THE COMPUTER AS PLAYTHING

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Sometimes one's playthings shape one's play; sometimes they do not. The shape of a ball affects the games that can be played with it. A wheeled toy can be propelled with different results than can a toy without wheels. But the shapes of chess pieces are not instrumental in playing chess, as long as there are discernibly different shapes that are agreed to have specified meanings. An instructional game like Layman Allen's *Equations* (1969) can be played with resources (i.e., numerals and mathematical operators) generated by dice or computers . . . or they can be called out more or less at random by a group of people who will then play with them, or be written down on paper by someone in advance. The particular artifacts of play make no difference in the play of the game . . . at least in a formal sense.

The question at hand involves the impact of a microcomputer as a plaything; in particular, as a plaything for a *group* of

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EDITOR'S NOTE: *Fred Goodman is known to readers of this journal as one of the most distinguished and creative game designers and theoreticians in the field. "The Computer as Plaything" was originally presented at Ohio State University on October 14, 1983, in a conference on "Computers and Young Children." It illustrates Fred's appreciation for Bernard Suits's logic and his talent for integrating theory and practice. It also synthesizes three of his current interests: (1) use of the LOGO language in gaming and game design; (2) focusing educational research to investigate group response as well as to provide clues for individualized diagnosis and remediation; and (3) demonstrating how the "play as work" orientation of children can be employed to make them "at home in the water" with computers.*

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children. The reasons for emphasizing a *group* of people are many.

Chief among these reasons are questions of equity, questions of "equal opportunity." Computers are probably valuable things with which to play, but they are expensive playthings. Thus, we should be encouraged to find ways in which they will be useful to groups, not just to individuals.

Second, so many applications of computers are conceived in terms of their being "personal" computers, devices that will support and reward hours of individual interaction . . . just one person and one machine . . . that there is little natural and spontaneous inquiry about how a group might respond to a computer. Many other electronic artifacts such as radio and television are group oriented, are studied in terms of their impact on large segments of society, their impact on family interaction, and so forth. But with the exception of the impact of computer-conferencing, people have not spent much time speculating about, or studying the impact of, a group interacting with a computer.

Third, most of what we know about children and computers we know as a result of examining what happens when a relatively few, relatively privileged, and/or relatively interested children interact with computers. It is probably not safe to assume that large numbers of children will be captivated by computers in the sense that they will spend long hours probing the alleged joys of programming, especially when contact occurs in institutionalized setting such as schools. If we really are concerned with acquainting massive numbers of people with technology via computers, it might be wise to recognize that many children are highly social creatures who love to move about, talk to one another, jostle, and simply interact with other human beings. Disciplined athletes spend long, lonely hours practicing their skills, strengthening their bodies, perfecting their concentration. Many more people play a sociable game of softball, of volleyball, of touch football . . . or spend hours hitting a tennis ball or tossing a frisbee back and forth to one another.

So, we might speculate, what would happen if we set out to find out something about how groups of children would interact if their interaction were "mediated" by a single microcomputer? What if the plaything, the "artifact" that somehow was the focus of interaction, was capable of doing what a computer does? At the individual level one could argue that an arcade-type video-game could encourage eye-hand coordination in something like the way that paddle, racquet, or bat games do. But might the interaction be influenced in the way footballs, along with the necessary helmets, pads and other highly specialized accountrements that go with them, influence the precise, orchestrated violence that is so often associated with American football? Or turning the argument around a bit, does the easy familiarity with certain kinds of objects such as balls that fit comfortably into one hand, and can be thrown with relative accuracy because of their weight and their stiches that provide a grip and perhaps certain aerodynamic features, lead one to feel at ease with any such objects, whenever and wherever they may be encountered? Might children who grow up with a computer as a common plaything in a sociable setting treat the computer less as a magical object endowed with incredible powers for good or evil, and more as an everyday object that can occasion feelings of joy and sadness, lead to inspired strategic insights and classic "boners," depending on how one related to it, and more particularly, one's fellow interactors?

For me the motivation to explore this line of thinking lies less with the existence of hardware like Apples and TRS-80s and Ataris and IBM-PCs, and with software like Logo (the language developed by Seymour Papert at MIT; see Papert, 1980) for all its seductive charm as an avenue to one's own "micro-world"; and more with my experience over the last ten or more years with my game called "They Shoot Marbles, Don't They?" (Coppard and Goodman, 1979).

"Marbles" was my first venture into the realm of "artifact dependent" games—at least at the purposeful or instructional gaming level. The basic idea was to design a game for young children, in this case (at the outset) children of age ten, eleven, or twelve, in which the interpretations of "what happened" would be up to the children. No notebook, no adult game director, no computer (mainframe in those days) to say "because you did *this*, the result is *that*." If you aimed to knock over the tower of dowel sticks in the center of the board, or *seemed* to aim at it, and the tower tottered and toppled (or maybe even got "blown away"), you and your playmates dealt with it. The "judge," who was instructed never to look at the board during the shooting, might have to deal with whether the shooter's finger was or was not "over the line," or whether there was "intent" to do something illegal if a law had been passed by the three children who, at least until they were voted out of office, were "the government." And whether the "sure shot" should be let into the coalition "owning" the tower next time would be a question to be decided as the sand slid out of the timer on the next round. A three-foot square piece of felt that provided a good surface for the marbles, five dowel sticks of one and one-quarter inches that would stack nicely (but precariously if too many people were "in" in the coalition), marbles that would provide both targets and the wherewithall to hit them, plastic Lego blocks that could be assembled in a variety of ways to make more or less easy wickets to go through: these were the artifacts that were to inspire many experiments in social interaction, in rule-governed behavior.

Only recently have we had the opportunity to emulate such an environment electronically, thanks to Logo and the Apple microcomputer on which LOGO was first implemented for use by the general public. And the experiments, at least in my case, have only begun to be designed, let alone conducted. The hardest task was to create a truly ambiguous environment, the very essence of "They Shoot Marbles, Don't They?," in an intrinsically digital environment. This seems to be possible by having areas that the Logo turtle (i.e., the triangular shape that is used to draw lines in turtle graphics) "shouldn't be into," but having the visible boundaries being only the approximate boundaries and the "real" albeit invisible boundary having a ±2 turtle-step relationship to the visible boundary. The actual position varies from round to round and the results of "trespassing" are presented in aggregate form at the end of the round so those concerned with such antisocial behavior will have considerable doubt as to just where, when, and if such transgressions occurred.

Similarly, the turtle moves in either "long-left" arcs or "long-right," "short-left," or "short-right" arcs at a player's command—en route, it hopes, to a reward of some sort. The arcs also are of slightly different lengths each round, although the variation is fixed throughout a given player's turn so that a clever player may calculate the potential of a series of "slightly longer than usual" arcs.

All this adds up to the potential for mistaken judgments, misunderstood motives, acts of trust as well as broken promises, long-range strategies, sudden opportunism, attempts to adjudicate consistently and equitably, pleas for fairer laws, political platforms declaring an incumbent government's desire to institute reforms, and so forth. To the person knowledgeable about the distinction between play and games, this is *play about games, not a play of a game.* This is children playing *at* rule-governed behavior, not playing because of rules as is the case of a bona fide game.

From a research point of view, the position is not primarily one of doing research in a kind of "once and for all" way leading to pronouncements about what children of a certain age are capable of doing. The point is for those concerned with children's behavior and learning to conduct miniature experiments with specific children with real names and real track records of cooperation, competition, disruptive behavior, withdrawal, and so on. The goal is to observe and guide those children as they discuss the inevitable differences in perception associated with the police versus police roles, the seemingly inevitable inequities of marble distribution, and so forth, all in an environment characterized by its "trivialness," its playfulness. In short, the research should yield insight into learning styles and difficulties of particular children and provide possible clues to remediation.

From the particular point of view of the relationship between computers and kids, the goal is to look at kids moving about in a world that "is" electronic as well as to let them "swim" in such a world from as early an age as possible, to make them "at home in the water."

This metaphor leads to the next question: Just how early might it be reasonable to introduce children to swimming in an electronic environment? If it is too early to talk about children being literate, too early to talk about children being "computer literate," can we "drown-proof" them? Is there any harm, is there anything to be gained, from very early experience with this environment?

What might play, involving a group of children using an electronic plaything, look like if we were to honor the approach inspired by "Marbles"? Again, the experiments are just beginning to be designed.

The approach is roughly the same as with the "Marble" example. Think of an activity that is rather familiar to the children of the age in question, and add an electronic plaything in as simple a way as possible, concentrating on getting the children *to interact primarily with each other,* and only incidentally with the computer.

To this end picture a group of preschoolers, kindergarteners, or first graders who are to engage in an activity requiring them to sit down, stand up, shoot up their hands, quickly pull them down, reach out to one another, hold hands, form circles, form squares; whatever they might be doing if there were no computer. Perhaps one would be wise to think in terms of playing "ring-around-the-rosie" and other such games, and then start adding some interesting learning tasks such as learning to recognize shapes.

My first programmed versions of such a game, again utilizing Logo, gives the person in charge control over which shapes to play with—a circle, a square and a triangle, or segments thereof. As these shapes combine into figures that are remarkably facelike, two little lines have been added so that "eyes" can appear if desired.

There seem to be countless ways to proceed. Working just with a square, for example, eight to twelve children can be "lined up facing in" in the form of a square, two to three to each side. If they are asked to stand holding their hands at their sides, it is not at all clear that "the figure" is recognizable as a "human square." If all are asked to hold their hands straight out, touching, forming four straight lines with fingertips touching at right angles on the part of each pair of children who thus form the corners, the square looks more like a square. The computer can give the signal to put arms up or down by flashing the square on or off. The whole square can come up at once at the start; later the lines can be turned on or off one at a time, two at a time, three at a time. The speed can be varied. Each line can be drawn in segments, one for each child in the line (i.e., two or three in the example in question). Sounds can be added—sounds by the computer, sounds by the kids.

The process can also be reversed, with the human square signaling what it wants drawn on the computer. It is extremely simple to program a key such as "I" to produce the top line of the square, perhaps placing a line on a sticker on the key; "J" can be the left side of the square, "K" the right side, and "M" the bottom of the square. This configuration turns the stickers into a sketchy little square on the keyboard. One child may be in charge of creating the square on the computer, or four children may be, each charged with punching only one key. Another key could be the whole square, for example, "S"; and the children can even learn to "program" by seeing how in Logo the instruction "To S" can be followed by I, J, K, M, one letter to a line, resulting in a touch of "S" being the same as sequential touches of I, J, K, and M.

As children become familiar with one figure, the possibility of introducing quite complex figures made of the parts of the circle, square, and triangle offer many opportunities. A human "bingo" card can be formed with each child representing one cell. Armed with a particular shape, perhaps presented as print-out rather than on a card or on regular paper, each child could put his or her hand up if his or her portion of one of the figures matched the lines on the screen, stand up if two parts matched, and stand up with one's hand up if all three figures matched. As the figures pop on and off the screen kids would be actively putting up their hands, standing up, sitting back down . . . essentially trying to get five kids in a row in the same posture other than sitting.

Clearly it is not difficult to make the exercise increasingly complex; its merit probably lies in the fact that it can be kept simple. Perhaps the most interesting thing that might be learned from such play involves ascertaining the level of complexity that can be handled by a particular child at a very young age if ideas presented emerge in a spontaneous, playful way, yet in a way that is as logical, impersonal, abstract, and even formal as it would be if it were part of the ever so precise procedures of a computer. My preference, as stated before, is not so much to strive for *generalizations* dealing with such matters, but to create a classroom or playroom that is tantamount to an ongoing experiment dealing with what *particular* children are capable of learning.

Together, teachers and children should search for many ways to interact with the computer. The tradition of theater games, or improvisation games, is probably a rich source of ideas (Spolin, 1963). Between the turtle's sketchily drawn letters and the notion of children forming their bodies into approximately the shape of letters could lie many exercises for exploring the alphabet. This implies that the teacher of young children should learn to program well enough to instruct the turtle to draw letters. Although a bit time-consuming perhaps, it should not be beyond the talents of any adult capable of working with children to program the computer to draw large letters, using Logo's turtle graphics.

If the goal is to "drown-proof" children, it certainly makes sense to have adult role models who are not afraid of the water. Teachers are not likely to achieve confidence relative to computers if they use only preprogrammed materials that are as mysterious to them in terms of how the programs produce the information on the screen as they are to the children in terms of actual concepts presented on the screen. The cues that children pick up from the adults who ultimately should be in control of the computer are probably as important as the cues picked up directly from the machine itself. The adult should not be giving off signals that the computer is really beyond his or her control.

The enormous advantage that young children offer the imaginative educator is that "play" is considered to be children's "work," and the large gulf that divides the world into extraneous play and important work has not yet developed. In this world it is probably all right to treat the computer as a plaything. Later on teachers will fear the seductive power of computer games unless they can be shown to be pedagogically redeeming; but for the very young, playing is more nearly "OK." So the responsible adult must, it would seem, turn to a concern for the socializing impact of one kind of play versus another, one kind of playing versus another. If the computer is treated entirely as an artifact to occupy an individual, something to be explored in and of itself, there may be no great harm done . . . but there may be countless opportunities lost. These range all the way from opportunities for many more people to learn to be comfortable and competent around things technological, to opportunities to learn things about one another that we might otherwise never know.

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