

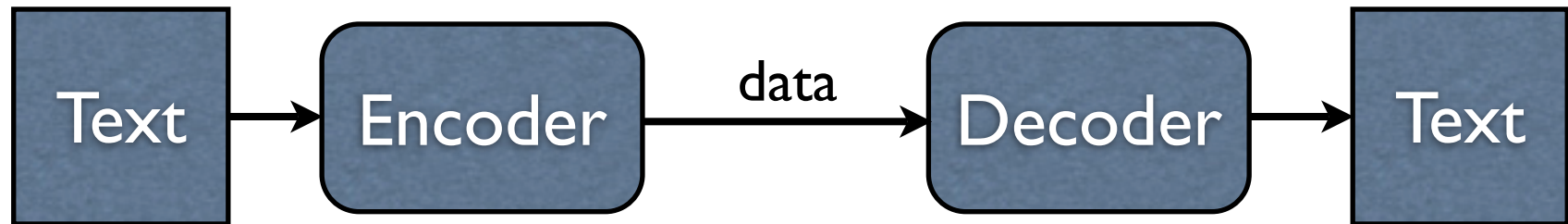
Dasher

A Data Entry Interface Using Continuous
Gestures and Language Models

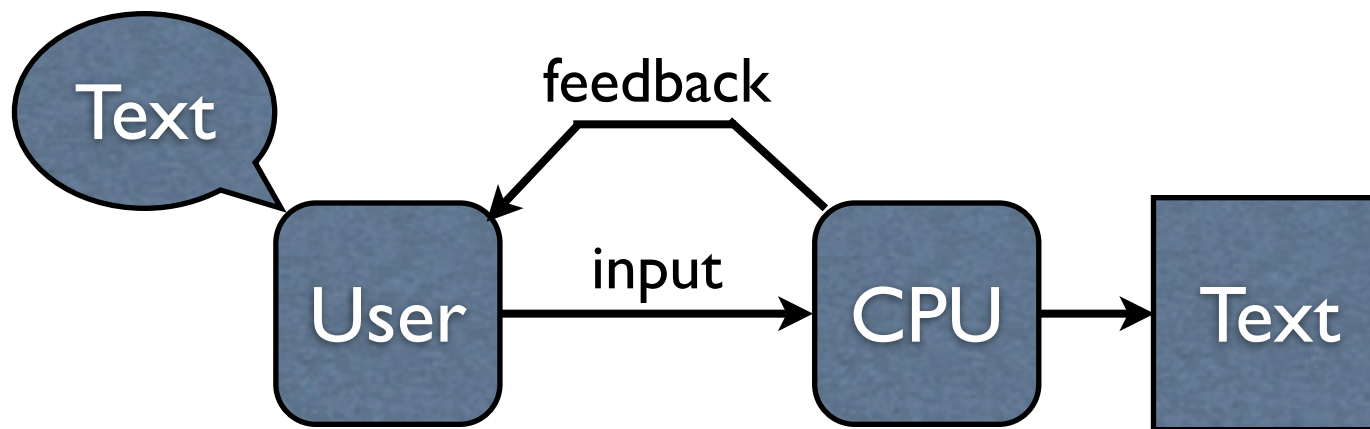
David J. Ward, Alan F. Blackwell, David J.C. MacKay
Cavendish Laboratory, Cambridge

presentation by Benjamin Newman

What does compression have to do with user interfaces?



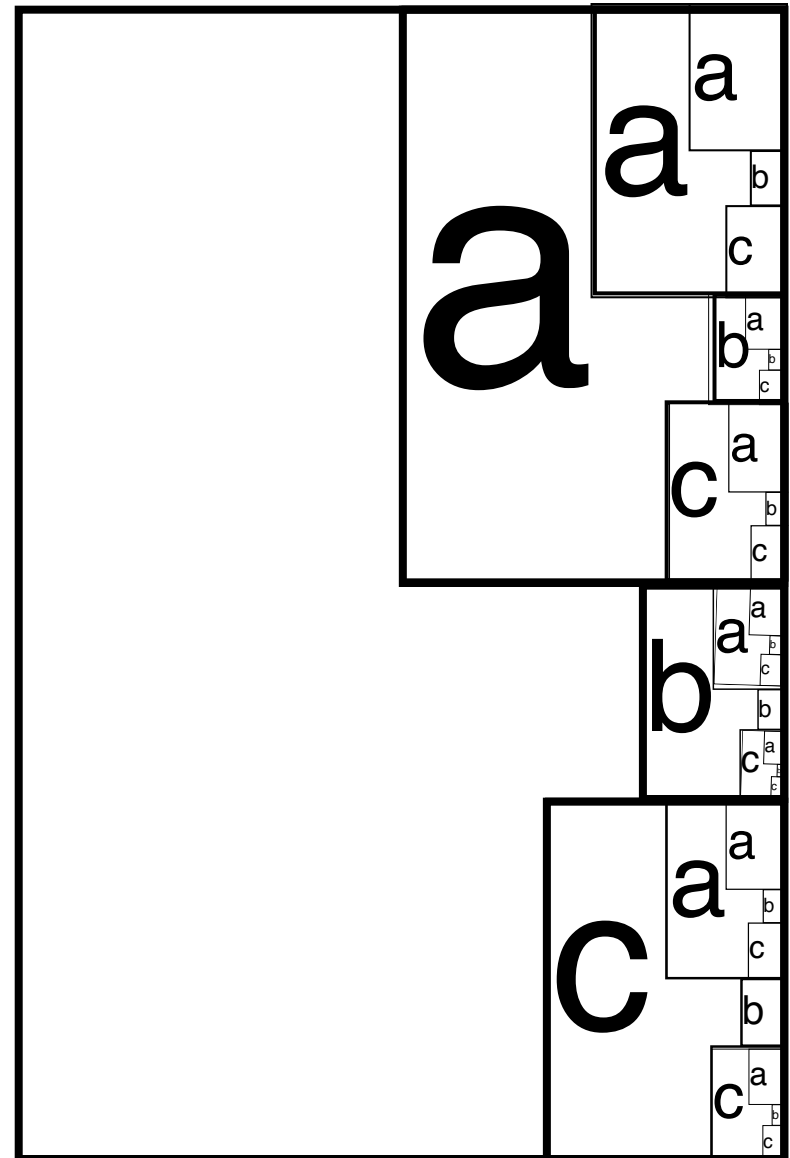
Typical text compression scenario



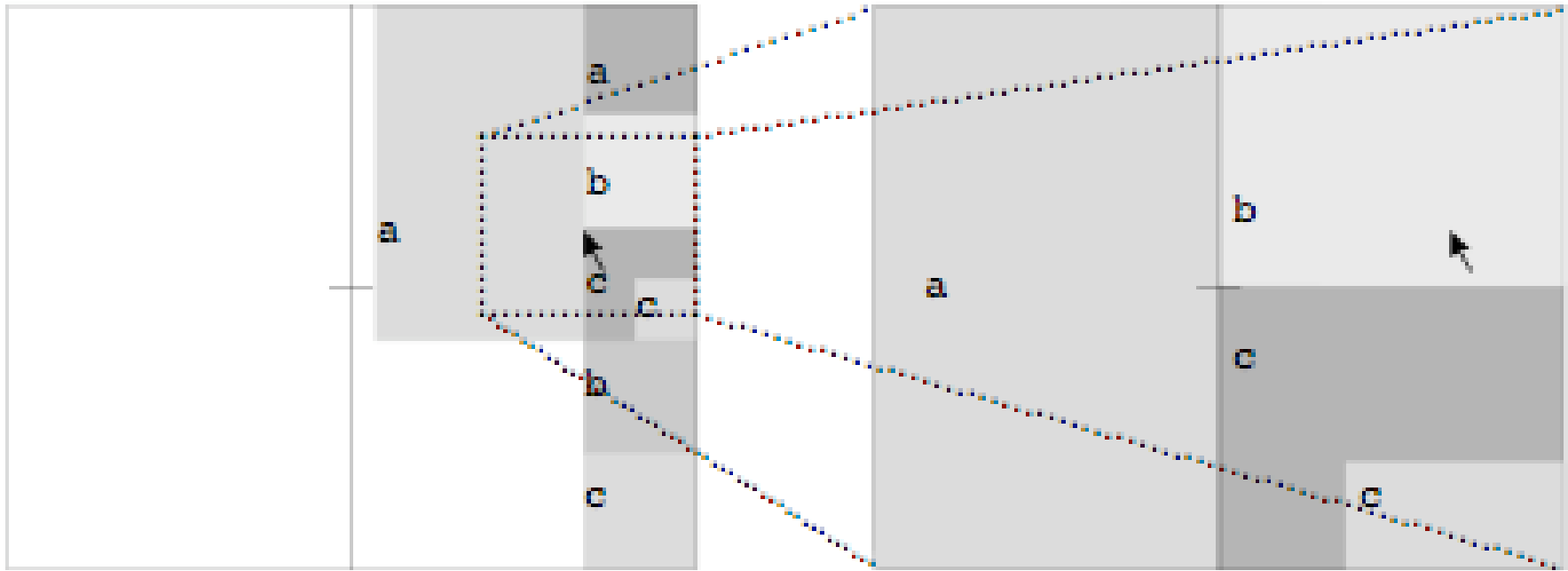
User interface scenario

Quick review of arithmetic coding

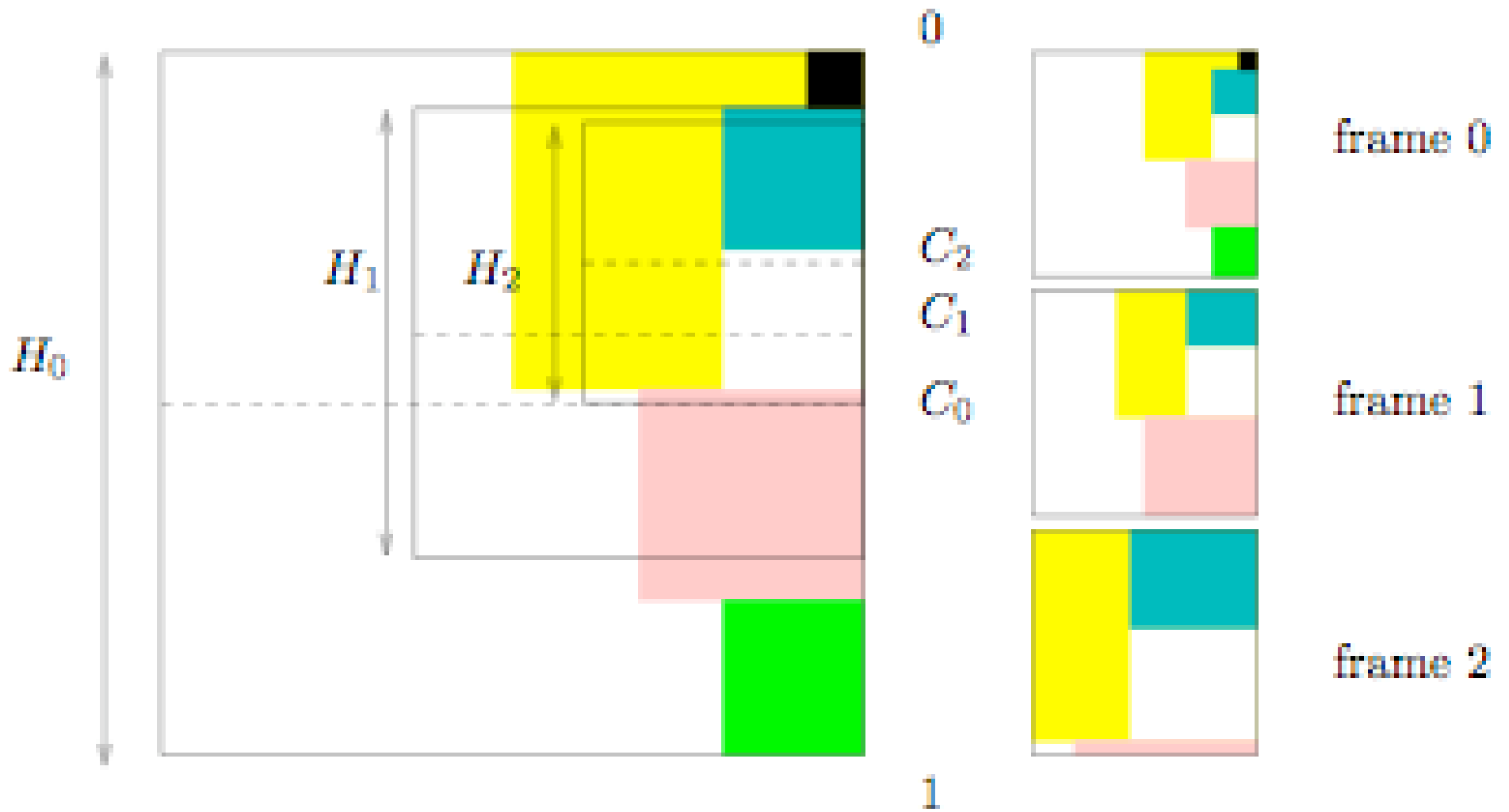
- An interval on the real line corresponds to each continuation.
- Length of this interval reflects likelihood as predicted by a model.
- Each interval is subdivided recursively.
- Compressed size equals entropy of the model.



How the Dasher interface works



- Just point where you want to go.
- The point in the coding plane that the cursor is pointing at will pass through the crosshairs (center of the display) in S frames.
- Parameter S controls speed/responsiveness of the interface.

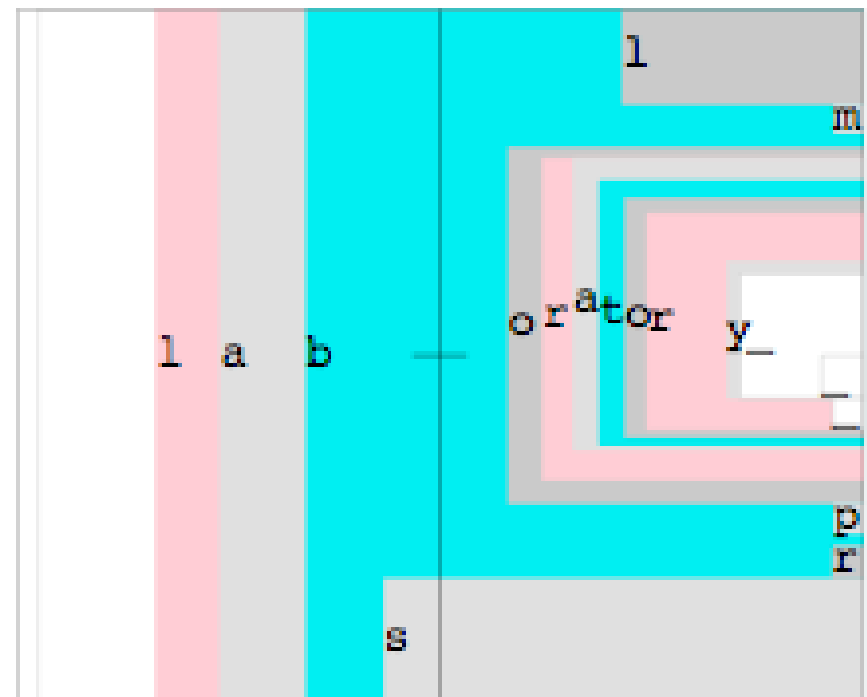
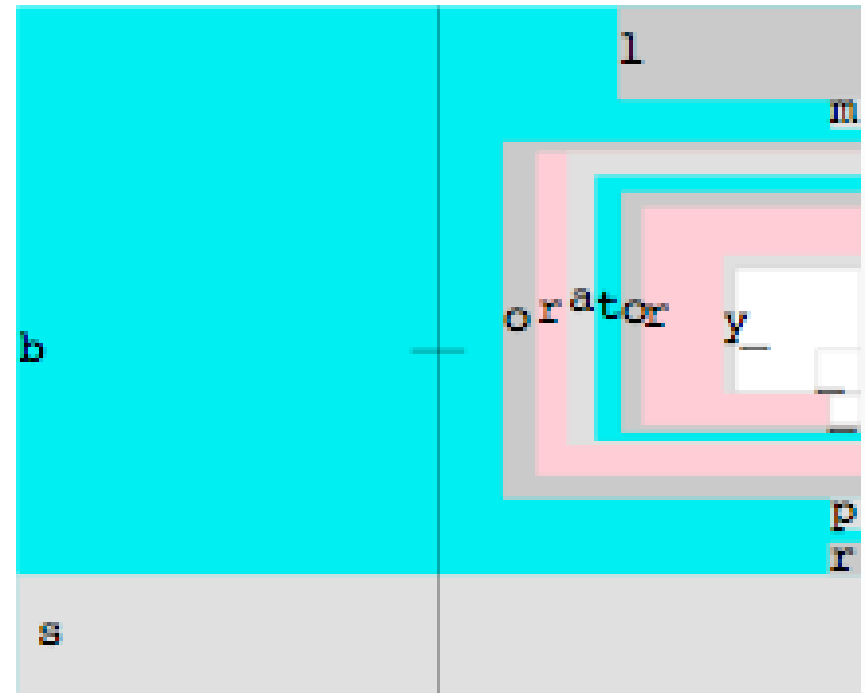
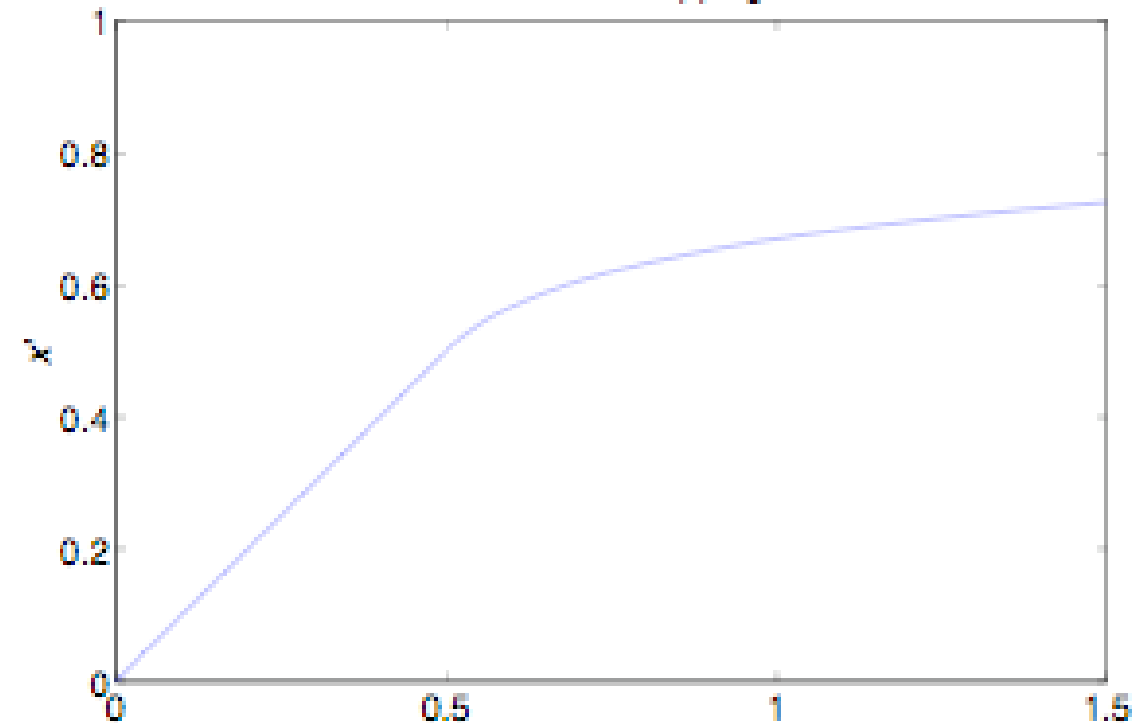


- The visible region of the coding plane corresponds to an interval on the real line.

Further refinements:

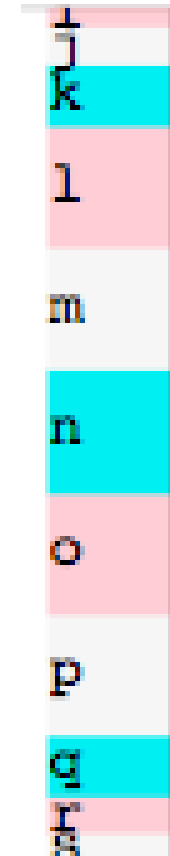
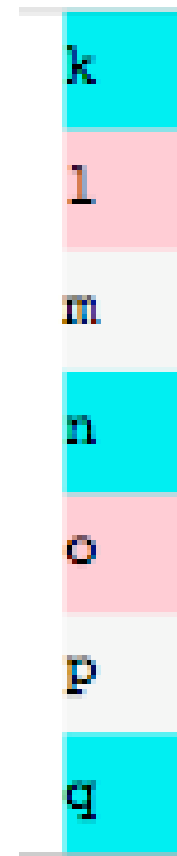
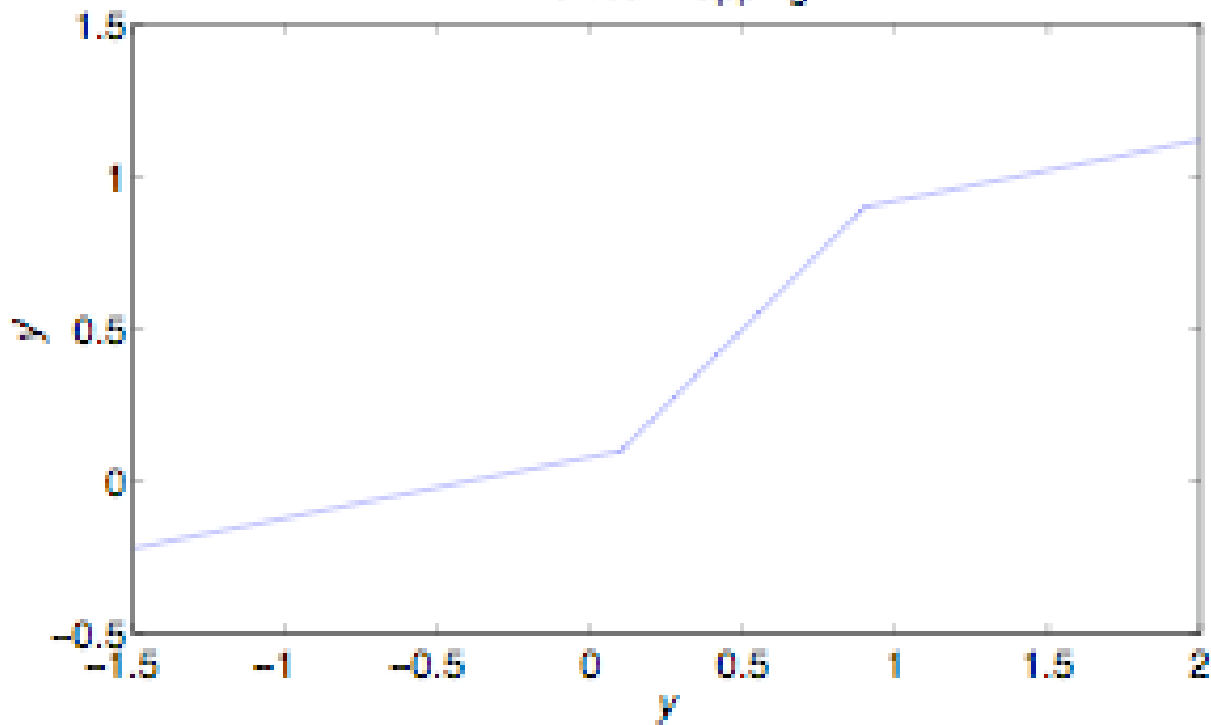
- Nonlinear mapping of x axis makes it easier to backtrack (delete).

Horizontal mapping



- Nonlinear mapping of y axis makes it easier to make course corrections.

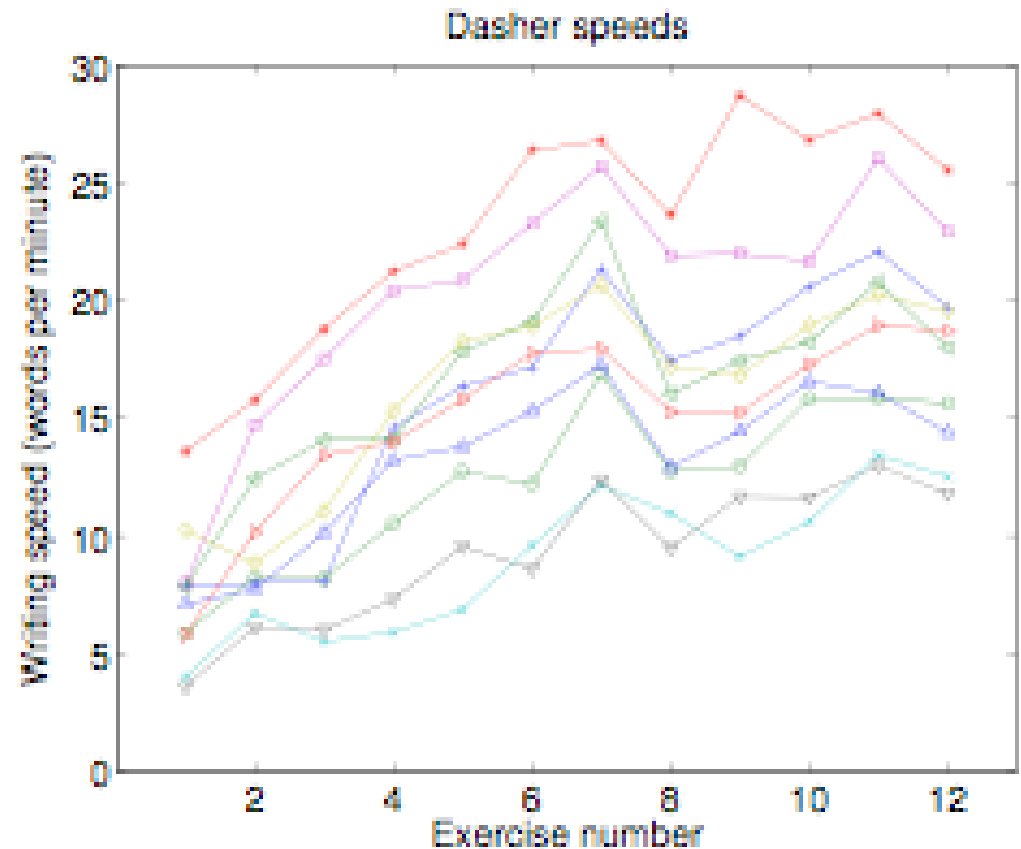
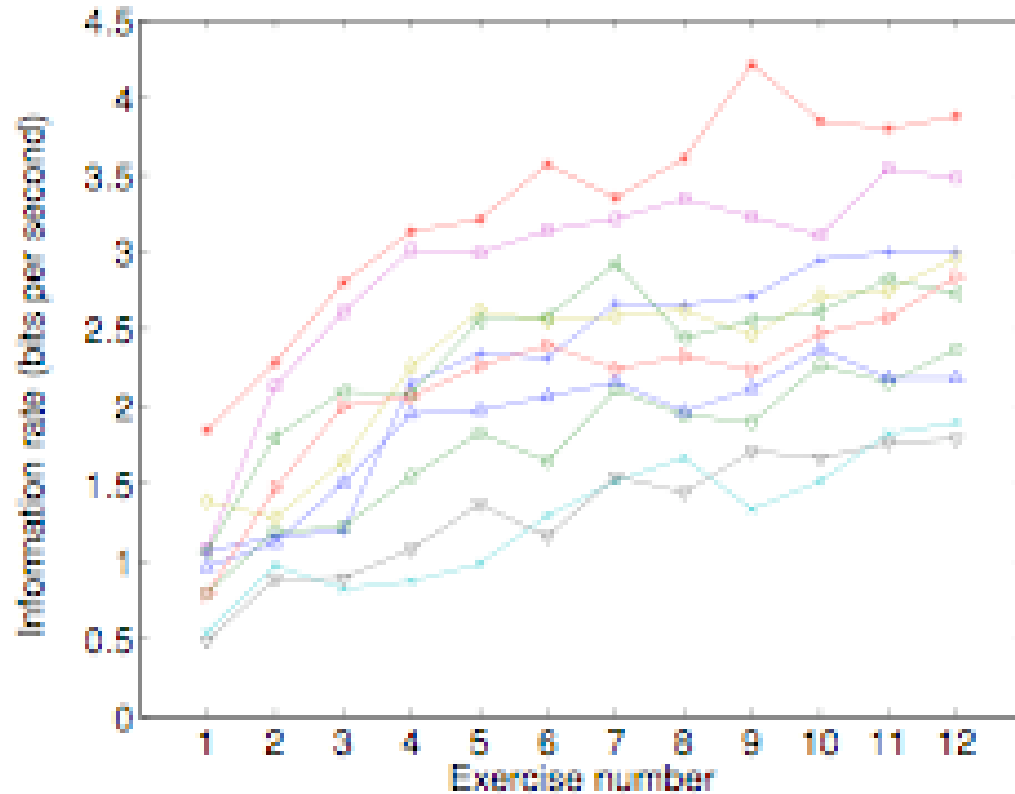
Vertical mapping



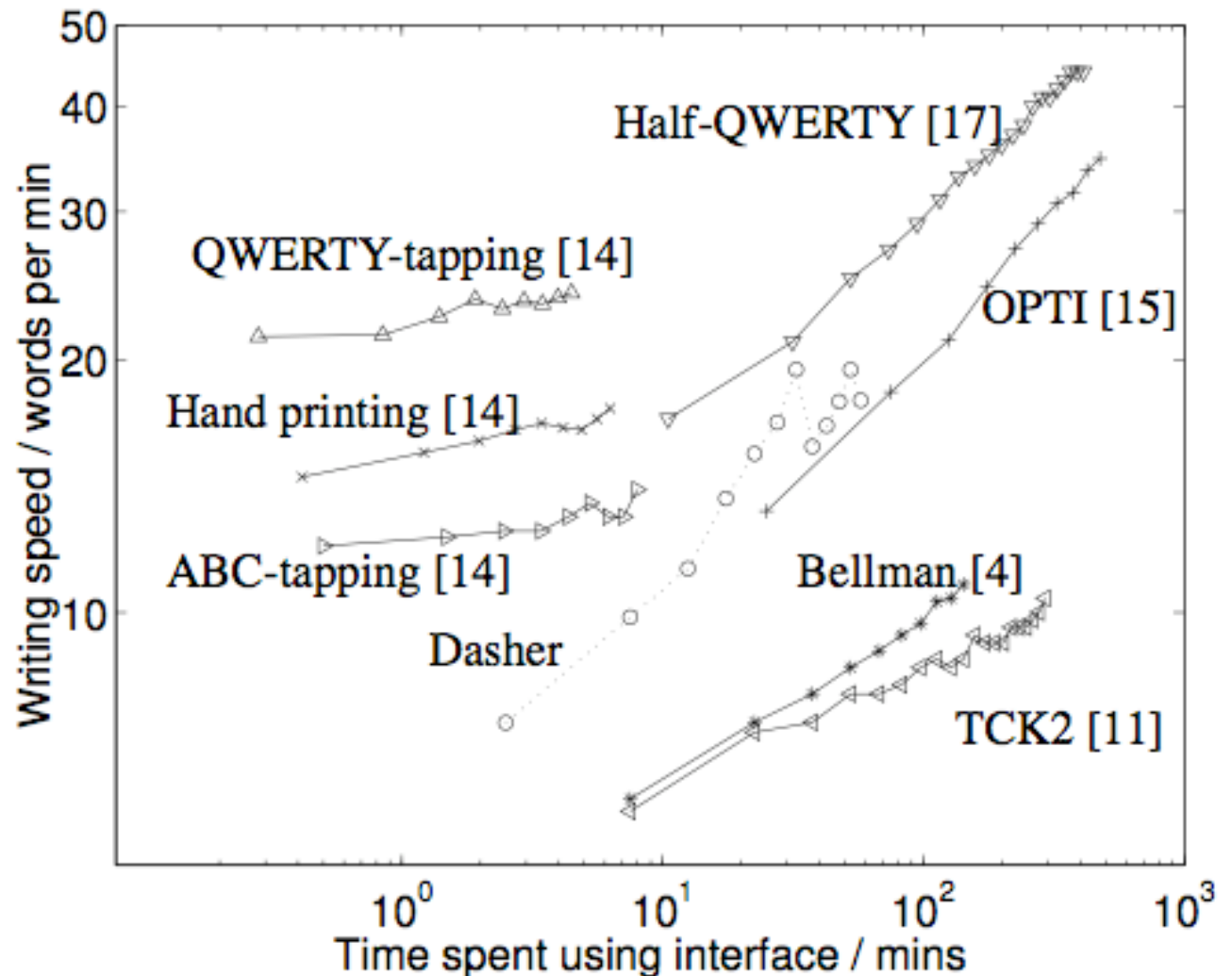
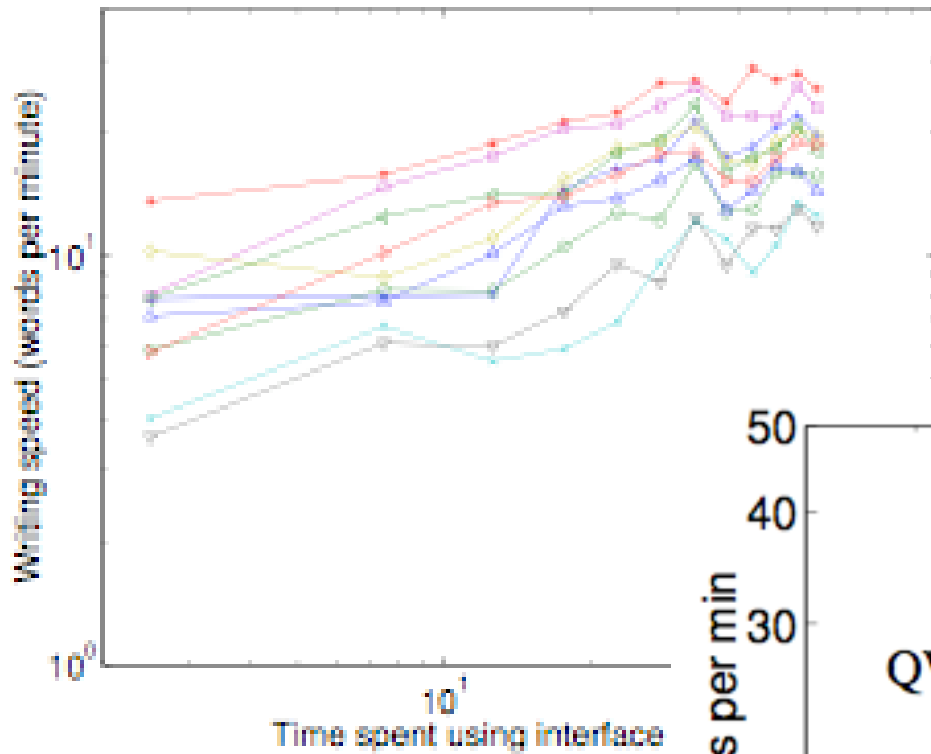
The predictive model

- Dasher uses PPM to predict future text.
- The maximum order context used is 5.
- Some extra probability is added to each character in the alphabet.
- The entropy is about 1.7 bits per character.

Testing the efficiency of Dasher



Learning rate



Conclusions

- Continuous gestures make it easier to enter text without errors. (Subjects made fewer errors with Dasher than with the keyboard.)
- With practice, Dasher should be competitive with other alternative text-entry modalities.
- However, it requires sustained visual attention, making it unsuitable for many applications.
- May be very useful for users who are unable to use a keyboard (works with eye-tracking).