LSci51/Psych56L: Acquisition of Language

Lecture 23

Language in special populations II

Announcements

Review questions available for language development in special populations & HW6 due 12/3/21.

Review session in class on 12/3/21 for timed assessment 6

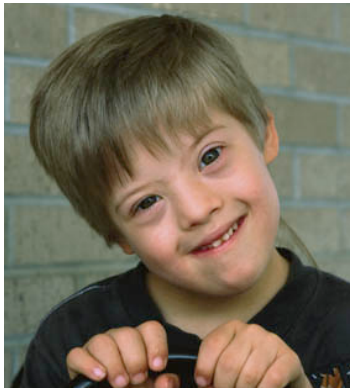
Timed assessment 6 & timed assessment extra credit due 12/6/21

Please fill out course evaluations

Remember that extra credit is available!

Consider taking more language science classes (LSci)!

Special populations

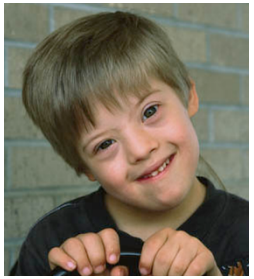


Why special populations?

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

Does language develop differently if "general intelligence" is lower (**mentally retarded children**)?



Autistic children

Autistic children

Naigles & Tek 2017: “Children with autism spectrum disorder (ASD) demonstrate impairments in social interaction and communication, and in repetitive/stereotypical behaviors.”

Daniel Abrams, on findings of Abrams, Padmanabhan, Chen, Odriozola, Baker, Kochalka, Phillips, & Menon 2019: “…brain responses to mom's voice are a key element for building social communication ability” and these responses are greatly diminished in children with ASD.

https://www.sciencedaily.com/releases/2019/02/190226091549.htm

Autistic children

Naigles & Tek 2017: “Children with autism spectrum disorder (ASD) demonstrate impairments in social interaction and communication, and in repetitive/stereotypical behaviors.”

Kissine 2020: Infants later diagnosed with ASD…

— look and smile less at people

— rarely gaze in the direction of a human voice, even when called by their name

— almost never produce sounds or babbling directed at another person

Autistic children

Naigles & Tek 2017: “Children with autism spectrum disorder (ASD) demonstrate impairments in social interaction and communication, and in repetitive/stereotypical behaviors.”

Kissine 2020: One-year-old and two-year-old autistic children have less attention-sharing behaviors

— rarely switch their eyes back and forth between an adult and some object they find interesting

— rarely point at an object to draw the adult’s attention to it

— spend less time looking at the eyes and the mouth regions of speaking faces

Autistic children

Naigles & Tek 2017: "…impairments in social/pragmatic aspects of language…are one of the defining characteristics of ASD."

- use & comprehension of body language
- understanding humorous material & figurative language
- initiating social interactions with others

Pragmatics

Naigles & Tek 2017

"…pragmatics involves discerning meaning in a specific context. A successful conversation with a social partner is not possible if one is not able to decode the intended meanings of words and utterances or, conversely, to produce utterances that are meaningful from a listener's perspective."

Language in autistic children

Naigles & Tek 2017

Language impairments:

- Problems in discourse such as the use of repetitive phrases or inappropriate comments.
- Difficulties with storytelling: producing impoverished narratives, such as using bizarre or inappropriate utterances, neglecting to mention central themes, and misinterpreting story events
- Conversations: difficulty turn-taking, following topics, responding adequately to questions or providing clarifications for topics that are unclear to a conversational partner

Though keep in mind that there's a great diversity in language development in children with ASD: Fusaroli, Weed, Fein, & Naigles 2019

https://www.sciencedaily.com/releases/2019/01/190124105320.htm

Language in autistic children

Naigles & Tek 2017

"Deficits in pragmatic aspects of language usually persist throughout the lifespan, and are equally observed among high-functioning children with this disorder."

Ex: "high-functioning individuals with ASD with average to above-average cognitive and linguistic skills demonstrate difficulty comprehending humorous materials such as picking funny endings for cartoons and jokes compared to their age-matched typical peers."

Language in autistic children

Naigles & Tek 2017

Clinical significance: "[I]mpairments in language use are one of the earliest symptoms that parents of young children with ASD notice, and because language functioning early in life strongly correlates with long-term outcomes. "

Language in autistic children

Naigles & Tek 2017

Scientific significance: "…characterizing the strengths and weaknesses of the language of children with ASD, because their most overt impairments are in the domain of social interaction, can shed light on the degree to which different aspects of language rely on the meanings and intentions that social interaction affords. "

Language in autistic children

Naigles & Tek 2017

"Form is easy, meaning is hard" hypothesis (Naigles 2002):

"…to the extent that the discovery and abstraction of grammatical forms can occur prior to complete establishment of their meanings,…then children with ASD should not demonstrate as severe delays of [syntactic] development as they do of semantic and pragmatic development."

Language in autistic children

Naigles & Tek 2017

Lexical development

- While onset may be delayed, development appears similar to typically-developing children:
  - similar lexical diversity as the lexicon develops
  - higher percentage of nouns than verbs in early vocabularies ("noun bias")
  - Hartley, Bird, & Monaghan 2019: can follow speaker's focus of attention to learn new object labels (some social cue sensitivity)
  - Venker 2018: similar ability to learn a word's referent by tracking its use across multiple situations (known as cross-situational learning)

Language in autistic children

Naigles & Tek 2017

Lexical development

- But there are some notable differences
  - mental-state terms such as *think*, *know*, and *imagine*, and words referring to emotions are underrepresented (though girls tend to use more of these than boys: Boorse, Cola, Plate, Yankowitz, Pandey, Schultz, & Parish-Morris 2019, https://www.sciencedaily.com/releases/2019/04/190423145523.htm)
  - difficulty labeling emotions in video vignettes
  - low-verbal ASD children produce more "general-all-purpose" verbs like *make, do,* and *go* than typically developing children and high-verbal ASD children

Why might this be?

Language in autistic children

Naigles & Tek 2017

Why might this be?

Lexical development

"All of these effects can be traced to difficulties in socially-based meaning discernment: children who find it difficult to read the mental states and emotions of others will likewise find it difficult to learn the words that refer to these, and lower-functioning children who experience even greater difficulties in navigating the cognitive and social worlds may over-rely on words that are essentially 'bleached' of specific lexical content."

Language in autistic children

Naigles & Tek 2017

Lexical organization

There are notable differences

- ASD children don't seem to have a shape bias when learning how to extend the meaning of new words, unlike typically-developing children (Tek, Jaffery, Fein, & Naigles 2008)
- Categorical induction (which allows the extension of properties associated with one instance of a category to other instances with the same label) also seems impaired.

Language in autistic children

Naigles & Tek 2017

Morphology

- The order of acquisition for morphological affixes appears similar
- Morphological rule development seems similar, with both ASD and typically-developing children appropriately adding plural markers to novel nouns (*wug+s*), past tense markers to novel verbs (*wugged*), and recognizing that *-ing* signals the imperfective aspect while *-ed* signals the perfective aspect.

Language in autistic children

Naigles & Tek 2017

Syntax

- Preschoolers with ASD understand *wh*-questions (e.g., *What did the apple hit?*)
- ASD children process sentences incrementally, similar to typically developing children
- High-functioning ASD children understand the structural restrictions on reflexive pronouns (*Jack washed himself* = Jack washed Jack, vs. *Jack washed him* = Jack washed someone else)

Autistic children: Big picture

Naigles & Tek 2017

For autistic children, it seems "form is easy, meaning is hard"

"…the disconnects between language form…and language meaning… are intriguing because their directionality suggests that at least some components of grammatical form can develop more quickly than—and possibly somewhat independently of—some components of lexical meaning."

Autistic children: Big picture

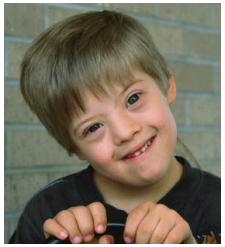
Kissine 2020

Older children (9 and 12): “seemed to enjoy the experience of learning a new language for its internal, structural properties, rather than for the communicative potential it could offer…[language acquisition] skills in autism are usually explained in terms of preferential attention to detail, enhanced processing of local structural properties, as well as…a superior capacity to detect and analyse domain-specific, systematically recurring patterns.”

Mentally retarded children

A heterogeneous group

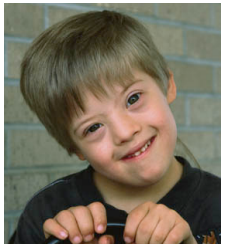
Mental retardation = "significantly subaverage general intellectual functioning…that is accompanied by significant limitations in adaptive functioning"



This lets us test how general intelligence impacts language acquisition.

A heterogeneous group [Extra]

Mental retardation = "significantly subaverage general intellectual functioning…that is accompanied by significant limitations in adaptive functioning"



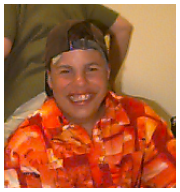
This lets us test how general intelligence aids language acquisition.

Research importance:

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

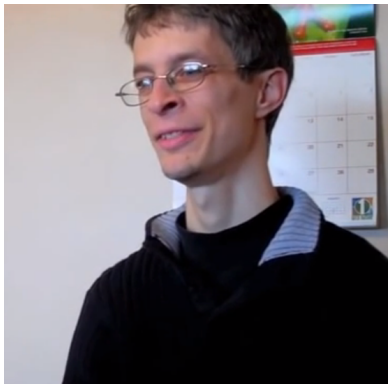


Characterized by a well-defined set of approximately 25 genes missing on chromosome 7q11.23. (Landau & Ferrara 2013)

https://www.youtube.com/watch?v=AHT4-dB4MiI

~5 minutes total, especially 2:17-5:00

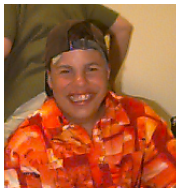
(no longer available)



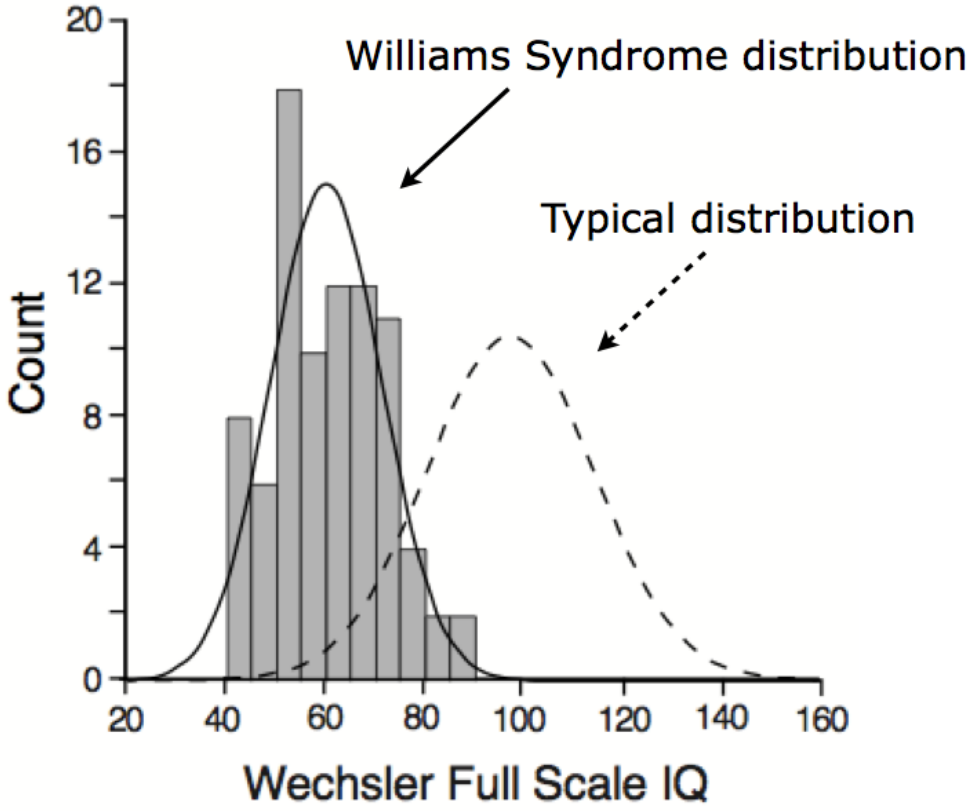
https://www.youtube.com/watch?v=gF4DiqEdN3w

~5 minutes total, especially 2:24-4:56

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, …

Williams Syndrome [Extra]

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, …

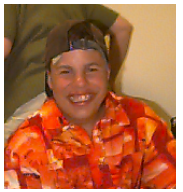
Often used to make the argument for the dissociability of language and cognition.

Williams Syndrome: Copying simple pictures

Model

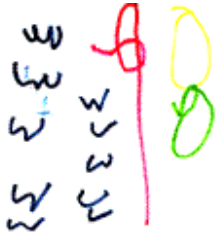
WS

Age 11



WS

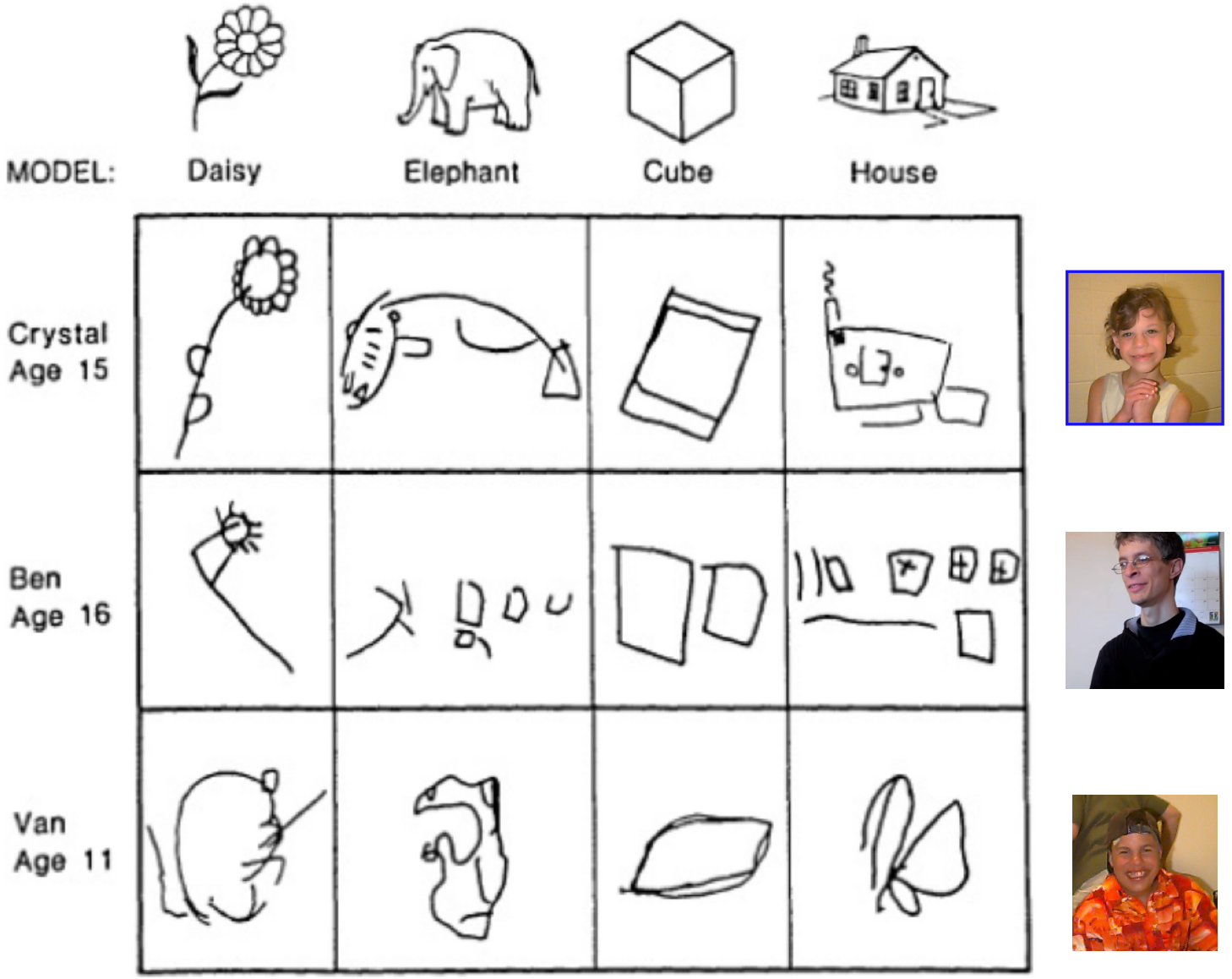
Age 11



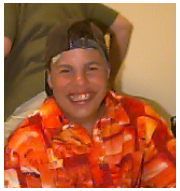
Control

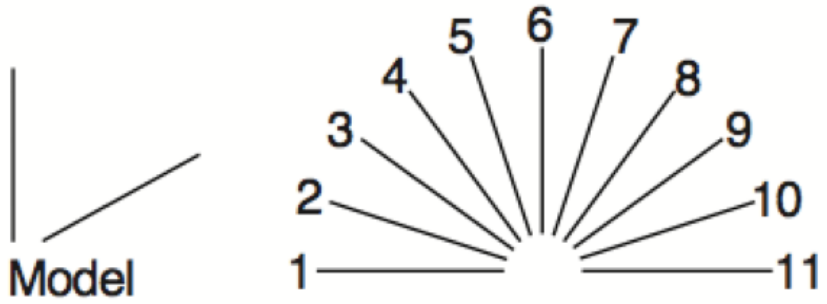
Age 6

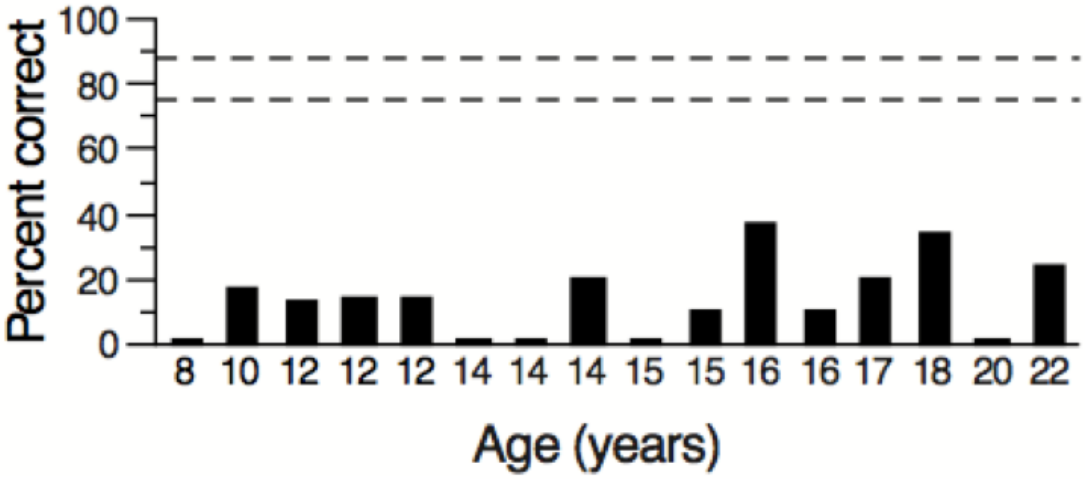
Williams Syndrome: Copying simple pictures



Williams Syndrome: Discriminating visual angles

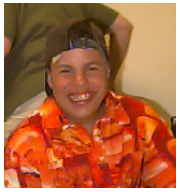


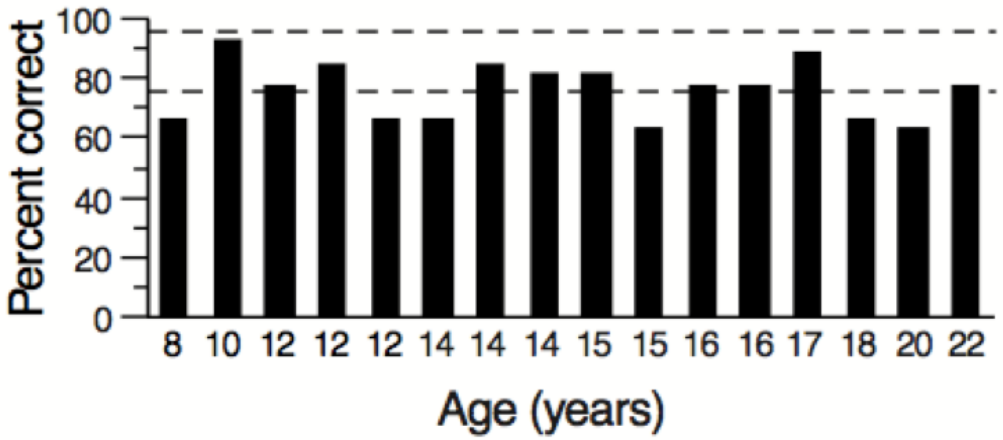




Not so good…

Williams Syndrome: Discriminating faces

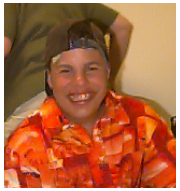




Much better!

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

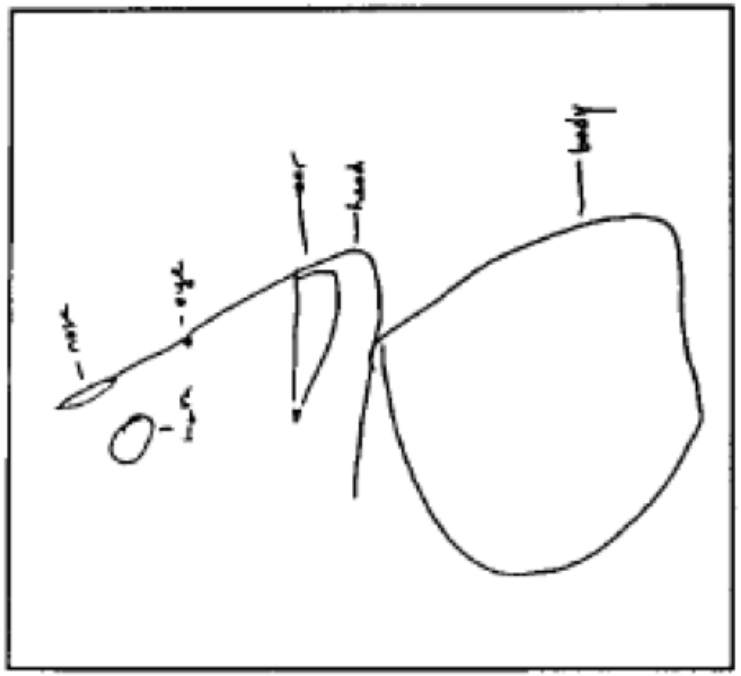
Williams Syndrome: Spatial development in general



A limit on Williams Syndrome spatial developmental trajectory

"Spatial functions that typically mature early (e.g., by age 4 or 5) are also observed to reach normal adult levels among people with WS, but those that typically show lengthier developmental trajectories appear to be arrested at an early functional level, with little change thereafter." — Landau & Ferrara 2013

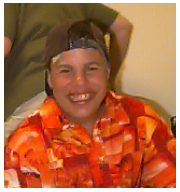
Williams Syndrome: “Draw an elephant”



Williams Syndrome: “Describe an elephant”

“And what an elephant is, it is one of the animals. And what the elephant does, it lives in the jungle. It can also live in the zoo. And what it has, it has long gray ears, fan ears, ears that can blow in the wind. It has a long trunk that can pick up grass, or pick up hay…If they’re in a bad mood it can be terrible…If the elephant gets mad it could stomp; it could charge, like a bull can charge. They have long big tusks. They can damage a car…it could be dangerous. When they’re in a pinch, when they’re in a bad mood it can be terrible. You don’t want an elephant as a pet. You want a cat or a dog or a bird…”

Describing complex pictures

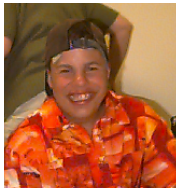


Zukowski 2008

"Max is looking at the cow who um the boy's pointing to."
(WS age 12;10)

Note: This level of syntactic knowledge is attained by typically-developing children ages 5 to 6.

Understanding complex meaning



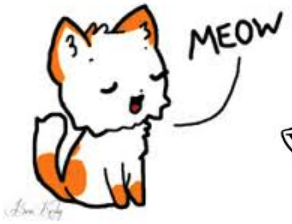
Musolino, Chunyo, & Landau 2010, Musolino & Landau 2010

WS adults can understand the difference between:

“The cat who meows won’t get a fish or milk.”

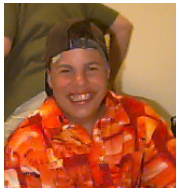
vs.

“The cat who doesn’t meow will get a fish or milk.”



Note: This level of syntactic & semantic knowledge is attained by typically developing children around age 5.

Williams Syndrome: Conclusive?

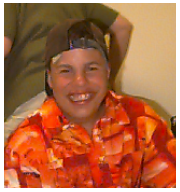


While their language skills are quite impressive in comparison to other cognitive abilities, they still lag behind those of typically developing children of the same chronological age.

The Developmental Arrest Hypothesis

"Developmental arrest would imply no further growth beyond this point. The arrest hypothesis suggests that structures typically acquired late in development may never be acquired by people with WS—or indeed, might be acquired in a way that fits 'late learning' by normal individuals." — Landau & Ferrara 2013

Williams Syndrome: Conclusive?



While their language skills are quite impressive in comparison to other cognitive abilities, they still lag behind those of typically developing children of the same chronological age.

The Developmental Arrest Hypothesis

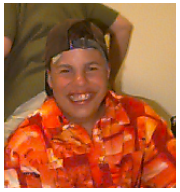
Supporting evidence for this hypothesis (Landau & Hoffman 2012, Karmiloff-Smith et al. 1997):

WS individuals never master late-developing linguistic knowledge like raising, certain passives, and other morphosyntactic knowledge acquired late by typically developing children.

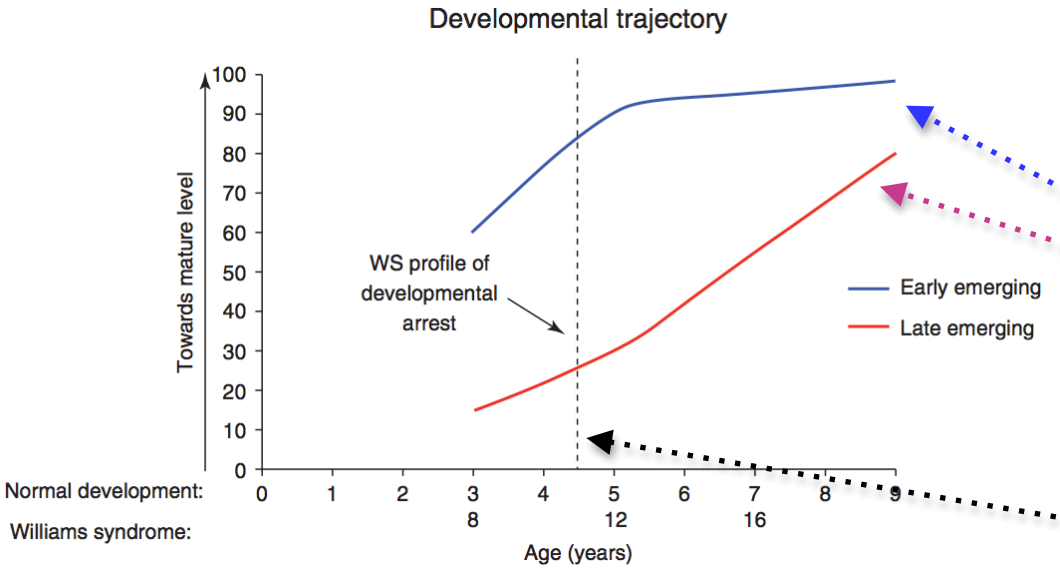
Raising (implied subject):

"She seems *_she* to like penguins."

Williams Syndrome: Conclusive?



The Developmental Arrest Hypothesis



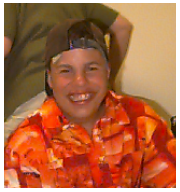
Landau & Ferrara 2013

Hypothetical developmental curves for early emerging spatial and language functions vs. late emerging spatial and language functions.

Williams Syndrome arrest point

"People with WS are hypothesized to undergo very slow development for both spatial and language functions, followed by arrest, resulting in a mature cognitive profile that resembles that of a typically-developing 4–6 year-old."

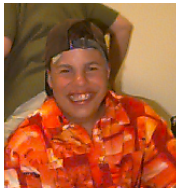
Williams Syndrome: Conclusive?



In addition, while they may make grammatical errors similar to typically-developing children (ex: contracting *wanna* when they shouldn't: **Who do you wanna win the race?),* they don't seem to recover from them the way that typically-developing children do (Zukowski & Larsen 2012).

They also seem to produce more than they comprehend. Often they can't answer questions about the stories they just told.

Williams Syndrome: Implications



Excellent lexical development, phonological memory

+

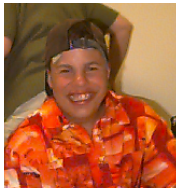
Poor performance on some aspects of late-developing grammar (and spatial ability)

=

Williams Syndrome children may acquire language differently than typically-developing children, given the slower overall timeline and potential arrest of linguistic development.

[Extra]

Williams Syndrome: Implications



Excellent lexical development, phonological memory

+

Poor performance on some aspects of late-developing grammar (and spatial ability)

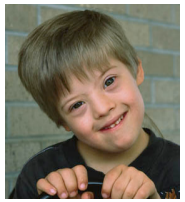
=

Williams Syndrome children may acquire language differently than typically-developing children, given the slower overall timeline and potential arrest of linguistic development.

The process is not the same (or at least gets stuck), and so the 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.

Mentally retarded children

Down Syndrome



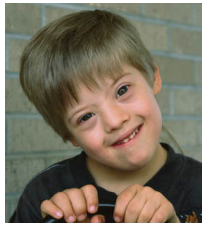
Due to a chromosomal abnormality, and accounts for about one third of the moderately to severely mentally retarded population.

While some Down syndrome individuals achieve typical adult-linguistic competence, most do not. Language tends to be more impaired than other cognitive functions. Morphology & syntax are 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.

[Extra]

Down Syndrome implications



Some language development (ex: morphology + syntax) is impaired.

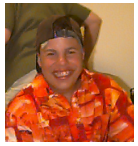
One conclusion: Therefore language development requires general cognitive abilities. (But perhaps a specific brain part could be impaired…)

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.

Williams Syndrome (WMS) vs. Down Syndrome (DNS): Language

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

(M. Mayer, "Frog Where are You")

WMS age 13

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. "Ribbit."

WMS age 17

Suddenly when they found the frogs... There was a whole family of frogs... And ah 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 arounmd again". "Thank you Mr. Frog and Mrs. Frog for letting me have one of your baby frogs to remember him".

DNS age 13

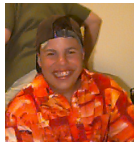
There you are. Little frog. There another little frog. They in that... water thing. That's it. Frog right there.

DNS age 18

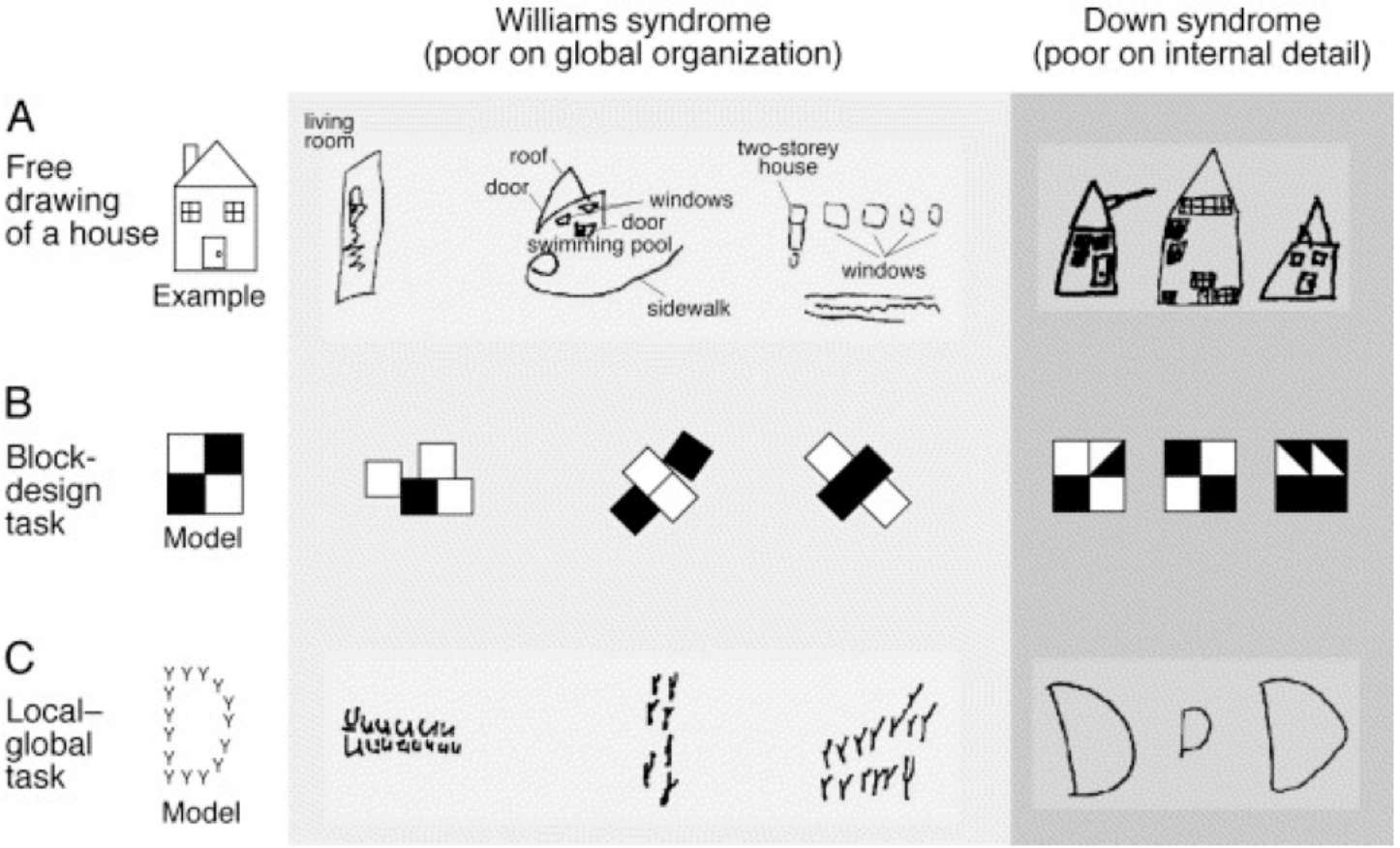
Thy're hiding; see the frogs... the baby frogs. Uh, the boy, and, and the dog saw the frogs. The frog's got babies. The boy saw the... no, the boy say good bye.

(Reilly, Klima & Bellugi, 1990)

Williams Syndrome (WMS) vs. Down Syndrome (DNS): Language

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



Williams Syndrome (WMS) vs. Down Syndrome (DNS): Language


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

Remember: Attention to local detail was one aspect of ASD children that's thought to help them be so good at acquiring the morphology and syntax components of language.

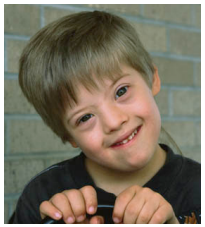

This is something ASD children and Williams Syndrome children have in common.

Recap: Autism & mental retardation

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

Social aspects: May not be as crucial for acquiring form (morphology, syntax) but important for learning meaning, especially in context

General intelligence: Potentially important for language acquisition, but not straightforward (Williams Syndrome, Down Syndrome) — attention to local detail appears to be important for morphology and syntax



Questions?

You should be able to do all of HW6 and all of the special populations review questions