Children's Understanding of Factivity in Hungarian

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In everyday communication, speakers often refer to their internal mental states, such as feeling or knowing something. Acquiring the correct meaning of the verbs that refer to these internal states can be challenging. While it is relatively easy to understand the difference between *eating* and *drinking*, despite them being similar actions, it is more difficult to grasp the difference between *knowing* and *thinking*. So, how do young children solve this challenge and understand the differences in meaning between various types of mental state verbs? One important distinction within this class of verbs is that some of them are factive, while others are non-factive. Factive verbs (such as *know*) presuppose, or take for granted the truth of their complements, while non-factive verbs (such as *think* or *believe*) do not presuppose the truth of their complements (Kiparsky & Kiparsky, 1970). Consider sentences (1) and (2). The sentence which contains the factive verb *know* (1) is not felicitous if Mary is not at home. On the other hand, (2), which contains the non-factive verb *think*, can be true regardless of whether Mary is at home or not.

(1) John knows that Mary is at home.
(2) John thinks that Mary is at home.

Evidence concerning mental verb acquisition in English suggests children only start to learn mental state verbs in the third year of their lives (Bretherton & Beeghly, 1982; Moore, Bryant & Furrow, 1989; Shatz, Wellman & Silber, 1983). However, a profound understanding and the correct usage of such verbs does not fall into place until later in life, with different mental verbs seemingly mastered at different ages. A body of work suggests that most English-speaking children understand the meaning of *know* at the age of 3, but they struggle with interpreting *think* and can only differentiate between the verbs after the age of 4 (Moore, Bryant & Furrow, 1989; Wellman & Liu, 2004). A similar pattern appears in children's production data (Shatz, Wellman & Silber, 1983; Booth, Hall, Robison & Kim, 1997) and across Indo-European languages such as Spanish and German, contributing to the the robust set of findings supporting the Theory of Mind scale (Pascual, Aguado, Sotillo & Masdeu, 2008; Kristen-Antonow, Jarvers & Sodian, 2019; Yu & Wellman, 2024).

However, more recent findings controlling for pragmatic confounds in assessing how children understand *know* and *think*, report that some children are able to correctly use mental state verbs at an earlier age than previously thought, when examining subtle aspects of the verbs' use. In one relevant study, Lewis, Hacquard & Lidz (2017) hypothesized that the kinds of *think* utterances

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regularly used in Theory of Mind tasks are often interpreted as parentheticals by young children. Instead of understanding *John thinks that Mary is home* as an assertion about John's beliefs, they may understand it as a statement about Mary's location which marks John as the source of information (Urmson, 1952). In order to test this hypothesis, Lewis and colleagues compared children's interpretations of these utterances in the traditional "one-seeker" variant of a false belief task to their interpretations of the same utterance when two different individuals had conflicting beliefs about the location of a displaced object ("two-seeker" variant). They find improved performance in a false belief task when the parenthetical interpretation is unavailable, suggesting that some of children's errors may be due to pragmatic factors such as the communicative intention that is attributed to the speaker. Relatedly, Hansen (2010) found that highlighting the contrast between the beliefs held by a seeker and the beliefs that the participant shares with the experimenter can also improve preschoolers' performance. Work by Dudley, Orita, Hacquard & Lidz (2015) continues in the spirit of Hansen and Lewis and colleagues by testing other subtle aspects of how children understand "know" and "think". They target one important characteristic of factive verbs which is due to their presuppositional status: the truth of their complements projects out of entailment-canceling contexts, such as under matrix negation (Chierchia & McConnell-Ginet, 1990). For instance, the speaker of (3) must take for granted that Mary is at home in the same way that the speaker of (1) does. In contrast, (4) doesn't require the speaker to be committed to anything about Mary's whereabouts, and may be used to describe a false belief. As a result, a statement like (3) is a reliable cue to infer Mary's location, but (4) is not.

(3) John doesn't *know* that Mary is at home
(4) John doesn't *think* that Mary is at home.

Dudley and colleagues tested children's understanding of these projective differences, finding that children begin to understand the difference between factive and non-factive verbs at 3 years of age, with better understanding of the non-factivity of *think* than the factivity of *know* between 3-4 years. Pragmatic explanations involving task artifacts have also been used to account for the Theory of Mind scale generally (Westra & Carruthers, 2017), and pragmatic manipulations have shown improved performance not only in English but also French (Baratgin, Dubois-Sage, Jacquet, Stilgenbauer & Jamet, 2020) and Spanish (Rubio-Fernández & Geurts, 2013).

Consistent with pragmatic challenges to generalizations about the typical developmental trajectory for mental verbs in Indo-European languages, another line of challenging evidence comes from studies targeting non-Indo-European languages, including Cantonese, Mandarin, Farsi, Japanese and Turkish (Naito & Koyama, 2006; Wellman, Fang, Liu, Zhu & Liu, 2006; Shahaeian, Peterson, Slaughter & Wellman, 2011; Hughes Devine & Wang, 2018; Selcuk, Brink, Ekerim & Wellman, 2018). These non-Indo-European languages exhibit relevant linguistic differences from the typical Indo-European language, including the

presence of false-belief verbs (e.g., Mandarin *yiwei* 'falsely think') or factivity alternations (e.g., Turkish *bil* 'know' used to ascribe knowledge or justified false beliefs). This raises the question: does the conflicting pattern of results from non-Indo-European languages arise given linguistic differences between Indo-European languages and other language families? Or is it an artifact of pragmatic confounds in traditional experiments that can be mitigated with new methodologies? In this study, we use such a paradigm that has already been used to explore the trajectory in English, collecting data from a new factivity-alternating language: Hungarian. If we find no difference between the performance of Hungarian-speaking and English-speaking children in this paradigm, it would align with previous findings supporting a universal typical trajectory for mental verb acquisition. If we instead find differences between Hungarian-speaking and English-speaking children, it would highlight the role of variation across languages and raise the importance of cross-linguistic comparisons.

1. Relevant properties of Hungarian

Hungarian is a non-Indo-European language, part of the Uralic family. It is the official language of Hungary, spoken by about 14 million people, including significant diaspora communities outside of Central Europe. Hungarian exhibits several properties that are not characteristic of Indo-European languages, including vowel harmony, agglutinative morphology, and a lack of gender marking. Hungarian is also a discourse-configurational language, meaning that word order is determined not by argument structure, but instead by information-structural considerations such as topic and focus (É. Kiss, 1981). The verb or else the element immediately preceding the verb receives focus, and topics can occur at the left periphery, as in (5-7).

(5) Szereti$_F$ János Marit. [É. Kiss 1981, (1a)]
love.3SG János Mari.ACC
'János loves Mari'

(6) János$_F$ szereti Marit.
János love.3SG Mari.ACC
'It is János who loves Mari'

(7) Marit János$_F$ szereti.
Mari.ACC János love.3SG
'As for Mari, it is János who loves her'

The set of belief verbs in Hungarian is similar to Indo-European languages, including two knowledge verbs (*ismer* 'know' and *tud* 'know', see 8-10), and two belief verbs (*gondol* 'think' and *hisz* 'believe', see 11-12). *Ismer* is used to express acquaintance knowledge (8), while *tud* expresses either knowledge-how (9) or propositional knowledge (10), depending on the kind of complement it selects (É. Kiss, 2002; Coppock, 2013).

(8) János ismeri a macskát.
János know.3SG.DEF the cat.ACC
'János knows the cat'

(9) János tud táncolni.
János know.3SG.INDEF dance.INF
'János can dance' or 'János knows how to dance'

(10) János tudja, hogy esik az eső.
János know.3SG.DEF that fall.3SG the rain
'János knows that it's raining'

(11) János azt gondolja, hogy esik az eső.
János it.ACC think.3SG.DEF that fall.3SG the rain
'János thinks that it's raining'

(12) János azt hiszi, hogy esik az eső.
János it.ACC believe.3SG.DEF that fall.3SG the rain
'János believes that it's raining'

Despite having a similar core inventory of mental state verbs, Hungarian seems to use these verbs differently than Indo-European languages might. *Know* and *think* are relatively frequent in English, both verbs occurring in the top 100 most frequently used words in this language (COCA; Davies, 2008). In contrast Hungarian *tud* is commonly used, but neither *gondol* nor *hisz* are used with the same level of frequency (HNC; Váradi, 2002; Oravecz, Váradi & Sass, 2014). While these belief verbs can be used to proffer or express uncertainty about a proposition in English (Simons, 2007), Hungarian commonly achieves the same discourse moves through the postposition *szerint* 'according to' (13), which might account for the lower frequency of non-factive verbs in Hungarian.

(13) János szerint esik az eső.
János according.to fall.3SG the rain
'According to János, it's raining'

Another important difference between Hungarian and Indo-European languages is the centrality of clausal prolepsis for making belief and knowledge ascriptions. Clausal prolepsis is possible in languages like English in sentences like *John regrets it that Mary is home*, where a proleptic pronoun *it* is doubled by the clause *that Mary is home*. As you can see in the examples above (11-12), mental verbs in Hungarian can co-occur with the proleptic demonstrative pronoun *azt*. As we will see with the examples below, the location of the proleptic pronoun contributes to the availability of factive readings with *tud*. While there is debate in the literature, some have argued that prolepsis is required in Hungarian, even if there is no overt proleptic pronoun (Kenesi, 1994; É. Kiss, 2002).

Hungarian is also considered a "factivity-alternating" language. In languages with factive alternations, the translation equivalent of *know* (*tud* in Hungarian) can receive factive readings (14), but also seems to lose its factivity under certain conditions (15-16). This is most clearly diagnosed in negative environments, as in the examples below that are adapted from Abrusán's (2025)

examples (5b,7b,10b), given that truth of the complements of factive verbs should project through negation. According to Abrusán, a sentence like (14) cannot be continued by asserting that Mari did not resign, which suggests that the speaker of (14) must be committed to the fact that Mari resigned, regardless of János's knowledge about the resignation. On the other hand, (15) and (16) can be followed felicitously by the assertion that Mari has not resigned, suggesting that the speaker of (15) or (16) is not committed to the actuality of Mari's resignation.

(14) János nem tudja (azt), hogy Mari lemondott. [(5b)]
János not know.3SG.DEF (it.ACC) that Mari resigned
'János doesn't know that Mari resigned'

(15) János nem úgy tudja, hogy Mari lemondott (volna). [(7b)]
János not so know.3SG.DEF that Mari resigned (would)
'János doesn't (lit.) know so that Mari (would have) resigned'

(16) János nem azt_F tudja, hogy Mari lemondott. [(10b)]
János not it.ACC know.3SG.DEF that Mari resigned
'What János knows is not that Mari resigned'

Interestingly, (15), which includes the evidential *úgy* 'so', is compatible with false belief reports: this sentence could be used to describe a scenario where János has a justified belief in Mari's resignation, perhaps supported by some evidence, but where this belief doesn't amount to knowledge because Mari hasn't actually resigned. In Hungarian, the factive alternation is conditioned on several factors, including syntactic, morphological, prosodic and contextual determinants. See Abrusán (2025) for the most recent and comprehensive work on Hungarian factive alternations. Note that the clausal prolepsis has been linked to factive readings across languages, and the pronoun *azt* linked to the availability of factive readings in Hungarian (see Abrusán, 2025 and discussion therein). Factivity alternations have also been documented in languages such as Turkish, Korean, Mongolian and Azeri (Özyıldız, 2017; Lee, 2019; Bondarenko, 2023). There is some overlap in the kinds of determinants that condition the alternation across these languages, but the alternations are not entirely identical. While the familial relationship between this set of factivity-alternating languages is unclear, the relevant features may have spread due to a prolonged history of language contact.

With this study, we want to ask how a factivity alternation might impact the acquisition trajectory for mental state verbs. In previous work, researchers have directly compared alternating languages such as Turkish, to non-alternating languages such as English and German. These comparisons have been made primarily in the conceptual development literature and contextualized as cross-cultural comparisons which examine the impact of the cultural context on the development of mental state concepts. But these studies also employ linguistic stimuli involving mental state verbs, and overlook linguistic confounds that make the cultural comparison challenging. In this study, we embrace the

cross-linguistic variation that occurs in the mental state verb domain, and ask how it might present different challenges to the language learning child.

We use a methodology that has been applied to English, developed by Dudley et al. (2015) and extended in Dudley (2017), to ask how the developmental trajectory in a factivity-alternating language such as Hungarian might differ from a non-alternating language like English. On the one hand, we might find that the alternation has no impact on development: that there is no discernable difference in how English-speaking and Hungarian-speaking children perform. On the other hand, we might find English-speaking and Hungarian-speaking children perform differently in this task, which would support the idea that the alternation may impact the developmental trajectory. But what kinds of differences might we expect to see? One salient possibility is that the factive alternation introduces so much noise into the signal that *tud* is factive, that Hungarian-acquiring children take longer than English-acquiring children to settle into an adult-like understanding of the factive verbs. Another possibility would be that non-factive verbs are harder for Hungarian-acquiring children than their English-acquiring peers because the factive alternation obscures the distinction between knowledge verbs and belief verbs: what unique role does *gondol* have, if *tud* can be used to take about false beliefs?

2. The paradigm

Dudley and colleagues adapted and extended a paradigm that had been used previously to test English-speaking preschoolers' understanding of *know* and *think* utterances (Moore, Bryant & Furrow, 1989; Dudley, Orita, Hacquard & Lidz, 2015; Dudley, 2017). Compared to previous experiments targeting children's understanding of mental state verbs, the adapted paradigm did not require participants to make metalinguistic judgments about mental verbs. The children were seated in front of a table on which there were two boxes, one blue and one red. An experimenter sitting opposite hid a toy in one of the boxes while an occluder covered the child's view. After the hiding, the experimenter gave a verbal clue about the whereabouts of the target toy, in the form of a belief or knowledge report (e.g., *Chris knows/thinks that it's in the blue box* or *Chris doesn't know/think that it's in the blue box*). The child could then use this clue to search for the toy, and the box that they selected to search in was taken to indicate what they knew about the projective behavior of the two verbs. As a factive verb, uses of *know* take for granted that the truth of the proposition expressed in the embedded clause, so a listener who doesn't know the toy's actual location can use knowledge of *know*'s factivity to infer that it is hidden in whichever box the sentence mentions. In contrast, the non-factive *think* is more compatible with an endorsement reading of the belief ascription (e.g., *Chris doesn't think that it's in blue box because he thinks it's in the other box*), so a listener who understands *think* well would tend to search in the box that isn't mentioned by the sentence (which we label the other box).

The verb-type (*know* or *think*) and the negation-type (none, matrix or embedded) in the clue was manipulated across the trials, forming six types of

test sentences with different inferences about the speaker's meaning (Table 1). Importantly, the truth of the proposition in the embedded clause projects out from matrix negation, but negation in the embedded clause would be part of the proposition that projects. As a result, different inferences are predicted for the two types of negative sentences for factive verbs like *know*, but not non-factive verbs like *think*.

Results showed that children aged 3-4.5 years performed adult-like in case of the *think* sentences: they chose the mentioned box in case of the affirmative condition and the other box in the two types of negative conditions. In case of the *know* sentences, they picked the mentioned box in the affirmative condition and the other box in the embedded condition, as expected if they had an adult-like understanding of *know*. However, a different pattern emerged in the matrix negation condition: children picked the mentioned box only 52% of the time, while adults picked the mentioned box 100% of the time. Regardless of this, results show that children differed in their answers in the know-matrix and think-matrix sentences. Another important finding is that when taking a closer look at individual differences, they found that some children always picked the mentioned box (treating *know* as factive) in case of know-matrix sentences, while others always picked the other box (treating *know* as non-factive). This shows that they were able to differentiate between the two verbs on the basis of their projective properties even at the age of 3, and that previous results indicating that children failed to differentiate between *know* and *think* may have been due to the additional demands posed by the tasks used. The individual variation in children's understanding of *know* also suggests that there may be different developmental trajectories in the acquisition of factive verbs, and raises the importance of investigating such trajectories in future research.

3. Experiment

In the current study, we used the same paradigm with Hungarian-speaking children, in order to test the effect of factivity alternation on mental verb acquisition. If we find differences between our sample and prior data collected with English-speaking children, that would support the idea that factive alternation may impact developmental trajectories. It is possible that factivity alternation introduces noise into the understanding of knowledge, causing Hungarian-speaking children to reach an adult-like understanding of factive verbs later. It is also possible that the understanding of non-factive verbs will be impaired by factivity alternation, as it can obscure the differences between the two types of verbs. In order to develop stimuli that are comparable to the English stimuli, we analyzed the Hungarian CHILDES corpus, and ran a pilot experiment with adults (n = 45).

The Hungarian CHILDES contains data from three corpora, following eight children between the ages of 1;5-2;10 years (MacWhinney, 2000; Réger, 2004; Bodor & Barcza, 2008). We examined the frequency with which different mental verbs were produced by native speakers of Hungarian in ambient speech to the children. We found that while *tud* appeared 1278 times, non-factive verbs were

much rarer: *hisz* appeared 62 times, while *gondol* appeared only 17 times. Despite the greater frequency of *hisz*, we used *gondol*, allowing for a closer match with the English experiment.

In the adult pilot, we investigated which sentences receive the highest proportion of factive readings, in order to present child participants with stimuli that most closely match the English pattern. In particular, we tested items with the pronoun *azt* occurring preverbally vs. postverbally (e.g., Péter nem azt tudja vs. Péter nem tudja azt), given that the position immediately preceding the verb is the focus position in Hungarian and preverbal negation will target whatever occurs in this focus position. While we judged the preverbal *azt* to be less felicitous with *tud* than the postverbal *azt*, only the preverbal *azt* reliably elicited factive readings from adults. For this reason, in the experiment with children, we used items with a postverbal *azt* in case of matrix negations, and a preverbal *azt* in case of affirmative and embedded sentences (Table 1).

3.1. Participants

48 Hungarian-speaking children (24 girls, 24 boys) between the ages 3;0-4;6 years;months (Mean age = 44.7 months) were tested in the laboratory of Central European University's Babylab in Budapest, Hungary. An additional 7 children were tested but excluded from the analysis, 3 for not passing enough of the control sentences, and 4 for not finishing enough trials. Written informed consent was obtained from parents, and verbal consent was obtained from the children before the experiment. The study was approved by the Hungarian United Ethical Review Committee for Research in Psychology.

3.2. Procedure and Materials

Children were told that they would be playing a game together with two other people, in which their task would be to find a toy hidden under one out of two boxes. The experiment took place in a room used for behavioral testing. Children were seated at a table, with the experimenter and the agent sitting on other sides of the table. There were two plastic boxes on the table that were used for the hiding: a red one and a blue one. The experimenter hid a small toy in one of the boxes on each trial, while the agent put up the occluder to cover the child's view during the hiding. Crucially, this meant that the agent was always able to see where the toy was hidden, while the child never saw it. After the hiding, the agent lowered the occluder, hid her face behind a curtain while remaining seated, and the experimenter said the clue that referred to the agent’s mental states about the location of the toy. Children were told that they could use this clue to decide where to look for the toy. Upon children’s selection of a box, the experimenter would reveal its contents. In case the child chose the wrong box, the correct location was revealed after the first box was opened.

3.3. Design

Children participated in 42 trials, and it took 10-15 minutes to finish the game. Six types of critical items and one kind of control were tested, following the design of Dudley and colleagues (Dudley, 2017). See Table 1 for the items and predicted responses, based on an adult-like understanding of the verbs.

Table 1: Items used in the current study (Hungarian) and in Dudley 2017 (English).

		Test item	Adult-like response
Tud Know	none	Péter azt tudja, hogy a kék dobozban van. Peter knows that it's in the blue box.	blue
	matrix	Péter nem tudja azt, hogy a kék dobozban van. Peter doesn't know that it's in the blue box.	blue
	embedded	Péter azt tudja, hogy nem a kék dobozban van. Peter knows that it's not in the blue box.	red
Gondol Think	none	Péter azt gondolja, hogy a kék dobozban van. Peter thinks that it's in the blue box.	blue
	matrix	Péter nem gondolja azt, hogy a kék dobozban van. Peter doesn't think that it's in the blue box.	red
	embedded	Péter azt gondolja, hogy nem a kék dobozban van. Peter thinks that it's not in the blue box.	red
Control		Nem a kék dobozban van. It's not in the blue box.	red

Children heard each sentence type 6 times, with the color of the box mentioned in the sentence counterbalanced. Based on the pilot with Hungarian-speaking adults and the previous pilot with English-speaking adults (Dudley, 2017), we predicted that an adult-like understanding of *tud* and *gondol* would lead children to choose the mentioned box upon hearing affirmative sentences, regardless of the verb used. We expected the opposite pattern when children heard either verb in a report with embedded negation: children should never choose the mentioned box for these cases. Our prediction diverged for reports with matrix negation. An adult-like understanding of *tud* would result in choosing the mentioned box in such sentences, since the truth of its complement projects. On the other hand, the mentioned box should not be chosen in reports with *gondol*.

Given the prior English results, we expected that children might not follow an adult-like pattern in case of matrix negation reports, since some might lack an adult-like understanding of factivity. However, in the case that Hungarian-speaking children's understanding of the factivity contrast differs significantly from English-speaking children's understanding of it, we might expect to see Hungarian-speaking children perform differently than English-speaking children in the matrix negation condition specifically (since this is the condition that most directly taps into the factivity contrast).

3.4. Results

Children who completed at least 28/42 trials were included in the analysis. Participants who did not pass at least 4/6 control items were excluded from the analysis, forming a sample of 48 children and a total of 2000 trials. 38 trials (out of the 2000) were further excluded due to an experimenter mistake or the child not making a choice. The experimenter coded children's choice online. An offline coder later coded their answers based on the video recordings. There was a 99.97% agreement between the two coders, in case of disagreement the second offline coder watched the video again. Children's choices were coded either as 1 (choosing the mentioned box) or 0 (choosing the other box). Children chose the mentioned box in only 22/281 control trials, which showed that they were able to understand negation and did not consider only the mentioned box when making a choice.

For the *gondol* sentences, children chose the mentioned box 92% of the time in the affirmative condition and 16% of the time in the embedded negation condition, which would be expected in case of an adult-like understanding of *gondol*. In the matrix negation condition 29% chose the mentioned box, which is more often than adult participants, but still well below chance. For the *tud* sentences, children chose the mentioned box 95% of the time in the affirmative condition and 16% of the time in the embedded negation condition, which would be expected in case of an adult-like understanding of *tud.* In case of the *tud* sentences with matrix negation, the mentioned box was selected 39% of the time (see full results and a comparison to the prior English study in Figure 1).

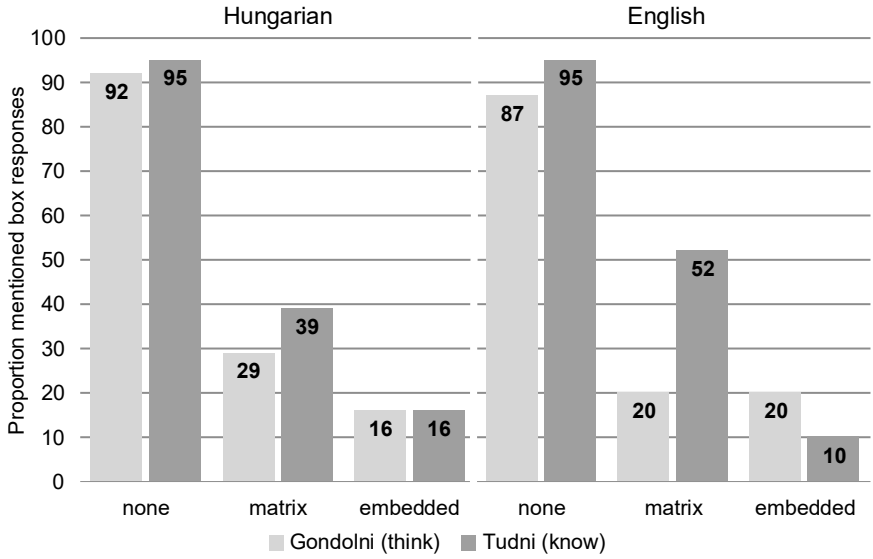

Figure 1: Results of the current study in Hungarian and the prior study in English.

Two generalized linear mixed-effects models were fitted in R using the lme4 package (Bates et al., 2015), with *answer* as the dependent variable, *negation type* and *verb type* as fixed factors, *age* as a covariate, and *participant ID* as a random intercept. One model included an interaction between negation and verb (*answer* ~ negation × verb + age + (1 | ID)), whereas the second model included only main effects (*answer* ~ negation + verb + age + (1 | ID)). Because the interaction model did not provide a better fit, the main effects model was used for the final analyses. We found a significant main effect of negation ($\chi^2(2) = 881.75$, $p < 0.001$), verb ($\chi^2(1) = 6.40$, $p = 0.011$) and age ($\chi^2(1) = 3.90$, $p = 0.048$). Planned pairwise comparisons showed differences between know-matrix and know-embedded ($z = -6.24$, $p<0.001$), and know-matrix and know-none ($z = -11.75$, $p<0.001$). Unlike the English data, no differences were found between know-matrix and think-matrix ($z = -2.66$, $p = 0.12$).

The results show that the type of negation affected children's performance. While most children correctly chose the mentioned box for the affirmative sentences, they realized that the other box should be chosen for the sentences with embedded negation regardless of the type of verb used. This aligns with the prediction that children have an adult-like understanding of *tud* and *gondol* in case of affirmative and embedded sentences. However, unlike the prior English data, no differences were found in children's responses to the two verbs in the matrix negation condition: they were unable to reliably pick the mentioned box in the tud-matrix condition, and they selected the mentioned box at the similar rates in the tud-matrix and gondol-matrix conditions. The results suggest that Hungarian children as a group do not yet understand how the verbs differ between 3-4.5 years, consistent with the prediction that the factive alternation affects the way *tud* and *gondol* are acquired by Hungarian children.

4. Discussion

The current study aimed to explore the developmental trajectory of understanding mental state verbs in Hungarian. A body of evidence shows that the acquisition of mental state verbs in children acquiring English and other Indo-European languages seems to follow a uniform pattern, showing that differentiating between factive and non-factive verbs does not occur until the age of four. However, novel paradigms controlling for the pragmatic aspects of mental verb understanding, as well as studies from the literature on cross-cultural comparison, show that the acquisition of mental verbs may not be as uniform as previously thought (Hansen, 2010; Lewis, Hacquard & Lidz, 2017; Selcuk, Brink, Ekerim & Wellman, 2018; Yu & Wellman, 2024). For this reason, we tested Hungarian-speaking children using a paradigm originally created for English-speaking children that targeted understanding of the projective differences between *know* and *think* in children aged 3-4.5 years (Dudley, Orita, Hacquard & Lidz, 2015; Dudley, 2017). Hungarian is a non-Indo-European, factivity-alternating language. This means the factive verb

tud ‘know’ can lose its factivity under certain conditions (Abrusán, 2025), making Hungarian an interesting test case for studying the developmental trajectory for understanding of factivity.

The results of the study showed that children’s overall performance did not differ between the two verbs for critical sentences with matrix negation, unlike English-speaking children and adults, and Hungarian-speaking adults. This suggests that Hungarian-speaking children could not demonstrate understanding of the difference between factive and non-factive verbs, whereas the other populations could. Why is Hungarian-speaking children’s understanding so different from their English-speaking peers? It could be due to issues with the design of the experiment that limit the validity of the cross-linguistic comparison. For the non-factive sentences, we used the Hungarian equivalent of *think* to better match the English experiment. However, Hungarian speakers seem to use *gondol* less frequently than the English equivalent, instead using either the postposition *szerint* or, less frequently, the verb *hisz* ‘believe’ to express their thoughts. It is thus possible that Hungarian children are not familiar with the less frequently used *gondol*, causing uncertainty about the meaning of such sentences. A related task artifact could also arise from the structure of the sentences with matrix negation. In these sentences, the verb was always followed by *azt* (due to the loss of factivity when *azt* occurs in the preverbal focus position under negation), while in the other cases *azt* preceded the verb. While both locations of *azt* are grammatically correct and used in everyday conversations, certain combinations are less frequently used and might sound less natural. Alternatively, the cross-linguistic difference could be due to differences in how children have to learn about factivity in the two languages, due to differences in the languages’ grammars of factivity, given that Hungarian is factivity-alternating. If children hear *tud* used both factively and non-factively, it could obscure the contrast between factives like *tud* and non-factives like *gondol*. After all, why would one use *gondol*, when the same, non-factive reading could be achieved by using *tud*? And maybe this also contributes to the low frequency of *gondol* in children’s input? Perhaps children who are still learning the differences between factive and non-factive mental verbs first focus on understanding the most frequently used *tud*, which can not only give a factive or non-factive reading, but is also used to express knowledge-how. This means that the most commonly used mental verb in Hungarian can have three meanings, and it could take children some time to learn when certain interpretations are used. To explore the possible reasons behind the results, we are currently conducting a deeper analysis of the Hungarian CHILDES corpus data reported above, with a focus on what kinds of utterances and discourses *tud*, *gondol*, and related verbs occur in. Another planned line of research will examine what Hungarian-speaking children know about *tud* in an ecologically valid way. This task would be developed specifically to match the characteristics of Hungarian language better, and it would allow us to compare cases where *tud* is preceded or followed by *azt* or *úgy*, in order to study variations in factivity alternation and how children interpret them.

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