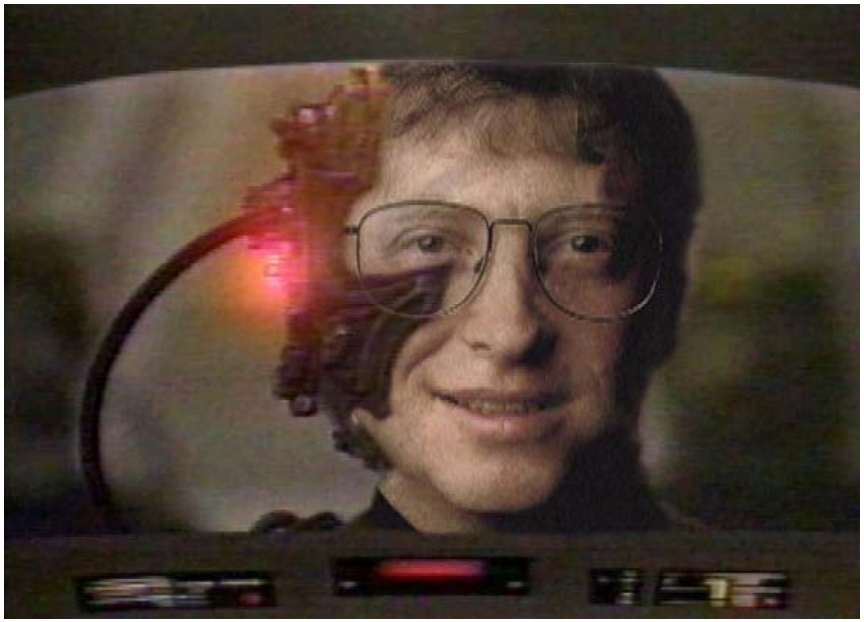
"Man-Computer Symbiosis"

Or

How I Learned to Stop Worrying and Love the Borg



JOSEPH 'LICK' LICKLIDER (1915-1990)

Selected educational and pre 1965 career highlights

- 1937 obtained degrees in Physics, Math and Psychology
- 1938 M.A. in Psychology
- 1942 PhD in Psychology
- 1942 joined Harvard's *Psycho-Acoustics Laboratory*
- 1950-1957 an associate professor at MIT
- 1950's Human factors head on project SAGE
- 1958 President of the Acoustical Society of America
- 1960 wrote "Man-Computer Symbiosis"
- 1962-1964 Lick became the first director of the Information Processing Techniques Office (IPTO) of Advanced Research Projects Agency (ARPA)

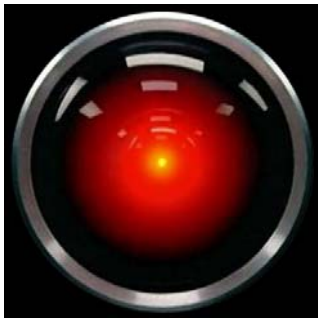
A MAN OF HIS TIMES

Two influences on Licklider to consider:

1. The Cold War

1. The concept of the computer as a physically massive object

LICK, MY MIND IS GOING…



In the 50's and 60's the thinking was that computers were always going to be physically massive.

Examples in Science Fiction

- 1950 The positronic computer "Machines" from Isaac Asimov's short story "The Evidence" part of the I Robot collection
- 1951 The Encyclopedia Galactica from Asimov's Foundation series
- 1965 Mike from Robert Heinlein's Moon is a Harsh Mistress
- 1968 Hal from Stanley Kubrick's and Arthur C. Clarke's 2001

All these cutting edge science fiction writers thought that computers of the future would be physically massive with vast stores of knowledge and accessed remotely via terminals.

SOME ONE SET US UP THE BOMB.

At the beginnings of the Cold War the USA was worried about a Soviet Surprise attack using jet bombers.

- Do to advances in Jet propulsion visual sightings no longer useful.
- Impossible to leave enough fighter aircraft in the air to keep constant vigilance
- Radar offered the only hope, but how to process all that data?

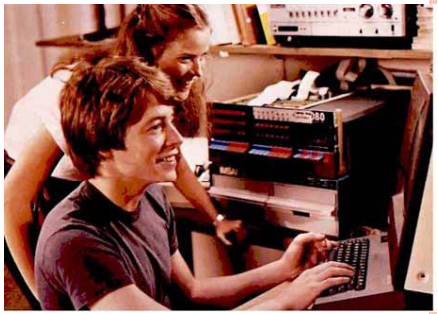
SAGE ADVICE

Semi-Automatic Ground Environment (SAGE) project was created to respond to the Soviet bomber problem.

- Automated radar tracking system that updated in real time.
- Coordinated multiple radar stations and controlled input and output data to a human operator
- Human operator identified threats and prioritized targets

Licklider headed up the SAGE human factors team.

WOULD YOU LIKE TO PLAY A GAME?



Working on SAGE Licklider became every interested in how human and computers could work together in a partnership to perform tasks that each on their own could not do.

"Without computers, humans couldn't begin to integrate all that radar information. Without humans, computers couldn't recognize the significance of that information, or make decisions." –History-Computer.com

MAN-COMPUTER SYMBIOSIS

Licklider States 2 Goals:

1) "To let computers facilitate formulative thinking as they now facilitate the solution of of formulated problems" - Licklider

1) "To enable men and computers to cooperate in making decisions and controlling complex situations without inflexible dependence on predetermined program"-Licklider

Definition of SYMBIOSIS

1: the living together in more or less intimate association or close union of two dissimilar organisms (as in parasitism or commensalism)

2: a cooperative relationship (as between two persons or groups

Merriam-webster.com

WITH THE INFORMATION I CAN ACCESS…

Licklider is not interested in if AI will ultimately surpass human thought and to avoid the argument he is willing to concede "dominance in the distant future of cerebration to machines alone"

He is interested in the space between "Mechanical Extended Man" and our Cyber OverLords.

Blue screen of death

So Why Bother?

Licklider assumed that "if they [computers] could be introduced effectively into the thought process, the functions that can be performed by data-processing machines would improve or facilitate thinking and problem solving in an important way."

Deep Thought

Licklider studied himself while he was performing "thinking" tasks, and noted that 85% of this time was "spent getting into a position to think". Most of his "thinking" time was spent doing what he termed "clerical or mechanical" tasks, graphing, plotting, calculating, checking logic. All task which are better performed by machines.

If humans were removed of this burden humans would have more time for make decisions, find insights, and learn.

THEY HAVE A PLAN

However, Licklider envisioned computers doing more than just the clerical.

True human computer symbiosis requires the computer to suggest courses of action, make evaluations of data, turned up flaws in reasoning, revealed unexpected solutions. The computer needs to be an active participant in the relationship.

My CPU is a neural net processor

For Licklider there were several problems needed to be solved to achieve true human computer symbiosis.

Hardware Problems:

- Computers to fast and to costly for one user
- Memory Cost and Type
- Memory Organization

Proposed Solutions:

- "Thinking centers" with user time sharing
- Selective data entry and permanent and rewritable memory
- Trie Memory systems

COMPUTER…

Language Problems

Human and computers communicate very differently. This difference goes beyond just ones and zeros.

Licklider was excited about new programming languages such as FORTRAN and also noted that humans were adapting "standard formulas of representation" that were easy to translate into computer code.

He also thought that computers need to be able to understand communication in terms of goals. Which is more natural way of thinking for humans.

Wii would like to play

Interface Problems

Punch Cards, Keyboards, Plotters and Oscilloscope were not cutting it.

Licklider proposed the following:

- Writeable display surfaces, with pen like inputs
- Table top displays
- The ability for the computer to recognize handwritten letters and graphs
- Wall displays, with local controls
- Speech Recognition

HUMAN 2.0

"The Hope is that, in not too many years, human brains and computing machines will be coupled together very tightly, and that the resulting partnership will think as no human brain has ever thought and process data in a way not approached by the information-handling machines we know today." -Licklider

What is the matrix

Questions:

What would Licklider thing of our current progress?

Have we achieved computer human symbiosis?

If not should we keep trying?

Is symbiosis a real benefit to humans?

RESOURCES

Web Sources

Articles

"Joseph Licklider" http://history-computer.com/Internet/Birth/Licklider.html

"Biography of Joseph Licklider" http://history-computer.com/People/LickliderBio.html

"SAGE" http://en.wikipedia.org/wiki/Semi_Automatic_Ground_Environment

Defintion of Symbiosis http://www.merriam-webster.com/dictionary/symbiosis

Images

Borg Gates http://www.thecroatiaportal.com/?p=1156

Hal http://www.reellifewisdom.com/taxonomy/term/1

Licklider http://history-computer.com/Internet/Birth/Licklider.html

Dr Strange Lovehttp://www.norwich.edu/about/news/2010/070210-strangeloveScreening.html

SAGE http://en.wikipedia.org/wiki/Semi_Automatic_Ground_Environment

War Games http://blog.beliefnet.com/moviemom/2008/06/five-movie-computers.html

MCP http://tron.wikia.com/wiki/File:Mcp.PNG

Cylons http://www.battlestarprops.com/cylons-and-their-wonderful-clothes/

Terminator http://showbread.wordpress.com/2009/12/21/james-cameron-countdown/

Scotty http://www.collider.com/2009/05/27/star-trek-original-motion-picture-collection-blu-ray-review

Wii Play http://www.effie.org/winners/showcase/2008/2331