

COMPUTERS AND CREATIVE PLAY

by Nolan Bushnell

The computer, the single most powerful development of the twentieth century, is still puny in com-

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parison to the mind of man. The difference lies in the innate creativity that is our birthright, our passport and our guide through life, without which we would be little more than machines executing programs someone else has written. The goal in



producing computer-programmed video games is to provide the stimulus, the opportunity, for people to experience the essential creativity they knew as children, when their minds were actively involved in fantasy worlds of their own making. We have discovered that computers can be a highly effective tool in inspiring people to draw upon this often repressed reservoir. One way we achieve this is by designing games that combine fantasy with problem solving.

Problem solving is closely linked to creativity because it involves hypothesizing, or making guesses. In order to solve puzzles, you have to invent solutions and then try them out to see if they'll work. Whether it's a crossword puzzle, detective story, board game or video game, you're confronted with a problem that can be solved only if you devise a viable algorithm. In computer parlance an algorithm is a procedure for solving a mathematical problem in a finite series of steps, but I use the term to refer to the step-by-step procedure for accomplishing **any** kind of objective or solving **any** kind of problem.

You break the problem down into basic component parts. You prioritize the areas needing attention. Then you formulate a strategy to solve the problem. Sherlock Holmes, a keen observer who deduced most of his solutions by creative hypothesis-building, is an example of someone who utilized algorithms, Holmes noted all the minute details of his environment, methodically proceeding to create hypotheses in such a way that all the data were met, and only then did he offer his solutions.

Deciding on a strategy, therefore, can be a very creative act. And watching how the strategy you create with your own mind turns out—that's really what the fun is all about.

After all, who knows whether your strategy will win or lose? The only way you're going to learn is by devising new strategies and testing them whether they work or not.

Video games have a unique educational component that involves the application of an algorithmic process to a certain kind of problem. In this case, the player faces the challenge of eye-hand coordination applied algorithmically to solve a problem in motion graphics. For instance, how does a person learn a pattern by which he scores high at Pac-Man? He must constantly test his hypothesis. If the hypothesis doesn't work, the feedback of the medium is quick and final: his quarter's gone.

The learning process, then, is one of constantly testing your hypotheses to see which ones work, which ones don't. In the process a person can assimilate one of the basic rules of scientific discipline, though I think this kind of learning often happens at a level of mind that you may not be totally aware of.

Research has shown there are important educa-

tional components associated with playing video games, and these special benefits accrue from the tests of eye-hand coordination comprising the fundamental challenge of virtually all video games. The development of good eye-hand coordination is particularly important in young children, who need to develop a sense of confidence and a feeling of mastery over their environment. Moreover, playing video games not only results in improved eye-hand coordination, but also-fascinatingly enough-correlates highly with an improvement in reading skills. If I were to offer a creative hypothesis on this phenomenon, I would guess the deinitive skill involved probably has a lot to do with youngsters learning to focus their eyes, to scan data by tracking movement on a screen.

On the other hand, I wouldn't claim that all video games are educational in and of themselves. As in other media and other art forms, there are so many different types that it is impossible to treat them as a monolithic group. Certain video games give knowledge of some scientific principles, while others actually violate the same principles. Some games appear to reward the player for activity that would generally be interpreted to be rather antisocial behavior.

But I don't need to defend video games per se, because as in any other medium there are good ones and bad ones. The moral dilemma that some adults toss themselves into over the issue of video games seems similar to the hue and cry raised in opposition to that allegedly corruptive new medium introduced at the turn of the century: motion pictures. As is true of the movies, a great deal depends on the character of the producer as well as the eye of the beholder. You can't let a few rotten apples spoil the whole industry.

Video games are clearly here to stay. The only question is, what form will they take in the future? Like most other entertainment fields, the future of video games will be bounded only by the imagination of the people in the production arena.

I believe that video games will proceed unrelentingly toward higher-resolution, higherdefinition and more intricate graphics. Some of the technologies that will contribute to these improvements are higher-speed microprocessors, cheaper memory and laser optical video disks.

As home video games improve, arcade video games will take on more mechanical aspects to provide the player with an enhanced experience, one that will increasingly blur the distinction between internal and external perceptions of reality. I think games in arcades will become more elaborate as arcades themselves evolve into mini amusement parks from their present incarnations as rooms full of television sets with coin slots on their fronts.

As competition for home video games, I envisage arcade games involving all the human senses in the

game-playing experience. We've seen a trend in which sound systems have improved enormously. We already have capabilities to chemically synthesize a variety of fragrances. Soon game machines will be able to vibrate, bringing in the tactile sense. And, utilizing advanced locomotive devices, we'll start moving people around bodily from scene to scene.

I don't know at this juncture exactly how we'll be able to get taste in there, but I never say never. And I always avoid always. We're working on ways to trigger different brain receptors that are responsive to taste perception. I believe there will be ways we can fool a person into thinking he's experienced taste.

The overall objective of engaging all the human senses will be to create a heightened sense of realism.

The game designer who enhances the fantasy—who makes it more real—will be the one who is the most profitable. Look at it this way: if you can have a video game designed to simulate a trip to Europe for twenty-five cents a throw, and you think playing a video game is as real as getting on an airplane and actually going to Europe, well, who's to say a trip abroad is preferable when you can have all that fun at a local video arcade for so much less?

Of course, the price for this enhanced experience will probably go up a bit. But this is inevitable as long as people demand more capabilities. Even so, you'll get much more back in terms of realism for your expense, because that never-ending march toward realism will continue.