

Psych 56L/ Ling 51:  
Acquisition of Language

Lecture 17  
Language in special populations

Announcements

Review questions available for language development in special populations

Review session in class on 3/13/14 for final

Final: 3/20/14, 1:30pm-3:30pm, in the normal classroom  
OR the computer lab in NS1 2144

Please fill out course evaluations

Remember that extra credit is available!



Special populations



Why special populations?

Not everyone is a typically developing child.

We can explore how different human abilities contribute to the human language acquisition process.

Does language develop differently if there's no auditory input (**deaf children**)?

What about if there's no visual input (**blind children**)?

What if general intelligence is lower (**mentally retarded children**)?

*[In extra material]*

What if social abilities are lagging (**autistic children**)?


What about if only language abilities are lagging (**specific language impairment children**)?



### Sign language

- Remember: Sign languages are just as complex as spoken languages - it's just that they're expressed with manual gestures and facial expressions, rather than spoken words.

Sign language sample:  
[http://www.youtube.com/watch?v=K3PIAbBbHSU&feature=player\\_embedded](http://www.youtube.com/watch?v=K3PIAbBbHSU&feature=player_embedded)



### Sign language

- Remember: Sign languages are just as complex as spoken languages - it's just that they're expressed with manual gestures and facial expressions, rather than spoken words.

Signed vs. spoken languages:  
[http://www.youtube.com/watch?v=p\\_AAttEQj88](http://www.youtube.com/watch?v=p_AAttEQj88)  
(~6 minutes)  
(0:37 - 4:12)  
Using sign language to identify what the core properties of any language system are


(4:12 - end)  
Language processing in brains of deaf people (left hemisphere specialization)

### Some American Sign Language (ASL) signs

ASL literature projects:  
<http://csdr-cde.ca.gov/category/asl-videos/>

ASL dictionary:  
<http://www.aslpro.com>

ASL lessons and a dictionary:  
<http://www.lifeprint.com>



### Sign language features

Like spoken languages sounds, sign language signs can be broken into features which can be combined:

- **handshape**
- **palm orientation** (direction palm is facing)
- **location**
- **motion**



Notably, features in spoken languages combine to form individual sounds (ex: +stop, +voice, +velar = /g/). Features in signed languages combine to form words.

### Some ASL handshapes



### ASL signs differing only by handshape

[http://www.linguistics.ucla.edu/people/schuh/lx001/Discussion/d07b\\_videos\\_ASL\\_min\\_pairs.html](http://www.linguistics.ucla.edu/people/schuh/lx001/Discussion/d07b_videos_ASL_min_pairs.html)

Ex: HOME vs. YESTERDAY



### ASL signs differing only by palm orientation

[http://www.linguistics.ucla.edu/people/schuh/lx001/Discussion/d07b\\_videos\\_ASL\\_min\\_pairs.html](http://www.linguistics.ucla.edu/people/schuh/lx001/Discussion/d07b_videos_ASL_min_pairs.html)

Ex: SOON vs. TRAIN



### ASL signs differing only by location

[http://www.linguistics.ucla.edu/people/schuh/lx001/Discussion/d07b\\_videos\\_ASL\\_min\\_pairs.html](http://www.linguistics.ucla.edu/people/schuh/lx001/Discussion/d07b_videos_ASL_min_pairs.html)

Ex: APPLE vs. ONION



### ASL motion types (and sub-types)

**Linear:** Up, down, in, out, and to the two sides (contralateral and ipsilateral)

**Internal:** Opening the hand, closing the hand, bending at the wrist, twisting at the wrist, wiggling the fingers.

**Complex:** Moving toward a location, moving away from a location, touching a location, brushing a location, crossing (hands or fingers), exchanging hands, grabbing, inserting, and circular motions.

### ASL signs differing only by motion

[http://www.linguistics.ucla.edu/people/schuh/lx001/Discussion/d07b\\_videos\\_ASL\\_min\\_pairs.html](http://www.linguistics.ucla.edu/people/schuh/lx001/Discussion/d07b_videos_ASL_min_pairs.html)

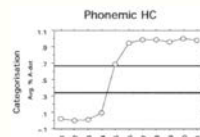
Ex: CHOCOLATE vs. CHURCH



### Signers have categorical perception of features



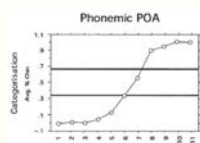
(Emmorey, McCullough, Brentari 2003)



### Signers have categorical perception of features



(Emmorey, McCullough, Brentari 2003)



### Sign language properties

Unlike spoken languages, sign languages allow for **simultaneous articulation** of information.

Example: **Aspect** + primary sign



**Repeated circular motion**: an ongoing, or continuous, event at that point in time [**imperfective**]

**Repeated straight motion**: a punctuated event that happens multiple times, or habitually [**perfective**]

<http://www.start-american-sign-language.com/sign-language-instruction-asl2-4.html>

### Sign language properties

Unlike spoken languages, sign languages allow for **simultaneous articulation** of information.

Example: **Y/N question** + declarative utterance

**Yes/no question face** + regular declarative sign sequence



### The situation

- Deaf individuals aren't all the same
- Deaf parents vs. Hearing parents
  - **Deaf-of-deaf** children are exposed to a full language immediately
  - **Deaf-of-hearing** children are exposed to "non-native" signers: they receive inconsistent and incomplete input
- Parents of deaf children also have to make a choice in how to teach their children

### Manual / Oral / Total traditions

- **Manual tradition (Bilingual-Bicultural)**
  - Teach sign language exclusively (at least at first)
  - Gives linguistic input from day 1
- **Oral tradition**
  - Force deaf children to learn spoken language
  - Delayed linguistic input, but potentially better communication with non-signers
- **Total communication (TC)**
  - Expose deaf children both to manual & oral language
  - Very popular in the 70s & 80s, less popular today

### Progression of sign language acquisition

Children pass through the same stages as in spoken language acquisition, in the same order: manual babbling to single-sign productions, to multisign combinations, followed by morphological development and more complex syntax.

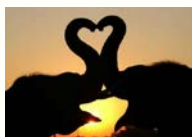
Children make the same kind of mistakes as in spoken language acquisition, such as overregularization errors in morphology (“goed”), ignoring parental corrections of form, pronoun reversal errors (confusing what “I” and “you” mean) - despite these being signified by pointing gestures.

### Oral language development

Deaf children are only exposed to lip movements  
- This is really hard!

Mouth “Elephant shoes” vs. “I love you.”

vs. “olive juice” vs. “island view”



### Oral language development

**Phonological development:** Deaf children differ during the babble stage from hearing children in both the quality and quantity of sound production. However, some orally trained children develop enough phonological awareness to identify rhymes from lip-reading.

**Lexical development:** oral vocabulary is delayed and proceeds more slowly.

**Syntactic development:** delayed, and endpoint of development falls far short of normal language competence.

John goes to fishing.

Him wanted go.

Who TV watched?

Who a boy gave you a ball?

Tom has pushing the wagon.

### Deaf children: Interim recap

Deaf children exposed to sign language learn language the same as normal-hearing children

- There's no inherent deficit in language ability for deaf children

Deaf children exposed to spoken language learn much slower and never catch up to their normal-hearing peers!

- Deficit in spoken language, NOT in language generally



### Cochlear Implants

- Cochlear Implants (CI): Allow certain deaf individuals to hear
  - CIs are controversial: treat deafness as a disease which can be "cured"
- How do they work?
  - Replaces the cochlea
  - Takes air pressure and turns it into neural signals



### Cochlear implants: Sample speech

8-channel vocoded sentence



Normal sentence



### Cochlear implants

- Why are cochlear implants interesting?
  - Explore how oral language develops after a lack of linguistic exposure
- How do these children do with spoken language?
  - Wide variability, some catch up to normal-hearing peers, some are unable to use their implants
  - Deficits appear to be due to auditory capabilities

### Deaf children: Bigger picture recap

Implication 1: Language is a property of the human brain, not a property predicated on the mouth and ears.

Implication 2: Since deaf children make the same mistakes in learning as hearing children - despite sign languages being more naturally iconic – this suggests that acquiring a formal grammatical system is a separate cognitive enterprise from learning how to communicate. If it wasn't, sign languages should be easier to pick up than spoken languages.

### Deaf children: Bigger picture recap

Implication 3: While cochlear implants allow some deaf children to hear spoken language, there is wide variability in the ability to pick up the spoken language. However, this is a deficit in the spoken modality, rather than a language deficit - these children still have native-level proficiency in their signed languages.



### Blind children



### Why blind children?

Blind children hear and talk, but lack visual cues to language:

Ex 1: achieving joint attention through pointing and eye gaze isn't possible.





### Why blind children?

Blind children hear and talk, but lack visual cues to language:

Ex 2: visual information about lip configurations for producing sounds isn't available.



### Linguistic development of blind children

Phonological development: Blind children make **more errors than sighted children with sounds that involve visible articulatory movements** (/b/, /m/, /f/).

Lexicon development: Blind children have **fewer words for things that can be seen, but not touched** (like *flag*, *moon*). They have more words for things associated with auditory change.

Syntactic development: **Same as that of sighted children.**

- Some differences due to mother's input (fewer questions, more commands), which leads to late auxiliary verb (*has*, *is*) acquisition

### Insight into first language acquisition

One perspective: language development builds on nonverbal communication, and on accessing the meanings of sentences from the observable nonlinguistic context.

**But blind children can't do either of these - yet they still acquire language the same way (and at the same time) as sighted children do.**

Implication: Nonverbal cues are helpful, but not necessary. Syntactic information in the language itself can be just as useful. (Remember how useful syntactic bootstrapping was for lexical acquisition.)

### Children with Intellectual Disabilities



### A heterogeneous group

Intellectual Disability = “significantly subaverage general intellectual functioning...that is accompanied by significant limitations in adaptive functioning”

This lets us test how general intelligence aids language acquisition.

Research import:

If language is the result of general cognitive abilities, mentally retarded individuals should have poor language.

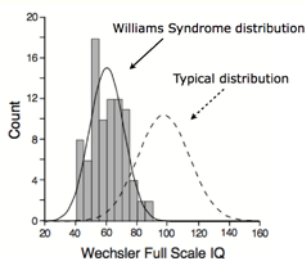
If language is a specialized ability, it may be fine even if general intelligence is poor.

### Williams Syndrome

<http://www.youtube.com/watch?v=AHT4-dB4Mil#t=35.5>

### Williams Syndrome

Low general IQ (40-70), poor math, poor *visuospatial* reconstruction abilities



### Williams Syndrome

Good language, often good with music, highly social  
Lexicons tend to include more unusual words (and they like to use them).













Ex: “Tell me some animals”.

Williams Syndrome Answer: brontosaurus, ibex, koala, dragon, ...

















Often used to make the argument for the dissociability of language and cognition.




### Williams Syndrome: Copying simple pictures

Model			
WS Age 11			
WS Age 11			
Control Age 6			

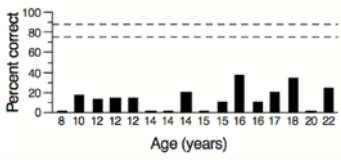
### Williams Syndrome: Copying simple pictures

MODEL:				
Crystal Age 15				
Ben Age 16				
Van Age 11				

### Williams Syndrome: Discriminating visual angles




Model

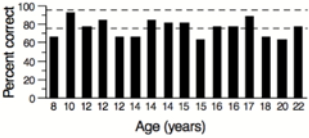


Age (years)	Percent correct
8	10
10	15
12	10
14	10
16	15
18	40
20	15
22	30

### Williams Syndrome: Discriminating faces



Model



**Much better!**  
(There's a specific area of the brain for facial recognition (the fusiform face area) which appears undamaged in Williams Syndrome.)

Age (years)	Percent correct
8	90
10	85
12	80
14	85
16	80
18	85
20	75
22	75



### Williams Syndrome: Neurological underpinnings

Williams syndrome brain is hypersensitive to processing faces and voices, and **more of the brain is devoted to learning language.**

So why does this lead to poorer performance in the end?

Karmiloff-Smith et al. (1997) says: The learning device is only driven to find patterns and extract rules (like grammar) when the space available is insufficient to memorize everything (similar to the "Less is More" idea of Newport 1990). So, **Williams Syndrome children have a lot of memorization space...and subsequently not enough (unconscious) motivation to find patterns and make a more compact system of representation.**

### Williams Syndrome: Implications

Excellent lexical development, phonological memory

+

Poor performance on some aspects of grammar (and finding pattern regularities)

=

Williams Syndrome children may acquire language differently than typically developing children. **Process is not the same (or at least gets stuck), and so end result (language system) may not be not the same. Therefore, this may not be as decisive about the separation of typical language development from general intelligence.**

### Down Syndrome



Due to a chromosomal abnormality, and accounts for about one third of the moderately to severely intellectually disabled population.

While some Down syndrome individuals achieve typical adult-linguistic competence, most do not. **Language tends to be more impaired than other cognitive functions. Grammar is particularly impaired.**

However, **communicative development and pragmatic development are strong.** Down syndrome babies vocalize more and engage in mutual eye contact more. School-age children are particularly interested in social interaction and less interested in objects.

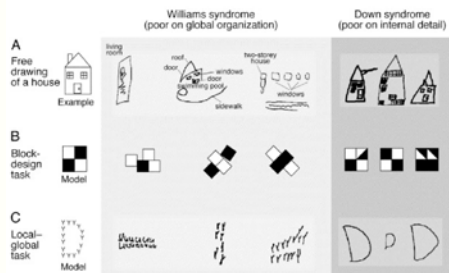
### Down Syndrome (DNS) vs. William Syndrome (WMS): Language

Down Syndrome individuals show a deficit for putting together complex utterances while Williams Syndrome individual do not.

<p>(M. Mayer, "Frog Where are You?")</p>	<p><b>WMS age 13</b> And he was looking for the frog. What do you know? The frog family! Two lovers. And they were looking. And then he was happy 'cause they had a big family. And said "good bye" and so did the frog. "Rabbit."</p> <p><b>WMS age 17</b> Suddenly when they found the frogs... There was a whole family of frogs... And all he was amazed! He looked... and he said "Wow, look at these... a female and a male frog and also lots of baby frogs". Then he take one of the little frogs home. So when the frog grow up, it will be his frog... The boy said "Good bye, Mrs. Frog... good bye many frogs. I might see you again; if I come around again". "Thank you Mr. Frog and Mrs. Frog for letting me have one of your baby frogs to remember him".</p>	<p><b>DNS age 13</b> There you are. Little frog. There another little frog. They in that... water thing. That's it. Frog right there.</p> <p><b>DNS age 18</b> They're hiding; see the frogs... the baby frogs. Uh, the boy, and, and the dog saw the frogs. The frog's got babies. The boy saw the... no, the boy say good bye.</p> <p>(Hilly, Klima &amp; Bellugi, 1990)</p>
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### Down Syndrome vs. Williams Syndrome: Visuospatial abilities

Down Syndrome individuals show a deficit for local details while Williams Syndrome individuals show a deficit for global organization.



### Down Syndrome implications



Some language development (ex: grammar) is impaired.

One conclusion: Therefore language development requires general cognitive abilities. (Any other ways to interpret this if you're a nativist? Hint: Could a specific brain part be impaired too?)

Some language development (ex: communicative/social aspects) is not as impaired.

Therefore, "language" is not a single cognitive ability. Some aspects can be impaired while others are spared.

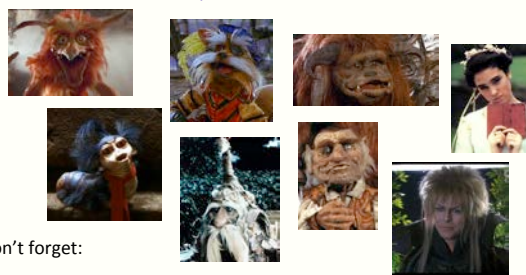
Also consider that "intelligence" is not a single ability. Down Syndrome may affect some aspects of intelligence but not others.

### Recap: Special Populations

Special populations let us test what matters and what doesn't matter for language acquisition:

- Auditory cues: Only crucial for acquiring spoken language (deaf children)
- Visual cues: Not crucial for acquiring language (blind children)
- Social cues: Only crucial for pragmatics (Down Syndrome)
- General intelligence: Potentially important for language acquisition, but not straightforward (Williams Syndrome, Down Syndrome)

### Questions?



Don't forget:

Final Exam Review – 3/13/14, in class

Final Exam – 3/20/14, in classroom or NS1 2144, 1:30pm-3:30pm

Extra material

### Autistic children



### Characteristics of autism

Always: **impaired language and communication**

Includes: impaired social development, delayed and deviant language, insistence on sameness, and onset before age 30 months

Variability: **Distinction between lower- and higher-functioning individuals; linked to nonverbal cognitive abilities**



### Language in lower-functioning autistics

Lower-functioning = ~80% of autistic individuals, scoring in mentally retarded range on nonverbal tests of development

~50% either do not speak at all or have **echolalic speech**, which is the meaningless repetition of a word or word group previously produced by another speaker

Some mixed success in teaching lower-functioning individuals when speech is combined with manual signs.

### Language in higher-functioning autistics

Language success varies widely among higher-functioning autistics. In general, development is delayed and deviant in at least some respects.

**Odd prosody:** speech sounds mechanical (problems expressing emotional affect); possibly resulting from lack of attention to how others sound and/or a lack of interest in sounding like others

**Gaps in semantics:** autistic children do not use words that refer to mental states, such as *believe*, *guess*, *idea*, etc.; however, **generally show similar understanding of other word meanings** when compared with non-autistic children

### Language in higher-functioning autistics

Language success varies widely among higher-functioning autistics. In general, development is delayed and deviant in at least some respects.

**Gaps in syntax:** autistic children use a narrower range of constructions, generally do not ask questions; however, **development generally follows a similar course to that of non-autistic children**

**Severe communicative competence impairment:** infants show little interest in people and no preference for their mother's speech, rarely produce pointing gestures, joint attention skills markedly deficient, make pronoun reversal errors

### Autism: Implications

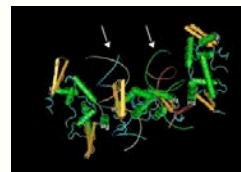
Impaired social abilities = impaired language, but crucially not the basic core of semantics and syntax

Idea: There is a dissociation between language acquisition ability and social/communicative abilities

One idea: Basic deficit is **lack of theory of mind**, and understanding people's minds is a prerequisite to true communicative behavior.

However...lots of overlap with **specific language impairment** children, so underlying deficit may not be so simple as that. Lack of theory of mind could be the result, not the cause.

### Specific Language Impairment





### Characteristics of Specific Language Impairment (SLI)

Speech from a 16-year old with SLI:

He **want play** that violin.

Can I play **with violin**?

Then he went home and **tell mother** - his mother - tell **what he doing** that day.

Then about noontime **those guy** went in and eat and warm up.

### Characteristics of Specific Language Impairment (SLI)

In the absence of any clear sensory or cognitive disorder, language development is impaired.

FoxP2 gene on chromosome 7: impairment affecting jaw and tongue movement, speech, and grammar (tense, number).

Generally, these children show late onset of talking as well. Vocabulary development is typically delayed, **but the greatest deficits are in morphology and syntax.**

However, SLI children **produce different kinds of grammatical errors than typically developing children** – they may be learning differently than typical children

### Characteristics of Specific Language Impairment (SLI)

**Impaired phonological memory:** SLI children are generally worse than typically developing children at repeating a meaningless sequence of sounds. (Remember, that was useful for predicting size of vocabulary in typically developing children.)

**Nonlinguistic cognition impairment:** worse at symbolic functioning, mental imagery, hierarchical planning, hypothesis testing, reasoning, drawing inferences from stories. **Maybe SLI isn't so specific to language?** (Though perhaps these are the result of a language deficit in some cases - without the ability to use language for cognitive-offloading, performance on these other tasks suffers.)

### Accounting for Specific Language Impairment (SLI)

Idea 1: SLI children have an **impairment in the language acquisition device** (generativist viewpoint). Specifically, their innate knowledge about language is missing a piece.

Ex: Unimpaired children hear *walk, walked, jump, jumped*, and build a rule for forming the past tense (+ed). Children with SLI never use those regularities to build a rule. They just memorize the different forms. (This is similar to one idea about how Williams syndrome children develop, with the difference that Williams syndrome children have better associative memories for acoustic stimuli.)  
Crucial difference: even when SLI children lack the memory capacity for all the grammatical forms, something keeps them from learning the rule.

### Accounting for Specific Language Impairment (SLI)

Idea 2: SLI children's phonological memory impairment means that they don't pick up on phonological information that is less salient, like unstressed grammatical morphology (Leonard 1989).

Ex: walk~walking, may be difficult for SLI children to retain in memory, and so they are delayed in picking up this information.

Note: doesn't necessarily account for all the differences between SLI and typically developing children.

Prediction: Should depend on the language - languages with more of this kind of less salient morphology should have more SLI kids. So far, sometimes yes, sometimes no.

### Accounting for Specific Language Impairment (SLI)

Idea 3: SLI children can't process rapidly processed stimuli, like speech, as well as typically developing children.

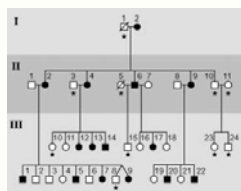
Ex: They can't process rapidly presented musical tones as well (Tallal 1978, Tallal et al. 1985), in addition to not being able to distinguish acoustic signals like dabiba vs. dabuba (Leonard et al. 1992).

Ex: They have trouble integrating the auditory and visual aspects of speech (Pons et al. 2013).

This ties in with the impaired phonological memory story, since children with a processing deficit will definitely have more trouble with less salient phonological cues like most grammatical morphology.

### Genetic Factors in Specific Language Impairment (SLI)

There seems to be a familial concentration of specific language impairment. In the KE family, it turned out to be a single dominant gene at work (the FOXP2 gene).



### SLI: Implications

Since language development seems to depend on many different underlying abilities, language impairment will likely have a number of different underlying causes.

It also may be that SLI simply represents the low end of the spectrum of language acquisition (Leonard 1987, 1991). SLI children show the same variability seen in typically developing children: some are weak in syntax but strong in pragmatics, some have the opposite pattern, and some are weak in both. Potential underlying problem: ability to extract regularities is significantly below average, which leads to many problems in language development (and elsewhere).

### Recap: Special Populations

Special populations let us test what matters and what doesn't matter for language acquisition:

- Auditory cues: Only crucial for acquiring spoken language (deaf children)
- Visual cues: Not crucial for acquiring language (blind children)
- Social cues: Only crucial for pragmatics, maybe theory of mind (Down Syndrome, autistic children)
- General intelligence: Potentially important for language acquisition, but not straightforward (Down Syndrome, Williams Syndrome)
- Genetic factors? (SLI children)