

Why Gender Matters

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*Please note: this handout is intended as a **supplement to** the presentation, not as a **substitute for** the presentation. It is intended to assist those who attend my presentation in Winnipeg in August 2014, to spare them the distraction of taking excessive notes. These pages are NOT intended to be read separately from the presentation; they cannot “stand by themselves.”*

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The consensus, 1972 – 1997: Gender is primarily a social construct

In 1972, Dr. John Money published the first of several reports about “the boy who was raised as a girl”, which seemed to provide conclusive proof that gender is indeed merely a social construct. You can take a boy, raise him as a girl, and he/she will indeed become a normal, happy, well-adjusted girl who likes to play with dolls and bake cookies. During this quarter-century, 1972 – 1997, most American scholars agreed on the following:

- 1) *There are few if any **innate** differences between girls and boys of any relevance to education; instead, kids **learn** how to “do gender”, as a result of culturally-specific patterns of gender socialization*
- 2) *Notions of innate gender difference are not only wrong, they are harmful; the ideal which all teachers should strive to instill in their students is **androgyny**, an equal mix of female and male*
- 3) *Enlightened teachers minimize or ignore gender differences*

See John Colapinto’s book *As Nature Made Him: the boy who was raised as a girl* for more about the tragic story of David Reimer, “the boy who was raised as a girl”. In 1997, Dr. Milton Diamond learned that Dr. Money’s publications were fabrications, roughly opposite to what actually happened. The modern science of gender differences can be said to have begun with the 1997 publication of Dr.

Diamond's paper documenting the truth about David Reimer. Nevertheless, many North American universities still teach the 1972 – 1997 consensus, as embodied in points 1, 2, and 3 above.

Sex differences in vision /

Sex differences in hearing /

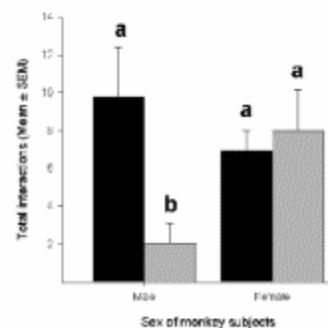
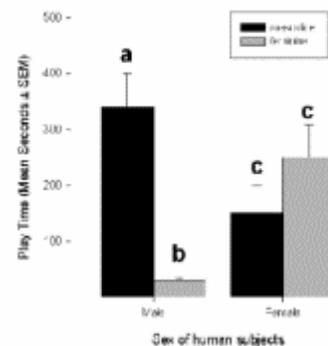
Sex differences in brain development

Sex differences in the visual system

Researchers have long known that young boys tend to prefer playing with a truck rather than a doll. The graph at right shows the typical findings when girls and boys are given a choice of playing with a “boy toy” such as a truck (black bar) or a “girl toy” such as a colorful plush doll (grey bar). Before 2002, most scholars agreed that boys' preference for trucks over dolls reflected the social construction of gender. Boys were taught that boys were supposed to prefer trucks over dolls; as a result, boys preferred to play with trucks rather than dolls.

Dr. Gerianne Alexander was the first to offer monkeys the same choice: playing with a dull grey truck or a colorful plush doll. Her findings have since been replicated by Kim Wallen and colleagues with a different species of monkey, and by Sonya Kahlenberg and Richard Wrangham in their observations of monkeys. The primate data are shown above.

It's difficult to invoke the social construction of gender to explain these findings in monkeys or in chimpanzees. One *can* reasonably invoke the social construction of gender to explain the difference across species. Why is the preference of the juvenile



male to play with a truck rather than a doll greater in our species than among monkeys or chimpanzees? Answer: the social construction of gender among humans exaggerates the innate preference. The preference of the juvenile male primate to play with trucks rather than dolls must be innate, because this preference is conserved across species. This preference is more pronounced in our species because of the social construction of gender in human cultures; or as Dr. Melvin Konner puts it, “Culture *stretches* biology.” But what explains the main effect? Why do juvenile primate males – whether they are human or monkey – prefer to play with a dull grey truck rather than with a colorful plush doll?

Dr. Gerianne Alexander was the first to document this finding in nonhuman primates, and also the first to propose a plausible explanation. To understand her explanation, you have to recall some basic facts about the visual system in primates.

Two visual systems:

- One visual system, the Parvocellular (P) system, is devoted to color, texture, detail
- The other visual system, the Magnocellular (M) system, is devoted to detecting speed, direction, and change in direction
- Why do juvenile males – whether human or monkey – prefer to play with a dull grey truck rather than with a colorful plush doll?
- Because the truck MOVES; it has wheels
- Katrin Amunts et al. 2007: compared M system in human occipital cortex (hOc), in women and men

Application. *Suppose you are teaching students in the early elementary grades. You give all your students a blank sheet of paper and a box of crayons and tell*

*them to draw whatever they want. What do children draw? Studies using this paradigm have found that young **girls** tend to draw people, pets, flowers, and/or trees, facing the viewer, with lots of detail, eyes, hair, clothes, etc. →*



Boys, on the other hand, are more likely to draw a dynamic scene of action, such as a rocket smashing into a planet.

Faces, if visible, are often lacking features.

The key is to understand: **What is the picture the boy is trying to draw?** Then help him to draw it better. Don't insist on "one right way." Most schools of education teach undergraduates that at 6 years of age, a child drawing a human figure should include eyes, hair, mouth, and clothes. If the drawn figure does not have eyes, hair, mouth, and clothes, then the child should be corrected. In other words, most schools of education teach that 6-year-olds should draw like a girl. The result of this misguided approach is not that boys try to draw like girls. The result is that many boys decide that "drawing is for girls." **The lack of awareness of gender differences has the unintended consequence of reinforcing gender stereotypes.** When more teachers understand these differences, the result is that they are able to break down gender stereotypes, and boys like to draw. At least, that is the experience of Margrét Pála Ólafsdóttir in Iceland. Boys at all 17 of her schools love to draw. And her teachers know all about M and P (she sent 44 teachers from Iceland to Chicago for the conference I hosted there; she sent 60 teachers from Iceland to Orlando for the conference I hosted there).

The importance of these differences extends beyond visual arts. How we see influences how we read and how we write. Some characteristics of "boy writing" – particularly the emphasis on action – may be traced in part to these differences in the visual system.

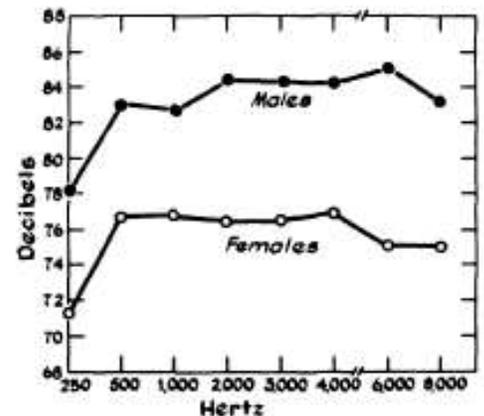
But where do you draw the line? What's "out of bounds" with regard to writing, or drawing? What child should be disciplined, or even referred?

- The lesson from St. Andrew's, in Aurora, Ontario
- Throwing of snowballs is permitted on the football field, but not elsewhere
- **In-bounds vs. out-of bounds**
- Snowball tournament

It's not about ability; it's about motivation. The big differences between girls and boys are not in what they *can* do but in what they *want* to do.

Sex differences in hearing

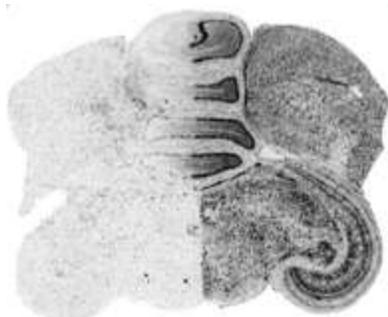
- L = Loudness (subjective)
- Φ = physical amplitude of the sound
- n = "loudness exponent"
- Stevens' Law: $L = k \Phi^n$
- n declines as a function of amplitude
- At any particular amplitude and frequency, ***n is higher for females than for males***
- Stevens' n is higher for the average girl compared with the average boy (e.g. D'Alessandro & Norwich, 2009); this difference is clearly established at 5 years of age
- As a result: You need to speak about 8 decibels more loudly for the **average** boy. But not for all boys!
- Consider selective amplification
- "Noisy Time Story Time" (Sax, 2007)
- In a boy-friendly classroom, the teacher should:
 - . . .be moving front-to-back and side-to-side
 - . . .frequently interrupt herself, calling on students



- . . .speak about 8 decibels louder
- – but please note the caveats and exceptions!!

See my article “Sex differences in hearing: implications for the classroom,” full text online at <http://www.mcrcad.org/2010-Sax-hearing.pdf>.

Sex differences in brain development. We now know that the various regions of the brain develop in a different sequence in boys compared with girls. Thirty years ago, most neuroscientists believed that sex differences in the brain were due to adult production of sex hormones. If that were true, then sex differences in the brains of children would be very small or non-existent. But in 1980, nobody tested that hypothesis.



Chromosomes, not hormones. The zebra finch shown at right is a lateral gynandromorphic dizygotic zebra finch, which is a fancy way of saying that this bird formed as a result of the fusion of fraternal twins, one male and one female.

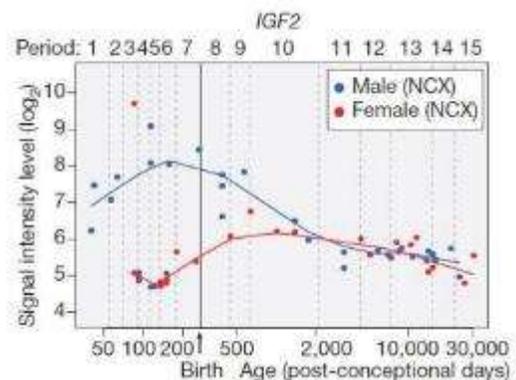


Every cell on the left side of the bird's body is female; every cell on the right side is male. This bird has an ovary on the left side manufacturing female hormones, and a testicle on the right side manufacturing male hormones. If sex differences in the brain were hormonally mediated, then both sides of the bird's brain should look the same. But the two sides are very different, suggesting that sex differences in this bird's brain are chromosomally mediated rather than hormonally mediated. Similar findings in humans.

At what age are sex differences in gene expression in the human brain most dramatic?

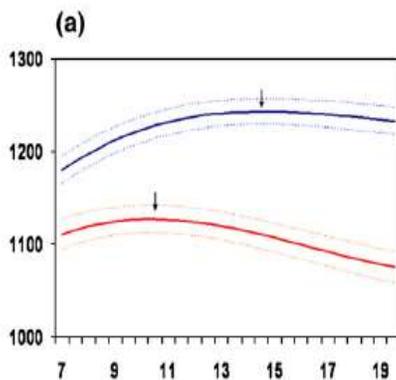
Answer: Just before birth. See Kang et al.

2011, "Spatio-temporal transcriptome of the human brain", re IGF2 →



NIH study, 1995 to the present (see e.g.

Lenroot et al., 2007, figure at left; Raznahan et al. 2010; comment in Sax 2010). Girls reach the inflection point (arrow) just before 11 years of age. Boys do not reach the inflection point (arrow) until about 15 years of age.



Sex differences in the brain are largest between young girls and young boys; sex differences between adult females and adult males are small. The same is true for many parameters relevant to education. For example: **How long can you sit still, be quiet, and pay attention?** We find no difference on that parameter comparing a 40-year-old woman with a 40-year-old man. But when we compare a 6-year-old girl with a 6-year-old boy, we find that the average 6-year-old boy can sit still, be quiet, and *pay attention* for only about half as long as the average 6-year-old girl. He may be sitting still and being quiet, but he is not paying attention. It's not unusual to find 6-year-old boys who absolutely have to stand and make buzzing noises in order to learn. It *is* unusual to find a 40-year-old man who absolutely has to stand and make buzzing noises in order to learn.

Development of brain regions involved in emotion: e.g. Killgore & Yurgelun-Todd, 2004. Left amygdala activation corresponds with cognitive awareness of emotion, conscious reflection on emotions; right amygdala activation corresponds with unconscious "instinctive" emotion (Dyck et al., 2011). Boys activate primarily right amygdala; girls activate primarily left amygdala (Schneider et al., 2011)

Elsevier virtual special issue on male/female differences in the brain:

www.journals.elsevier.com/neuroimage/virtual-special-issues/virtual-special-issue-on-neuroimaging-gender-differences/

Gender-Aware Instructional Strategies for English Language arts / Creative writing / Expository writing History / Social Studies

Be skeptical of anyone who promotes the idea of “girl books” and “boy books.” You can teach ANY of the “Great Books” to girls, and to boys. But you may teach them somewhat differently.

In medias res: starting in the middle of the story. Teach *Jane Eyre* to boys by starting in chapter 19, then go back to the beginning. This is not a new idea. Homer knew it. Hollywood screenwriters knew it. Ben Williams at Georgetown Prep knew it. We can learn from them.

Technical Details, and Maps are good strategies for engaging boys in literature, even in elementary school; less often effective with girls in this age group. When teaching *The Secret Garden*: make a map of the Manor; determine the location of the secret garden by interpolating its position from the herb garden and the fountain.

Allow transgressive responses: *Write about your first date.*

Frank McCourt assigned his students to write an excuse about why they didn't turn in a story. Then he asked them to write an excuse to God. Both good ideas. Then he asked them to write an obituary for anybody at the school now living – NOT a good idea. Challenging the notion of “girl books” and “boy books”.

Avoid *requiring* boys in grades K-8, “*How would you feel if you were that character?*” Instead suggest, “*What would you DO if you were in that situation?*”

Encourage boys to make their writing more vivid by **restating adjectives as subordinate clauses or as participles**. Instead of “goldenrod eyes,” try “eyes the color of rotting squash” (that's from *The Hunger Games*, chapter 1).

Encourage hyperbole: *His feet smelled so awful, the flowers wilted and DIED when he walked past* (that's an example from Denise Scott, who teaches 3rd grade at Clemmie Ross James Elementary School in Tampa, Florida).

Creative writing storyboarding: start with a picture, perhaps *in medias res*. Ask the boy what's going on in the picture. What happened right before? Right after? Make a series of captions. Now remove the pictures and string the captions together.

Imagining the counter-factual: e.g. in teaching *The Secret Garden*, asking what would have happened if Mary's parents did not die of cholera? Why this strategy is less effective with boys than with girls. One boy said: "*Suppose Mary's parents were aliens from outer space!*"

Expository writing: girls are equally comfortable with critical approach and personal approach. Most boys in elementary school and middle school are more comfortable with the critical approach.

- Personal: *How did Dr. King's speech make you feel? How might you have felt in that situation?*
- Critical: *What was Dr. King's objective in writing this speech? How well did he achieve his objective?*

Your **instructional objective** is to teach the elements of a persuasive essay: topic sentence, evidence, chain of argument etc. There are multiple ways to achieve that objective.

Here's a common question from teachers and administrators:

The provincial test *requires* that all students answer questions such as "*How would you feel if . . . ?*"

Many schools therefore drill students in writing about "*How would you feel if . . . ?*" But this strategy is often ineffective. For many students, especially boys, a more effective strategy is to offer many opportunities for free writing (creative writing) and critical essays. **Develop the student's fluency and skills as a writer.** Help him to find his voice. Once he finds his voice, and he is a fluent writer, he can write even on topics

which make him uncomfortable – such as “How would you feel if . . .?” But if he has never developed that fluency, he is less likely to be successful.

Evidence-based strategies for engaging girls in **social studies and history**

- Begin with “what would it be like to be a girl *your age* living in . . .”
 - Make the connection with the student
 - Examples from the southern United States before the Civil War: what would it be like to be a White girl on a Virginia plantation? What would it be like to be a Black slave girl on the same plantation? Introduce the narrative history only after the connection is made, and interest is engaged.
 - Merging the content areas: history/English/art/music/math. Why **thematic instruction** works better for most elementary- and middle-school girls than it does for elementary- and middle-school boys. . .and why HISTORY is often the most efficient nucleus around which to organize thematic instruction for girls
 - Integrate across different content areas. Why don’t we do that more? Why don’t we do it ALL the time? Who came up with the idea of dividing up the content into history, English, art, music, etc.? The answer: Winchester, Eton, Harrow.
- ◆ Best practices for teaching **social studies and history** to boys
- Use narrative history as a vehicle to engage boys, and then make the pivot into social studies.
 - Why is historical fiction less reliably effective with elementary- and middle-school *boys* – even though adult *men* love it?
 - *In medias res*: why it sometimes makes sense to start “in the middle of things”
 - Emphasize technical elements, and maps: What was the difference between a Confederate rifle and a Union Army rifle? Why did it matter?

Gender-Aware Instructional Strategies for mathematics /

the sciences / computer programming

Mathematics, beginning with navigation:

In navigating, males are more likely to use north/south/east/west and “two blocks” or “six blocks.” Females are more likely to use landmarks, left/right, and “five minutes’ walk.” Which approach is better? Meaningless question – because the answer depends entirely on the context. If you are stranded in midtown Manhattan on a cloudy day, then the male approach is useless – you can’t see the sun. But if you know your landmarks, you can’t get lost.

Moving on to arithmetic, number theory, and algebra: For girls, begin with concrete, then move to abstract. For boys: Start with numbers for the sake of numbers. Although one of Piaget’s basic principles – concrete before abstract – is accurate in most content areas, researchers have discovered in the past decade that specifically with regard to mathematical concepts, most boys do better if you teach the abstract mathematical principle first, *then* move to the concrete application and the word problems. For example, in teaching how to solve equations in multiple variables, the “boy-friendly” approach might be to ask: *If $x + 2y = 90$, and $2x + y = 60$, solve for x and y .* The “girl-friendly” approach might be to ask: *If a blouse and two sweaters cost \$90, and a sweater and two blouses cost \$60, how much does one blouse cost and how much does one sweater cost?* The “boy-friendly” approach is to begin with the equations, then move to the word problem. The “girl-friendly” approach is to begin with the word problem, then move to the equations. Even girls who hate to shop will be more likely to engage if you begin with the shopping example rather than with “ $x + 2y = 90$.”

- Number theory: example of Fibonacci numbers, and phi: the girl-friendly strategy (beginning with quantitative measurements of pinecones, artichokes, and nautilus shells); the boy-friendly strategy (beginning with $x - 1 = 1/x$; solve for x). In both examples we cover the same material: by the end of the unit, girls and boys have both mastered the same material.

But the sequence of topics is different. Remember the principle: no

difference in *curriculum* between the girls' classroom and the boys' classroom; the difference is evidence-based differences in *pedagogy*.

- Arithmetic and algebra; geometry; gender-aware use of manipulatives. Recognize that some boys may insist on using manipulatives as toys rather than as aids to learning. "Jason, step away from the pinecones!"

Computer science for girls. Based primarily on the work of Professor Caitlin Kelleher at Washington University – St. Louis, in this segment we explore a new perspective on engaging girls in computer science, a different approach which was remarkably effective in one study: more than tripling the proportion of girls who use their spare time to work on their computer programming, from 16% to 51%.

- The role of mentors. What are the characteristics of effective mentors for girls? Is it essential that the mentor be female? Why has the National Science Foundation been so unsuccessful?
- How to make computer programming "cool" in the eyes of girls

Mentors work only if the mentor is someone the girl would like to BE or be WITH.

A *man* who is friendly and easy to talk with might be a better mentor, under some circumstances, than a woman who keeps shouting about *Star Trek* and Leonard Nimoy.

Best practices for **physical education** for boys and girls, K-8

- ❖ Why many girls retreat from P.E. after the onset of puberty – which today means, after 8 or 9 years of age, i.e. still in elementary school
- ❖ How does girl-friendly P.E. differ from boy-friendly P.E.?
- ❖ P.E. usually includes instruction in soccer and baseball, even though few adults regularly play these sports. We rarely teach hopscotch as a competitive sport. Think outside the box: hopscotch; balance beam; jump-rope.

Ladies and Gentlemen. It's not sufficient for a boy to become a man; we want him to become a *gentleman*, i.e. a man who is courteous, responsible, and genuine. How to create a classroom in which it's "cool" to be a gentleman? See my essay "Ladies and Gentlemen, Skanks and Pimps" for *Psychology Today*, www.psychologytoday.com/node/121388.

The anomalous male is most likely to be the victim in boy-on-boy bullying

Characteristics of the anomalous male (see *Why Gender Matters* chapter 9)

- Draws people, pets, flowers, and trees
- More articulate than the average boy
- Doesn't like to hit or be hit
- More likely to have allergies, asthma, eczema
- NOT more likely to be homosexual
- Width of the face less than 54% the height of the face (i.e. narrow face)

What are the characteristics of a great teacher of girls?

What are the characteristics of a great teacher of boys?

Today it's common to hear people say "Great teaching is great teaching." But that's demonstrably untrue. The teacher who is most effective in the girls' classroom is sometimes a complete failure in the boys' classroom, and vice versa. What are the characteristics of a great teacher of girls? And how is that teacher different from a great teacher of boys? Is it possible to be both? How important is the teacher's own gender – female or male – as a predictor of effectiveness in a girls' classroom, or a boys' classroom? Over the past decade, substantial research has been conducted on these topics. The good news is that almost every teacher can become more effective with boys, and with girls, if they incorporate the findings of this new research.

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