

(1) Terms/concepts to know: Neo-Whorfian, cognitive off-loading, theory of mind, embedded sentence, sentential complement, false belief task, parenthetical endorsement vs. literal statement of belief

(2) Syntactic knowledge includes the fact that some verbs like *think* and *say* can take sentential complements. Social knowledge includes the fact that other people can have a false belief. How would a Whorfian label these with respect to cause and effect – that is, which is the cause and which is the effect? Why?

(3) Baillargeon, Scott, & He (2010) discovered that very young children (2 years old) could pass a false belief task. What was the main difference between the false belief task they used and the false belief task commonly used in previous research where children younger than 5 failed the task? Why might this difference have caused the 2-year-old children to succeed in the Baillargeon et al. (2010) variant of the task, but fail in the previous version of the task? (Hint: Think about how children needed to respond in order to demonstrate their knowledge.)

(4) Is there evidence that children under a year old understand false beliefs?

(5) Sigmund has heard that sentential complements are somehow related to acquisition of theory of mind.

(a) Remind Sigmund what a sentential complement is by indicating which of the following sentences below has a sentential complement.

- (i) Sarah said that Hoggle was a nasty little thief.
- (ii) Hoggle denied it.
- (iii) Hoggle denied he was a nasty little thief.
- (iv) Sarah later thought Hoggle was very brave.
- (v) Sir Didymus congratulated Hoggle on his bravery.
- (vi) Ludo and Sir Didymus suggested that Sarah shouldn't face Jareth alone.
- (vii) Sarah whispered a secret to Hoggle.
- (viii) The fairy surprised Sarah.
- (ix) The fairy gleefully shrieked that she had bitten Sarah.
- (x) Sarah was distinctly displeased.

(b) Sigmund has been observing his four-year-old brother Aethelric, who does not yet use sentences with sentential complements. Should Sigmund expect Aethelric to succeed at a standard false belief task that requires Aethelric to use language to answer? Why or why not? You may assume that Aethelric has never encountered false belief tasks before and that his prior experience with mental state verbs is that they are used as parenthetical endorsements. [Hint: Think about the false belief task studies in the lecture notes – what was the difference between the standard one and the ones done

later on with younger children? Do standard false belief tasks use mental state verbs as parenthetical endorsements?]

(c) Suppose that Aethelric is tested with a false belief task that requires him to say whether statements like the following are true or false, based on the story presented: “Sarah thinks Ludo is behind the door.” (In this story, perhaps Hoggle was the one actually behind the door, but Sarah didn’t know that.) In addition, suppose that the beliefs of the characters in the story are made especially salient (in the example above, perhaps there is another character, Sir Didymus, who believes Hoggle is behind the door, and so the beliefs of Sarah and Sir Didymus are contrasted). Is Aethelric more or less likely to pass this false belief task, as compared to one where the beliefs of the characters aren’t made salient? Why or why not?

(d) Suppose that Aethelric actually has very high executive function skills, and is explicitly trained on theory of mind tasks. Is Aethelric likely to improve his subsequent performance on theory of mind tasks, when compared with other four-year-olds who were not explicitly trained on theory of mind tasks? Why or why not? What about when compared to other four-year-olds with lower executive function skills?

(6) Is there any behavioral evidence that children who may not pass a standard false belief task are still capable of representing the cognitive concept of a false belief or false desire, and interpreting verbs that take sentential complements? (Hint: Think about the verb *want* and what we know about children interpreting sentential complements, but not in a standard false belief task.)

(7) Is there any neurological evidence that explicit false belief tasks don’t transparently indicate a child’s theory of mind development? (Hint: Think about the neurological profiles of children who failed, passed, and had inconsistent performance on explicit false belief tasks. Do they look the same or different? What does this mean for how well performance on the task correlates with the neural networks that support theory of mind reasoning?)

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Extra Material (Theory of Mind):

(E1) What evidence is there that having more mental state (or “mind-minded”) language in the input is useful for the child’s development of theory of mind?

(E2) Think about the difference between great apes and human children on the non-verbal false belief task of Call & Tomasello (1999). What is Ciruolo et al.’s (2014) proposal about why there are differences in performance? Does it specifically involve language? Is there any evidence that non-human primates can pass false belief tasks? (Hint: Think about indirect false belief task performance.)

**Note on Extra Material below: This is what we would have covered if we had two sessions for Language & Cognition. Since we don’t this quarter, this is for your edification only – as with all extra material, you will not be responsible for any of the material on navigation & number.**

Extra Material (Navigation):

(E1) Terms/concepts to know: spatial language, verbal shadowing, rhythm shadowing

(E2) What is one major difference between the navigation abilities of adult humans and that of younger children?

(E3) What is the Neo-Whorfian explanation for why young children are unable to find something that can be encoded as “to the left of the black wall”? What evidence is there from rats and monkeys that might go against this explanation?

(E4) What is the Neo-Whorfian explanation for why verbal shadowing (but not rhythm shadowing) causes adults to perform like young children when trying to find something that can be encoded as “to the left of the black wall”?

(E5) Sigmund was quite impressed by the idea that language can help someone think thoughts they otherwise could not think. He wants to test this out in the domain of navigation. He plans to run several experiments, outlined below. For each experiment, state whether the subjects should succeed or fail, based on Neo-Whorfian ideas of how language can augment reasoning. Make sure to briefly explain your answer.

(i) Adults who need to find an object that can be encoded as “to the right of the purple wall” in a rectangular room with one wall painted purple.

(ii) Adults doing verbal shadowing who need to find an object that can be encoded as “to the right of the purple wall” in a rectangular room with one wall painted purple.

(iii) Adults doing rhythm shadowing who need to find an object that can be encoded as “to the right of the purple wall” in a rectangular room with one wall painted purple.

(iv) Adults who need to find an object that can be encoded as “at the purple wall” in a rectangular room with one wall painted purple.

(v) Adults doing verbal shadowing who need to find an object that can be encoded as “at the purple wall” in a rectangular room with one wall painted purple.

(vi) Adults doing rhythm shadowing who need to find an object that can be encoded as “at the purple wall” in a rectangular room with one wall painted purple.

(viii) Young children who need to find an object that can be encoded as “to the right of the purple wall” in a rectangular room with one wall painted purple.

(vii) Young children who need to find an object that can be encoded as “at the purple wall” in a rectangular room with one wall painted purple.

Extra Material (Number):

(E1) Terms/concepts to know: Weber’s Law, subitizing, cardinal principle

(E2) What are the two core number systems humans and other animals seem to have?

(E3) Approximately how many items can be subitized by humans?

(E4) Can pre-verbal infants manipulate very small, exact numbers? How do you know? What about non-human primates?

(E5) Can pre-verbal infants accurately judge that a small exact number (like 2) is smaller than a large approximate number (like 8)? How do you know?

(E6) What kinds of numbers does language allow us to comprehend and manipulate? Explain why these numbers cannot be dealt with by the two core number systems.

(E7) What evidence is there that dealing with large exact numbers involves using the same neural networks in the brain that language processing uses?

(E8) Sigmund has been exploring the words for number in the language of the Ervee, who live near the Guins. To his surprise, he has discovered that the Ervee have words only for “one”, “two”, and “a lot”. If we believe the Neo-Whorfian hypothesis, should an adult Ervee speaker be able to tell the difference between the following groups of objects? Why or why not? (Hint: Remember to also think about Weber’s Law.)

(i) 20 vs 10

(ii) 3 vs 1

(iii) 8 vs 2

(iv) 100 vs 40

(v) 10 vs 7

(vi) 12 vs 9

(vii) 7 vs 5

(viii) 21 vs 20

(ix) 120 vs 100

(x) 9 vs 8

(E9) How do home-signers from Nicaragua do when dealing with large, exact numerosities? According to the Neo-Whorfian hypothesis, why would this be the case?

(E10) How does a three-knower differ from a cardinal-principle knower?

(E11) Do all children seem to go through an extended period of time where they understand the meaning of some small exact numbers (like one, two, or three), but don’t yet understand the Cardinal Principle? If so, how does it differ across different languages and/or cultures?

(E12) What evidence do we have that having language for numbers helps children comprehend and remember numbers?