

# Expectations of Copy-and-pasting formulæ

Paul Libbrecht, PH Weingarten

Matija Lokar, University of Ljubljana

CC-BY



# Menu

- Defining selection, copy, point and paste
- Motivation
- What's working thus far
- Expectations: types and examples
- One flexible approach?
- Future



# Definitions

- Any piece of information or knowledge that can be selected
  - should be copyable
  - i.e. *put in a clipboard*
- could also be input
  - recreated or simply *pasted from the clipboard*



# Technically

- Within MacOSX, Windows, GNOME and others the clipboard is
- A record: content-types → array of bytes
- Applications are free to record whatever type they want
- Pasting: apps are expected to select the best type
- gotchas:
  - there may be *parallel data* (e.g. internal references)
  - agreement on content-types...



# So you want to copy?

- Antiquity n°1: Just copy text syntax
  - syntax match? try TeX with macros
- Antiquity n°2: you want standards?
  - Use Edit : Copy special : Copy as MathML
- Antiquity n°3: a universal language exists (e.g. Wolfram's)
  - The nifty function `prime-check-with-a-hardware-chip-that-removes-your-privacy` will not be available in OpenOffice soon



# Motivation

- Several tools, each with their specialty
  - need inter-application communication
- Facilitating the input is a key cognitive support
  - *It didn't accept my answer as correct, despite clear syntax (checked by the syntax checker) and my answer being correct.* (with T Smith, paper at MathUI 07)
- Somehow, the issue was not observed
  - Internal copy and paste of course insures the quality of the copy



# Expectation: I am not dumb

- Users are fully able to understand the encoding differences
  - but refuse to be cognitively loaded with it
- E.g. differences of syntax or context
- Ok if it can't input half-a-fraction...
  - but should still do something useful!





# Expectations



# Expectation: I am not dumb

- Users are fully able to understand the encoding differences
  - but refuse to be cognitively loaded with it
- E.g. differences of syntax or context
- Ok if it can't input half-a-fraction...
  - but should still do something useful!

# Expectation: Natural Selection

- Formulæ are often understood as text
  - horizontal selection typically natural
  - kind of ok for simple polynomials
- Feedback is key!
  - MathML selection miserable thus far (a pack of letters)
  - e.g. TeXmacs' tree-selection
- Q: is multiple selection display useful?

# Expectation: A single copy and paste

- Multiple copy operations are generally useless
  - E.g. *Copy special*, *Copy as...*
  - It should depend on where you go to
- Often used currently because users want to be control
  - Mathematicians who know the syntaxes
  - Persons who want a chance to hack the result



# Expectation: Choose the One Right Thing

- Easy strategies:
  - Going to a text editor? plain text (or... TeX? Mathematica?)
  - Going to a text-processing? display formula, styled text, pictures
  - Going to a CAS? computable formula, s-expression, display formula, styled text? pictures?
  - Going to a dynamic geometry figure: i2g construction, computable formula, ...
- And, in all cases: internal data and proprietary format should take precedence (e.g. Maple has prepared something for Mathematica)

## A Surprisingly Complete Solution: the Wiris Input Editor

- The current Wiris Input Editor is in JavaScript
  - and edits formulæ for display only
- Any selection is reflected a MathML text (the only widely allowed format)
- Receiving applications can *sniff* MathML and act accordingly
  - could contain computable and display formulæ
  - multiple formats (also TeX or differnt computing levels)
- Probably a temporary solution until MathML is accepted as safe

## Conclusion

- Copy and paste still unpredictable
- Could be a game to teach students that they need to think a lot before c-n-p ing
  - Is this a matrix? *you'd better use a text editor's regexp to replace the brackets*
  - Is this a function definition? *Make it computable by assigning it...*
- Computers seem not there to help but to rob users' time.
  - Lots of natural expectations not assumed
  - Reporting could help