Conjunction as a default meaning of disjunction

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based on joint work with Andreea Nicolae, Anton Benz, Gabriela Bîlbîie, Mara Panaitescu , Alexandre Cremers, and Lyn Tieu

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Contribution

- Do children interpret disjunction conjunctively due to implicature or due to an innate basic semantic default?
- We report two experimental studies:
- an experimental study on Romanian 3-year-olds' interpretation of utterances containing nonce connectives *mo/ mo…mo*.
- an experimental study on Romanian 3-year-olds' interpretation of disjunctive utterances containing the complex disjunction *fie…fie* 'either…or'.
- The results support the view that the conjunctive reading is a basic interpretation.

Background: Insights from child language

Găina a împins trenul sau barca. **'The hen pushed the train or the boat.'**	
Interpretation	**Paraphrase**
Inclusive	*The hen pushed one and possibly both.*
Exclusive	*The hen pushed only one, not both.*
Conjunctive	*The hen pushed both, not just one.*

- Adults tend to interpret disjunctive utterances exclusively (Nicolae & Sauerland 2016, Nicolae et al. 2024).
- Children rarely do so, instead interpreting these inclusively or conjunctively (Paris 1973, Braine & Rumain 1981, Singh et al. 2016, Tieu et al. 2017, Sauerland & Yatsushiro 2018).

Background: Sources of conjunctivity

- An experimental artifact (Skordos et al. 2020, Huang & Crain 2020)
- A genuine semantic-pragmatic interpretation:
  - Implicature (Singh et al. 2016)
  - Conjunctive default (disjunction is interpreted as conjunction, see Aloni et al. 2024, Bleotu et al. 2025a)
  - A basic meaning of disjunction alongside inclusivity (Sauerland & Yatsushiro 2018)
- A processing account (ignoring the connective, see Bleotu et al. 2025b,c)

Background: Disjunction in child Romanian

- Romanian 5-year-olds have been shown to interpret the complex disjunction *fie…fie* conjunctively ‘either…or’ even when the set-up includes more than the mentioned objects (see Bleotu et al. 2025c).
- Conjunctivity is **not just a task effect**.

Bleotu, Tieu, Benz, Cremers, Bîlbîie, Panaitescu, Ivan, and Nicolae. (2025c). Children interpret some disjunctions conjunctively: Evidence from child Romanian. To appear in *Journal of Semantics*.

Background: Disjunction in child Romanian

- The **implicature account** (Singh et al. 2016, Tieu et al. 2017) treats conjunctivity as a derived meaning.
- Children lack access to the conjunctive alternative and compute implicatures with disjunction by negating pre-exhaustified disjuncts (*only p*, *only q*), resulting in $p \wedge q$.

$$EXH[p \vee q] = (p \vee q) \wedge \neg(p \wedge \neg q) \wedge \neg(q \wedge \neg p)$$

Background: Disjunction in child Romanian

- The **basic meaning account (**Sauerland & Yatsushiro 2018, Aloni et al. 2024, Bleotu et al. 2024, 2025a) sees conjunctivity as underived.
- In the **ambiguity approach** (Sauerland & Yatsushiro 2018), children access both conjunctive and inclusive meanings early on.
- The **conjunctive default view** (Aloni et al. 2024, Bleotu et al. 2024, 2025a) proposes that children start with a conjunctive bias and later embrace inclusivity and then exclusivity.
  - For Aloni et al. (2024), the conjunctive default arises due to two cognitive biases:
    - a neglect-zero bias, which leads children to avoid empty or incompatible scenarios, and
    - a no-split bias, which discourages consideration of multiple alternative states.
  - For Bleotu et al. (2024, 2025a,b,c), children ascribe to disjunction a conjunctive meaning, or they simply ignore the connective.

Current studies

- support the idea of conjunction as a basic interpretation of disjunction

Nonce Word Study

Developmental Study

Nonce Word Study

- We probe into Romanian adults' and children's understanding of nonce functional words: *A mo B* or *mo A mo B*

- **Findings:** when exposed for the first time to sequences of words containing nonce connectives, participants tend to associate them with a conjunctive interpretation rather than a disjunctive or negative one

- **Possible interpretations of *A mo B* or *mo A mo B***
- **(both) A and B (privileged)**
- (either) A or B
- A not B/neither A nor B

- Bleotu,, Nicolae, Panaitescu, Bîlbîie, Benz, & Tieu, L. (2025a). A nonce investigation of a possible conjunctive default for disjunction. *Experiments in Linguistic Meaning, 3,* 53–64.

Nonce word paradigms

- Nonce words – a method to probe into children's ability to interpret words by relying on syntactic cues, i.e. *syntactic bootstrapping* (Gleitman 1990, Brown 1957):

  *Do you see any/ a **sib**? vs. What is **sibbing**?*

- Jean Berko Gleason's Wug Test (1958): children extend known morphology to novel words

  e.g. plural (*one wug-two wugs*), verbal morphology (*He zibs*).

- Many experiments ensued (Naigles, 1990; Syrrett et. al., 2010; Yuan & Fisher, 2012; Huang et al., 2021; a.o.)
- Interesting paradigms investigating logical defaults:

  (i) the *Human Simulation Paradigm* (HSP; Gillette et al. 1999), testing whether adults can infer meaning from context (see Dieueleveut et al. 2022 on modals)

  (ii) *Artificial Language Learning Paradigms* (Culbertson & Schuler 2019, Maldonado & Culbertson 2021 a, b), testing adults' and children's biases in learning artificial words (see Maldonado & Culbertson 2021b on negation)

Aim

- We look at what kinds of meanings children and adults ascribe to a nonce word linking A and B, using the materials from Tieu et al. (2017).

Participants

Cd. 1 *(mo)*	**Cd 2 (*mo…mo*)**
N = 21 adult native speakers of Romanian N = 17 child native speakers of Romanian	

- The same participants were tested on both conditions.

Procedure

- Both tasks employed a TVJT in Prediction Mode (Tieu et al. 2017), not Description Mode (Singh et al. 2016) – to license *ignorance inferences*, which often characterize disjunctive statements.
- Participants evaluated whether puppet Bibi had correctly guessed the outcome of a situation.
- Guesses were in the form

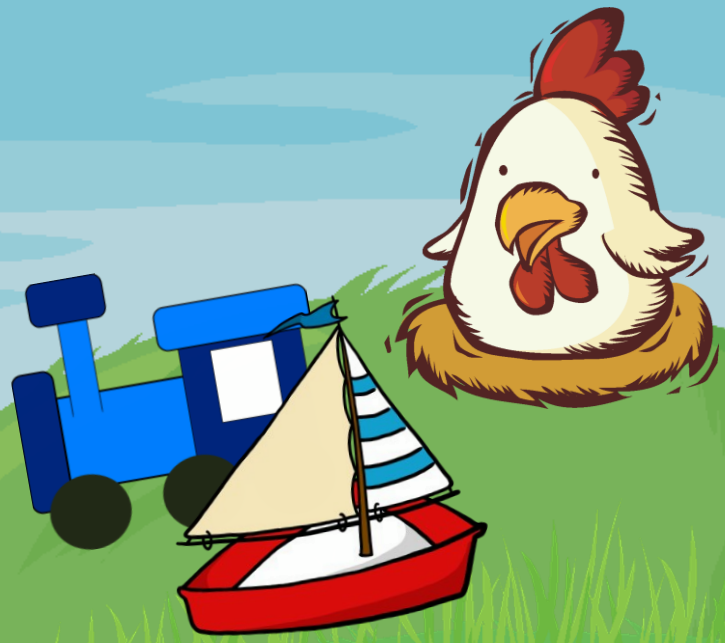
  The hen pushed (mo) the train mo the boat.
- Participants were told that Bibi would sometimes make use of an unknown word, and they had to decide what it meant for Bibi.
- They were also told that the unknown word does not refer to something that one can point to.
- At the end of the experiments, participants had to say what they thought the nonce words meant.
- We avoided using the logical operators *and, or, not*

Materials

- Two practice trials, three fillers
- **Four 1-disjunct-true (1DT) targets** (e.g., only one)
- **Four 2-disjunct-true (2DT) targets** (e.g., both)
- **Two 0-disjunct-true (0DT) controls** (e.g., neither)

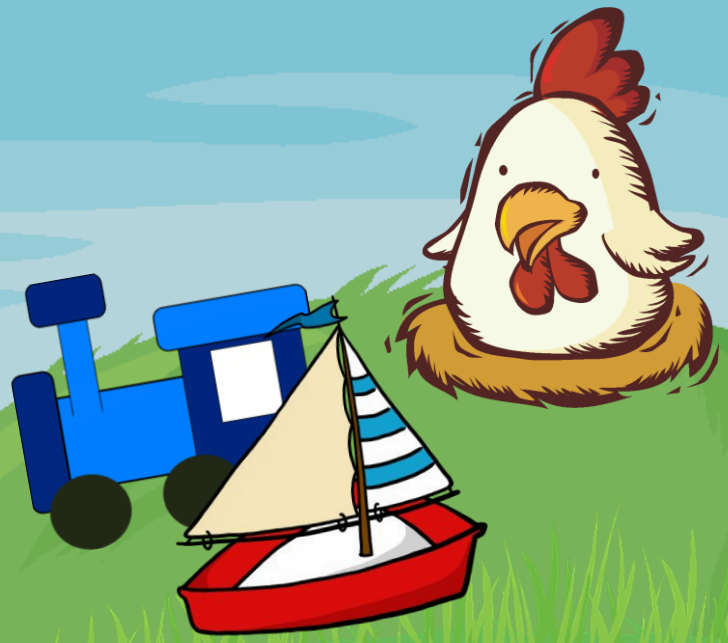
Cd. 1 ***(mo)***	BIBI: *Găina a împins trenul mo barca.* BIBI: 'The hen pushed the train mo the boat.'
Cd. 2 ***(mo…mo)***	BIBI: *Găina a împins mo trenul mo barca.* BIBI: 'The hen pushed mo the train mo the boat.'

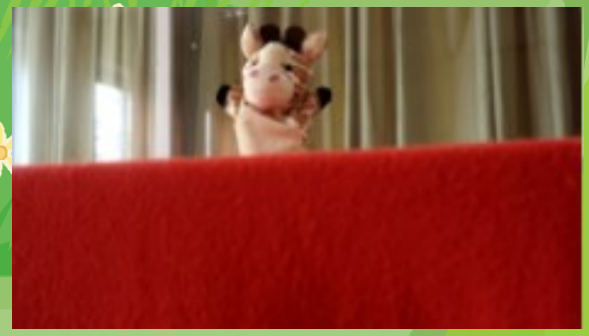
Example of a statement in 2DT

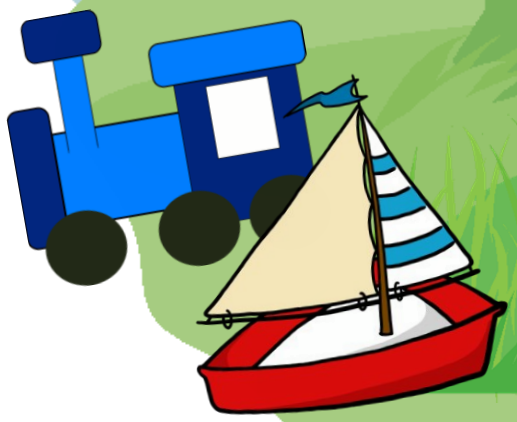


SCENE 1: There once was a hen who loved to play with her toys, she especially loved to push them around! One day her papa gave her *a train, a boat*.
The hen was very happy to play with them. Let's see if Bibi can guess what happened next!

SCENE 2:
Bibi: *Găina a împins mo trenul mo barca.*
‘The hen pushed mo the train mo the boat.’







SCENE 3: Look at what the hen pushed. Was Bibi right?

Categorizing participants

- We categorized participants based on 1DT/2DT responses and on their final judgments.

Participant category	Conditions	
	1DT	2DT
Conjunctive	No	Yes
Inclusive	Yes	Yes
Negative/Exclusive	Yes	No
Mixed	Yes/No	Yes/No

Categorization results

Participant category	Adults		Children	
	mo	*mo…mo*	*mo*	*mo…mo*
Conjunctive	13	16	12	16
Inclusive	0	0	0	0
Negative/exclusive	2	2	1	0
Mixed	5	2	4	1

- Children and adults preferred conjunctive readings both with *mo* and *mo…mo…*
- Chi-squares reveal **no significant difference** in conjunctivity between groups ($\chi^2 = 0.0083$, $df = 1$, $p = 0.92$) or between *mo* and *mo…mo…* for either age group.

Discussion

- When adult participants are exposed to nonce words connecting A and B, their default interpretation seems to be conjunctive.
- Even more strikingly, they seem to default to conjunction even in an experiment where Bibi does not always make correct guesses (as is obvious from the fillers).

Possible interpretations of the results: Frequency

- Participants simply associate the unknown connectors with the interpretation corresponding to the most frequent logical operator linking two elements, conjunction.
- Jasbi et al. 2018, 2022: corpus evidence that conjunction is more frequent than disjunction

Possible interpretations of the results: Logical universal primitives

- Conjunction is more basic than disjunction, since disjunctive interpretations can be treated as the conjunction of two modalized elements (Zimmerman 2000):

  (A V B) as (◊A & ◊B)

- Conjunction has the advantage of conceptual simplicity:

  (A and B) is simpler than (◊A & ◊B)

Possible interpretations of the results: Strongest Meaning Preference

- If S is ambiguous between 2 meanings, go for the stronger one (Dalrymple et al. 1998).
- Conjunction has a stronger meaning than disjunction.

Possible interpretations of the results: Visual effect

- effect of the visual set-up (Skordos et al. 2020, Huang & Crain 2020), i.e., mentioning 2 objects in a context where there are only 2 objects leads to a conjunctive default

  BUT what if the context involved 4 objects?

Possible interpretations of the results

- ***Question***: How can we distinguish between these approaches?
- ***Problem*:** Not so easily, given that frequency may also be a consequence of a conjunctive bias, and it is even possible several explanations are the case at the same time.

Possible interpretations of the results: Implications for disjunction

- **How do these findings reflect on Romanian children's interpretation of the complex disjunction *fie…fie*?**
- Children's interpretation of *fie…fie* as conjunctive could be due to a conjunctive default, if *fie…fie* is perceived as infrequent/unknown.
- **Supporting evidence**: *fie…fie* is less frequent than *sau…sau* in adult corpora (see Bleotu et al. 2023a).

Nonce Word Study: Main takeaway

- Our nonce experiments suggest that a conjunctive default could be a possible source for children's conjunctive interpretation of disjunction.

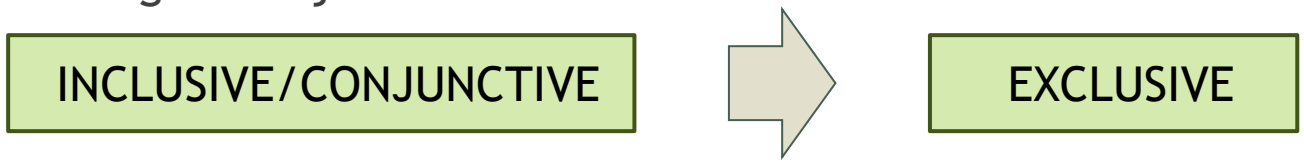
Developmental Study

- What can looking at 3-year-olds tell us about children's interpretation of disjunction?
- Can it help us settle whether children's interpretation of disjunction is a basic underived meaning or an implicature?

Theoretical predictions

- The **implicature account** predicts that children should start out as inclusive, only later deriving conjunctive implicatures and exclusivity implicatures.

- The **ambiguity approach** predicts that children should be inclusive and conjunctive with disjunction from the start, as both meanings are basic meanings of disjunction.



- The **conjunctive default approach** predicts that children should start out as conjunctive, later developing an inclusive interpretation, and even later developing an exclusive interpretation.

Aim of the developmental study

- Previous research on Romanian (Bleotu et al. 2023, 2024, 2025) focused on 5-year-olds and found that some children were conjunctive, and some were inclusive with the complex disjunction *fie…fie*.
- In the current study, we investigate 3-year-olds' behaviour with *fie…fie*.
- Assuming age 3 is early enough to capture the onset of the acquisition of the disjunction *fie…fie*, we expect 3-year-olds to be:
  - (i) inclusive under an implicature account
  - (ii) inclusive and conjunctive under an ambiguity account, and
  - (iii) conjunctive under a conjunctive default account.

Experiment: Methodology

- We tested 34 3-year-old children (*M*=3;06).
- We used a modified TVJT presented in Prediction mode in order to license *ignorance inferences*, which often characterize disjunctive statements (Tieu et al. 2017).
- Participants were introduced to a puppet, Bibi, who made guesses about what would happen.
- Participants then saw the outcome and had to say whether Bibi had guessed well and why.
- 4 objects were always present in the scene, even though the test sentences mentioned only 2.

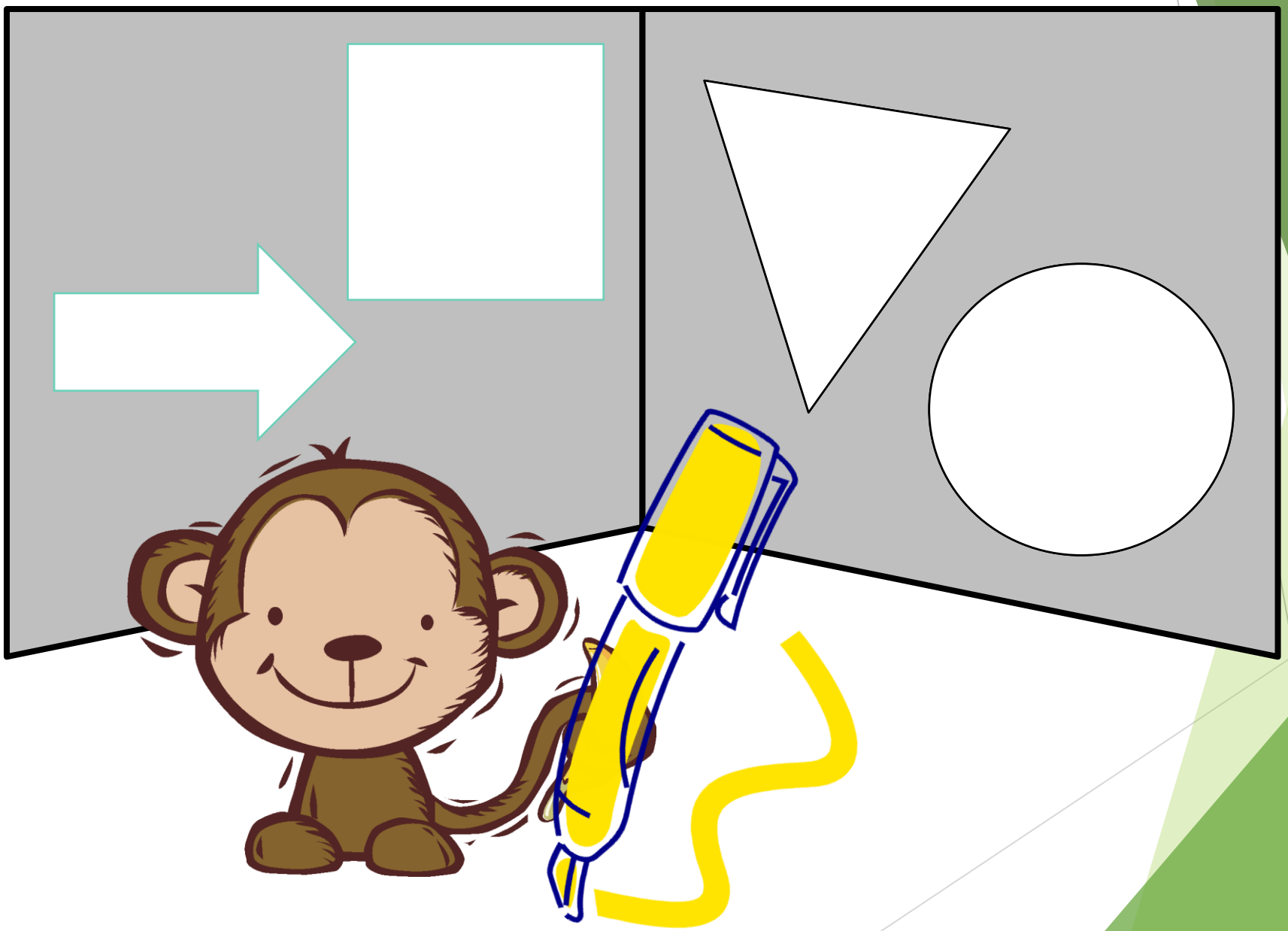
Experiment: Materials

- Each participant saw 26 sentences:
  - 2 practice trials
  - a randomized block of 8 disjunctive test sentences, 4 fillers/controls
  - a randomized block of 8 conjunctive test sentences, 4 fillers/controls

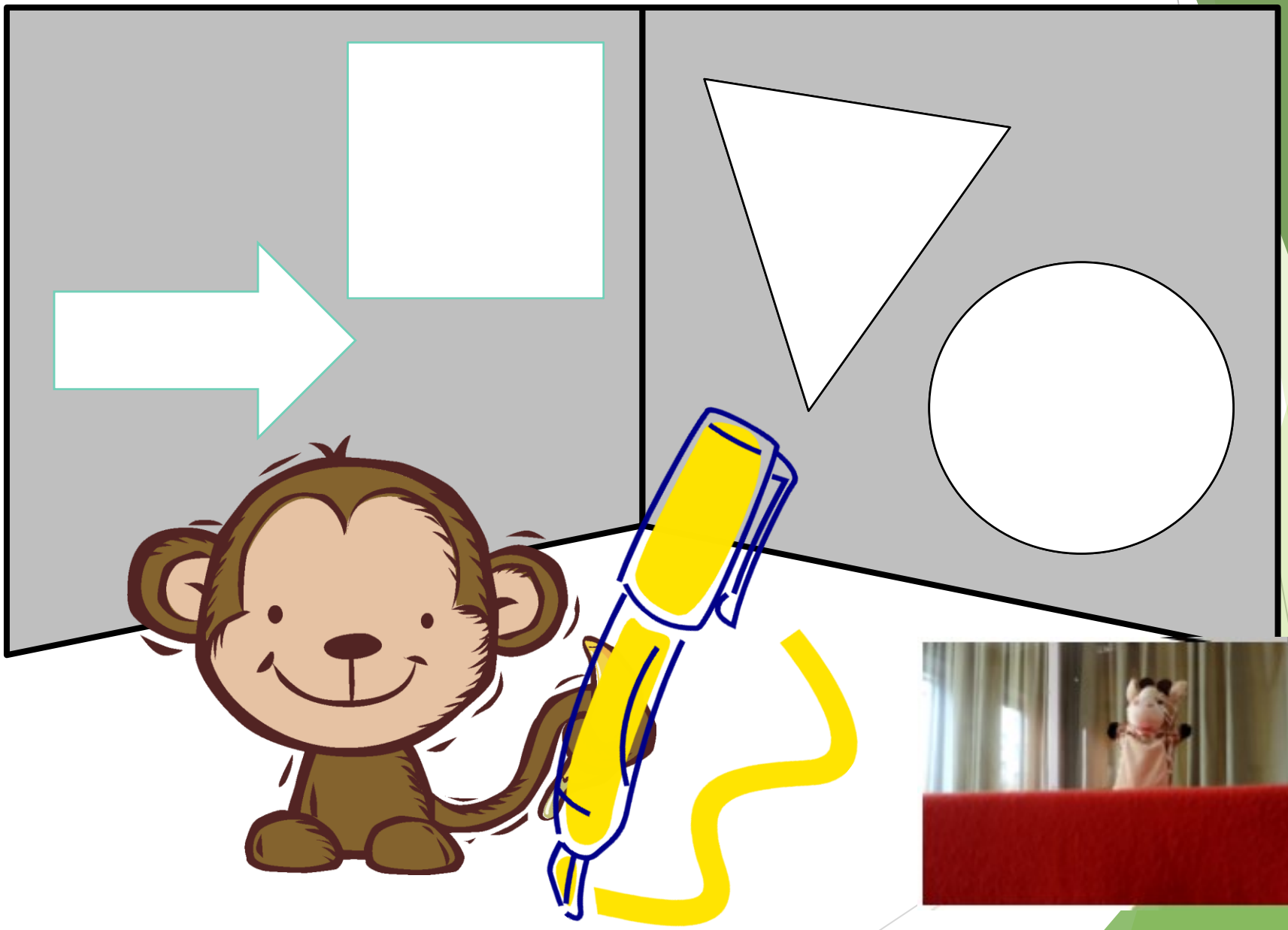
Experiment: Materials

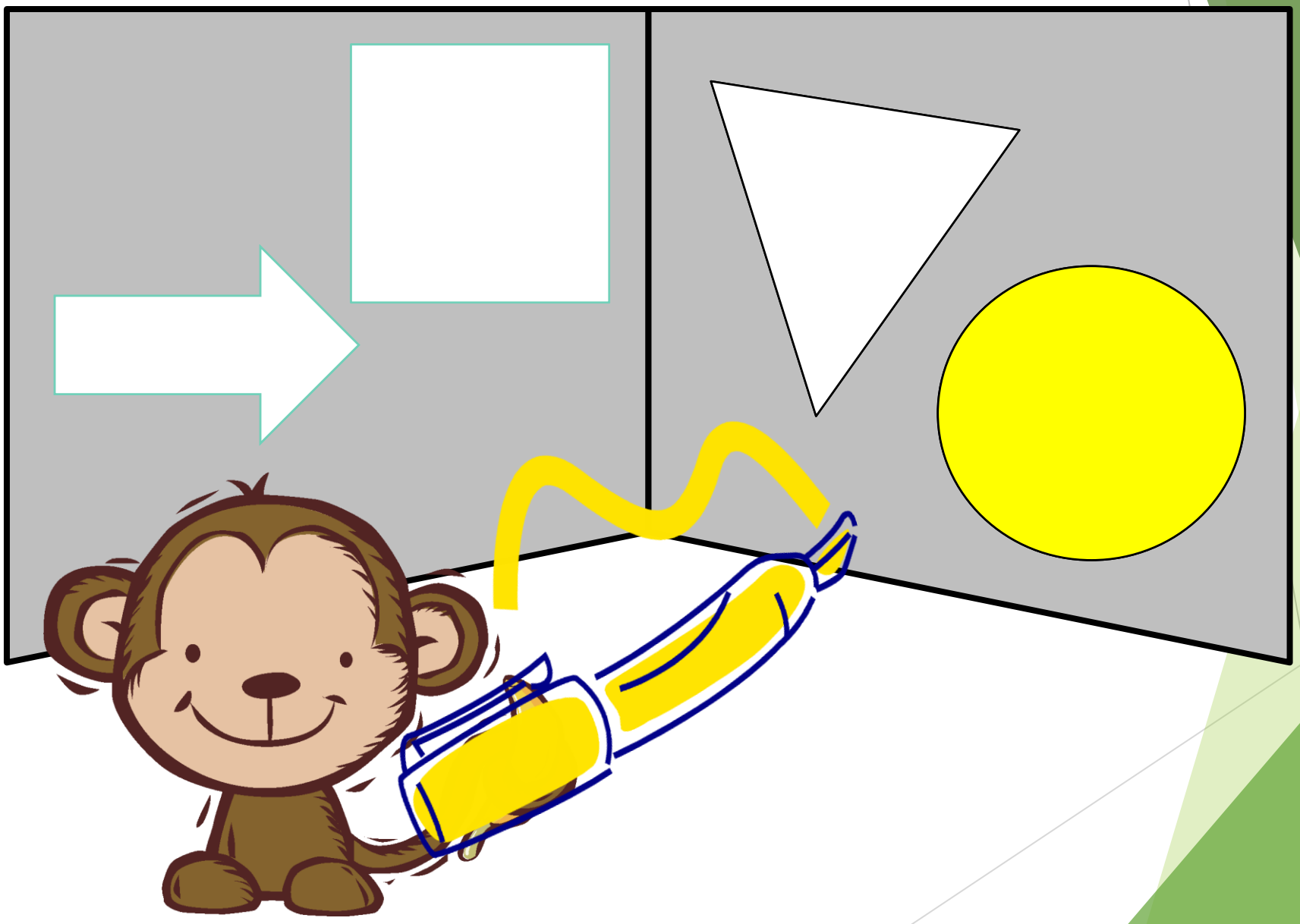
- Disjunctive test sentences were presented in:
  - 1-disjunct-true (1DT) contexts (x4), where only one disjunct was true
  - 2-disjunct-true (2DT) contexts (x4), where both disjuncts were true

Example of a disjunctive statement in 1DT

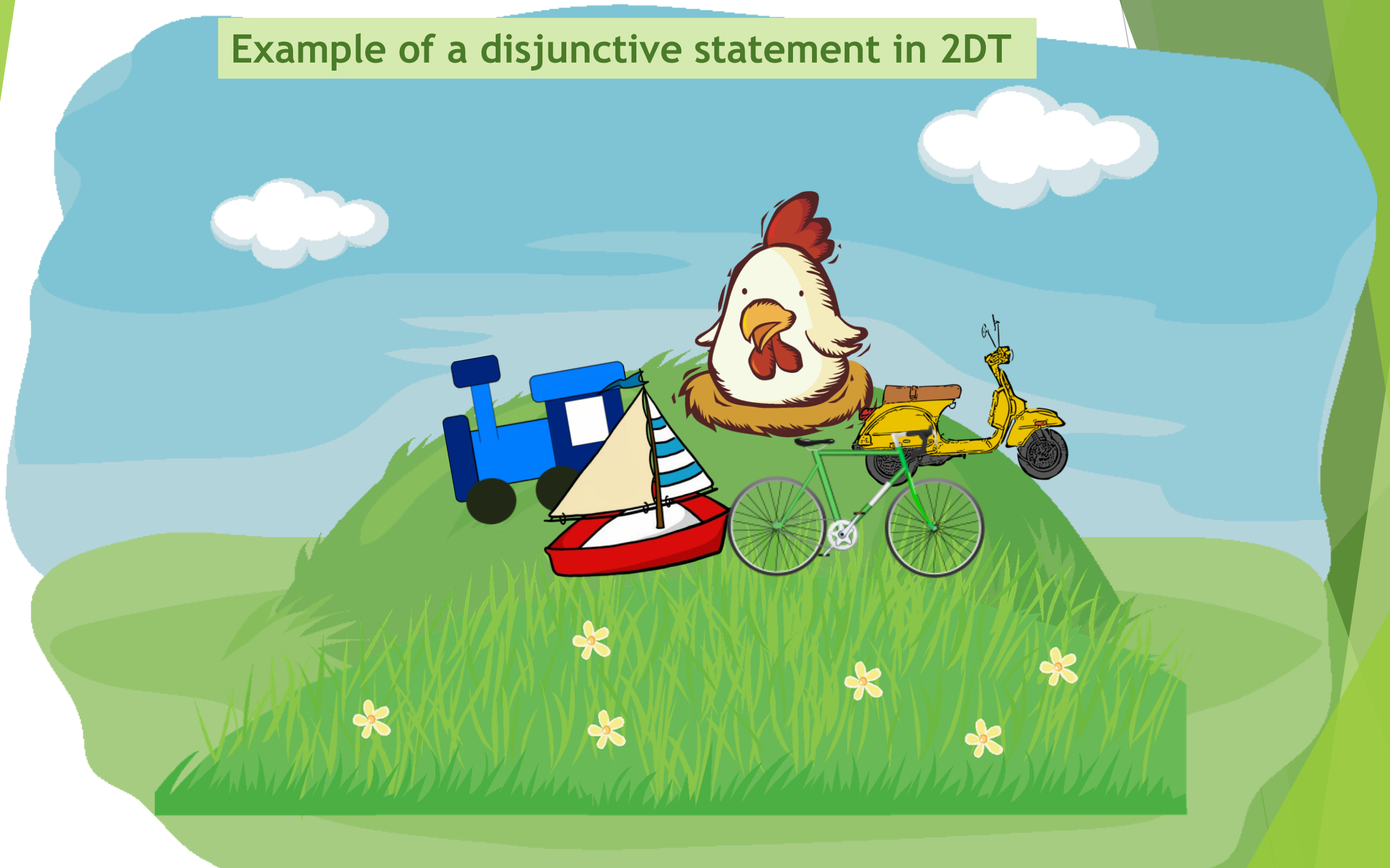


Maimuța a colorat fie triunghiul fie cercul.
‘The monkey colored either the triangle or the circle.’

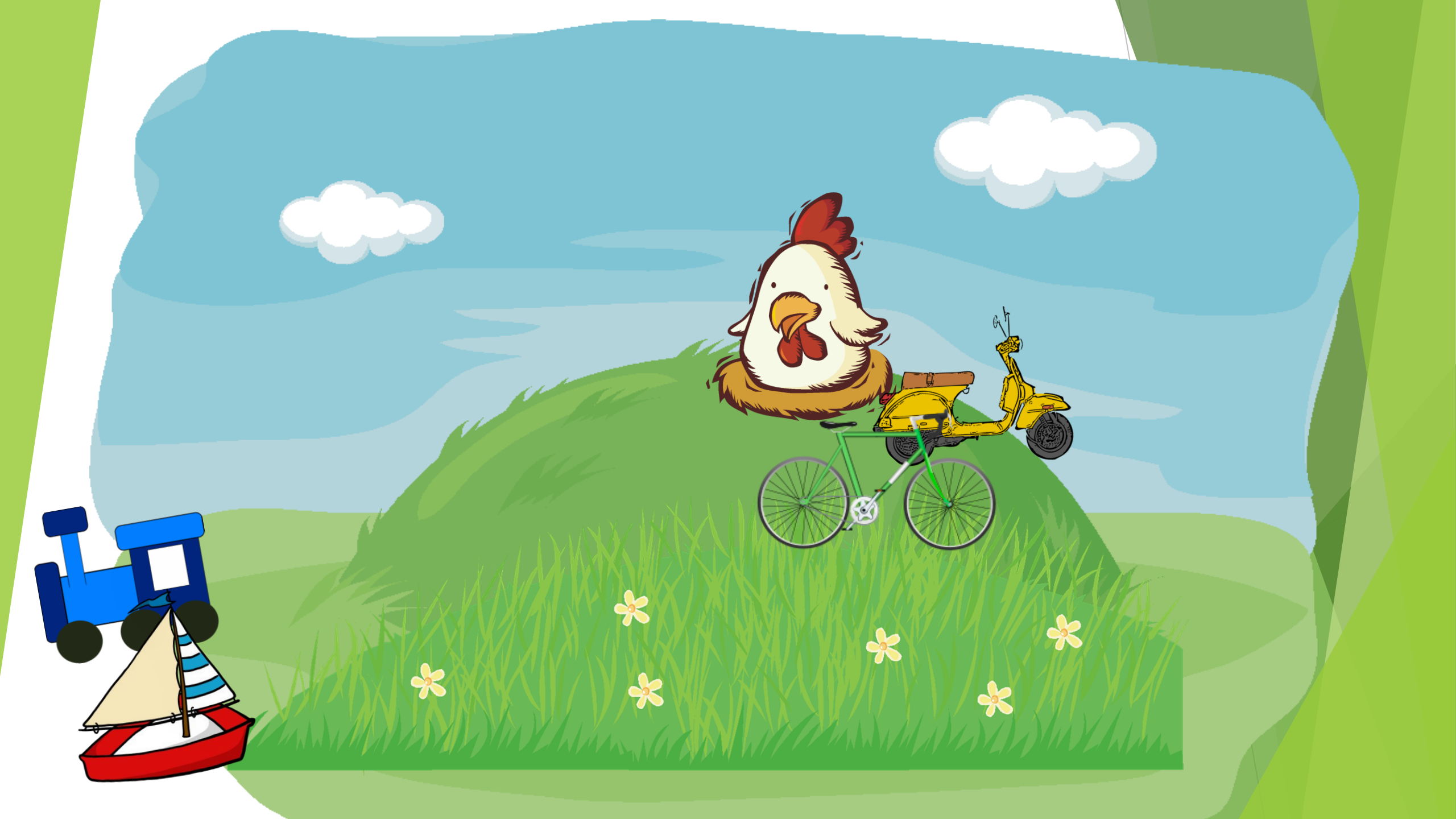




Example of a disjunctive statement in 2DT



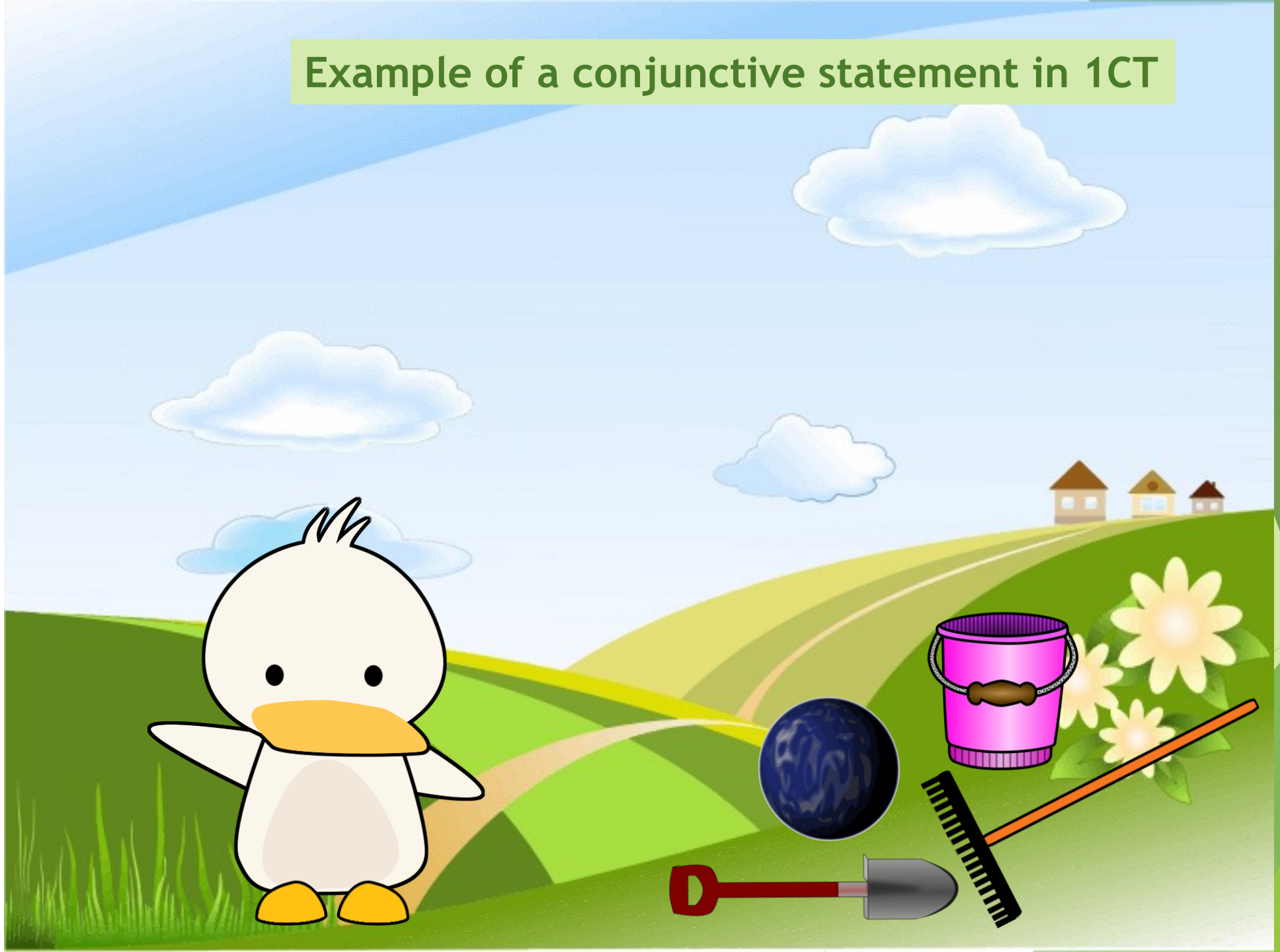
Găina a împins fie trenul fie barca.
'The hen pushed either the train or the boat.'



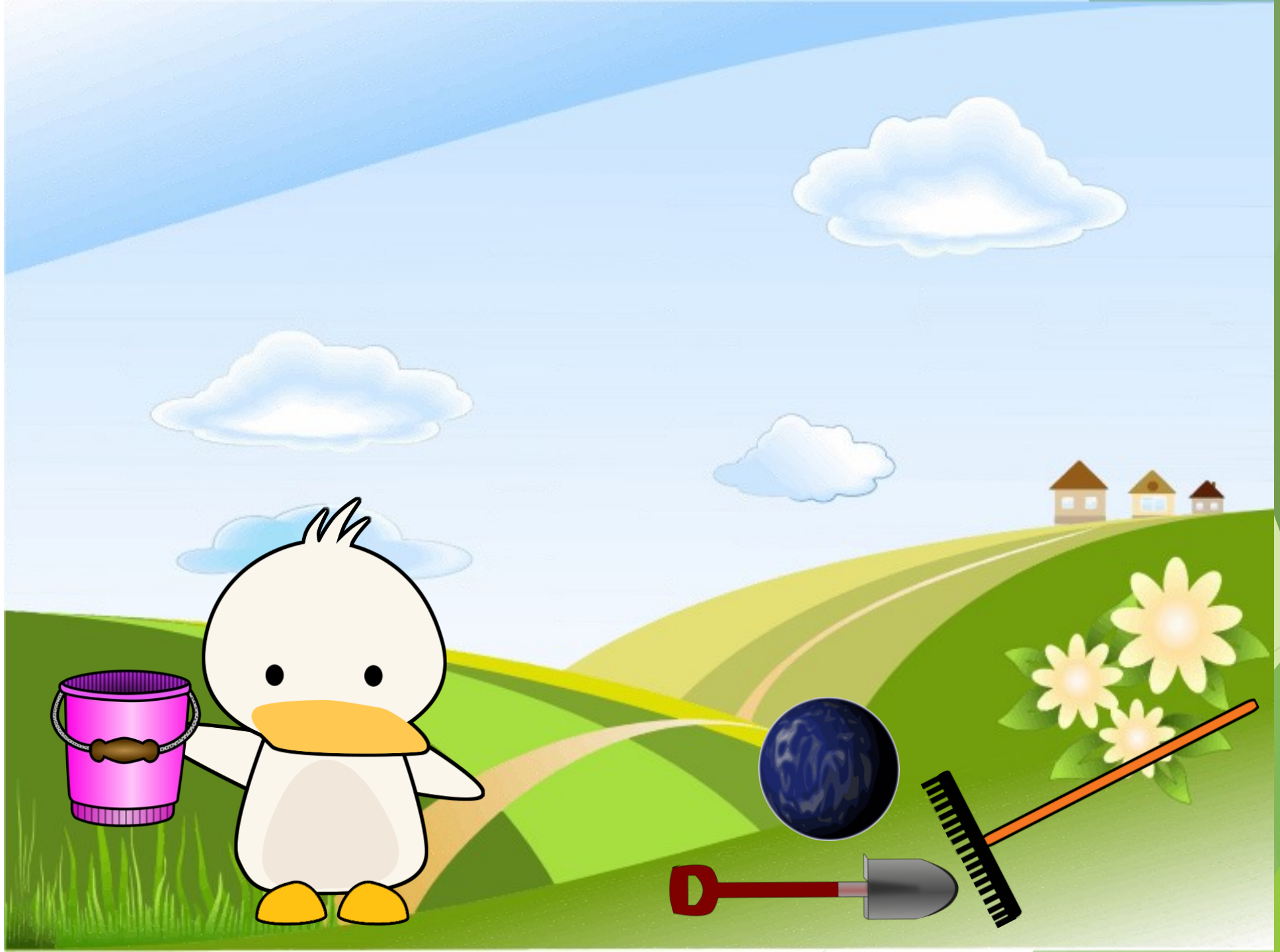
Experiment: Materials

- Conjunctive sentences were presented in:
  - 1-conjunct-true (1CT) contexts (x4)
  - 2-conjunct-true (2CT) contexts (x4)
- These conditions were included to ensure that ‘inclusive’ participants who accept disjunctive statements in 1DT are genuinely inclusive, i.e. they reject conjunctive sentences in 1CT rather than accept them out of pragmatic tolerance for partial truth.
- If a participant accepts a disjunctive statement in 1DT but also accepts a conjunctive statement in 1CT, this could mean they are potentially conjunctive but accept partial truth, showing pragmatic tolerance.
- If a participant accepts a disjunctive statement in 1DT but rejects a conjunctive one in 1CT, they are clearly not conjunctive.

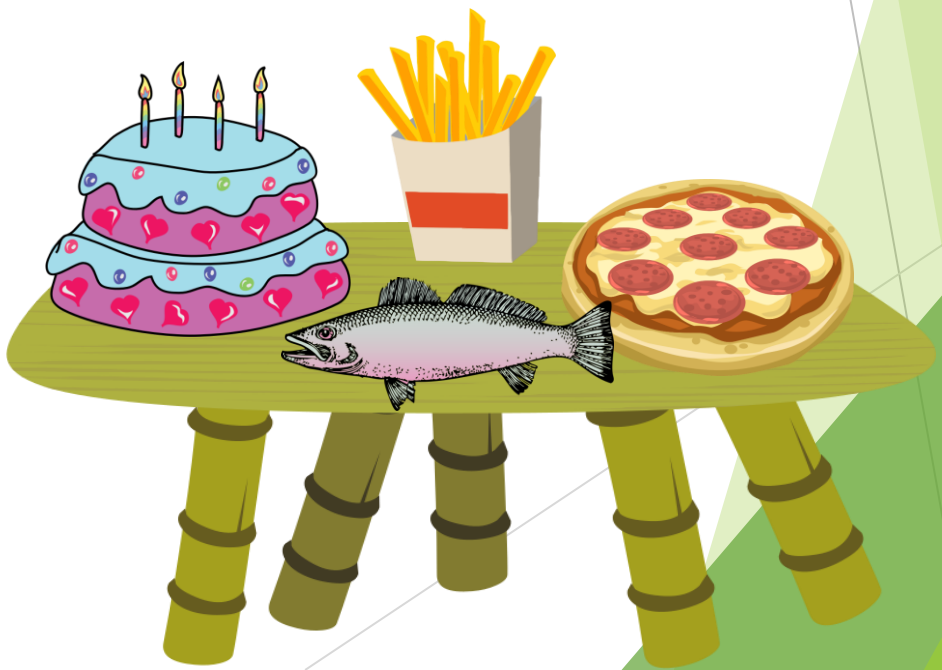
Example of a conjunctive statement in 1CT



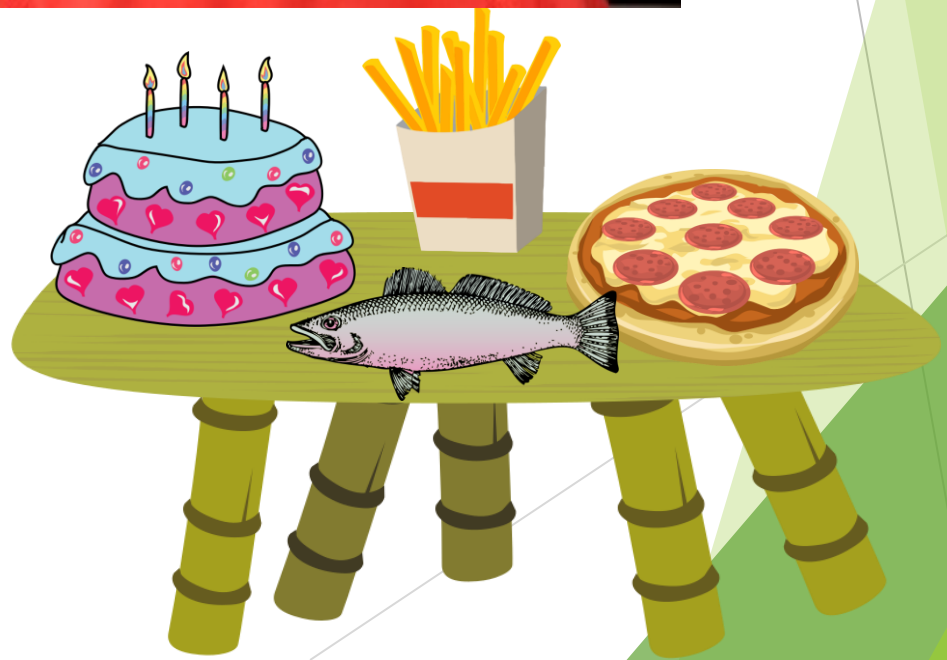
Rățusca a preferat o minge și o găleată.
‘The duck preferred a ball and a bucket.’

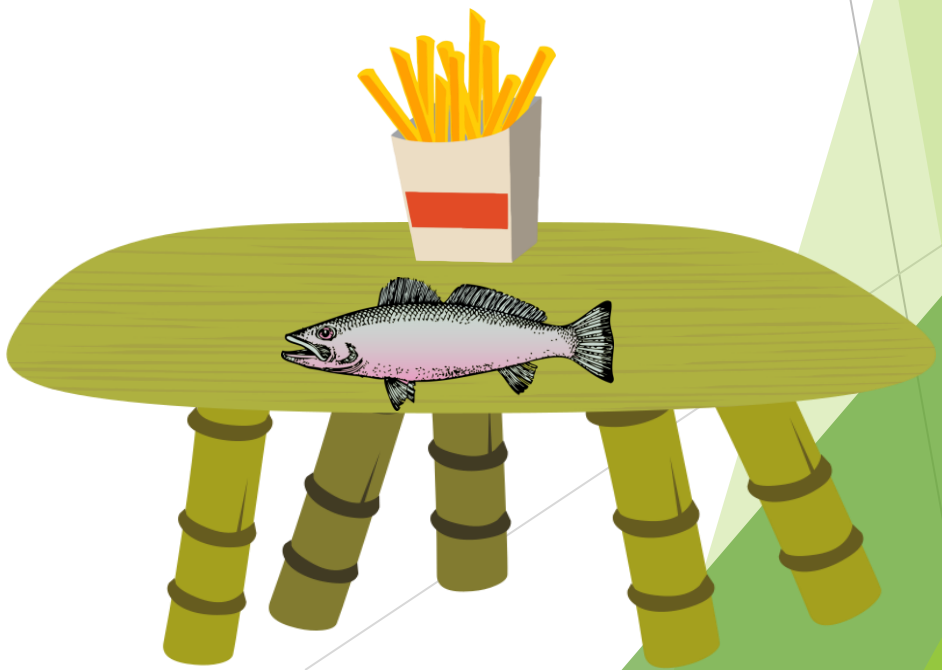


Example of a conjunctive statement in 2CT

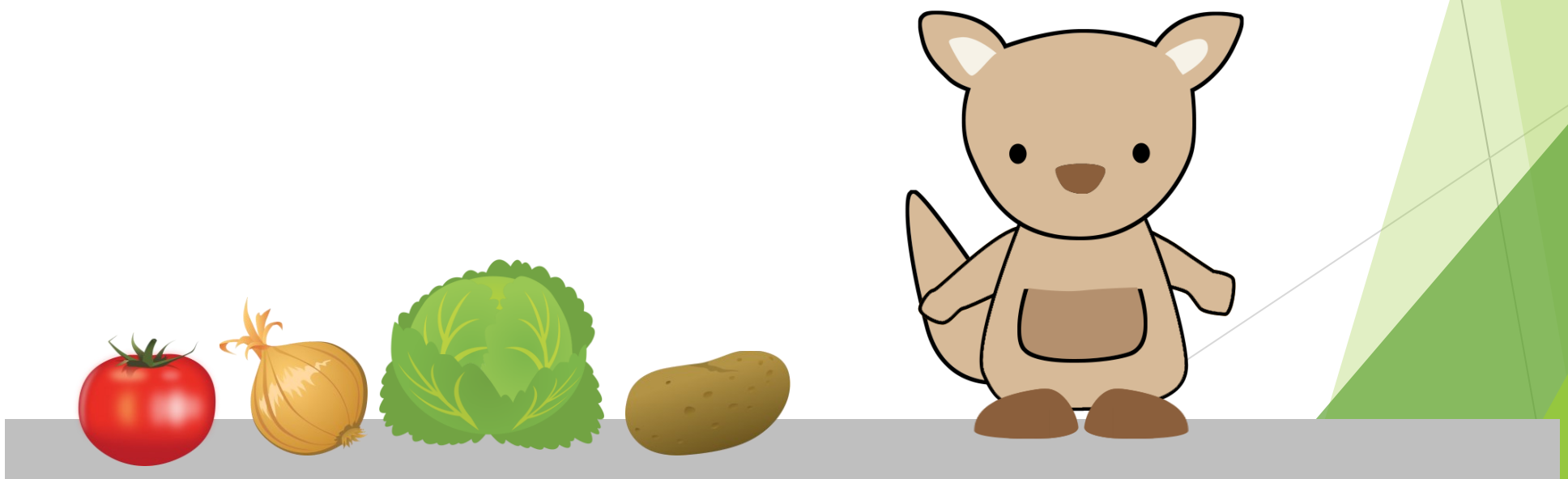


Elefantul a preferat o pizza și o prăjitură.
‘The elephant preferred a pizza and a cake.’

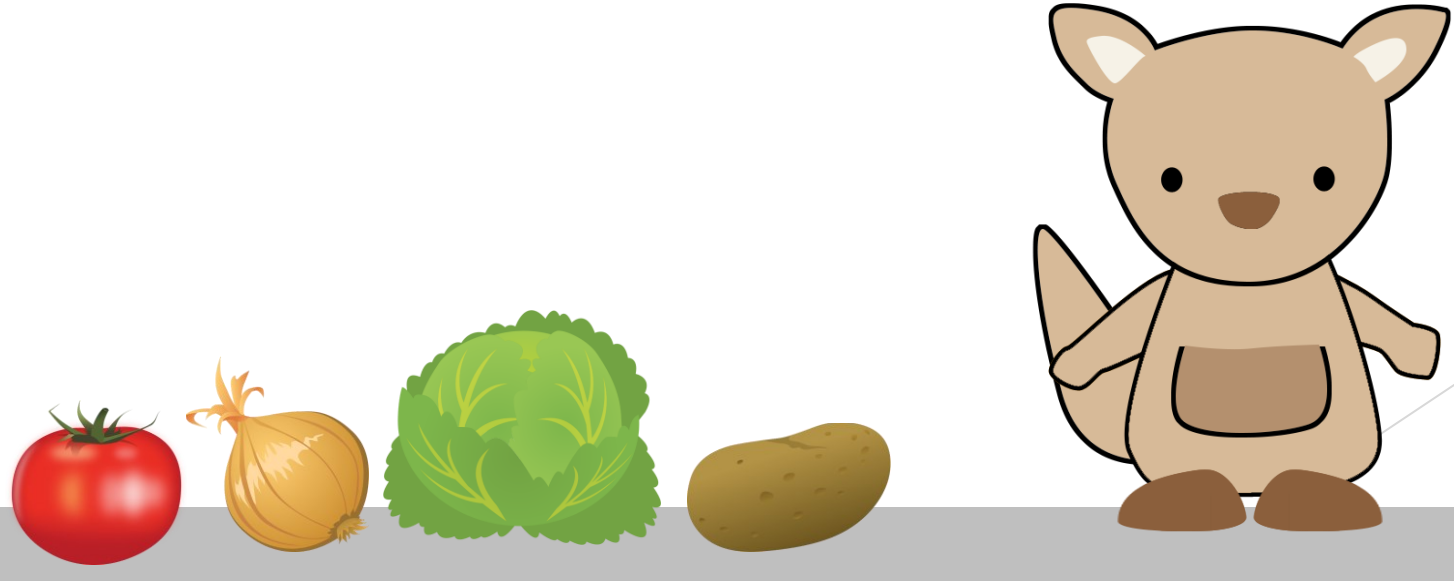


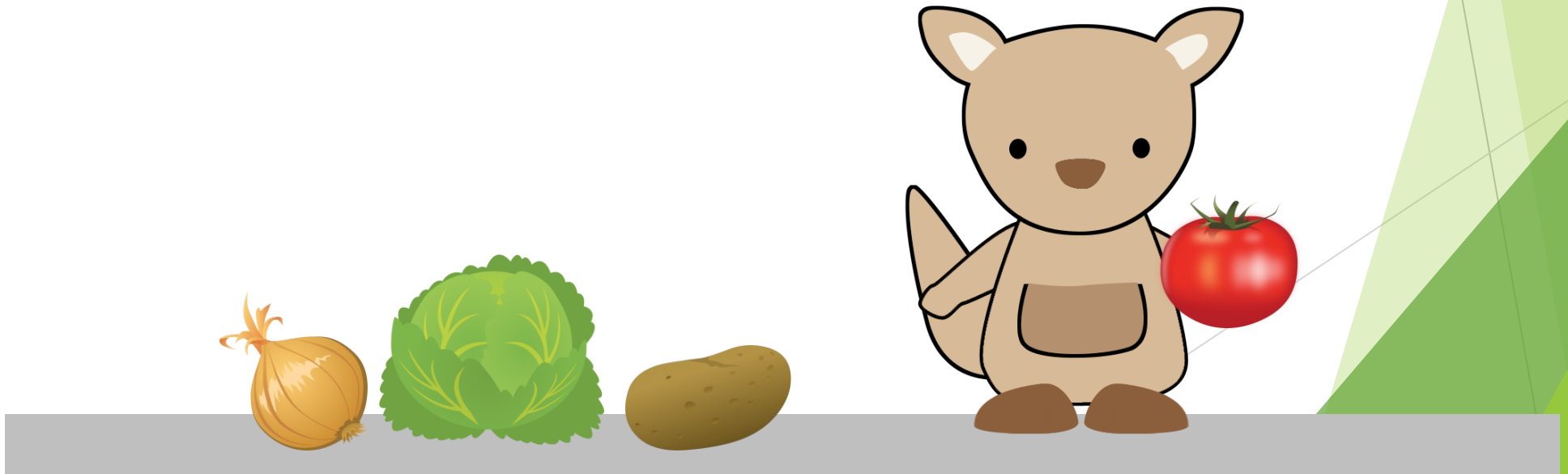


Example of a (false) control

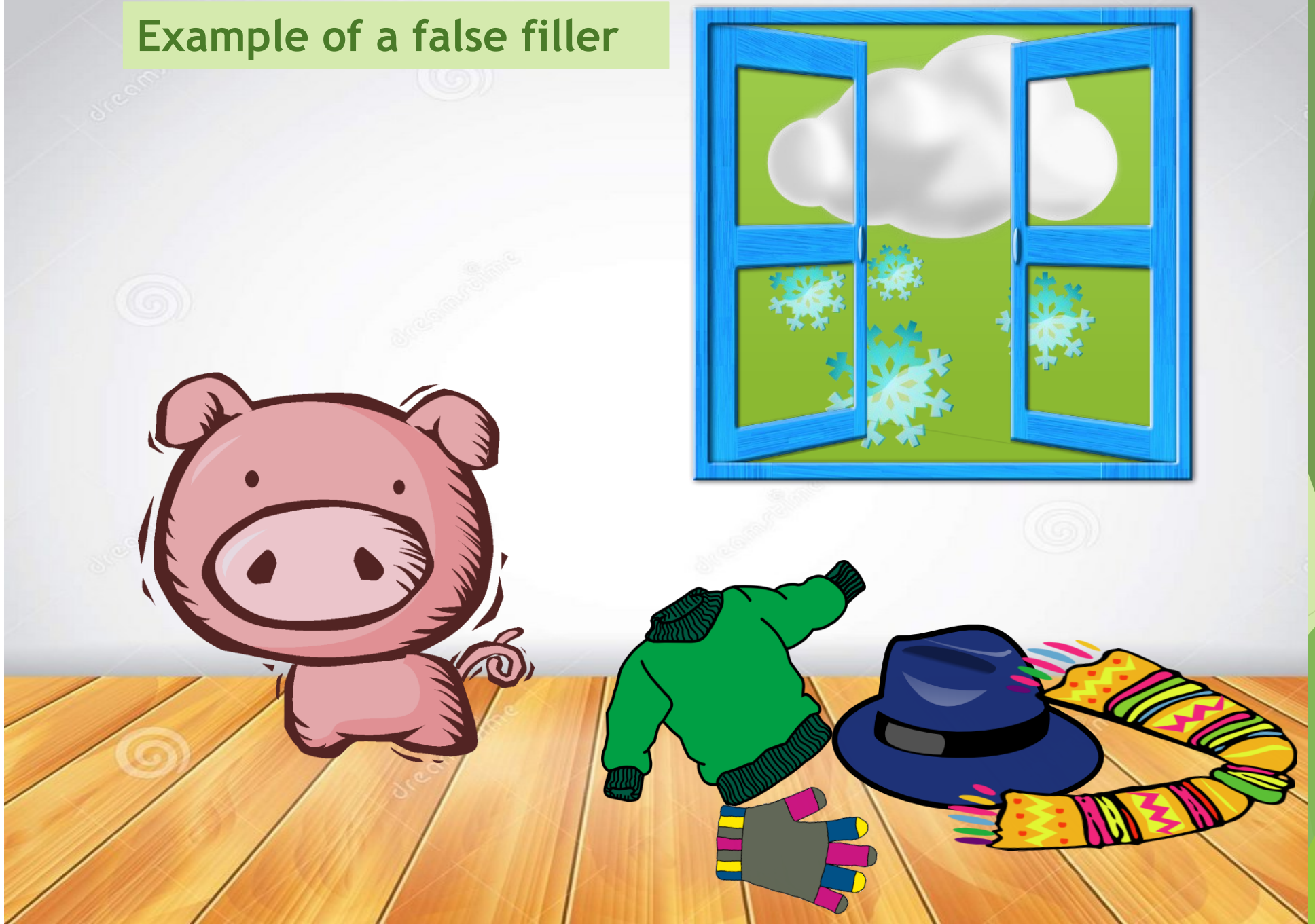


Cangurul a luat fie un cartof fie o varză.
‘The kangaroo took either a potato or a cabbage.’





Example of a false filler



Porcusorul și-a luat prașția.
'The little pig put on his slingshot.'

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Categorizing participants

- We categorized participants as *partial truth*, *inclusive*, *exclusive*, *conjunctive* or *mixed responders* based on their responses to the 1DT, 2DT targets and 1CT targets.
- Participants were said to accept a certain condition if they accepted more than half of the statements in that condition.

Categorizing participants

Participant category	Conditions		
	1DT	2DT	1CT
Partial truth	Yes	Yes	Yes
Inclusive	Yes	Yes	No
Exclusive	Yes	No	No
Conjunctive	No	Yes	No
Mixed	Yes/No	Yes/No	Yes/No

Categorization results

Participant category	Current study	Bleotu et al. (2025a)	
	Age 3	Age 5	Adults
Partial truth	9	0	1
Inclusive	5	13	3
Exclusive	0	1	20
Conjunctive	16	7	1
Mixed	3	5	4

Analysis of categorization data

- Based on performance on fillers and controls, we removed 1 child participant.
- A Fisher's test comparing the distribution of participants (excluding the mixed category) in 3- vs. 5-year-olds (our previous dataset) revealed a significant difference.
- Children were **more conjunctive**, **less inclusive**, and more tolerant of partial truth with *fie…fie* at age 3, compared to age 5.

Discussion

- Most of the 3-year-olds were conjunctive and more so than at age 5.
- Our findings are more in line with the view that the conjunctive interpretation is a basic default meaning of disjunction rather than an interpretation derived via an implicature.
- Our results are in line with the following developmental path:

- While our study sheds light on the transition from the first stage to the second stage, further research is needed to shed light on the transition from the second stage to the third stage.

Discussion

- The existence of 5 inclusive and 3 mixed participants may cast doubt on the conjunctive default account.
- Under an ambiguity account: Children may access both conjunctivity and inclusivity from the start.
  - But we would then expect a more similar distribution of inclusive and conjunctive children
- Under a conjunctive default account: The inclusive and mixed children could simply be more advanced than their peers (age is just a proxy for development).

Discussion

- Younger children seem to accept partial truth more than older children, i.e. they accept conjunctive statements in 1CT.
- Partial truth children could be argued to be truly inclusive or may be argued to treat disjunction as conjunction.
- Nonetheless, their acceptance of conjunctive statements in 1CT, alongside their justifications for their 1DT answers (*the hen has to push both*) suggest that they are actually conjunctive children.
- Our findings are thus more in line with approaches that consider conjunction to be a non-derived meaning of disjunction: a default or a basic meaning alongside inclusivity.
- Longitudinal studies are further needed to confirm these findings.

Developmental Study: Main takeaway

- We have extended our previous work to 3-year-olds with the aim of determining whether children start out as conjunctive or as inclusive.
- On the methodological side, we have improved previous designs by including conjunctive conditions to verify that 'inclusive' children are truly inclusive rather than conjunctive but partial truth responders.
  - This methodological improvement better isolates inclusive children.
- Our investigation allows us to distinguish between implicature-based vs. basic meaning accounts of conjunctivity (default/ambiguity).
- Our findings are not in line with implicature accounts but instead suggest that Romanian children initially associate *fie…fie* with a basic conjunctive meaning.

Nonce Word Study & Developmental Study: Main takeaway and remaining puzzles

- Together, the findings from the nonce word study and the developmental study suggest that children may initially default to conjunction when having to interpret an unknown/challenging connective such as disjunction.

- Both the nonce word study and the developmental study point to the idea that conjunction is a basic interpretation of disjunction.
- **Question**: Does this interpretation arise from a more superficial processing strategy whereby participants merely ignore the connective, or does it arise from ascribing a conjunctive meaning to the connective, based on the simplicity of conjunction in comparison to other logical operators and on certain cognitive biases?

Nonce Word Study & Developmental Study: Main takeaway and remaining puzzles

- Both studies suggest that many 3-year-old children interpret the connective conjunctively, but it is a bit unclear why other children show different interpretations: Are they more mature? Or are they driven by different biases?

- For the Nonce Word Study, could it be the case that participants default to simple operators? (in a sense, negation is simple, which explains why we see some negative interpretations)

- For the Developmental Study, could it be that conjunction is not the sole basic meaning but disjunction may initially be ambiguous between conjunctivity and inclusivity? (both meanings seem to be available)

Nonce Word Study & Developmental Study: Future studies

- Importantly, the preponderance of conjunctive responses in very young children seems to suggest that conjunction is a basic meaning (or at least one of the basic meanings) of disjunction.
- Future research should try to further shed light on the nature of this basic meaning, and whether it is the sole basic meaning.
- Future studies should extend Romanian to a wider variety of languages.

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