Standardizing Textual Descriptions of Interactive Graphics

A Plea To Support More Robust Verbosity

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Outline

- Background
- Project Goals
- Long-term Vision
- Relation to EDUPUB
- Digital Control Objects - DEMO
- Interactive Graphics – DEMO
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- Conclusions

My Background

- Legally Blind
  - diagnosed with RP at age 4
- PhD in Physics
  - Univ. of California, Riverside
- Research Programmer
  - Long-time *Mathematica* user
  - Started at Wolfram after graduation
- Accessibility
  - Compelled to make a difference
  - Looking for funding and resources

Wolfram Research

- *Mathematica*
  - Programming environment for Wolfram Language
  - Over 25 years in existence
  - Used throughout the world in many industries
- Wolfram|Alpha
  - Natural Language Knowledge Engine
  - Makes human language computable
- Much, much more

www.wolfram.com

Project Goals

- Identify idealized workflows for interacting with digital control objects
- Identify best practices for providing pedagogically-optimized verbal descriptions of interactive graphics

Long-term Vision

My long-term vision is to initiate the creation of syntactic standards for communicating educational material.

Beyond a common vocabulary, there needs to be a mechanism for a syntactic standard for verbally communicating the information conveyed in scientific graphics within different disciplines (and as things develop the result of dynamic updating caused by user interactions with those graphics)

Relation to EDUPUB

- How to best allow a user to interact with content
  - Which control objects to support
  - What interaction workflows should be supported
- How to best communicate the result of an interaction to a user
  - What tagging mechanisms should be supported
  - What specs will allow an ebook to mimic a human expert's guidance
  - Where does verbal description fall short and what else needs to be incorporated to supplement

Control Objects - DEMO

“Identify idealized workflows for interacting with digital control objects”

Interactive Graphics - DEMO

“Identify best practices for providing
pedagogically-optimized
verbal descriptions of interactive graphics ”

More Robust Support for Verbosity

Static Graphics

- There is a great depth of information at any given moment in time when parameters are not being changed
- This is the problem of making a regular image accessible
- Currently there is only space for a short description and a long description for textual alternatives to graphics

Alt Text

Plot of sinc function

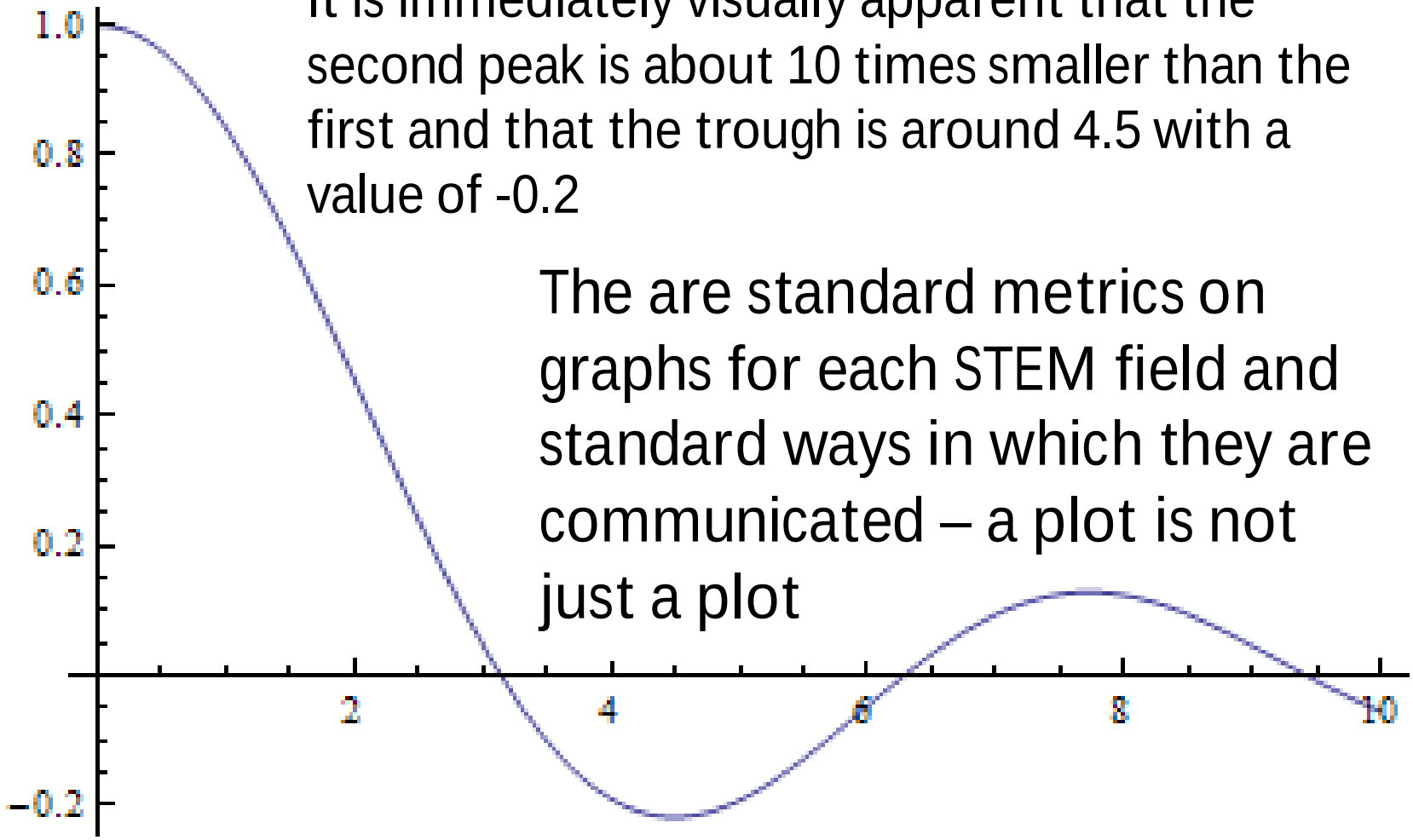
Can you figure out what this is
without extensive training in complex functions?
Would you trust a doctor to diagnose your illness with this
much information?

Long Description

Plot of sinc function: the independent variable runs from zero to ten. The sinc function looks like a sin function concatenated with a decaying exponential function

Can you figure out what this is
without extensive training in complex functions?
Would you trust a doctor to diagnose your illness with this much information?

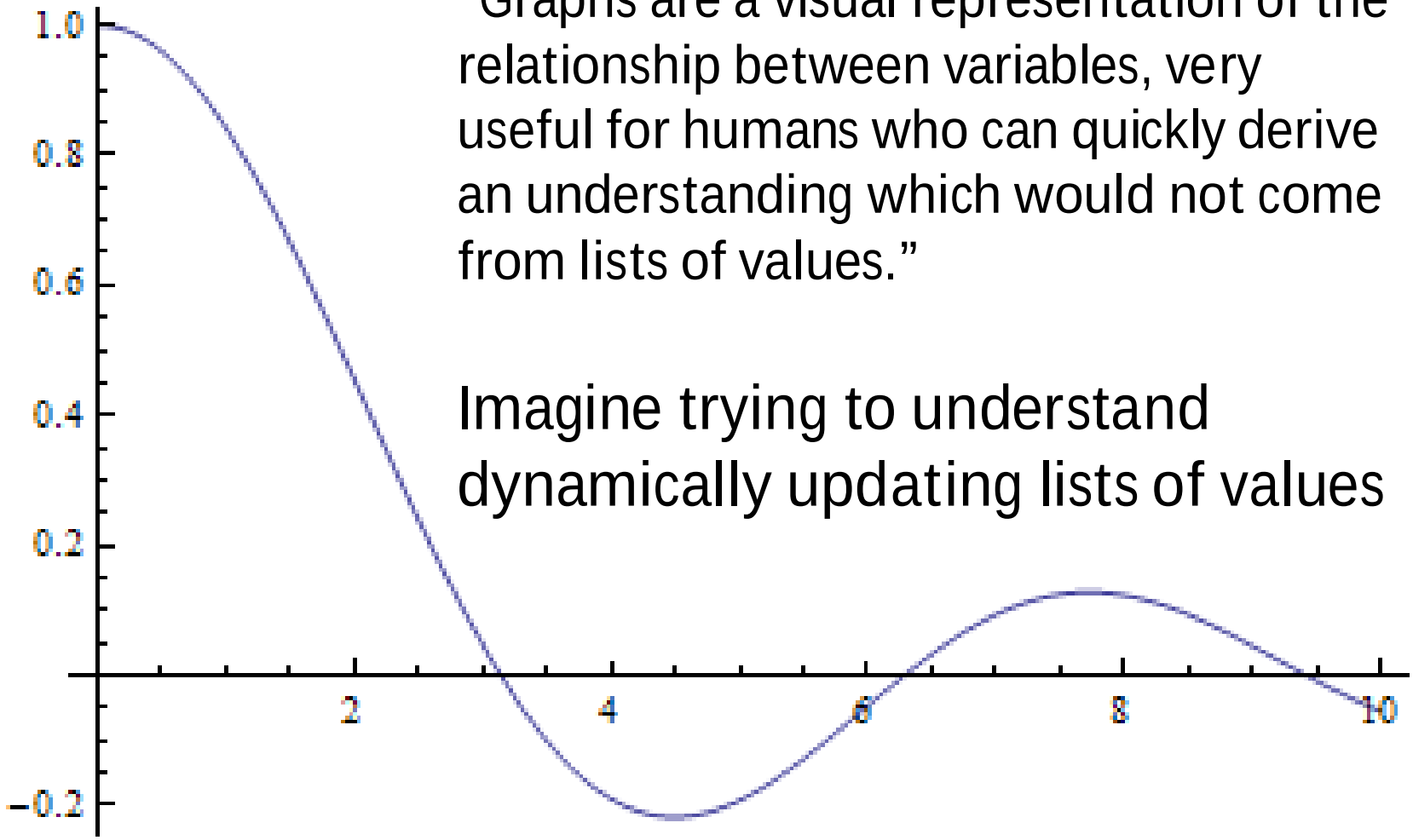
Standardized Visualization



It is immediately visually apparent that the second peak is about 10 times smaller than the first and that the trough is around 4.5 with a value of -0.2

The are standard metrics on graphs for each STEM field and standard ways in which they are communicated – a plot is not just a plot

Raw Data is Insufficient

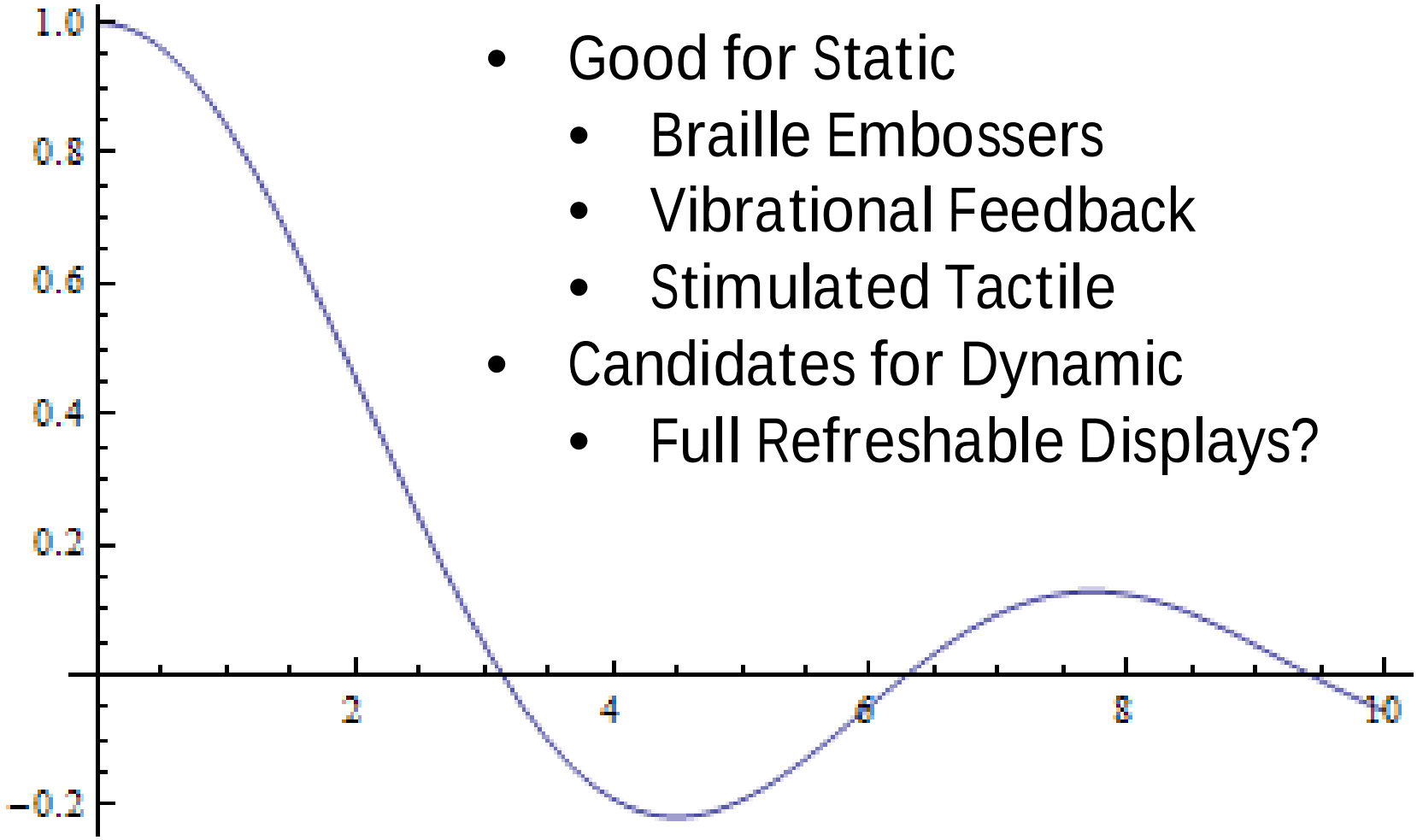


"Graphs are a visual representation of the relationship between variables, very useful for humans who can quickly derive an understanding which would not come from lists of values."

Imagine trying to understand dynamically updating lists of values

Quote from http://en.wikipedia.org/wiki/Plot_(graphics)

Dynamic Tactile Doesn't Exist



- Good for Static
  - Braille Embossers
  - Vibrational Feedback
  - Stimulated Tactile
- Candidates for Dynamic
  - Full Refreshable Displays?

Conclusions

- Making a static graphic pedagogically equivalent is a long-standing issue and has many people working to find a solution
- Short and Long Description fields are insufficient by themselves
- There are no current options for addressing interactive dynamic content beyond support for more robust verbosity

If we do not start working toward a more flexible communication mechanism for verbal information, then we have no hope of providing meaningful verbal information for interactive graphics