# CSEP 510: Human Computer Interaction

Lecture 1: History
Richard Anderson

## Introductions

- Instructor
  - Richard Anderson
  - CSE 582
  - anderson@cs.washington.edu
  - 206-543-4305
- Teaching Assistant
  - Alan Liu
  - aliu@cs.washington.edu

## My Background

- UW CSE since 1986
- Sabbaticals
  - IISc, Bangalore, India, 1993-1994
  - Learning Science and Technology group, Microsoft Research, 2001-2002
- Research background
  - Algorithms: Parallel Algorithms, Network flow, N-body computation, Computation Geometry.
  - Adaptive layout, Constraint Satisfaction, Model checking, Educational Technology, Pen based computing.

## Administration

Course Web:
www.cs.washington.edu/education/courses/csep510/04wi/

Web Viewer
www.cs.washington.edu/education/dl/confxp/webviewer.html

Sign up for the CSEP510 Mailing list
mailman.cs.washington.edu/mailman/listinfo/csep510

## Workload

- Weekly assignments
  - Reading
  - Written homework assignment
    - Some writing
    - Some programming
  - Homework turn in aliu@cs.washington.edu
- My goal: uniform, moderate workload
- Sorry, no final exam, no term project ☺

## Vannevar Bush

- MIT Faculty / Dean
- Early work on computers
  - 1927 – Intergraph
- Name rhymes with "beaver"

## Computing in 1945



## As We May Think

- Director of Office of Scientific Research and Development during WW II
- Oversaw 6000 scientists
- Essay written July 1945



## The war is over, What do we do now?

- Essay written by the Director of the Office of Scientific Research and Development
- Biologists
  - Get back to work on curing the world's diseases
- Physicists
  - You've been making "strange destructive gadgets"
  - Do something else
  - Solve the "information overload problem"

## Too many papers

The difficulty seems to be, not so much that we publish unduly in view of the extent and variety of present day interests, but rather that publication has been extended far beyond our present ability to make real use of the record. The summation of human experience is being expanded at a prodigious rate, and the means we use for threading through the consequent maze to the momentarily important item is the same as was used in the days of square-rigged ships.

## Supporting arguments

- Dramatic technological change
  - Believed that advances in photography the key
  - Able to visualize many orders of magnitude improvement
- Recognized the importance of industrial economy and mass production

## Vision

- Foresaw massive compression of storage
  - The Encyclopedia Britannica reduced to the size of a matchbox
- Speech to text

## People adjusting to computers

Our present languages are not especially adapted to this sort of mechanization, it is true. It is strange that the inventors of universal languages have not seized upon the idea of producing one which better fitted the technique for transmitting and recording speech. Mechanization may yet force the issue, especially in the scientific field; whereupon scientific jargon would become still less intelligible to the layman.

## Computing

- Massive improvements in performance
  - Envisioned a 30Mhz machine!
- Controlled by card or film (programmed)
- Did not appreciate the role of software
  - This is a running theme in history of computing

## Computing in the future?

Such machines will have enormous appetites. One of them will take instructions and data from a whole roomful of girls armed with simple key board punches, and will deliver sheets of computed results every few minutes. There will always be plenty of things to compute in the detailed affairs of millions of people doing complicated things.

## Storing all the world's knowledge

- Recognized that using knowledge is what is important
- Amazing discussion of data structures and search
  - "Selection, in this broad sense, is a stone adze in the hands of the cabinetmaker"
- Foresaw both credit cards (c. 1950) and transaction processing (c. 1970)

## Memex

Consider a future device for individual use, which is a sort of mechanized private file and library. It needs a name, and, to coin one at random, "memex" will do. A memex is a device in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility. It is an enlarged intimate supplement to his memory.

## Memex

## Memex features

n *All this is conventional, except for the projection forward of present-day mechanisms and gadgetry*
- n Books preloaded or added by microfilm
- n Direct insertion of correspondence
- n Scanner for handwriting
- n Access by code – frequent codes are mnemonic
- n Levers for navigation
- n Annotation of materials

## Invention of hyperlinks

When the user is building a trail, he names it, inserts the name in his code book, and taps it out on his keyboard. Before him are the two items to be joined, projected onto adjacent viewing positions. At the bottom of each there are a number of blank code spaces, and a pointer is set to indicate one of these on each item. The user taps a single key, and the items are permanently joined.

## Navigation

Thereafter, at any time, when one of these items is in view, the other can be instantly recalled merely by tapping a button below the corresponding code space. Moreover, when numerous items have been thus joined together to form a trail, they can be reviewed in turn, rapidly or slowly, by deflecting a lever like that used for turning the pages of a book. It is exactly as though the physical items had been gathered together from widely separated sources and bound together to form a new book. It is more than this, for any item can be joined into numerous trails.

## Homework Assignment

- n Is Google Memex?
- n Bush gives an example the paper of using Memex to investigate the following
  - n Why was the Turkish short bow superior to the English long bow in the crusades
- n Use Google to explore

## The vision

Presumably man's spirit should be elevated if he can better review his shady past and analyze more completely and objectively his present problems. He has built a civilization so complex that he needs to mechanize his records more fully if he is to push his experiment to its logical conclusion and not merely become bogged down part way there by overtaxing his limited memory. His excursions may be more enjoyable if he can reacquire the privilege of forgetting the manifold things he does not need to have immediately at hand, with some assurance that he can find them again if they prove important.

## Ivan Sutherland

- n Sketchpad (1963)
- n Pen based (or pointing based) computer
- n Many HCI / Graphics ideas can be traced to his PhD Thesis

## Sutherland, 1963

The Sketchpad system makes it possible for a man and a computer to converse rapidly through the medium of line drawings. Heretofore, most interaction between man and computers has been slowed down by the need to reduce all communication to written statements that can be typed; in the past, we have been writing letters to rather than conferring with our computers.
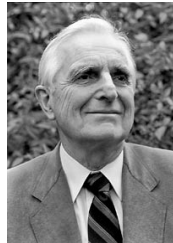
## Contributions

- Interactive Pen Drawing
- Constraints
- Select / Copy / Group
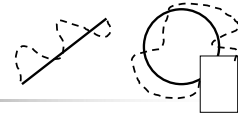
- Example – build hexagonal grid
  - Six sided figure
  - Create Circle
  - Inscribe in circle
  - Make sides equal
  - Erase circle
  - Make Copies
  - Join Copies

## Doug Englebart

- Stanford Research Institute (SRI)
  - Augmentation Research Center

## Mother of all demos

- sloan.stanford.edu/mousesite/1968Demo.html
  - Homework assignment: spend at least 30 minutes
  - Clip 12 introduces the mouse
- 90 minute live demo between Menlo Park and San Francisco
- Fall Joint Computer Conference (1000 attendees)
- December, 1968

## Doug Englebart (1968)

If, in your office, you, as an intellectual worker were supplied with a computer display backed up by a computer that was alive for you all day and was instantly responsive to every action you had, how much value could you derive from that device?

## Mouse, Keyboard, Chorded keyboard

## Input devices



One-Handed, Chord Keyset:

Code for "a"

b
c
d
e
f
g
h
x
y
z
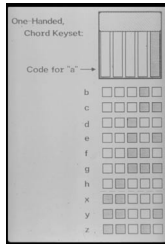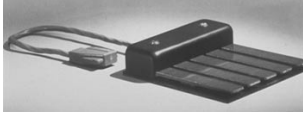
## Contributions

- First Mouse
- First Hypertext
- First word processing
- First 2d editing and windows
- First document version control
- First groupware (shared screen teleconferencing)
- First context sensitive help
- First distributed client-server
- And more!

## Course Preview

- Usability
- Cognitive models and process models
- Design Techniques
- Visualization
- Speech and Pen Input
- Handwriting, whiteboards, and recognition
- Multimedia
- CSCW
- Ubiquitous computing

## Usability

- The design of everyday things
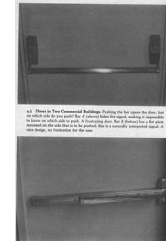


## Cognitive and Process Models

- Model human movement
  - Speed vs. accuracy
- Memory



maintenance rehearsal

Sensory Image Store | Working Memory | Long Term Memory

decay | decay, displacement | decay? interference?

chunking / elaboration
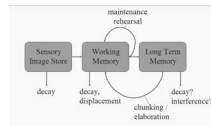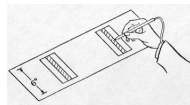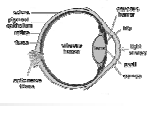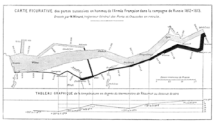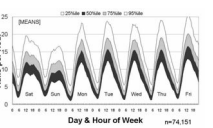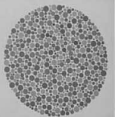
## Design Techniques

- Low Fidelity Prototypes
  - Wizard of OZ testing
  - Paper Prototypes
  - Design by sketching

## Visualization

- Properties of eye and color
- Display of information
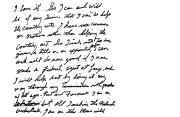- Charts and graphs

## Speech and Pen Input

- Speech input and output
- Pen Based Computing
- Stylus Input

## Handwriting and Whiteboards

- Handwriting recognition and segmentation
- Electronic whiteboards
- Natural UI

## Multimedia

- Video conferencing
- Archived audio/video
- Indexing

## CSCW (Computer Supported Collaborative Work)

- Feedback and reputation systems
- Groupware
- Annotation systems
- Sociology

## Ubiquitous Computing

- Location aware computing
- Activity inference
- Experience capture
- Privacy concerns