

# The Hurdle and the Highway

Timothy Cordes M.D., Ph.D.

BC General and Addiction Psychiatrist

# Disclaimer

- I have no financial conflicts of interest to disclose.
- I am an unapologetic advocate for people with disabilities.
  - These opinions are solely my own.
  - They do not represent those of the University of Wisconsin-Madison or Point and Click, my employers.

# Overview

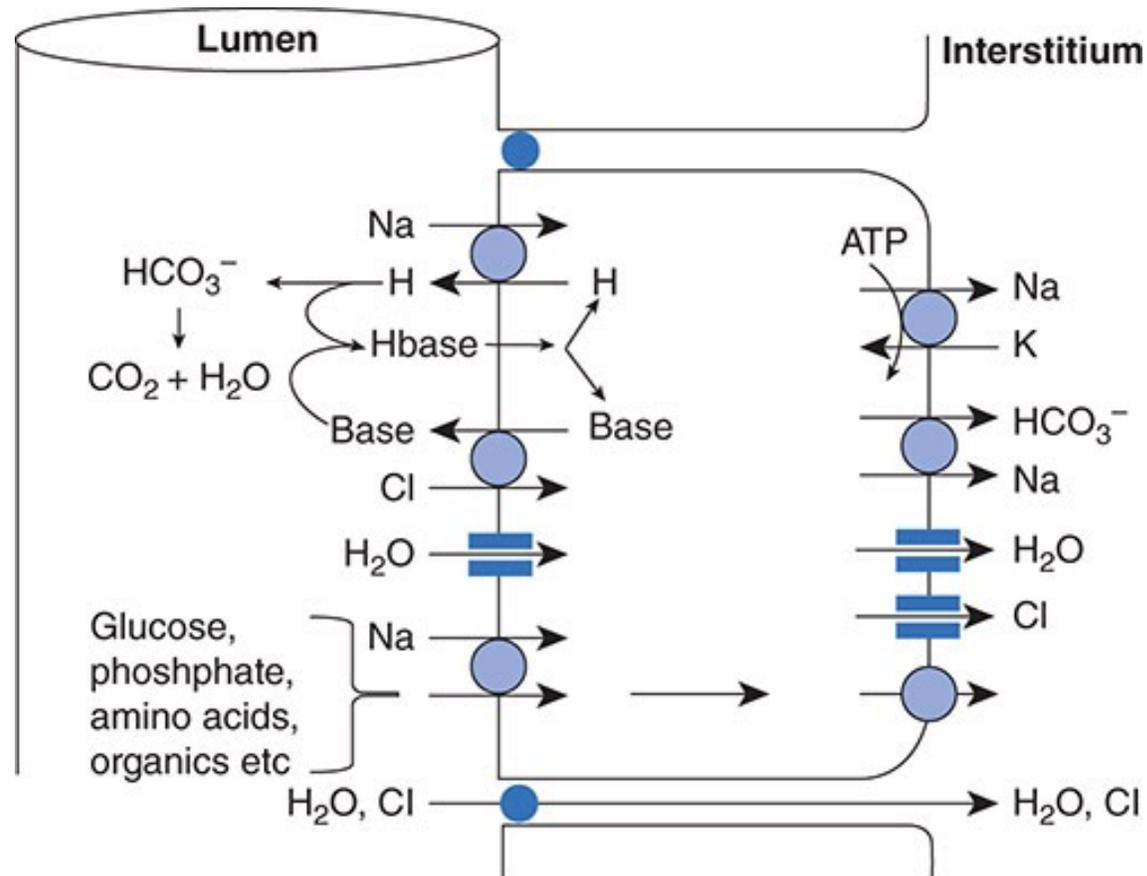
- Background
- Accommodation as addressing hurdles
- Recognizing our biases and becoming learners
- An example case
- From Hurdles to Highways
- Ideas on generalizing lessons from individual processes
- Putting it all together

# Educational Hurdles

- Educational tasks are viewed as hurdles that students overcome along their path.
- Disabilities may present additional challenges.
- Some students may need accommodation to clear the hurdle.



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Source: Douglas C. Eaton, John P. Pooler: *Vander's Renal Physiology, 9e*  
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Major pathways for reabsorption of sodium, chloride, and water in the proximal tubule. The entire proximal tubule is the major site for reabsorption of salt and water. Sodium entry is coupled to the secretion or uptake of a variety of substances, the major one being secreted hydrogen ions via the NHE-3 antiporter. These hydrogen ions combine with filtered bicarbonate and secreted organic base (see text and Chapter 9 for further explanation). Additional sodium enters in symport with glucose, amino acids, and phosphate. Sodium is transported to the interstitium mostly via the basolateral Na-K-ATPase, but also in symport with bicarbonate. (The coupling between sodium and bicarbonate is described fully in Chapter 9.) Chloride that enters in antiport with organic base leaves mostly via channels. In addition, a substantial amount of chloride is reabsorbed paracellularly. Water moves both paracellularly and intracellularly via aquaporins. ATP, adenosine triphosphate.



# Teach Me

- With nonjudgmental curiosity, the teacher can become the student.
- We discussed:
  - Tools and techniques of blindness
  - Computers
  - Braille
  - Raised line drawings

# Biases

- Could I clear the hurdle if I couldn't:
  - See
  - Hear
  - Have full mobility
  - Struggled with depression
- These considerations don't always happen consciously.

# Counter-transference

- A psychological concept which encompasses how a therapist feels towards a patient
- Needs to be brought into conscious awareness
- We all 'see' things through our own lens.
- In order to design or accommodate, we need to be aware of what we and those around us carry with us.
- It's not just the functional disability; it's the perception of that disability.!

# An Interlude

Let's consider a radio advertisement directed at people who are visually impaired.

# Know Where You Are



- Time to reflect on our personal preconceptions.

*If we could first know where we are, and whither we are tending, we could then better judge what to do, and how to do it.*

-Abraham Lincoln

# A Quick Check

- Can people with....
  - Visual impairments
  - Hearing impairments
  - Mobility impairments
  - Mental health disorders like bipolar affective disorder

.....Become successful physicians?



The disability may be obvious but is only one part of a complex human's identity. What lies beneath?

# Beneath the Surface

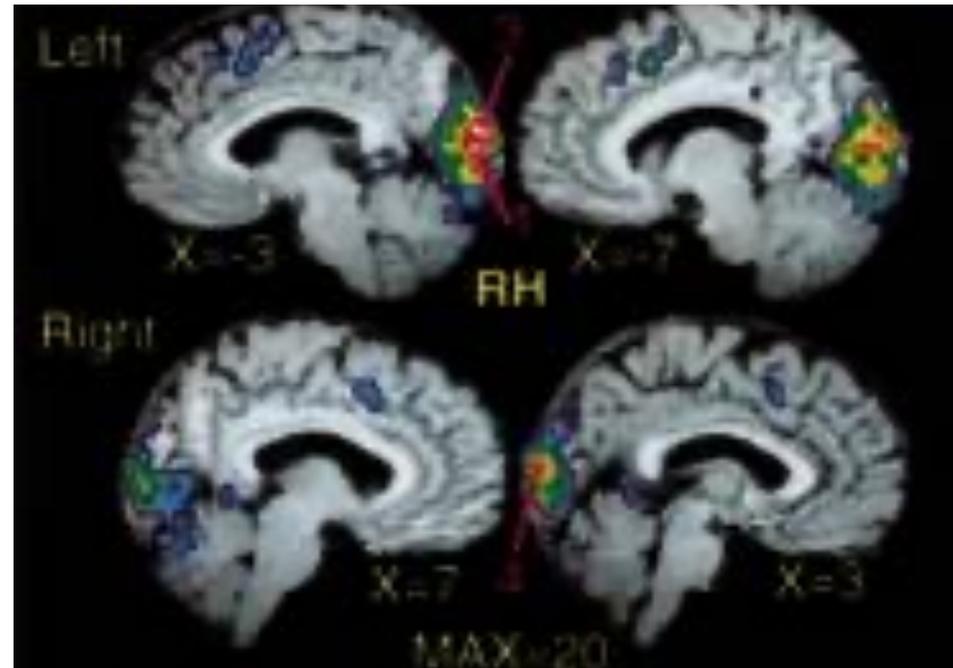
- Individual has had opportunity to:
  - Learn skills
  - Develop strategies to compensate
  - Acquire tools
- Other strengths may develop
- The brain itself may adapt
- And ... All those other special things that make us unique human beings

# Neuroplasticity

- The brain's ability to reorganize itself by forming new neural connections throughout life.
- Neuroplasticity allows the neurons in the brain to compensate for injury and disease and to adjust their activities in response to new situations or to changes in their environment.

The occipital cortex, which processes visual information in sighted individuals is active when a blind person reads Braille.

From J Neurophysiol. Jan 2002; 87(1): 589–607



# Examples of Neuroplasticity

- Changes in patterns of brain activation occurred after 5 days of blind folding
- Occipital cortex became active in sensory and auditory tasks
- Visual cortex has been found to be active in Braille reading and verbal memory tasks
- Auditory cortex has been activated in the deaf while lip reading
- The brain is a greedy real estate developer.

# How Do We Discover?

- Be aware of our own biases
- “Unlearn what you have learned.” Yoda.
- Use nonjudgmental curiosity
- Align the goal to teach with the student’s goal to learn.
- Relocate the uncertainty.
- It will be done. Let’s figure out how.

# Fastrach

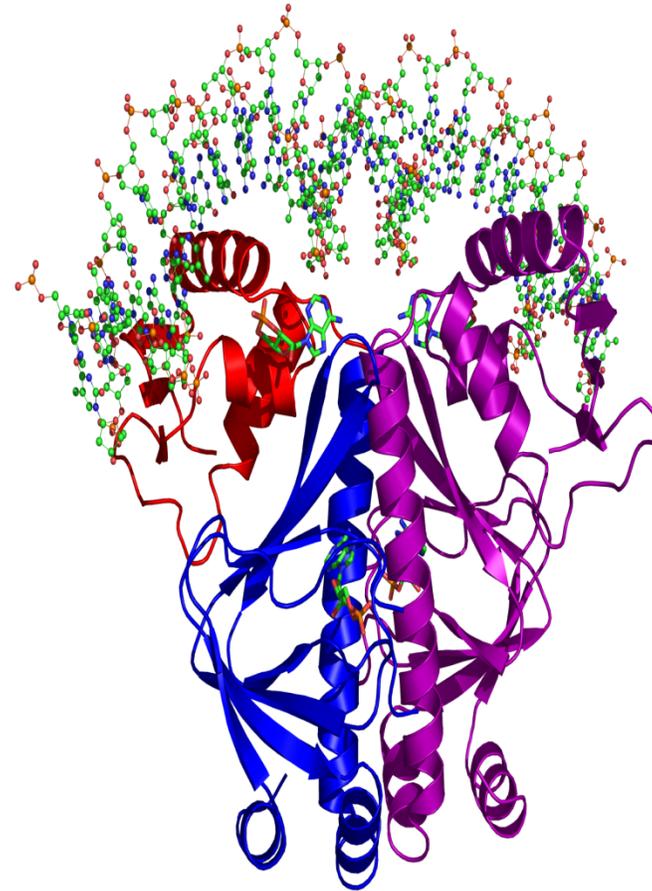


# The Process

- In this process, we learn about student, ourselves and the nature of learning
- Student becomes collaborator.
- When the teacher is ready, the competent student will appear.

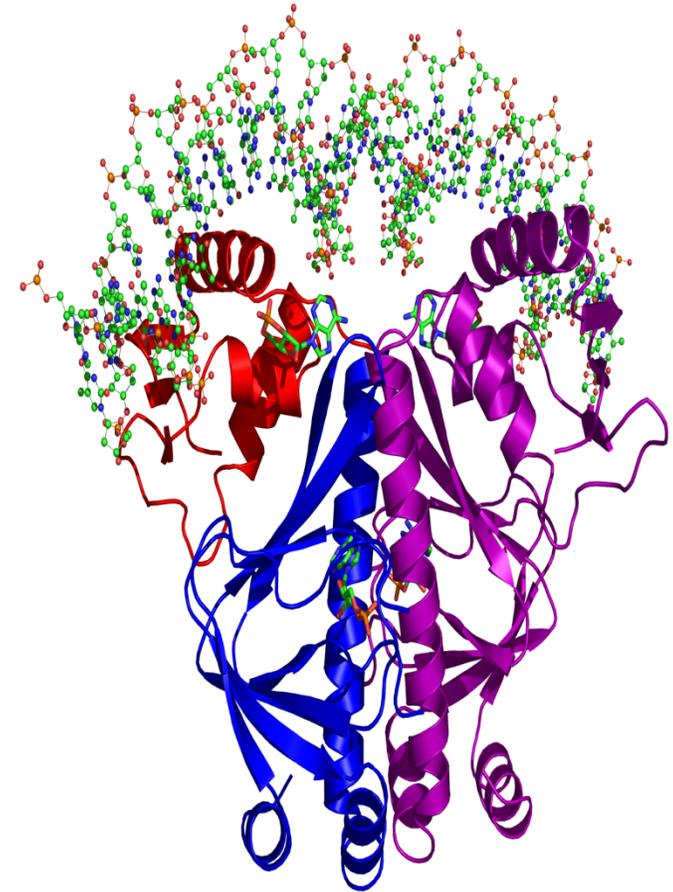
# A Test Case

- How could a blind person see protein structure?



# Check Your Assumptions

- The atomic structure of a protein is smaller than the wavelength of light.
- *Nobody sees protein structure.*
- *It's true that people commonly use visual images to represent aspects of protein structure.*



# Start with the Basics

- Need a way to appreciate distances
- Need a way to understand spatial relationships
- Need a way to use a tool in near real-time on multiple structures.

# Available Tools

- Technology
  - Computing resources
  - Publically available routines for computer graphics
  - Interest of my supervisor
- Techniques/Skills
  - Auditory spatial abilities
  - Musical experience
  - Programming experience

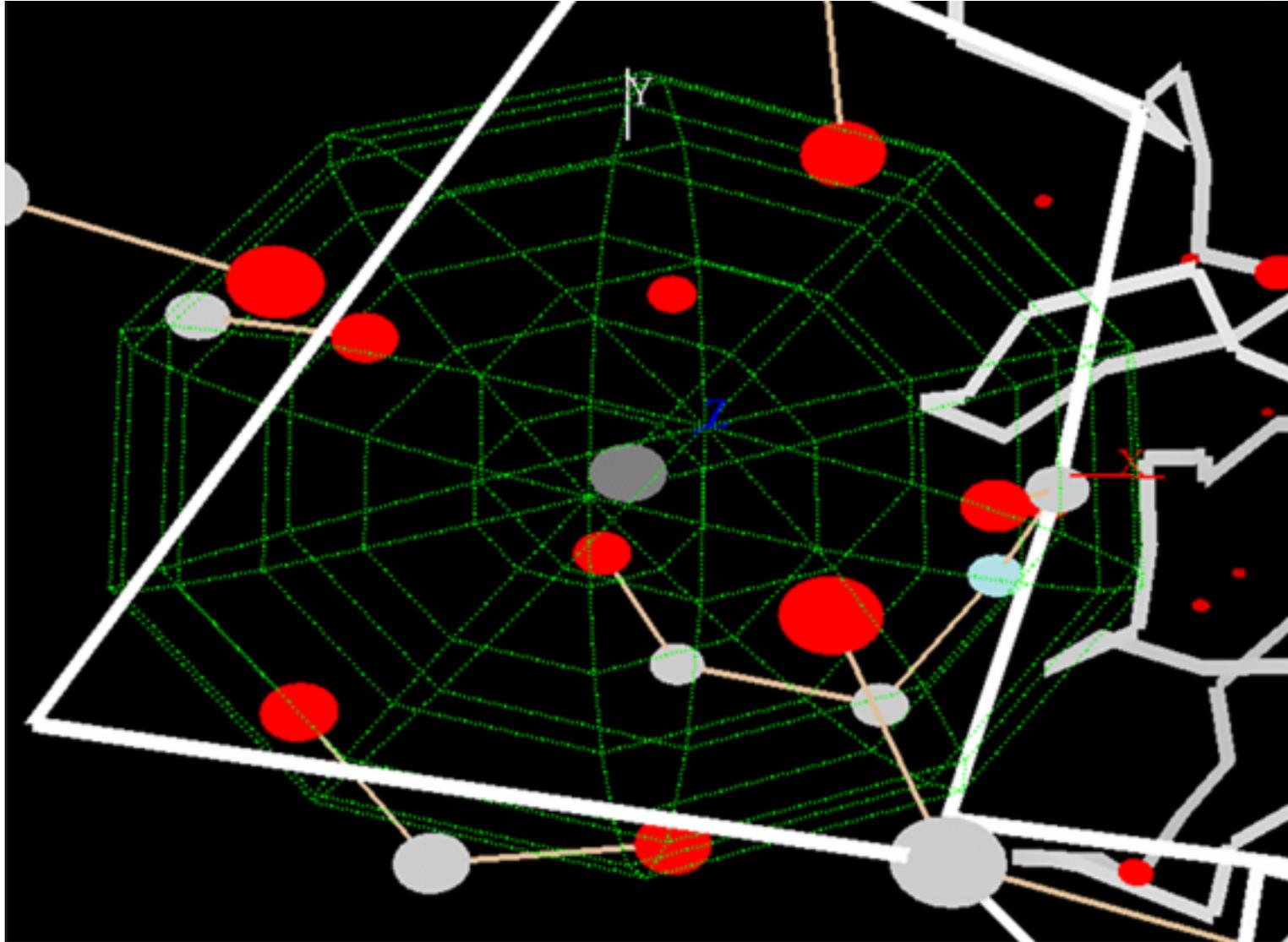
# TIMMol

- Explores the protein by moving a selection sphere or 3D cursor
- Text output describes the contents of the selection sphere
- Gives atom name identifiers and x, y, z location for each

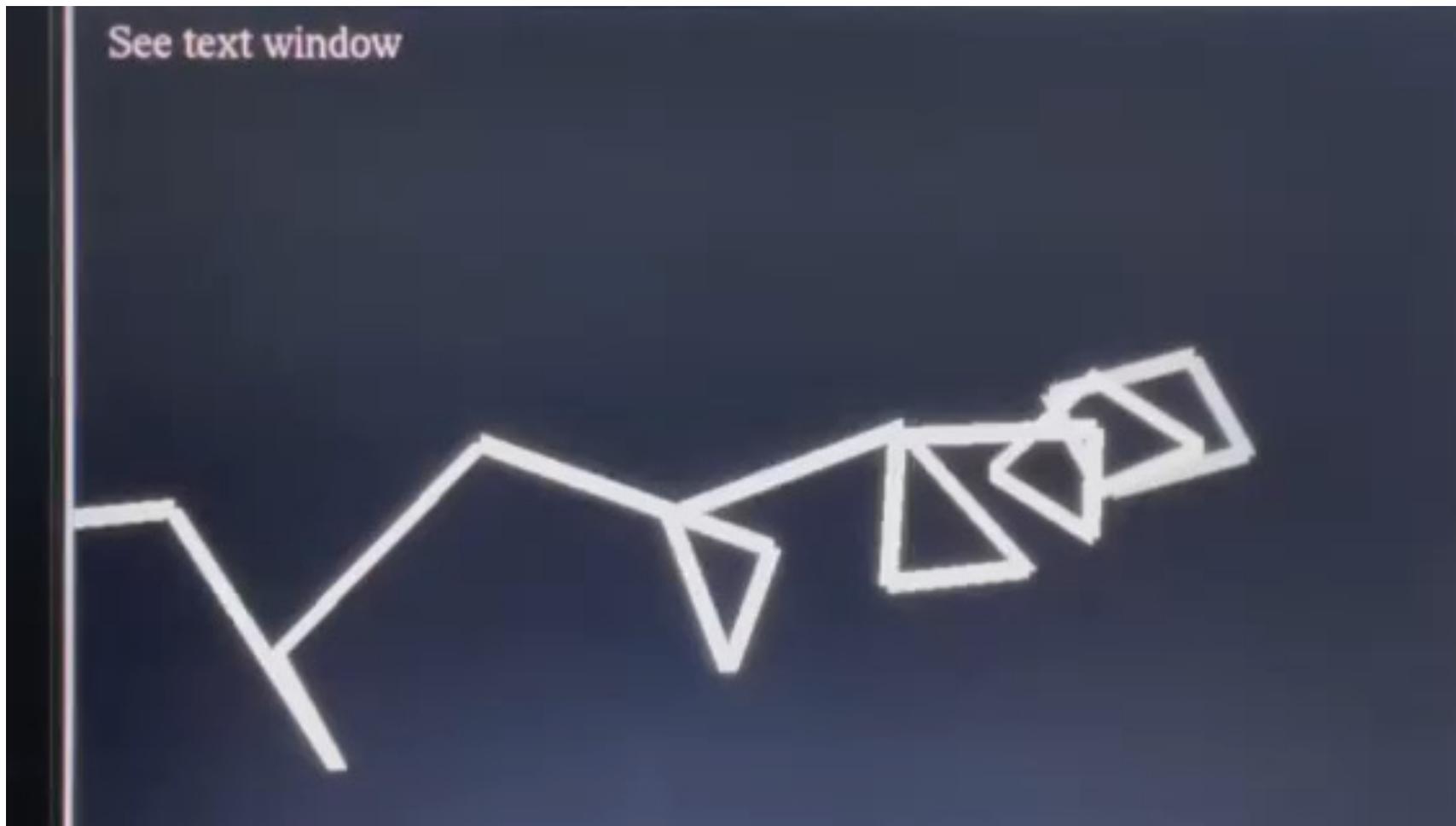
# TIMMol Audio Output

- TIMMol plays tones to indicate atom position and identity
- X axis: Left and right ear
- Y axis: Pitch
- Z axis: Softer and Louder

# Sample Graphical Output



# TIMMol in Action



# Summary

- When given a chance
- And with collaboration
- Awareness of biases
- Utilizing skills
- Towards a well-defined goal, students with disabilities can overcome educational hurdles.

# Shortcomings of the Hurdle Approach

- It can become sidetracked by the obstacle, not the goal.
- It is less efficient for mass education.
- Individuals may have their own barriers to seeking accommodation
- May be unaware of resources
  - Have frustration with systems
  - Wishes to not have the disability
  - Wishes to not have to seek help
  - Fear disclosing will somehow diminish the value of their achievements
  - Stigma
  - Disability itself interferes (example mental health)

# Mental Health Disabilities

- These are invisible.
- May interfere with the typical processes of accommodation
- We usually see the effect not the cause
- Anxiety as a barrier to engagement
  - We may see a student who doesn't participate in class.
- Low motivation and depression
  - We see a student who struggles with assignments or attendance
- “Fix the problem, not the blame.”

# Well-known Figures with mental illness

- Bipolar affective disorder
  - Ludwig Beethoven
  - Winston Churchill
  - Isaac Newton
- Some correlation between bipolar disorder and creativity
- Depression
  - Earnest Hemmingway
  - Abraham Lincoln
  - Virginia Wolf
- Dyslexia
  - Walt Disney
  - Steven Spielberg
  - Whoopi Goldberg
  - Charles Schwab
  - Richard Branson

# Obligatory COVID-19 slide

- Students arriving at university now have had new stresses and challenges
- Less structured social interaction in school
- Challenges with on-line course work
- They missed typical rituals of adolescence and adulthood
- They lived through additional pandemic-associated stresses
- Consequently: there is evidence of increase in mental health symptoms and needs in this population

# My Clinical Experience

- I currently work as a psychiatrist in college mental health at a university with 40,000 students.
- I have seen students succeed with all the previous disorders and more.
- Students are in a learning space and able to grow and adapt.
- Often highly motivated.

# Universal Design



# Principles of Universal Design

- Information
  - Clear and comprehensive expectations
  - Course materials are available in different formats
  - Ensuring that course materials are understood regardless of sensory abilities
  - Provide choice in ways of learning and presenting what's learned

# Principles Continued

- The environment
  - Minimize physical component to learning
  - Course space is physically accessible
  - Support respectful communication among learners
  - Create an environment that improves learning for disabled and nondisabled

# Building the highway

- Begin with the goal in mind.
- If the goal is to demonstrate mastery, give the option to write or present on a topic
- Allow extra time on tests
- Allow tests at different time of day
- Consider using flipped classes where students engage in a learning activity first and come to class for an engaging discussion or project
- See Reidsema, Carl, et al. "The Flipped Classroom." Practice and Practices in Higher Education. Ed. Springer (2017).

# Complementary Processes

- Individual and group processes will happen simultaneously
- Share common components
- Being aware of our assumptions
- Tapping into tools
- Focusing on the goal
- The more we build universally, the less individual accommodation may be needed.
- Thus, more bandwidth remains to help with the hurdles.

# Iteration is expected

- “Success is not final, and failure is not fatal. It is the courage to continue that counts.” -Winston Churchill
- We don't have to get it completely right the first time
- In these developments, faculty can be models of continual growth
- We hold ourselves accountable, collaborate, and share.

# A Final Pearl

- An oyster starts by facing an initial challenge or a difference.
- Analogous to a unique student facing an educational challenge and an educator seeking to teach for all
- With time, care, and iterative smoothing, something beautiful emerges.
- This can be the story of education for all, including those with disabilities.