementally acquires the semantics of *want*.

One way to assess how children's complement subjects shift over time is to test whether their complement subjects are the same as their matrix subjects. In general, children match complement subjects to matrix subjects reliably more often as they age (Jonckheere-Terpstra trend test, *p* < .001);but the effect is largely driven by the inclusion of non-

clausal complements. When non-clausal complements are excluded from the trend analysis, the trend is no longer reliable (Jonckheere-Terpstra trend test, *p* = .74). In essence, children seem to match their complement subjects with their matrix subjects most of the time. What develops is their decreasing tendency to produce utterances of the form *want + [nominal]*. As we show below, this same pattern has complementary ramifications on trends in the production of complement types.

Complement type. Table 3 provides an analysis of the different complement types in the utterances that children produced. The most frequent sort of complement in *want* utterances concerned actions, i.e., wanting to do something, wanting to have something, and so on. Children produced such utterances more often than the next most common desire they expressed, i.e., a desire for an object (52% vs. 38%; Wilcoxon test, *z* = 3.3, *p* = .001). And they produced both complement types more often (Wilcoxon tests, *z*s > 9.75, *p*s < .001) than relational desires that predicated some state or location, which occurred only 7% of the time.

As children matured, they complemented *want* less with a nominal, i.e., an object complement type (Jonckheere-Terpstra trend test, *p* < .001), and more with a clause, i.e., an
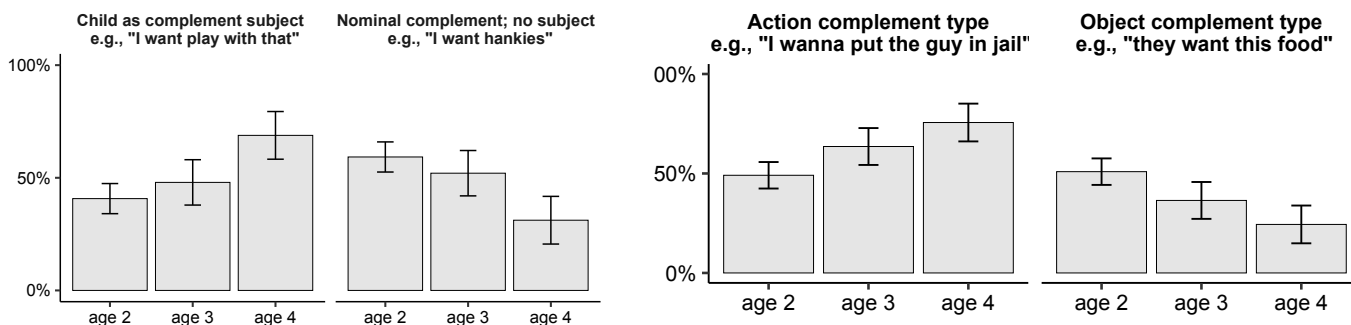

Figure 1. Percentages of children's *want* utterances where the embedded subject is either the child or the complement is nominal, i.e., non-clausal, and lacks a subject.

Figure 2. Percentages of children's *want* utterances where the semantic type of the complement is either an action or an object, i.e., is a non-clausal, nominal complement.

Complement type	Example utterance	% of utterances
action	"I wanna <u>get my Easter bunny</u>"	52.0%
object	"I want <u>a car</u>"	38.0%
state or location	"I want it <u>to be on a piece of paper</u>"	7.0%
unclear	"no I don't want"	1.5%
person	"I want <u>my mummy</u>"	1.3%

Table 3. Percentages of utterances in children's *want* utterances as a function of the complement subject produced.

action complement type (Jonckheere-Terpstra trend test, $p <$ .001; see Figure 2). The result reinforces the pattern described in the previous section, i.e., with the complement subject. Similarly, an analysis of complement type with the matrix subject shows that 2-year-olds expressed self-referencing desires for actions and objects, but as they grew older, they decreased in self-referencing desires for objects, i.e., *want + [nominal]* (Jonckheere-Terpstra trend test, $p < .001$) but increased in self-referencing desires for actions, i.e., *want + [action]* (Jonckheere-Terpstra trend test, $p < .001$), which reinforces the pattern illustrated in Figure 1.

Syntactic coding categories. We also evaluated children's use of *want* for the syntactic features of grammaticality and whether *want* appeared in negated contexts. For brevity we summarize only the important results: while children's utterances did not grow more grammatical with age, they described negated desires more as they developed, and the pattern resulted in a marginal trend. Given the known difficulties with representing and reasoning about negation (cf. Cameron-Faulkner et al., 2007; Khemlani et al., 2012; Horn, 2001), we suspect that experimental work could further evaluate how negation complicates children's ability to reason and speak about desires.

In sum, the corpus analysis we performed showed systematic development from ages 2-4 in the semantic production of *want*.

General discussion

No prior analysis of desire language in the developing child (e.g., Bartsch & Wellman, 1995; Ferres, 2003; Pascual et al., 2008) has examined *what* children desire or children's understanding of the desires of others. So we developed a new coding scheme to examine how the production of *want* matures. The coding scheme depends not just on coding individual utterances, but by looking at utterances in their conversational context, and so it is designed to investigate a wider range of questions about children's expressions of desire and their maturing cognitive abilities in general. We applied the scheme to 450+ instances of *want* – the most common and earliest emerging desire verb – produced by children in the CHILDES database aged 2-4. The analysis revealed two primary patterns of development in the way children refine their semantics of desire.

An early conception of *want* concerns the objects that children desire, as in *want + [nominal]*. It may be that these

expressions are tantamount to commands, i.e., equivalent to *give me + [nominal]*. But as children develop, they learn to generalize their usage of *want* to predicate over, not just objects, but actions, as in, "I want <u>play with this</u>" (sic) or "I want <u>do painting</u>" (sic). The examples are revealing, because they too can be construed as commands equivalent to:

Give me this (so I can play with it).
Give me what I need (to paint).

But they show subtle refinement in the semantics of *want*, such that the desire verb can be complemented by other verbs (e.g., *play, do*) and not just objects or object referents (e.g., *paintbrush, this*). Children likewise learn that they can use *want* to describe desires about relations or states to manifest, e.g., "want it louder" and "want ta zipper open" (sic). This pattern manifests in the complement subject and semantic type of the complement to *want*, and represents one primary discovery of this research.

If early desires are equivalent to commands, then more sophisticated desires may come about from conversations with caretakers. That is, caretakers may use *want* to ask questions about a child's desires, and children may learn this usage for the purposes of asking about others' desires. Indeed, as our analysis shows, the usage of second person desires (e.g., *you want*) correlates almost perfectly ($\rho = .91$) with the production of an interrogative across ages 2-4. This may be because *you want* is idiomatic early in development, i.e., it is used for highly specific purposes of inquiring about some alternative action that is about to take place, rather than actual consideration of an interlocutor's desires. Our analysis did not reveal that children ask more *want* questions as they age; instead, their newfound faculties in describing desires as relating to actions and relations may help them refine their queries, just as it helps them refine their declarative utterances. For instance, one older child asked a parent: "hey you want to play a game Mom?" This question is not a command; rather, it reveals interest in a caretaker's desires. The example helps illustrate the secondary discovery of our analysis, namely that children use *want* to speak about their own desires most often (contra Pascual et al., 2008), and their language about the second person's desires is mostly in the form of questions.

Indeed, the trend analyses we report show that the shift from simple to more complex *want* complements and the shift from describing personal desires to the desires of others produces systematic monotonic increases, i.e., increases from ages 2 to 3 and from ages 3 to 4. These gradual shifts support the notion that children incrementally acquire their

understanding of *want*, i.e., they learn to produce the verb in a wider range of semantic and syntactic contexts.

The usage of *want* may index, or interact with, children's developing theory of mind, and future work may benefit by investigating what children are able to understand about other people's desires, such as whether young children can comprehend talk about a second person's desires in declarative sentences. It is possible that children's use and competency with reports on the second person's desires are acquired after they learn to ask questions about those desires.

Overall, these findings add clarity to children's cognitive development in reasoning about desires. At age 2, they primarily desire objects, but as they grow older, they express desires for these objects less and more for actions they will perform; they are more inquisitive about what others want; and they envision a wider range of desirable possibilities for themselves and others.

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