Psych 56L/ Ling 51: Acquisition of Language

Lecture 14
Language & Cognition
(The Whirlwind Tour)

Announcements

If you haven't turned in homework 2, you can still do so for late credit. This is highly encouraged because zeroes are bad.

Review questions available for language and cognition (though we will probably finish up this topic on Monday)

Homework 3 officially assigned; due Monday 12/1/08

Reminder: No class 11/26/08

A Recap from Sound Perception

We do "hear" language sounds differently depending on what language we speak. But when we fail to hear a contrast that a speaker of another language does hear, it isn't because our physical ability to register the sound has disappeared. It's because we have learned that that type of contrast is not a meaningful contrast for our language.

Our mental representations of the sounds of words are an abstraction of the physical signal. (ex: Dental d and retroflex D sound the same to English speakers, but sound different to Hindi speakers.)

We hear language "through a lens"

Sapir Whorf Hypothesis

The structure of one's language influences the manner in which one perceives and understands the world. Therefore, speakers of different languages will perceive the world differently.

"Don't you see that the whole aim of Newspeak is to narrow the range of thought? In the end, we shall make thought crime literally impossible, because there will be no words in which to express it…" - George Orwell, *1984*

Degrees of Whorfianism

Linguistic Determinism (strong Whorfianism) = Language *determines* our perception of the world

Linguistic Relativism (weak Whorfianism) = Language *biases* our perception of the world

Sound perception supports linguistic relativism since there is evidence that the changes imposed by language are not permanent or insurmountable. (Adults can learn to hear non-native sound contrasts.)

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?

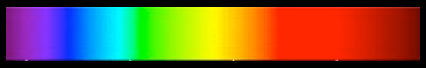
Language as a Toolkit: Does language augment our capacity for reasoning and representation?

Language as Category Maker

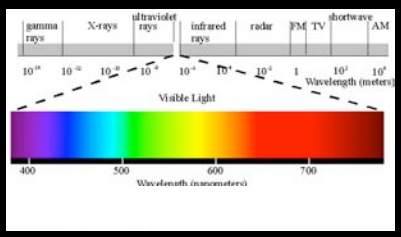
(1) Sound inventory of a language and perception of speech sounds in native & foreign languages

Contrastive sound categories formed based on data in language

(2) Color terms and color perception



The Physical Stimulus for Color



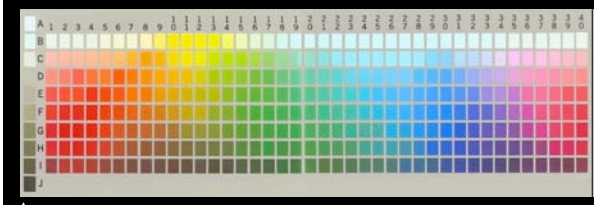
hue *"wavelength"* Oscillation frequency of light radiation

2 Other Dimensions of Color

brightness — *intensity* — Amplitude of light radiation

saturation — *purity* — Intensity of dominant wavelength, relative to entire light signal

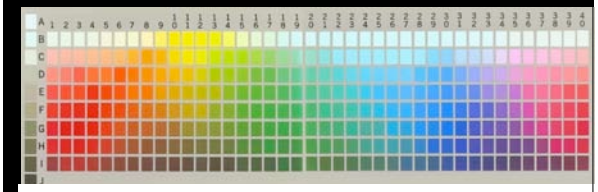
Range of Color: Maunsell color chips



brightness

hue

How English speakers tend to divide these up

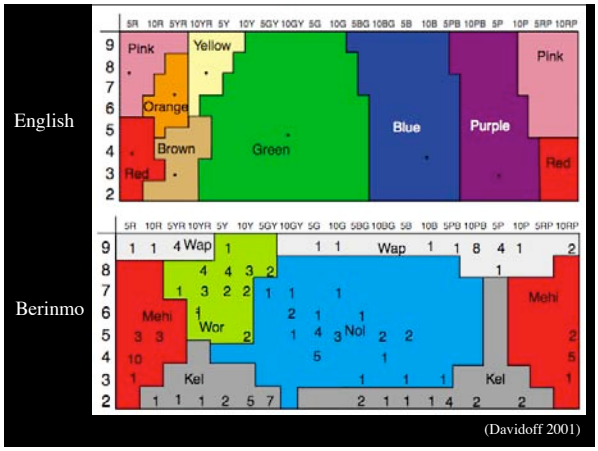


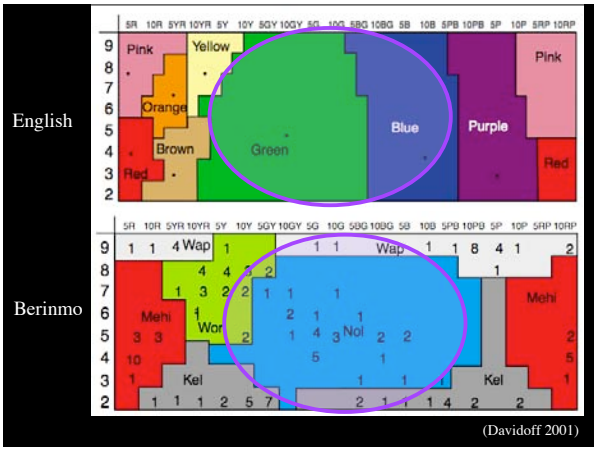
How do other languages divide the colors?

Berinmo tribe
New Guinea

Jules Davidoff
U. of London, UK

Debi Roberson
U. of Essex, UK





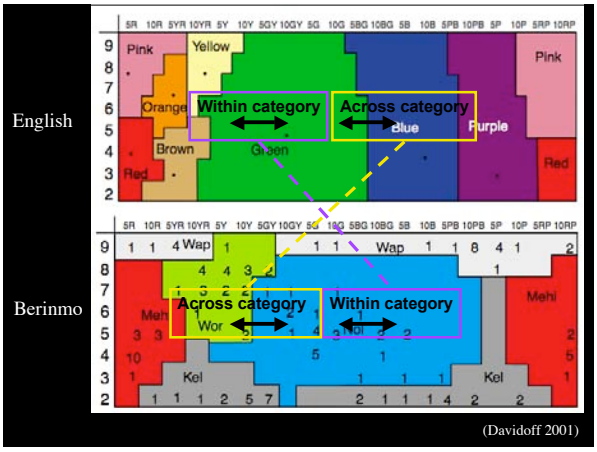
Language Influencing Perception in Color?

Berinmo divides the color space differently than English.

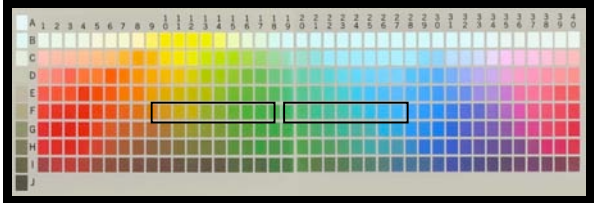
Do Berinmo speakers perceive color differently?

If categorical effects are restricted to linguistic boundaries, the 2 populations should show markedly different responses across the 2 category boundaries (green-blue and nol-wor)

If categorical effects are determined by the universal properties of the visual system, then both populations should show the same response patterns.



Test using Maunsell color chips from these ranges



Categorical Perception Results

English speakers showed significantly superior recognition for targets from across-category pairs than for those from within-category pairs for the *green-blue* boundary, but not for the *nol-wor* boundary. Berinmo speakers had the opposite pattern.

Implication: Categorical perception for color, so linguistic relativity in the domain of color, too.

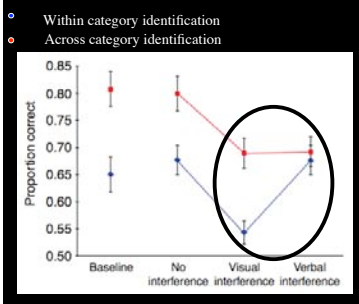
But maybe this is a result of people naming the colors in order to make their decision. So the effect of language is not on perception of color but *on strategy for encoding color.*

Eliminating the Verbal Encoding of Color (Roberson & Davidoff 2000)

Subjects were shown a color and then asked to read color words (verbal interference) or look at a multicolored dot pattern (visual interference)

Subjects then shown 2 color chips - the original color and one that was 1 or 2 color chips away - and asked which was the original color

Eliminating the Verbal Encoding of Color (Roberson & Davidoff 2000)



Verbal interference only affects across-category identification. This suggests that subjects are using language to help them make decisions about colors that fall into different linguistic categories.

Categorical Color Perception?

Conclusion: While language does have an effect on the way humans interact with color, it does not seem to alter their base-level perception of the physical stimulus.

Definitely not the strong version of linguistic relativism - but some support for language as category-maker at a conscious level for color.

Language as a Lens: possible evidence

Spatial Frames of Reference

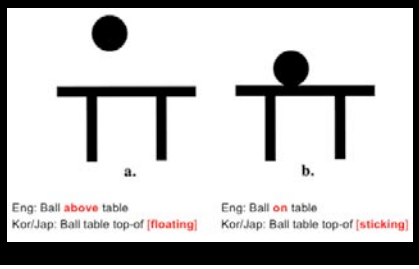
Motion Events (manner encoded in verb or PP)

Language for Spatial Location Relationships

Spatial Frames of Reference

Languages vary in which aspects of spatial location must be obligatorily encoded

Ex: English vs. Korean/Japanese



Spatial Frames of Reference

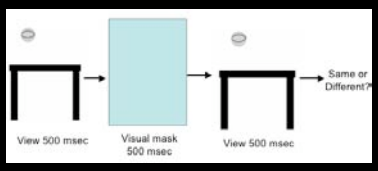
Languages vary in which aspects of spatial location must be obligatorily encoded

Ex: English vs. Korean/Japanese

Munnich, Landau & Dosher (2001): Does the difference in obligatory encoding of 'contact' in spatial prepositions in English vs. Korean/Japanese influence nonlinguistic memory of spatial relations between objects?

Munnich, Landau & Dosher (2001)

Memory Task



25 positions

Whorfian prediction: English speakers notice the difference more if it's a touching position vs. a not-touching position since they linguistically encode this difference. Korean speakers will show no difference.

Munnich, Landau & Dosher (2001)

Memory Task Results

Korean Speakers

0.52	0.54	0.55	0.55	0.53
0.54	0.56	0.57	0.53	0.53
0.55	0.55	0.56	0.55	0.53
0.55	0.55	0.57	0.56	0.57
0.67	**0.65**	**0.69**	**0.66**	**0.69**

Reference object

English Speakers

0.51	0.52	0.56	0.56	0.52
0.52	0.54	0.56	0.57	0.54
0.55	0.56	0.55	0.55	0.55
0.52	0.53	0.56	0.56	0.54
0.66	**0.64**	**0.71**	**0.61**	**0.66**

Reference object

Korean speakers no worse than English speakers at noticing the difference. Whorfian prediction not upheld - language not influencing non-linguistic memory.

Features of Motion Events

Languages vary in how various features of motion events are encoded

Motion—manner—path may be encoded in various ways
Motion+path (exit, enter, climb)
Motion+manner (skip, slide, scurry)

English: Hoggle scurried [along the wall]
Spanish, Hindi: Hoggle went-along the wall [scurrying]

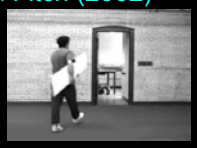
Features of Motion Events

Languages vary in how various features of motion events are encoded

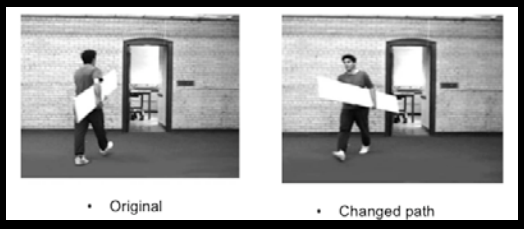
Gennari, Sloman, Malt & Fitch (2002): Does the difference in tendency to include manner vs. path in the linguistic expression of motion events in different languages influence nonlinguistic memory for those features of motion events?

Gennari, Sloman, Malt & Fitch (2002)

Spanish & English speakers watching clips of movies showing motion events

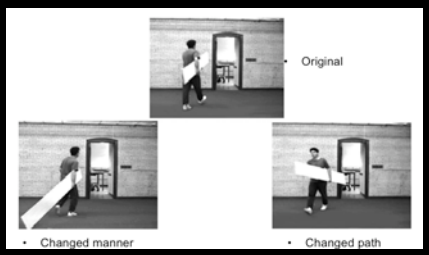


(1) "Which did you see before?"



Gennari, Sloman, Malt & Fitch (2002)

(2) "Which one is more similar to the original?"

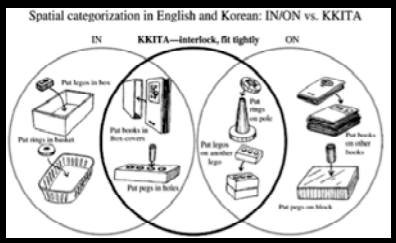


Language as Lens?

No differences between Spanish and English speakers on this nonlinguistic memory task. No Whorfian effect of language influencing nonlinguistic perception.

However, subjects who were asked to describe the event first tended to draw upon that description in subsequent nonlinguistic tasks. (Ex: Spanish describers using similar path verb ("enter") more likely to pick same-path event as more similar to original event; English describers more using similar manner verb ("carry") more likely to pick same-manner event as more similar.)

Spatial Categorization: Crosslinguistic Differences

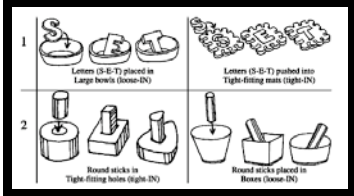


Spatial Categorization: Crosslinguistic Differences

McDonough, Choi, & Mandler (2003): Does knowing Korean/English affect nonverbal spatial categorization or spatial thought?

Using preferential looking technique on 9, 11, and 14-month infants as well as Korean-native and English-native adults

McDonough, Choi, & Mandler (2003)



Familiarization: 6 video-taped scenes showing a particular action & scenes shown in pairs
-1/2 participants familiarized with tight-fitting containment
-1/2 participants familiarized with loose-fitting containment
Participants *not* told what they were looking for

Test: one screen showing familiar non-native relation & one showing novel non-native relation

"Odd Man Out" Test for adults: Shown 4 relations, 3 of familiar kind and 1 of novel - asked which one does not belong?

Spatial Categorization: Language as Lens?

All infants and Korean adults preferred familiar relation, but there was no preference in English adults.

Implication: Infants and Korean adults pick up on the difference between tight-fitting and loose-fitting while English adults don't. Choi (2006) indicates that the English infants become less sensitive over time (tested up to 36 months).

Only 38% of English adults got the "odd man out" task right, while 80% of the Korean adults did.

Support for language influencing habitual methods of nonlinguistic (in this case spatial) thought/problem-solving?

Language as a Toolkit

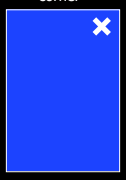
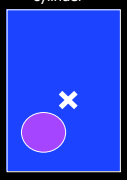
Does language augment our capacity for reasoning and representation? (Neo-Whorfian view)

Navigation (combining core knowledge systems info [geometric & color])

Number (combining core knowledge systems info [small, exact numbers & large, approximate numbers])

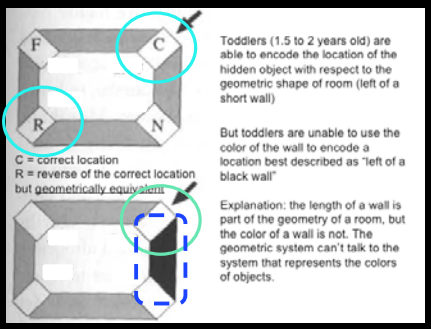
Theory of Mind (realizing that someone can have a different point of view than you - when does this realization come, and how?)

Navigation

Geometric	Object Landmark	Combination
"At the northeast corner"	"At the cylinder"	"Northeast of the cylinder"
		
*rats *human infants *adult humans	*rats *human infants *adult humans	*adult humans ONLY

Navigation

Can find it here.



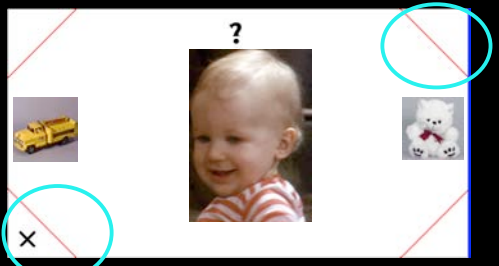
Can't find it here by combining cues.

But can toddlers *really* not do it?

Maybe wall color just isn't a very salient property for toddlers. How about trying more salient landmarks? (Hermer & Spelke 1996)

But can toddlers *really* not do it?

Maybe wall color just isn't a very salient property for toddlers. How about trying more salient landmarks? (Hermer & Spelke, 1996)



No change in navigation behavior in toddlers even with more salient landmarks (toys like truck and teddy bear).

So when does this ability develop?

Hermer-Vazquez, Moffet & Munkholm (2001): children with a high production of spatial language (like "left" and "right") succeed. This usually happens somewhere between 4 and 5 years old.

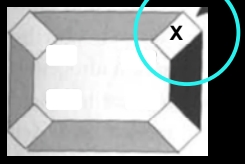
Implication: Spatial language use seems integral in solving this task that requires representing information from different domains (geometry & color).

However… rats (who don't have spatial language) can be trained to do the same thing after hundreds of trials. Spatial language is useful, but not necessary?

Is language really responsible?

Hermer-Vazquez, Spelke & Katnelson (1999)

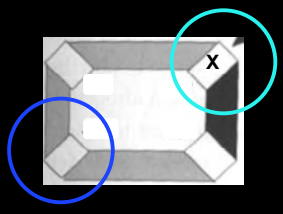
Testing adults, who were asked to verbally shadow as they performed the task. Verbal shadowing = repeating as fast as they could a passage recorded on tape. Interferes with linguistic combination abilities.



Is language really responsible?

Hermer-Vazquez, Spelke & Katnelson (1999)

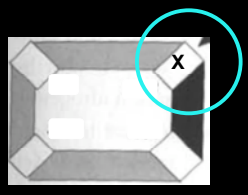
Verbal-shadowing adults behaved just like toddlers! They searched equally the correct corner and the rotationally equivalent one, seemingly unable to combine the information from geometry and color.



Is language really responsible?

Hermer-Vazquez, Spelke & Katnelson (1999)

Experiments with adults who were doing nonverbal shadowing (repeating a rhythm by clapping) did not show this result, despite the fact that rhythm shadowing is as cognitively taxing as verbal shadowing.



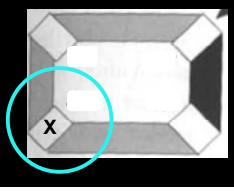
Is language really *necessary*?

Gouteux, Thinus-Blanc, & Vauclair (2001): testing Rhesus monkeys (who do not have spatial language)

Tested 3 monkeys on location "left of wall opposite the blue wall".
~50 trials each.

Two monkeys: ~85% correct
Other monkey: ~70% correct

Pretty good for no spatial language!



Is language really *necessary*?

So language *does* seem to play a very important role in the ability to combine information from different core knowledge systems. (Perhaps not absolutely necessary, but extraordinarily helpful - kind of like motherese for language development.)

Or maybe rhesus monkeys are just clever enough to do this without the spatial language that humans seem to rely on.

Questions?