Psych 56L/ Ling 51: Acquisition of Language

Lecture 15
Language & Cognition +
Childhood Bilingualism

Announcements

Reminder: Please complete your course evaluations

Reminder: No class on Wednesday, 11/26/08

Reminder: HW3 due Monday, 12/1/08

Please pick up your HW1, HW2, and/or midterm if you have not yet done so

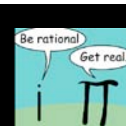
Different Whorfian Questions

Language as a Category Maker: Does the language we acquire influence where we make our category distinctions?

Language as a Lens: Do grammatical characteristics of a language shape speakers' perceptions of the world?

Language as a Toolkit: Does language augment our capacity for reasoning and representation?

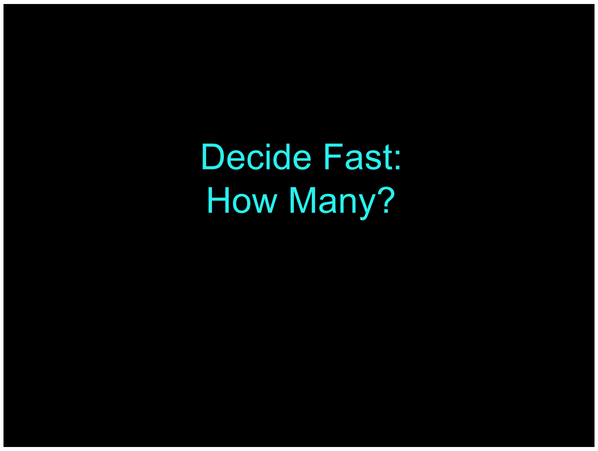
Number

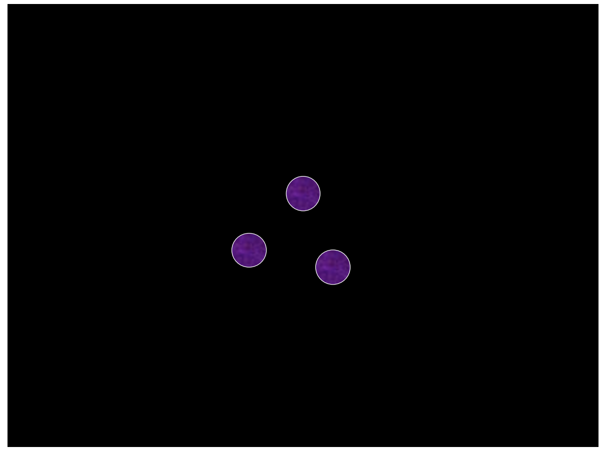


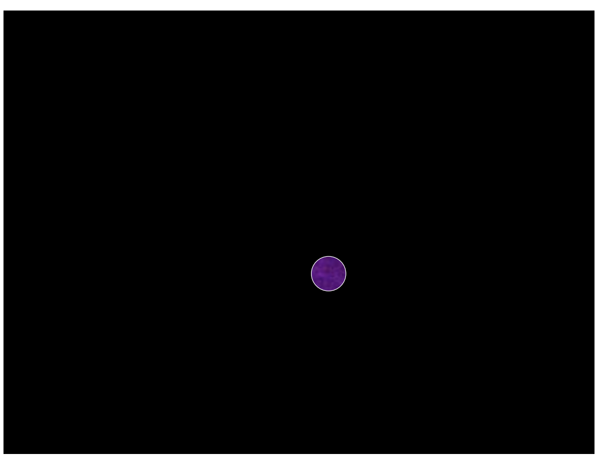
Core number systems shared by humans and other animals:

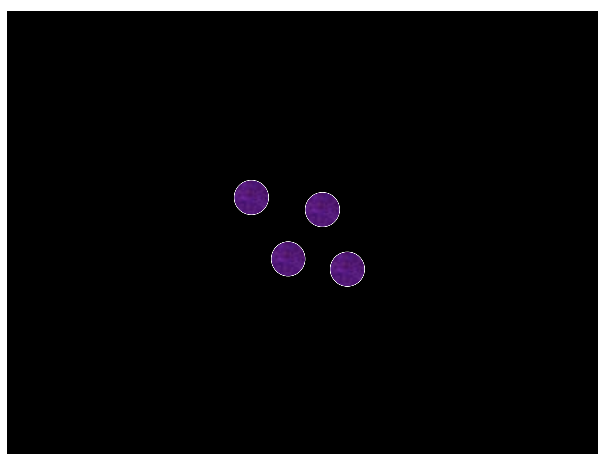
System for representing approximate numerical magnitudes (large, approximate number sense)

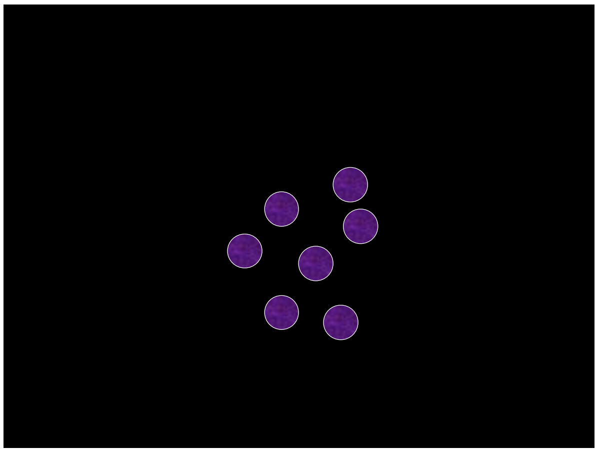
System for representing persistent, numerically distinct individuals (small, exact number sense)

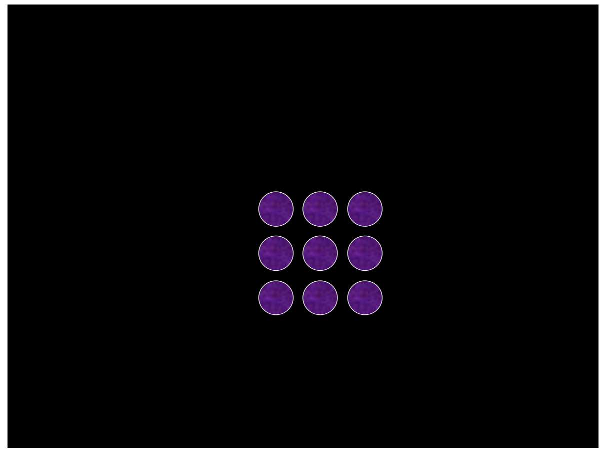

Decide Fast:
How Many?











How We Deal With Number

Amount Being Represented	How Represented
Very small numbers	"Subitizing"- up to 4; can tell what set looks like
Large approximate numerosities	System for representing approximate numerical magnitudes
Large exact numerosities	Combo of 2 above systems plus language

What human language does…

Many languages have an *exact* number system that provides names for exact quantities of any size

1, 2, 3, 4, 5…….578, 579, 580, 581, 582…

This bridges the "gap" between the two core systems.

Testing this: Look at numerical cognition of people whose languages *don't* have an exact number system.

Languages without Exact Number Systems

Pica, Lemer, Izard & Dehaene (2004): Munduruku speakers in Brazil who only have exact numbers for 1-5. When doing simple tasks like addition and subtraction with numbers outside this range (ex: 8-6), they do much worse than speakers who have an exact number system (though still better than chance).

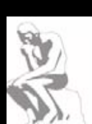
Gorndon (2004): Pirahã speakers in Brazil who only have words for "one/two" and "many". Exact arithmetic on larger numbers that are both outside the small, exact system and outside the language is very, very hard to do.

Gelman & Gallistel (2004) "Language and the Origin of Numerical Concepts"

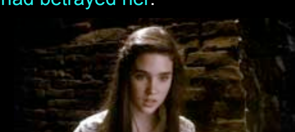
"Reports of subjects who appear indifferent to exact numerical quality even for small numbers, and who also do not count verbally, add weight to the idea that learning a communicable number notation with exact numerical reference may play a role in the emergence of a fully formed conception of number."

No language for large exact numbers =
no representation for large exact numbers

Language as a Toolkit: Theory of Mind



Sarah thought that Hoggle had betrayed her.



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

The 'truth value' of the embedded proposition cannot be evaluated with respect to this world. It must be evaluated with respect to Sarah's mental world.

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 can take sentential complements (think, believe, say, …)

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

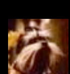
A Leeetle Problem…

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

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

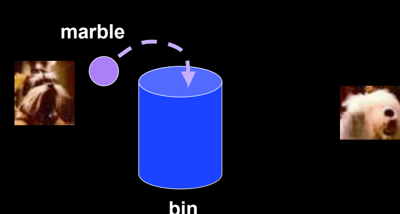


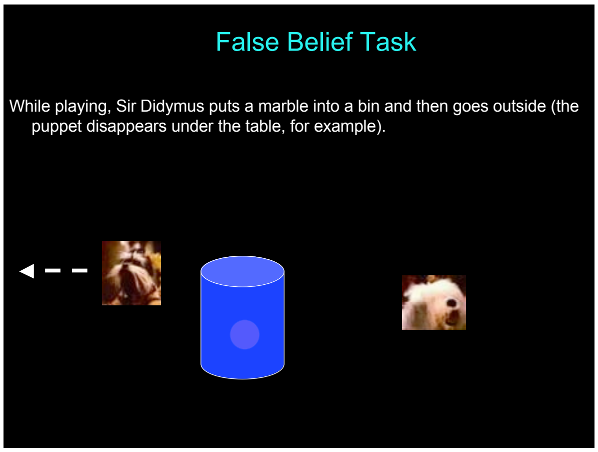
Sir Didymus

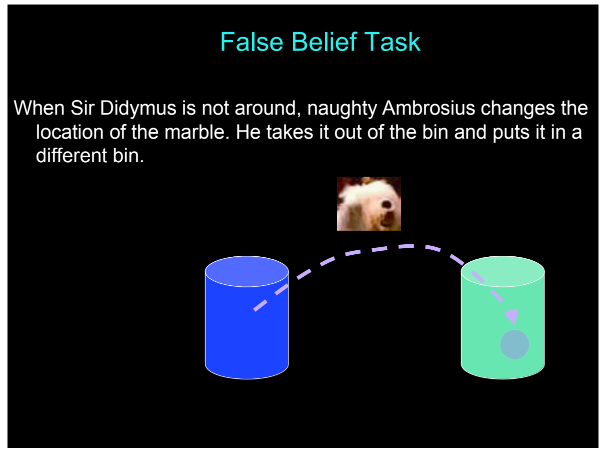
Ambrosius

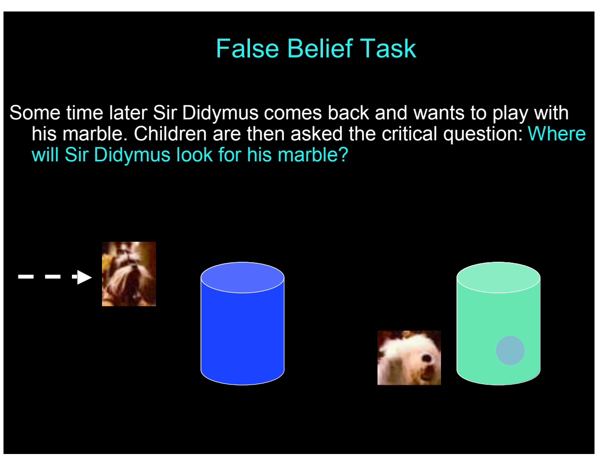
False Belief Task

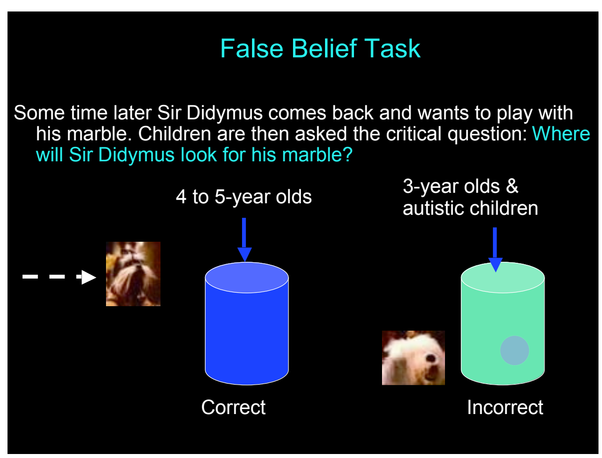
While playing, Sir Didymus puts a marble into a bin and then goes outside (the puppet disappears under the table, for example).




False Belief Task
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
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
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
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 in their scope (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.

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?

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

Test false belief understanding in non-humans

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.

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

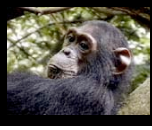
de Villiers & de Villiers (2003): Oral deaf children (who are language-delayed) with normal IQ and active social intelligence are significantly delayed in false belief tasks. Performance on both verbal and non-verbal false belief tasks are delayed to the same degree. Best predicted by sentential complement 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 (Necessarily Non-linguistic) Non-humans

Call & Tomasello (1999): While apes and young children can both succeed at understanding the indication method in non-verbal false belief tasks, tracking visible displacement of an object, tracking hidden displacement of an object, and ignoring a communicator indicating the wrong answer, only 5-year olds (not 4-year olds or apes) could successfully pass the final step of a false belief task - which involves realizing someone can have a different belief than you.

Implication: Sentential complement language required for theory of mind.



So what is it about language?

Perner, Stummer, Sprung, & Doherty (2002): Ability to simultaneously consider multiple names for a single object (Name-Name task) is strongly correlated with performance on False Belief tasks.

Name/Name
(Synonym)
Man/Guy

So what is it about language?

What do sentential complements and multiple names for a single object have in common?

Both require the use to represent an object or event from multiple perspectives simultaneously

"Our claim is that the ability to confront different perspectives emerges around 4 years and underlies the co-emergence of success on the False Belief and the Name-Name tasks" - Perner, Stummer, Sprung, & Doherty (2002)

Theory of Mind: Link to Language is…?

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

However, animals cannot seem to achieve this knowledge. Something about human brains and the way they develop may be responsible.

Language & Cognition: Recap

There are several ways language might influence cognition: providing a basis for categorical perception, providing a way to encode reality, and providing a way to enable more complex kinds of thought.

In general, it seems that language experience does not fundamentally alter perception of reality, though it is a very handy aid to encode experience.

In addition, there are several cases where language seems to enable more complex thought - or at least to enable it to happen more easily.

Childhood Bilingualism

One vs. Many Languages

While there may be considerable variability in the linguistic experience of children learning a single language, there is even more variability in the experience of children acquiring multiple languages. Each language provides its own variable input, and these children (by definition) have more than one language.

Simultaneous bilingualism: learning 2 languages from birth

Sequential bilingualism: learning 1 language exclusively, followed by exposure to another language

Simultaneous Bilingualism Situations

Possible situation 1: one parent/caregiver speaks a language not used by the rest of the community

Ex: Italian/English bilingual raising a child in a monolingual English community

Possible situation 2: bilingual community

Ex: French/English bilingual community in Quebec

Despite both being situations where the child is exposed to both languages from birth, both provide very different linguistic experiences.

Sequential Bilingualism Situations

Possible situation 1: Family immigrates to new country when child is still fairly young

Ex: Monolingual Spanish family is now living in the US, and child (as well as rest of family) is learning English outside the home

Possible situation 2: home language vs. official language

Ex: Child from family that uses Spanish at home goes to preschool and is exposed to English.

Despite both being situations where the child is exposed to a language within the home and a different language outside the home, both can provide very different linguistic experiences.

A "Standard" Bilingual

…is hard to identify. There are numerous ways to be bilingual, and even children within the same classification of bilingual may have very different experiences.

Ex: simultaneous bilingual

(a) Indian child lives in house where parents speak Bengali and English, while household help speak only Bengali.

(b) Child living in Flemish region of Belgium goes to French music school, and paternal grandparents speak Dutch while maternal parents speak French. Babysitters speak French.

Point: Bilinguals are a fairly heterogeneous group.

What does this mean for researching bilingualism?

The heterogeneity of the bilingual population makes answering questions about bilingual development difficult. Any sample of bilingual children is likely to vary with respect to how much of each language the child hears, the social circumstances in which the child hears the language (some languages may be more or less prestigious), and the proficiency of the speakers who provide the linguistic input, among other things.

"Bilingualism might better be thought of as an umbrella term for a variety of language experiences and competencies, rather than as one monolithic phenomenon." - Hoff, p.300

Questions in simultaneous bilingual research

Language differentiation: How and when does the child know that she is being exposed to two different languages? Does the child build two separate language systems in her mind, or is there a single system that encompasses both languages?

Language trajectory: Does bilingual development affect the course and rate of the development of each language? If so, how? Do bilingual children learn their languages in the same manner and at the same rate as monolingual children learn their one language?

Simultaneous Bilingualism: Language Differentiation

(1) Fusion: Children initially create one system that combines the two languages they hear.

(2) Differentiation with autonomous development: Children differentiate the two languages they hear and acquire each uninfluenced by the other.

(3) Differentiation with interdependent development: Children differentiate the two languages they hear, but the course of development of each is influenced by the other.

How Fusion Would Work

Volterra & Taeschner (1978)

Stage 1: Bilingual children begin by constructing a single system with one lexicon that contains the words from both languages and one system of rules.

Stage 2: Children realize there are two lexicons, but still have one set of syntactic rules.

Stage 3: Children realize there are two lexicons & two syntactic rule sets.

Evidence for Fusion

Phonological Development

3-year-old children produce words in one language with the phonological features of the other language (Burling 1959, Fantini 1985).

2-year-old Spanish/English bilingual children use a single phonological system (that of the dominant language), no matter which lexicon or syntactic rules they're using (Navarro et al. 1998).

Evidence Against Fusion

Phonological development: The ability to distinguish between two languages appears to follow a developmental course that is different from the monolingual trajectory.

Newborn monolingual children can tell two non-native languages apart by their prosodic structure (English vs. Japanese, but not English vs. Dutch). By 2 months, they only distinguish their native language from non-native languages.

Bilingual children at 4.5 months can distinguish their two native languages from each other. So they're unlikely to think sounds (and later words) from one language are in the same group as sounds from the other language.

Evidence Against Fusion

Phonological development: The ability to distinguish between two languages appears to follow a developmental course that is different from the monolingual trajectory.

Polka, Rvachew, & Mattock (2007): Catalan has a vowel distinction Spanish does not. Monolingual Catalan babies perceive the difference at 4, 8, and 12 months. Spanish babies can do it at 4 months, but not at 8 or 12 months.

Bilingual Spanish-Catalan children can distinguish it at 4 months and 12 months, but *not* at 8 months. Phonological development diverges from monolingual children's.

Evidence Against Fusion for All

Phonological development: The ability to distinguish between two languages appears to follow a developmental course that is different from the monolingual trajectory.

But bilinguals are a heterogeneous group…

Werker, Weikum, & Yoshida (2006): French/English bilinguals at 14 and 17 months vary on which contrasts they can distinguish. Some can distinguish both sets of contrasts, some only English contrasts, and some only French contrasts.

Evidence Against Fusion for All

Phonological development: The ability to distinguish between two languages appears to follow a developmental course that is different from the monolingual trajectory.

But bilinguals are a heterogeneous group…

Poulin-Dubois & Goodz (2001): No separation in babbling. French/English bilingual babies babble the same whether they're in an English context or a French context. (All resembled monolingual French.)

Maneva & Genesee (2002): Separation in babbling for French/English bilingual babies, depending on which parent they were interacting with (English vs. French-speaking parent).

What does lexical development tell us?

Clue: If young children have a word in each language for something, they likely have two separate lexicons since they don't like to give a single concept two names.

But bilinguals are a heterogeneous group…

…and there is considerable conflicting evidence on how much lexical overlap counts as having two separate lexicons.

What does morphological & syntactic development tell us?

Idea: If young children have two separate language systems, they should not build sentences in one language using the morphology & syntax of the other language.

But bilinguals are a heterogeneous group…

…and there is again considerable conflicting evidence as to whether children do or do not mix their language systems, and how much mixing constitutes one system.

Is it mixing if a child uses words from one language in a sentence from the other language? Adults who are bilingual often mix them when speaking…

Deciding between the developmental hypotheses

(1) Fusion: Children initially create one system that combines the two languages they hear.

(2) Differentiation with autonomous development: Children differentiate the two languages they hear and acquire each uninfluenced by the other.

(3) Differentiation with interdependent development: Children differentiate the two languages they hear, but the course of development of each is influenced by the other.

In each domain - phonology, lexicon, morphology, syntax - there is evidence both for and against these hypotheses. This is probably because bilinguals are a heterogeneous group…

Learning To Differentiate: "One-Parent, One-Language"

Popular idea: it's easier for a child to differentiate two separate languages if one parent only speaks one language and one parent speaks only the other one.

But…not supported by research evidence.

Very young infants ignore the speaker when categorizing speech sounds (Kuhl 1980).

So even if differentiating by speaker is helpful, it likely doesn't help bilingual infants early on when they're first figuring out that there are two languages.

Questions?