Psych 56L/ Ling 51:
Acquisition of Language

Lecture 16
Language & Cognition

Announcements

Review questions available for language and cognition

Be working on HW3 [due 3/13/12]

Remember to do extra credit

Please fill out course evaluations for this class

"Neo"-Whorfian Question

Language as a Toolkit: Does language augment our capacity for reasoning and representation (and thereby determine our perception of the world)?

Also sometimes referred to as "language as augmenter" (Wolff & Holmes (2010))

Theory of Mind

Sarah thought that Hoggle had betrayed her.

The embedded sentence encodes the contents of Sarah's mind.

The 'truth value' of the embedded sentence cannot be evaluated with respect to this world. It must be evaluated with respect to Sarah's mental world (what Sarah thinks).

What if a child didn't know this?

What you need to know to evaluate the truth value of these statements

Syntactic Knowledge: you know that some verbs (think, believe, say, …) can take sentential complements

Social Cognitive Knowledge: you know that other people can have a false belief

Bridge: you know that there is a connection between this syntactic form and the expression of potentially false beliefs

Which comes first, social or syntactic knowledge?
Usual Pattern: Social/Conceptual ---> Linguistic
Whorfian: Linguistic ---> Social/Conceptual

A little problem…

How do you measure children's understanding that other people can have false beliefs?

(abstracted away from their linguistic ability to represent false beliefs)

False Belief Task (Unseen displacement)

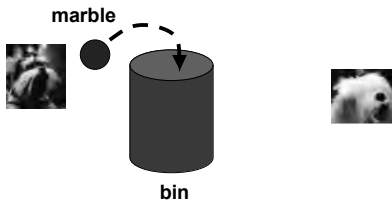The child is introduced to two puppets, Sir Didymus and Ambrosius.

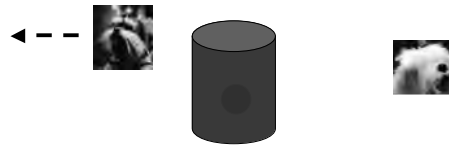
Sir Didymus   **Ambrosius**

False Belief Task (Unseen displacement)

While playing, Sir Didymus puts a marble into a bin and then goes outside (the puppet disappears under the table, for example).
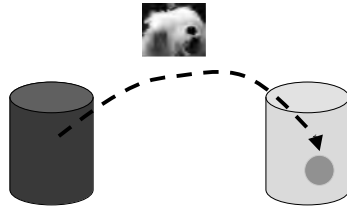

False Belief Task (Unseen displacement)

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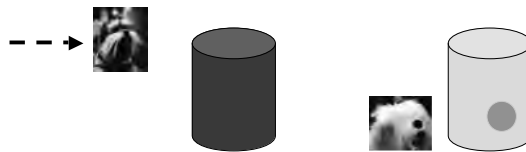

False Belief Task (Unseen displacement)

When Sir Didymus is not around, naughty Ambrosius changes the location of the marble. He takes it out of the bin and puts it in a different bin.

False Belief Task (Unseen displacement)

Some time later Sir Didymus comes back and wants to play with his marble. Children are then asked the critical question: Where will Sir Didymus look for his marble?
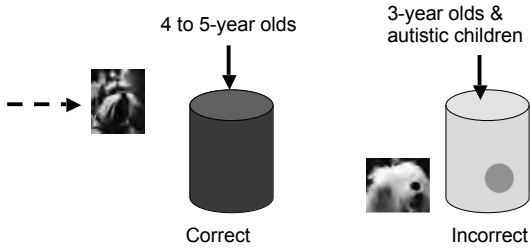
False Belief Task (Unseen displacement)

Some time later Sir Didymus comes back and wants to play with his marble. Children are then asked the critical question: Where will Sir Didymus look for his marble?

4 to 5-year olds

3-year olds & autistic children

Correct

Incorrect

If we're looking for a language connection…

At what age do children start talking about thoughts/beliefs? At what age do children first begin to use sentential complements?

2-year-olds talk a lot!
   ... about what they did, what they want
   ... about what others do
   ... possibly about what others say
   – not about what others think

If we're looking for a language connection…

At what age do children start talking about thoughts/beliefs? At what age do children first begin to use sentential complements?

Children's comprehension of sentential complements

"Sir Didymus said he bought peaches. But look! He really bought oranges. What did Sir Didymus say he bought?"

3-year-olds: oranges (reality, not mental state)
4-year-olds: peaches (key into "*say that*")

If we're looking for a language connection…

At what age do children start talking about thoughts/beliefs? At what age do children first begin to use sentential complements?

At around four years of age, children understand that mental verbs can take a whole sentence as their object (a complement)

Sir Didymus thought that the shampoo was the toothpaste.

And the embedded sentence can be FALSE from the child's Point of View, but TRUE for Sir Didymus.
Once the child has this capacity, he can represent two worlds: his own, and someone else's mental world.
This usually coincides with children's production of mental state verbs.

Testing typically developing children

De Villiers & Pyers (2002): Measures of comprehension and production of sentential complements far more correlated with children's performance on false belief tasks than any other linguistic measure.

Causation? "In every case, children who passed false beliefs gave us evidence that they had productive command of complementation."

Learning Trajectory: Easier to observe what people *say* than what they *think*. Can get more helpful data with communication verbs that take sentential complements (like *say*), and then extend that by analogy to mental verbs like *think*.

How exactly do children learn that connection? One idea

- Difficult to observe: someone else's thoughts
- Easier to observe: what people say
  "She said that she ate the peach."

- Children will sometimes hear sentences like this in a context where there is overt evidence to suggest that the embedded proposition is false.

- Children can use evidence from verbs like say to generalize to verbs like think and believe

How exactly do children learn that connection? One idea

- Syntactic Knowledge: you know that some verbs can take sentential complements

- Bridge: you know from hearing communication verbs and from observing the world while hearing them that there is a connection between this syntactic form and the expression of potentially false propositions.

- Having learned this connection from communication verbs, you then generalize that since mental verbs also take sentential complements, their sentential complements must also potentially be false.

- Social Cognitive Result: Therefore you can contemplate other (mental) worlds.

Testing the connection in other ways and in other populations

What if you train children on communication verbs that take sentential complements? Do they improve on false belief tasks?

What if you make children use mental state verbs that take sentential complements? Do they improve on false belief tasks?

Test development in deaf children who are language-delayed vs. not

Test other primates (who are non-verbal)

Training children on communication verbs

Hale & Tager-Flusberg (2003): Children who were trained on
sentential complements *("say that…")* did well on both
sentential complement tests and false belief tasks. However,
children trained only on false belief tasks also did well on false
belief tasks.

Familiar implication: Sentential complements not required, just
extraordinarily helpful.

Making children use mental state verbs

Ornaghi, Brockmeier, & Grazzani Gavazzi (2011): During a 2-
month period of intervention, children were read stories enriched with
mental lexicon items. After listening to a story, the experimental
group took part in language games and conversations aimed at
stimulating children to use mental terms. Four-year-olds improved on
false-belief understanding - even though they hadn't been trained on
false belief tasks. However, the control group also improved (just not
as much).

Familiar Implication: Mental state verbs can be helpful for thinking
about false beliefs, but they're not necessarily required.

Testing deaf children
(delayed v.s non-delayed language)

de Villiers & de Villiers (2003): Oral deaf children (who are
language-delayed) with normal IQ and active social intelligence
are significantly delayed in false belief tasks. Performance on
both verbal and non-verbal false belief tasks are delayed to the
same degree. Best predicted by sentential complement
production with verbs of communication or mental state, not just
by general language ability.

Implication: Language (specifically sentential complements)
required for success on false belief tasks. (Maybe no one
trained them explicitly on false belief tasks?)

Testing deaf children
(delayed vs. non-delayed language)

Pyers & Senghas (2009): Tested two groups of learners of
Nicaraguan Sign Language (NSL).
   Group 1 (older): Learned an early form of NSL
   Group 2 (younger): Learned a later form of NSL
   Main difference: Group 2 knew many more signs for mental
   state verbs like *think* and *know* than Group 1

Results: Group 2 did much better on false belief tasks than Group
1, despite being younger.

Implication: Language (specifically mental state verbs that take
sentential complements) required for success on false belief
tasks. (Maybe no one trained them explicitly on false belief
tasks?)

Testing other primates (who are non-verbal)

Call & Tomasello (1999): Used the same test for both children and great apes (though the great apes needed many more trials)

Main Test:

Communicator watches the Hider hide a reward in one of two containers and then leaves the room. The Hider switches the containers. The communicator returns and indicates which container has the reward. Participants are asked to locate the reward.
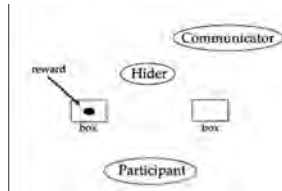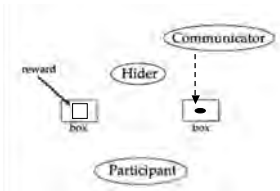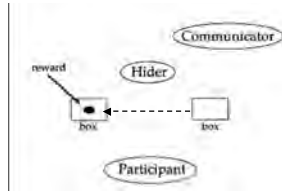

Testing other primates (who are non-verbal)

Call & Tomasello (1999): Made sure to check competency in skills needed to successfully perform the task (other than understanding of false belief)

Understanding of Indication
Behind barrier, Communicator watches Hider place reward in bucket. Communicator indicates bucket to participants.

(Do you understand that the Communicator picks out the location of the reward?)
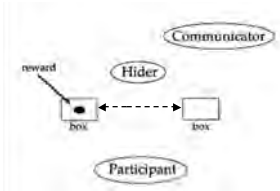

Testing other primates (who are non-verbal)

Call & Tomasello (1999): Made sure to check competency in skills needed to successfully perform the task (other than understanding of false belief)

Visible Displacement
Communicator indicates reward's location. Hider opens the container and moves the reward.

(Do you understand that the reward moves?)

Testing other primates (who are non-verbal)

Call & Tomasello (1999): Made sure to check competency in skills needed to successfully perform the task (other than understanding of false belief)

Invisible Displacement
Same as visible but containers are switched and participants do not see the object

(Do you understand that the containers can switch places, and that means what's in them switches places, too?)
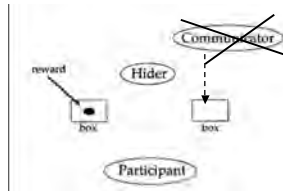
Testing other primates (who are non-verbal)

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Ignoring Communicator
Hider hides reward. Communicator leaves. Hider switches buckets. Communicator returns and indicates bucket with reward (the wrong container)

(Do you understand the communicator can be ignored, because he may not be right?)

Testing other primates (who are non-verbal)

Call & Tomasello (1999): Children do the same on the standard verbal task and this non-verbal equivalent. (Though it takes a five-year-old to pass.)
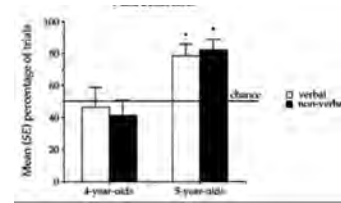
Testing other primates (who are non-verbal)

Call & Tomasello (1999): Great apes fail spectacularly, even though they pass all the preliminary control tasks.
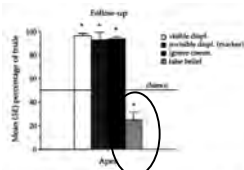

Implication: Having language (or a language-enabled brain) seems necessary. (Though maybe no one trained the apes on false belief tasks?)

Theory of Mind: Link to Language is…?

Additional evidence from Baillargeon, Scott, & He (2010):

2-year-olds can pass a false belief task when they are tested indirectly. How do we test them indirectly? We can gauge their spontaneous responses (as assessed by looking time) to events they are shown. Baillargeon et al. (2010) argue that this is an easier task than requiring the children to answer a question directly using language.

Familiar implication: Language is extraordinarily helpful but not explicitly required.

Baillargeon, Scott, & He (2010)

Familiarization:

In trial 1, a toy stood between a yellow and a green box; a female agent entered the apparatus, played with the toy briefly, hid it inside the green box, and then paused, with her hand inside the green box, until the trial ended. In trials 2 and 3, the agent reached inside the green box, as though to grasp her toy, and then paused.

Baillargeon, Scott, & He (2010)

Belief Induction:

In the belief-induction trial, the toy either moved from the green to the yellow box in the agent's absence (false-belief-green condition) or moved to the yellow box in the agent's presence but then returned to the green box after she left (false-belief-yellow condition).

Baillargeon, Scott, & He (2010)

Testing:

In the test trial, the agent returned, reached inside either the yellow box (yellow-box event) or the green box (green-box event), and then paused.

In each condition, the infants expected the agent to reach where she falsely believed the toy to be hidden, and they looked reliably longer when she reached to the other location instead.

Theory of Mind: Link to Language is…?

Language is useful for cognitive off-loading? Perhaps when children are tested directly on false belief tasks (that is, required to show their knowledge with language), having mental state verbs in their linguistic repertoire allows them to easily encode what's going on. Then, it's easier to do the task, which requires more mental work than tasks where children are tested indirectly.

But the jury is still out…(remember that the great apes were tested without language, as were the four- and five-year-olds in the Call & Tomasello (1999) study).

Language & Cognition: Recap

Neo-whorfianism is a variant of Whorfianism that believes language augments thought, so we can think more complex thoughts.

For theory of mind, we have seen evidence for cases where language seems to enable more complex thought - or at least to enable it to happen more easily.

Questions?

You should be able to answer all the questions on the language & cognition review questions, and all questions on HW3.