Continuous Paper : Print interfaces and early computer writing

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Subtitle	Print interfaces and early computer writing
Lead-in / Abstract	The computer is often equated with the screen, but CRTs were not widely used in early computing. Punch cards, teletypewriters, and print terminals were used in the development of the first computer gaming, art, and literary systems. The nature of these interfaces influenced this early work.
Participants and speakers	Montfort, Nick (US)
Short biography of participants	Nick Montfort, a new media author, critic, and theorist, is now studying for a Ph.D. in computer and information science at the University of Pennsylvania. He is author of Twisty Little Passages: An Approach to Interactive Fiction (MIT Press, 2003) and co-editor, with Noah Wardrip-Fruin, of The New Media Reader (MIT Press, 2003). He has written and programmed interactive fiction, including Ad Verbum (2000) and Winchester's Nightmare (1999). His collaborations with William Gillespie include The Ed Report and 2002: A Palindrome Story (Spineless Books, 2002), acknowledged by the Oulipo as the world's longest literary palindrome. Currently, he is writing the novel Implementation with Scott Rettberg. Montfort is a director of the Electronic Literature Organization. His site: http://nickm.com
Full text	The discussion of computer writing sometimes assumes that the screen is not just an important part of human-computer interface today, but an essential aspect of new media. The screen is relatively new on the scene, however. Early computer interaction with happened largely on paper: on paper tape, on punchcards, and on print terminals and teletypewriters, with their scroll-like supplies of continuous paper for printing output and input both. There were a handful of early, influential, screen-based systems. These included *Spacewar,* the first modern video game, developed at MIT in 1962; **Ivan Sutherland**'s Sketchpad, also developed at MIT in 1962; **Doug Englebart**'s NLS (oNLine System), developed at SRI and shown in the "mother of all demos" in 1968; and Grail, developed at the RAND Corporation in 1969. But other people using more run-of-the-mill interfaces were also making contributions to electronic art and computer writing. Three programs will focus this discussion of paper-based interfaces and early electronic writing: *Eliza/Doctor,* from 1966[1]; *Hunt the Wumpus,* from 1973[2]; and *Adventure,* from 1975[3]. **Eliza / Doctor**

The Eliza system was programmed by **Joseph Weizenbaum** in the mid-1960s. It was written in a language called MAD (Michigan Algorithm Decoder), using a package called SLIP (Symmetric LIst Processor) which Weizenbaum originally developed in 1963. Weizenbaum had an IBM 1050 in his office,[4] a print terminal which featured a Selectric typewriter ball. He programmed Eliza for the IBM 7094, running the Compatible Time-Sharing System that was developed at MIT's Project MAC, one of the first successful time-sharing systems.

The *Doctor* script became inextricably associated with the general-purpose Eliza. It allowed the system to impersonate a Rogerian psychotherapist. **Janet Murray** identifies <cite>Eliza/Doctor</cite> as the "moment in the history of the computer that demonstrated its representational and narrative power with the same startling immediacy as the Lumières' train did for the motion picture camera," and she names Weizenbaum "the earliest, and still perhaps the premier, literary artist in the computer medium."[5]

Sherry Turkle offered an important discussion of the phenomenon of *Eliza/Doctor* in *Life on the Screen,* but, typically, overlooked the material, non-screen-based experice of the system. Turkle states that the all-uppercase output of the program was an attempt to imitate a Teletype,[6] when, in fact, people initially interacted with Eliza using Teletypes and other print terminals. **Tom Van Vleck,** who was at MIT with Weizenbaum when he programmed Eliza, wrote: "I think mixed case output was seen as a 'decoration' in those days ... I think it would have actually detracted from the point Joe was trying to make about computer interaction."

Many people have interacted with *Eliza/Doctor* on screens. But early output being printed more or less permanently on paper, rather than transiently appearing on the screen, influences how we understand the system as literary and as psychotherepeutic. When interacting on a slow-moving Teletype, it also was possible to read the beginning of Eliza's statement and still have time to guess what the conclusion of that utterance would be, as is the case in human conversation.[7]

Hunt the Wumpus

Gregory Yob, who resided in Palo Alto, California, wrote of how he came to program a famous early BASIC game, *Hunt the Wumpus:* "[In 1973] I happened by People's Computer Company (PCC) and saw some of their computer games such as Hurkle, Snark, and Mugwump. My reaction was: 'EECH!!' Each of these games was based on a 10 x 10 grid ..." It's rather striking that these three early computer games were named after entities in literary works by **Theodore Sturgeon, Lewis Carroll,** and **William S. Burroughs,** but their frameworks were actually rather similar. The Cartesian grid would work well enough for Microsoft's Minesweeper almost 20 years later, but Yob decided that creative computer users working on print terminals back in 1973 should have a more interesting sort of grid. He chose the dodecahedron, he explained, "simply because it's my favorite Platonic solid and once, ages ago, I made a kite shaped like one."[8]

Just as the creators of modern online games might expect you to search for information on the Web as you play them, since you're online anyway, Yob expected that *Hunt the Wumpus* players would use paper, the output medium for the program, to create maps of the cave. Indeed, they did. Yob wrote that about a month after writing the game, "I went to the Synergy conference at Stanford ... To my vast surprise, all of the [PCC] terminals were running Wumpus and scraps of paper on the floor with scrawled numbers and lines testified that much dedicated Wumpus-hunting was in progress."[9]

It seems significant that *Hunt the Wumpus* was developed, before the era of home computing, in BASIC, an unstructured language that was approachable and easy to hack in. As the 1968 book *Game Playing with Computers* explains, "BASIC was developed at Dartmouth College for a GE-225 computer system and is similar to the FORTRAN language. It is a user-oriented language that may be learned in a few hours."[10] BASIC was created specifically for use on time-sharing systems, in interactive sessions, and it was made freely available. Anyone who wanted to was allowed to implement it--even **Bill Gates, Paul Allen,** and **Monte Davidoff,** who used a teletype to punch an implementation of BASIC, the first commercial product for Microsoft, onto paper tape more than a decade later.

Some of the standard games in the time-sharing library of the mid-1960s GE-265 system were written in BASIC; others were written in ALGOL. That system included

Blackjack, Tic-Tac-Toe, Battle of Numbers, Slot Machine, and *Craps.*[11] Even those early grid-based games of the PCC were, therefore, innovations, hinting at the possibility of new sorts of imaginative spaces. Yob's *Hunt the Wumpus* took the next step. By thinking outside the rectilinear grid, Yob--even before he used a screen--became an early liquid architect of cyberspace.

Adventure

A less regular cave environment was introduced a few years later by **Will Crowther,** who programmed *Adventure* in FORTRAN on Bolt, Beranek, and Newman's Cambridge-based DEC PDP-10, probably in 1975. The version of *Adventure* that became widely known was an expanded and modified version of this original, released by **Don Woods** at Stanford in April 1976.[12] The result was a simulated cave with rooms connected in a pattern that was anything but regular, forming, for instance, two mazes of twisty little passages. The regularity of the overall, governing system was also broken in *Adventure.* There were numerous different opponents and obstacles to overcome, areas to map, and pieces to fit together. *Adventure* showed that reading and of puzzle-solving could be integrated, and that textual output could do more than display instructions and pure status information. This would later lead to the interactive fiction works that functioned like literary riddles, combining strange systematic workings with a lattice of evocative language.

By 1975, screens were becoming more common, at least at companies like BBN and universities like MIT, where, a few years later, the programmers of *Zork* would have access to powerful Imlac terminals, screens included. But Crowther apparently programmed *Adventure* from home, using an ASR-33 Teletype--a rather old apparatus, even at the time.[13] It was written in FORTRAN, all in uppercase, and Crowther probably went through printouts to debug it.

Players also used paper in their adventuring, just as they did in their Wumpus-hunting. **Tracy Kidder** noted that one *Adventure* player's desk held "roughly drawn maps. They consisted of circles, inside of which were scrawled names such as Dirty Passage, Hall of Mists, Hall of the Mountain King ... Webs of lines connected the circles, and each line was labeled, some with points of the compass, some with the words up and down. Here and there on the maps were notations--'water here,' 'oil here,' and 'damn that pirate!'"[14]

The experience of interactive fiction as a continuous series of textual exchanges, and the requirement that the interactor look back carefully over the text to puzzle out how to proceed, is certainly consistent with the more permanent and uninterrupted printed output that early terminals produced, if not simply a product of this interface. Even the later commercial games of Infocom--which popularized the term "interactive fiction" and made up some of the best-selling entertainment software of the 1980s--included a "transcript" command that would allow players to print out the input and output text as the game progressed, just as if they were using a print terminal to play.

Other Early Excursions

Other early excursions into artistic and literary computing were also conducted without a screen. **Brion Gysin** and **Ian Sommerville** did a computer collaboration around 1960, which involved Sommerville programming a computer to produce every permutation of the phrase "I AM THAT I AM." Programming interactively a at that time was an extravagance that was "not favoured"; a paper-based, offile interface would have been the only option for Sommerville.[15] **Italo Calvino** was invited by IBM to write a story using a computer in 1973, but according to Calvino's wife, the limited computer access in Paris meant that Calvino had an even more paper-intensive experience; he worked by "carrying out all the operations the computer was supposed to do himself."[16] Finally, print terminals were also the medium for two teleconferences about art and computing that took place on the PLANET and EIES systems, from 1978 through 1981.[17]

Conclusion

Clearly, significant computer creativity did happen by means of paper interfaces. Computer users have had a "life on the screen" in recent times, but the "life on the scroll" that the users of print terminals had--as recently as the early 1980s--is also worth study, particularly as we hurtle past the flat panel into a life of mobile phones and hypertext-enabled MP3 players, while, at the same time, we continue to send more and more plain text emails, sometimes even printing these emails out--just as, originally, emails were printed out, rather than being displayed on a screen. Neither our office nor our literary and artistic future are likely to become paperless, and work of both sorts will continue to be shaped by the way print-based interfaces were used, not so long ago.

1) Joseph Weizenbaum, "ELIZA--A Computer Program for the Study of Natural Language Communication Between Man and Machine." *Communications of the ACM* 9(1), January 1966, pages 36-45.
2) Gregory Yob, "Hunt the Wumpus." *The Best of Creative Computing,* volume 1, edited by David Ahl, 1976, pages 247-250. Reprint of an article in *Creative Computing,* September/October 1975, pages 51-54.
3) Nick Montfort, *Twisty Little Passages: An Approach to Interactive Fiction,* Cambridge: The MIT Press, 2003, pages 85-93.
4) Tom Van Vleck, email to author, 27 February 2004.
5) Janet H. Murray, *Hamlet on the Holodeck: The Future of Narrative in Cyberspace,* New York: The Free Press, 1997, pages 68 and 72.
6) Sherry Turkle, *Life on the Screen: Identity in the Age of the Internet,* 1st Touchstone edition, New York: Simon and Schuster, 1997, page 290, footnote 22.
7) This was pointed out to me by a woman during the question period after a presentation I made on 3 April 2004 at the e(X)literature conference at UC Santa Barbara.
8) Yob, "Hunt the Wumpus," page 247.
9) Yob, "Hunt the Wumpus," page 248.
10) Donald D. Spencer, *Game Playing with Computers,* New York: Spartan Books, 1968, page 334.
11) Spencer, *Game Playing,* page 337.
12) Montfort, *Twisty Little Passages,* page 89.
13) Montfort, *Twisty Little Passages,* page 85.
14) Tracy Kidder, *The Soul of a New Machine,* Boston: Little, Brown, and Company, 1981, page 86.
15) A. D. Booth, *Digital Computers in Action,* Oxford: Pergamon Press, 1965, page 20.
16) Italo Calvino, *Numbers in the Dark and Other Stories,* translated by Tim Parks, preface by Esther Calvino, New York: Pantheon Books, 1995, page 2.
17) Roy Skodnick, introduction to "Teleconferencing Computers and Art," *All Area* 2, Spring 1983, pages 66-70.

Related internet addresses

http://huminf.uib.no/~jill
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