The role of "fake" past tense in acquiring counterfactuals*

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Abstract

Prior research on the acquisition of counterfactuals has not considered the mapping challenges associated with past tense morphology, which refers either to the actual past or a "fake" past expressing counterfactuality. In a corpus study of children's spontaneous productions of counterfactual constructions, we found that *wish*-constructions are acquired before counterfactual conditionals, and that children make productive tense errors in counterfactuals producing present tense marking instead of past. These errors cease around the time children start producing *wish*-constructions that unequivocally display counterfactual reasoning, and could reflect a stage where children are still figuring out that counterfactual past tense does not signal a past event on the timeline, but rather a present non-actuality.

1 Introduction

In a distributional learning approach to the acquisition of semantic meaning (Landau et al., 2009), the syntactic context in which a word (e.g. an attitude verb like *think*) appears is taken to help learners bootstrap abstract semantic concepts and categories that are not directly observable in the world of reference (Hacquard and Lidz, 2018). However, morphosyntactic cues can be misleading. The past tense marking in counterfactual (CF) wishes (1) and conditionals (2) is considered to be "fake" (Iatridou, 2000), because this past tense form appears even when the temporal orientation of the embedded clause is present (1a/2a). Counterfactuals with true past temporal orientation require double past marking (1b/2b). This pattern is attested cross-linguistically (Bjorkman and Halpert, 2017; James, 1982).

(1) a. I wish I **had** a car (right now/*yesterday).   PRESENT CF WISH
     b. I wish I **had** had a car back then.   PAST CF WISH
                                                          (Iatridou, 2000, 25-26)

(2) a. If I **had** a car (right now/*yesterday), I would drive. PRESENT CF CONDITIONAL
     b. If I **had** had a car back then, I would have driven.   PAST CF CONDITIONAL
                                              (based on Ritter and Wiltschko, 2014, 62)

How do children figure out the counterfactual past tense is fake, and refers to a counterfactual world rather than an actual past world? This task is by no means trivial, from neither a linguistic nor cognitive perspective (Reilly, 1982). Prior research on the first language acquisition of counterfactuality shows that children start acquiring counterfactual constructions between age 3-5, after they have developed the ability to refer to hypothetical future events (e.g. Bowerman, 1986; Guajardo et al., 2009; Nyhout and Ganea, 2019; Reilly, 1982). This asymmetry between the acquisition of hypothetical future and counterfactuality has mainly

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been attributed to the additional cognitive load demanded by counterfactual reasoning, which does not only depend on holding multiple possibilities in mind, but also requires considering a false possibility temporarily to be true (Beck et al., 2009; Byrne, 2007).

These studies do not consider grammatical complexity, but the mismatch between the morphological tense and the temporal orientation of the embedded clause poses a challenge to the grammatical mapping of counterfactual constructions. Rather than expressing regular past tense meaning, semantic accounts of counterfactuality assume that the past tense morpheme in counterfactual constructions plays a direct role in obtaining a counterfactual interpretation. Either by going back in time to gain access to an alternative world (Dudman, 1983; Ippolito, 2006; Ogihara, 2000; Romero, 2014) or by scoping over possible worlds rather than over time (Iatridou, 2000; Karawani and Zeijlstra, 2013; Ritter and Wiltschko, 2014). In both cases, acquiring counterfactual constructions requires the child to see through the "fakeness" of the past tense morphology, and learn to map this morpheme to a semantic operation supporting counterfactual meaning instead.

In this paper, we investigated the role of the "fake" past tense in the development of children's natural productions of counterfactuals in English, searching through corpora of recorded and transcribed child's speech. We investigated whether children go through a stage where they seem to think that the "fake" past tense is real. To our knowledge, no prior naturalistic study has looked specifically at counterfactuality in English, nor has the "fake" past tense been considered as an acquisition problem. Additionally, we examined whether counterfactual wishes are acquired before counterfactual conditionals. Although several studies included counterfactual conditionals in their overview of the acquisition of conditionals in general (Bowerman, 1986; Katis, 1997; Reilly, 1982), the development of counterfactual wishes has not yet been considered even though, unlike conditional structures, they are dedicated to express counterfactuality.

1.1 Hypotheses

Detecting that the past tense morpheme can be "fake" is not an obvious task. For example, past conditionals and counterfactual present/future counterfactual conditionals have identical antecedents (3), and would require the child to detect the *would* in the consequent in order to even start distinguishing it from other conditional structures.

(3)   a.   If they went to the market, then they **would get** milk.   CF CONDITIONAL
      b.   If they went to the market, then they **got** milk.   PAST CONDITIONAL
                                                                      (Karawani, 2014, 25)

While acquiring counterfactual wishes comes with its own challenges, i.e. the child will have to learn that desires expressed by *wish* are different from those expressed by *want*, we suspect that the *wish*-construction in English is easier to acquire than its conditional counterpart. Once the child has figured out *wish* differs from *want* in its counterfactual implication (4), the verb *wish* functions as a dedicated counterfactual marker that cannot occur with a present tense complement, even when the temporal orientation of the wish is present tense (5).

(4)   a.   I live in Bolivia because I **want** to live in Bolivia.
      b.   *I live in Bolivia because I **wish** *I lived*/to live in Bolivia.   [cursive ours]
                                                                      (Iatridou, 2000, 38/40)

(5)   a.   *I wish I have a car.   PRESENT CF WISH
      b.   I wish I had a car.   (Iatridou, 2000, 25)

This obvious mismatch between the temporal orientation and morphological marking of the wish complement could be salient enough for the child to detect that the past tense in wishes is "fake", and in turn help relate this to other constructions conveying counterfactuality. We thus hypothesize that counterfactual wishes in English are easier to acquire than counterfactual conditionals and might even help children bootstrap into acquiring counterfactual conditionals.

We also hypothesize that children might go through a stage where they map the "fake" past tense morpheme in counterfactual constructions to a past temporal orientation. This hypothesis is compatible with findings from Reilly (1982), who observed 2- and 3-year-olds deny or provide realist responses to counterfactual utterances. Some of these responses suggest the children interpreting the question as containing a real past tense (6).

(6)   a.   Adult: What if you were a little girl?
           3-year-old: Now, I'm a big one.   (Reilly, 1982, 60, p.116)

      b.   Adult: What if you ate three boxes of strawberries?
           3-year-old: I did / I ate 'em already.   (Reilly, 1982, 59, p.116)

If so, we expect children to productively form present counterfactual constructions that have present (rather than past) tense marking on the embedded matrix verb, as this aligns with the temporal orientation of the utterance. In wishes, this results in clear errors of the type shown in (5a). Errors like these should end once children have fully figured out the link between semantic operations giving rise to counterfactual meaning and the expression of past tense morphology.

2   Methods

We looked at the natural production of children's counterfactual constructions by searching through English corpora of recorded and transcribed child's speech available on CHILDES (MacWhinney, 2000). We selected corpora that contained data from typically developing monolingual children between 2;5-6;0, yielding 44 corpora for which we only examined utterances within the age range of 0;7-7;0. We extracted all child utterances containing the word *wish*.

Wishes were coded for temporal orientation of the prejacent (PRESENT, e.g. "I wish I had a train", PAST, e.g. "I wish I had had a train" or FUTURE, e.g. "I wish I would have a train"). Unlike adults, who use *would* in future wishes (e.g. "I wish you **would**n't do that"), children's utterances sometimes lack *would* in wishes with a future temporal orientation (e.g. "I wish you stop bug me"). Since lexical aspect contributes to the temporal orientation (Iatridou, 2000, section 1.1), wishes were coded as present when containing stative verbs (i.e. *had, was, could, knew*) and as future when containing event verbs (e.g. *go, stop, got*). The tests used to determine stative or eventive lexical aspect came from (Dowty, 1986). For wishes with embedded complements, we coded for morphological tense-marking errors. Errors were separated into those that lack past-tense marking (e.g. "I wish I **do** that") or 'other' errors (e.g. "I wish we have **gotted** some mail" or "I wish I **be** a sheep"). For all errors, we also indicated whether they are compatible with a 'bare verb usage' (which could possibly signal children using *wish* like *want* if also omitting non-finite to, as is relatively common).

For all wishes, we investigated the context provided in the CHILDES transcripts and determined whether the wish demonstrated 'clear' counterfactual reasoning. Counterfactual wishes were considered to contain 'clear' counterfactual reasoning when lexical material within the utterance itself contrasts the actual world with a counterfactual one (e.g.: "I wish I asked for toast **instead**") or when the utterance is in contrast with prior context (e.g.: "I wish I had green eyes." used in a context where it's clear the speaker does not have green eyes.). All data

was coded by the first author (non-native speaker). An inter-rater reliability analysis using the Kappa statistic was performed to determine consistency among raters in detecting errors and 'clear' counterfactual reasoning. A random subset of 100 child wishes were double-coded, by a native speaker of English. Since coding involves evaluation of the transcripts and assessments of grammatical and situational contexts, coders discussed all disagreements and came to a consensus for items where either coder missed contextual or grammatical cues in their original rating. A subset of disagreements remained where coders diverged on their answers and contextual cues could be interpreted in different ways. The inter-rater reliability was found to be $\kappa = 0.69$ (substantial agreement) for judging clarity of counterfactual reasoning and $\kappa = 0.85$ (nearly perfect agreement) for detecting children's tense errors (Landis and Koch, 1977).

To get some more insight into the individual longitudinal development of children, we specifically looked at children that produced more than 10 wishes total. From the complete dataset of 68 different children, the data of 6 children, Abe - Kuczaj corpus (Kuczaj, 1977), Adam - Brown corpus (MacWhinney, 1991), Laura - Braunwald corpus (Braunwald, 1971), Mark & Ross - MacWhinney corpus (Brown, 1973) and Thomas - Thomas corpus (Lieven et al., 2009), remained with 175 wishes overall. For these 6 children we documented age of first wish, age of first presumed counterfactual wish (based on inference from the context), age of first definite counterfactual (based on lexicalized reality contrast), age of first tense error and age of last tense error. Additionally, for these six children we also extracted all counterfactual conditionals from the corpora by searching for utterances containing *if* in combination with *would*, *should* and *could*, and noted down age of first counterfactual conditional and any observed tense errors. Just as for the wishes, we coded for temporal orientation. We only recorded errors in present or past antecedents with *would*, since they unequivocally signal counterfactuality. *Could-*, *should-* and future *would*-conditionals have non-counterfactual meanings with non-past marking that confound coder ability to see present-for-past tense errors, e.g. "Maybe you shouldn't be there, if you scare Ellen" or "If I saw a real wolf, I would kick the real wolf."

We extracted 398 child wishes (0.026% of 1540,139 total utterances) in total. Since wish is counterfactual only if its complement is a full proposition (Iatridou, 2000, p.241), we excluded utterances where *wish* did not embed a proposition. 39 utterances were excluded this way for being non-counterfactual (e.g. *wish* used as a noun or wishing in utterances such as "wish you a merry Christmas"). We also excluded an additional 30 for being a repetition of either themselves or a parent and 15 sentences that were without a complement (either "I/you wish" on its own (in response to a prior) or cut off utterances). The 6 children with longitudinal data were responsible for 173 of the wishes. For those 6 children, we extracted 381 conditionals with *would*, *should* or *could*. We excluded 115 conditionals with *could* and 9 conditionals with *should* for not being non-counterfactual usages. An additional 17 counterfactual conditionals were excluded for being incomplete, and 42 for being a repetition, This left 198 counterfactual conditionals in total, 89 of which with present or past tense orientation.

Since present tense errors in counterfactual constructions could also be due to overall underdeveloped past tense marking, we estimated children's overall past tense competence during the period where they made past tense errors in counterfactual constructions. From the six children, we extracted all utterances containing *yesterday*. From the 119 hits we excluded 24 utterances that lacked a verb and 6 utterances that were self repetitions. For the remaining 89 utterances we coded for present tense errors. Additionally, we investigated whether children productively used past tense morphology by searching for instances of overregularization (e.g. "I **telled** daddy something") during the error period. We extracted all 4281 utterances containing past tense morphology within the counterfactual present tense error period of each individual child and noted down instances of regular past tense marking on irregular conjugating verbs.

3   Results

3.1   Children's Wishes

Most children produce their first wishes at the end of age 2 or beginning of age 3, and often the first wishes are followed by more occurrences in subsequent recordings. Repeated uses of a new construction within a short period of time is considered to be a signal of productivity (Snyder, 2007; Stromswold, 1990). Most wishes were spontaneous, and we found few instances (n=2) where children directly repeated a wish from their caregivers. Most early wishes are desires about things in direct proximity, e.g. wishing for a horse when seeing a horse (7).

(7) a. EARLY WISHES (LIKE DESIRES)
         *CHI: I wish I had a horsie.   (Becky, 2;07, Theakston et al., Manchester)
     b. *CHI: I wish that you stop talking.   (Abe, 2;10, Kuczaj)

From their early uses, it is not obvious that children know that *wish* can only be used counterfactually, i.e. the desire is either established to be impossible or unlikely to be fulfilled. Evidence supporting are instances when parents correct their children's wishes, or comment on the non-counterfactuality of them. Throughout the different corpora we found 9 conversations where this happened, e.g. (8).

(8) *CHI: I wish you were my mommy.
     *MOT: I am your mommy.   (Laura, 3;02, Braunwald)

For this reason we separated wishes (n=314) into three separate categories: wishes that are undeniably counterfactual based on context and lexical content, i.e., past, negation and contrasting adverbs (n=40, 12.7%), wishes that are presumably counterfactual (based on context) (n=66, 21.0%) and wishes which may or may not express counterfactual reasoning (n=208, 66.2%). The first undeniably counterfactual wishes (based on lexical contrast) occur between age 3 and 4. Examples of these are past counterfactual wishes (9a), negated wishes (9b) and wishes that contain a contrast with reality (9c). An example of a wish where contextual information contains a contrast between reality and desire are displayed in (10).

(9) a. LEXICAL EVIDENCE FOR COUNTERFACTUAL: PAST
         [hearing a train in the distance]   (Thomas, 3;01, Thomas)
         *CHI: I wish gone Burnage Station watch that train.
         <later in recording Thomas comments "I'm missing all the trains">
     b. LEXICAL EVIDENCE FOR COUNTERFACTUAL: NEGATION
         *CHI: I wish humans were not humans.   (Ross, 4;02, MacWhinney)
     c. LEXICAL EVIDENCE FOR COUNTERFACTUAL: CONTRASTING ADVERB
         *CHI: oh I wish it was my birthday today really.   (Thomas, 4;02, Thomas)

(10) CONTEXTUAL EVIDENCE FOR COUNTERFACTUAL

      *FAT: You don't see bumblebees in the dark at all.
      *CHI: I wish that the lights were on.   (Mark, 5;10, MacWhinney)

3.2   Tense Errors

Children were found to make several tense errors in the complement of *wish*. In total we found 40 errors (13.2% of the 303 total wishes with complements) that inflected present rather than

past tense. For 16 of these errors, it is not entirely clear whether they are really marking present tense as they are indistinguishable from a bare verb construction (11a). For the remaining 24 it was clear, i.e. due to inflection (11b).

(11)   PRESENT TENSE ERRORS
      a.   *CHI: I wish I **have** a banjo like dis [this].   (Adam, 5;02, Brown)
      b.   *CHI: I wish it'**s** valentine.   (Sarah, 3;06, Brown)

When we group the error counts by age group (per year) we find that the vast majority of errors are made before age 4, and after this the amount of errors drops off to until it reaches 0 after age 6. This decrease in error rate is displayed in Table 1. Following exclusions, there were 302 child wishes for which we modeled the present-instead-of-past tense error rate (excluding 12 other errors) with a generalized linear mixed-effect model (lme4 package Bates et al., 2014; Team, 2015) to investigate whether the factor Age (in months) is a significant predictor of Error Rate, including different child corpora as a random factor (glmer, ErrorRate $\sim$ Age+(1|corpus), (1|child), family=binominal). This model confirmed that age is a significant predictor of tense error rates in counterfactual wishes, β = -0.11, z = -6.21, $p=$ < 0.001.

Age (years)	sample size per age window	# errors	% of total
2 - 3	15	18	56.2
3 - 4	15	14	19.4
4 - 5	42	5	3.94
5 - 6	26	3	4.55
6+	2	0	0
Total	76	40	100

Table 1: Past tense errors (present instead of past) per age window

3.3   Individual Development of Counterfactual Constructions

To get an idea of the counterfactual development of individual children, we investigated the age of first counterfactual conditional, first suspected counterfactual wish (based on context), 1st certain counterfactual wish (lexical evidence), and tense errors for the 6 children we had enough longitudinal *wish* data for. The individual development of each child is displayed in Figure 1, where one can observe each instance of *wish* grouped by counterfactual type, the age of their first counterfactual conditional (12) and any tense errors made in the counterfactual construction.

(12)   FIRST COUNTERFACTUAL CONDITIONALS
      a.   *CHI: if a really hole was in here then I would cry for new pants.   (Laura, 2;08)
      b.   *CHI: we could fly if we had wings.   (Mark, 3;07, MacWhinney)

The age of first *wish* uses vary from age 2;01 (25 months) to 3;08 (44 months), with subsequent usages following within the same file or month. The age of the first clearly counterfactual *wish* usages, however, vary widely by child, ranging from 2;10 (34 months) - 5;02 (62 months). We found that the acquisition of wishes precedes (4/6 children) or coincides (2/6) with first counterfactual conditionals. An interesting pattern seems to emerge. We observed that most tense error mistakes are made in the early stages of the emergence of the *wish*-construction,

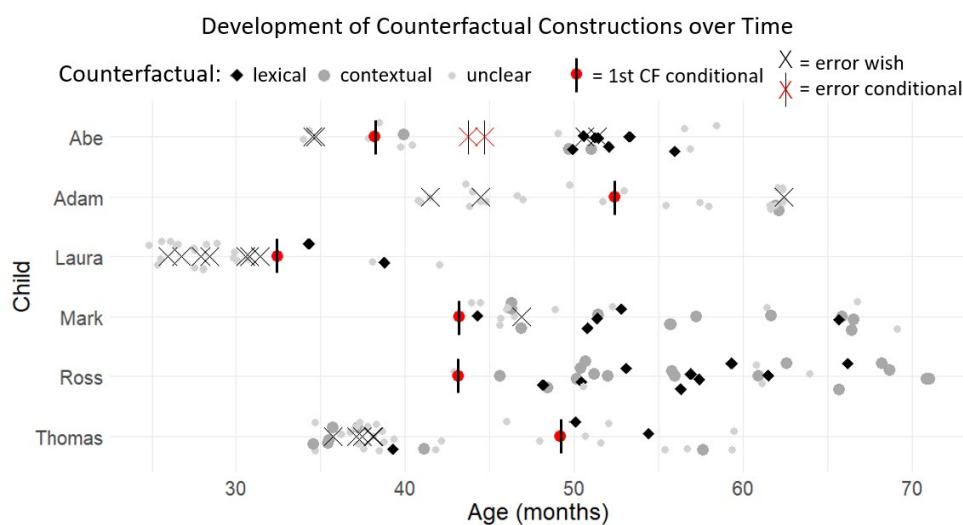Development of Counterfactual Constructions over Time

Figure 1: Wishes grouped by meaning (black diamond: clearly counterfactual based on lexical info, dark grey dot: suspected counterfactual based on contextual info, small grey dot: unclear whether counterfactual) and present-for-past-tense errors (crosses) over time (in months) for 6 children. Dot with black line indicates first clear counterfactual conditional.

regardless of at which age the child started using the construction. Moreover, the age of the last error seems to coincide with the age that children start using wishes that are clear lexical counterfactuals. This pattern is clear for 3/6 children (Abe, Laura and Thomas) and inconclusive for Ross (as we have no documented tense errors) and Adam (as the age of last error is also the last recording). Half of the children (Laura, Ross and Thomas) start using counterfactual conditionals around the time that they display clear counterfactual reasoning in their wishes, and after their last tense errors. Mark's trajectory is almost the same, except that we found one tense-error soon after his first clear counterfactual wish and conditional. Abe and Adam, start using counterfactual conditional constructions during the period in which they make tense errors in their wishes. Abe is the only child for whom we found tense marking errors in their conditional constructions as well. These errors stop around the time he produces clearly counterfactual wishes.

3.4 Productive Tense Marking

We investigated children's overall productive past tense usage during the period where they made past tense errors in counterfactual constructions, to make sure their errors in these counterfactual contexts are not due to a lack of past tense marking in general. For each child we recorded their (first) past tense marking in the context of the temporal adverb *yesterday* (YD), and (first) instances of past tense marking overregularization (OR) during the period they made mistakes in counterfactuals, displayed in Table 2. For all children, we found indications of productive past tense usage (both in overregularization and past tense usage with *yesterday*) outside counterfactual contexts during their error period. Only for Laura did we find present tense mistakes with *yesterday* before 28 months, indicating that some of her earliest mistakes could be due to overall lack of past tense marking.

Child	Age Range (months)	Error Range (months)	Age 1st YD Past	# Correct YD Past	Age 1st OR	# OR
Abe	28-58	35-51	31.4	17/17	34.1	109
Adam	27-62	42-62	41.0	3/3	42.3	7
Laura	15-84	26-31	28.0	2/5	22.6	10
Mark	7-66	47-47	44.9	2/2	48	4
Ross	6-92	NA	NA	NA	NA	NA
Thomas	24-59	36-38	32.8	1/1	33.6	2

Table 2: Overview Individual's Present-for-past Errors over Time

4   Discussion

In this paper we examined the acquisition of counterfactual constructions, focusing mainly on the development of wishes. Since *wish* is a dedicated marker of counterfactuality in English, we hypothesized that counterfactual wishes would be easier to acquire than counterfactual conditional constructions. Indeed we found that children seem to produce the *wish*-construction before (or simultaneously with) counterfactual conditionals. Counterfactual wishes seem to be productive between age 2 - 3, while counterfactual conditionals emerge age 2.5 - 4.

The second question addressed in this study was whether children go through a phase where they make tense-marking mistakes in the complement of counterfactuals. Acquiring counterfactual utterances requires discovering that the past tense in its complement/antecedent is "fake" and actually marks counterfactuality. This mapping between counterfactuality and the past tense morpheme is thought to require complex semantic operations (Iatridou, 2000; Ogihara, 2000; Karawani and Zeijlstra, 2013). Since children have to see through the "fakeness" of the past tense in order to learn this mapping, we hypothesized that children would productively form present counterfactual wishes, that have a present tense (rather than past tense) marking on the embedded matrix verb, as this aligns with the temporal orientation of a present wish. Indeed, we found that children make a substantial amount of past tense errors (13% of total wishes), most of them between age 2-4 (75.6%), with a clear drop by the beginning of age 4.

One may wonder whether the tense errors found in the complement of *wish* are due to children not yet having acquired the past tense form in general. This seems unlikely, as children generally have productive past tense usage before age 3 (e.g. Brown, 1973; Kuczaj, 1977). For six children, we showed that they display clear signs of productive tense marking during the period in which they make tense marking errors in counterfactual constructions. They use past tense in utterances with *yesterday* and overregularize the past tense morpheme on irregular verbs, showing productive usage. Only for the youngest child, Laura, do we find some tense marking errors outside counterfactual constructions, suggesting that her earliest errors (before 28 months) might be partially due to a general problem with the past tense morpheme.

Zooming into the individual development of wishes, we found that the age at which children stop making past tense errors seems to be very close to the age when they start using concrete counterfactuals. While we do not have enough data to make any clear generalizations, this finding is compatible with a view where children's mastery of the mapping between past tense and counterfactuality correlates with mastery of counterfactual reasoning. Perhaps it is only after they have fully mastered counterfactual reasoning that they realize how the past tense morpheme in counterfactuals is separate from the regular past tense morpheme. Most children start using counterfactual conditionals around or after the time they use clear counterfactual wishes. This suggests that figuring out the mapping between the past tense morpheme and

counterfactuality in wishes helps with acquiring counterfactual conditionals, but there are children (i.e. Abe and Adam) that do not follow this pattern. In accordance with this idea, we found almost no tense marking errors in the conditional constructions, suggesting children already know the mapping when using them. The only tense errors we found came from Abe, who actually participated in a longitudinal study investigating the development of hypothetical conditionals (Kuczaj and Daly, 1979), so this could have influenced his development.

All in all, these findings show that counterfactual constructions are not only challenging because they require complex reasoning, but also because they involve complex meaning-to-form mapping. Children productively make tense errors predicted by semantic accounts of counterfactuality that analyze the past tense in these constructions as "fake", and acquire the more transparent counterfactual *wish*-construction before counterfactual conditionals.

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