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TOYS AS CULTURE

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CHAPTER 5

The Toy as Machine: Video Games

The history of civilization is a history of successive inventions changing the nature of the way in which people lived, behaved and thought about themselves The history of evolution may be a similar story. It is a common view among evolutionists that the monkeys that stood upright and walked like men four million years ago, did not yet have human-size brains But that in standing up they discovered the usefulness of sticks and rocks for attack and defense and for eating In turn, the groups that made these discoveries were themselves affected by their skill with these objects and tools, so that those who used them successfully were more likely to survive than those who did not.[1] Brains most adapted to using such tools and weapons were the brains that survived, and through millions of years of such selection the human brain as a skilled

tool user gradually developed into its modern form Even if we are unsure of this evolutionary narrative, it is hard to deny that there have been many subsequent events that have given prime importance to the shaping impact of technology on human nature. Whether we choose to begin with the Ice Age forcing mankind into caves and into the systematic use of fire for cooking and warmth, or whether we prefer to think of our modern origins beginning with the discoveries of agriculture and husbandry, the wheel, the control of water power, the control of wind power, the cannon, galleons, clocks, spinning wheels, printing, microscopes, the wedding of science and technology, the Industrial Revolution, the space revolution and now the computer revolution—we are all in the habit of acknowledging that, as compared with the first 2½ million years of human life on earth (and the 5,000 million years of the earth's existence), modern man with all his inventions and comforts is a creature of the last 500 years In that time human lives have been totally transformed by technologies.[2]

The Machine Toy Concept

In this section on the toy as perceived in technology we focus on the ambivalences to the toy that derive from this history.

The development of the modern concept of the toy seems to have occurred first between the years 1550 and 1750 when the new idea of the industrial machine began to change the nature of the world To many scientists of the sixteenth and seventeenth centuries, the machine seemed to be a new marvel demonstrating the sanity of the universe The existence of machines showed that, despite other appearances, the world must be governed by reason and not by chance Man's discovery of machines implied that the whole Universe was itself a rational, self-running machine, and that that was the way God had planned it in his divine wisdom. After all, could God have done less with the Universe than had man in making machines

that worked by themselves? As Galileo put it, "Nor is God any less excellently revealed in nature's actions than in the sacred statements of the Bible."

Little machines like clocks were miraculous demonstrations of God's will. They were not just toys; they were examples of the rationality of the Universe. The clock, by the way its cogs moved about each other, was an illustration of the movement of the various planets about the sun The clock was indeed a Universe made small—made rational and controllable—by ourselves. In due course, clocks as miniatures gave to small things a central place in the character of civilization. The clock as the arbiter of fractional units of time also became central to religious and capitalistic notions of work and order.[3]

The modern toy may be seen in part as a symbolic legatee of this first optimistic scientific view of the planned universe. In its smallness the toy, along with other miniatures, represented a departure from the thousands of years in which the major "science" for the peoples of the world was the science of largeness, of the macrocosm, of astronomy. This had been the necessary science for the understanding of the role of the moon and the sun in seasonal change and agricultural planning. Just as the first machines were sometimes thought to mirror the movements of the universe, they were also a turning away from that universe to the smaller universes (microcosms) under more direct human control. Among other shifts this was a revolution *on behalf of the miniature.* It was a revolution fostered by the invention of the microscope (about 1590) and of the telescope (1600). These allowed the minutiae of outer or inner space to be brought more directly before human vision and be reproduced in the miniatures of globes, maps, models and toys, as well as in the tiny still-life paintings of the Flemish painters of the seventeenth century.[4] This turning to smallness was in its own way a parallel to the theory of Copernicus (1543) that the world was not really the center of the Universe after all. Instead it was much less important than that. It was just one planet going around the sun. When the earth is not the center of all things, it becomes possible to examine it for what it is.

Although this new view promised to deliver humankind from superstition, magic, the burning of witches, the making of

potions, and sorcery, not everyone was equally excited While some could see machines as a promise of reason in a dark and irrational world plagued by superstition, disease and war—others saw this view as an anti-religious one. While some saw God's plans in machines, others saw no such thing They said, God was not exhibited by acts of nature; He was communed with only through the spirit. Thus two of the greatest thinkers of the 1600s were pitted against each other: René Descartes, on the one hand, glorifying machines, and Blaise Pascal, on the other, decrying them.[5] Descartes felt that everything was a machine, not only the Universe but also animals and plants and even our own bodies. His was the line of thinking that today emerges in medicine, when we have organ transplants, and kidney and heart machines, and when we have often come to think of the mind as a kind of computer, a vast machine confined into a small space with its own micro micro-chips and its infinity of wet software. This is also the view that is caricatured in the movies featuring Dr. Frankenstein, where the scientist cares more for his control over nature than he cares for the real lives of ordinary people. The machine comes to stand both for control over nature and for something inhuman and dangerous. The toy, similarly, is both a sign of power over things, as well as a sign of the loss of what is human, warm and loving Pascal felt that Descartes exaggerated the power of science and of machines He felt that the experience of God was a personal and intense feeling; that the important thing about human beings was not that they worked like machines, but that they had personal feelings. To understand human nature, we had to begin with *human* meanings, not machine meanings.[6]

In modern times this very same dispute still rages between those who consider that human values should be the center of science—the humanistic scientists—and those who feel that true science is the prediction of human behavior as the result of experiments and measurements—the behaviorists. The modern toy is born of this controversy over human nature, and if it no longer captures the movement of the heavens, it still captures the bitterness of controversy over whether we move

like machines or by some more indefinable aspect of the human or divine spirit.

The role of the machine as toy steadily increased in the years that followed this seventeenth-century controversy. It is contended that Descartes himself built a mechanical figure of a young girl in order to illustrate his theory that even humans are highly developed machines[7] Although there is evidence of moving machines as spectacles in fairs and circuses and for the entertainment of the elite throughout Western history, particularly in Germany from about 1400 on, the 1700s were the heyday of new and ingenious "automata." Among the inventions were: moving ducks that quacked, sheep that bleated, dogs that barked, figures that played musical instruments with varied repertoires, miniature birds that sang and popped in and out of snuff boxes, a doll that could write epistles of 50 letters, human figures that could execute drawings, and crib scenes replete with moving village craftsmen (hammering and sawing).

Apparently not everyone was equally ready for these demonstrations of universal sanity. Some toymakers were accused by the Spanish Inquisition of being sorcerers. And it has been argued that the manufacturing in eighteenth-century France of intricate machinery—early precursors of today's automation and computers—was focused almost entirely on toys for rich or royal patrons. It fed a conservative and aristocratic society, rather than the Industrial Revolution, which was taking place concurrently in England.

The Anthropology of Games

Of all the toys that are machines and that work by themselves and can be enjoyed in solitude for endless periods of time, the apotheosis is undoubtedly today's video game The "video game" is an automaton that might have made Descartes

shout with delight It is not only an automaton; it engages the player in a two-way conversation of movements and of intelligence. Indeed, if God is like this machine, God is a very logical person.

But the video game is a toy that is also a game, and, in order to understand it properly, it is necessary to say something about games in general. What follows derives from the theory John M. Roberts and I developed in order to explain our anthropological data on games.[8] We found that games were not universal in human history There is on record some small collaborative tribal groups that did not have games. Games tended to rise when there was some basis for conflict, for example, between the different roles of men and women

Among the people of the Tierra del Fuego in Argentina and Chile, there were tug-of war-contests between men and women If the contest grew too unequal, the women were allowed to go and drag out a man or two from the other side and commandeer them for their own. It was agreed beforehand that the women should win. In some tribes it was agreed that no one should win. The joy was in the struggle, but there was no desire to have anything but equality in the outcome. Those were tribes that were so small, they could not afford to let anything interfere with their necessary cooperation. On the other hand, they had to deal with the tensions between men and women and between individuals that were likely to interfere with their group survival The games gave expression to those tensions and, at the same time constrained them in what was essentially yet another cooperative venture. They permitted the expression of antagonism but within a social context that on behalf of the total community, constrained that antagonism In more complex communities, where it was more permissible for individual differences to occur, games were typically competitive. Here the competitiveness of tribal members was harnessed into a game, which, although it allowed some to win and some to lose, nevertheless confined the conflict within agreed-upon limits. The underlying anger or arrogance was masked as a spear-throwing contest, or a running contest or a wrestling match, and was further confined by being held only on given ritual occasions in association with other celebrations of the community. In groups that depended for their survival on evoking the greatest competence from individual members (as spear-throwers, or runners, or strongmen), such games were a natural way to cultivate, express and harness these performances. Thus, games have to do with some of the major tasks of survival in the groups in which they are found

More interesting problems arise with games of chance and of strategy Games of chance first arose historically in association with tribes that used magical and divinatory procedures for finding out what the gods intended them to do. The games of chance were apparently models of this random decision-making, although it was not felt to be random by those who did it. They assumed that they were finding out what they should do. The games helped them to make decisions but with divine guidance. Today's gamblers might also attribute their own successes to "Lady Luck," but in both cases it is felt that some outside spiritual or superstitious agency plays a hand in the game. Here the game helps the players to *adapt* to their belief that the world is not really controlled by themselves but by forces outside of themselves—the Force, if you will Once again, while adapting to the Force, the game also expresses the player's own belief that, in fact, there is something they can do to affect the Force, e.g., spitting on the dice, or carrying a rabbit's tail

Games of strategy exist in cultures where there is a need for diplomacy, deception and strategy in decision-making. All modern city cultures have these kinds of games. Chess (Europe), Go (Asia) and Mancala (Africa) are all strategy games in which one social system contests with another social system and the one that wins has the better strategies. Here the games appear to have arisen to prepare the group members in these novel ways of thinking about human relationships. In more complex cultures there tends to be less trust in other people, and the members of such groups are trained in this distrust—among other agencies—by these board games. Gullibility is the norm among, for example, the Australian aborigines, where people live in small groups and are very dependent on each other. Without distrust, however, it is not easy to survive in modern business, modern politics, and modern marriage. Of

course, trust is also required, and the games require the players also to trust each other, e.g., not to cheat, or not to get outraged by failure Games of strategy balance these "trust" and "distrust" requirements in a way that is complex and adaptive to modern diplomatic requirements.

The purpose of this very brief anthropological review is to show that games can be seen as models of problems in adaptation. They exist to simulate some adaptive problem that the group is having. They exist to reduce that problem to a scale that is manageable. They reproduce the two sides of the problem (to capture or not to capture; to have luck or not to have luck; to deceive or to be deceived) and also the excitement that goes with the uncertainty of not knowing what the outcome will be. Yet, because they are only games, they reduce the insecurity that might go with that excitement if it was real life. Players are not hunting real tigers, or taking a chance with angry gods or trying to outwit diabolical adversaries The dangers that go with these excitements in real life are largely curtailed and can therefore be studied within manageable levels of anxiety.

The Computer

The adaptive problem to which the video game is a response is the computer. The computer is, to this century, what printing was to the sixteenth century The invention of printing gradually made information about biblical and other matters accessible to all people. It helped to change people's ways of thinking about religion and about science. It made information available to anyone who could read. From 1550 until today, the world has increasingly engaged in the reading enterprise, which has spread literacy and logic among humankind. But in the beginning there were multitudes who feared what this information might do to people when it could no

longer be controlled by the authoritative few who were priests or scholars.[9]

Similarly today, the computer strikes fear into the hearts of many people. The computer is a response to the information explosion. With the total sum of human knowledge doubling every decade or less, it has increasingly become impossible in this century to keep up with massive new amounts of information on every subject, let alone to make decisions about that information. The computer helps by storing such information and making it instantly accessible; it helps with decision-making by discovering many of the implications of all this data that it has stored, when one kind of data is compared or correlated with another kind.

But it requires training to understand how to read a computer and even more to understand how to make it give the answers one wants. It seems to be a machine which in many respects is more intelligent than human beings. Famous scholars actually argue with each other over just how intelligent and "human" the computer really is. Some suggest that ultimately it will be able to deal with emotional problems or unforseeable problems. The first line up with Descartes and computer optimism; the other with Pascal and computer pessimism. What the public has come to realize is that the computer will be the new force of the twenty-first century, when it may control most of what we do, from simple train timetables to landing on the moon; from banking, accounting, and business, to the military. Perhaps even our private medical histories will be on computer, as well as complete resumés of our education and our careers. Nothing may escape the immediate availability through computer of our total recorded lives Ours will be a world village of records succeeding those of rumor and simple observation.

The Computer then has become a Force in ourselves, not a physical force (to be countered by games of physical skill), not a random force (to be countered by games of chance), nor a deceptive force (to be countered by games of strategy), but an entirely logical and mnemonic force, to be countered by, of all things, video games.

The Video Game[10]

The adaptive problem in the video game is to "beat the machine " One does this by physical skill and coordination of hand and eye, by strategy and by good luck. All of the major competences of the prior three classes of games (physical skill, chance and strategy) must be used here separately or in combination to beat the machine. The primary thing about these games, as about all games, is that they involve a contest between players. But this time the other "player" is usually a computer, which controls the plays as well as the programs within the computer that must be played against. Sometimes these programs have random elements, sometimes logical elements and sometimes both. When they have random elements, it takes luck to succeed. But this machine is also a toy, because it is a play object and not a human being. Most of the time the battle will just be between you and the machine No one else need know what is happening, and you are ultimately the one in control, deciding to turn it on or off, to begin at the simpler level or the more complex level, to make your own programs or to buy other programs you like better. All of these decisions about this artifice make it a toy. And yet it is the most complex toy ever built and is vastly more responsive than any other toy ever invented. Compare it, for example, with its contemporary, the doll Chatty Cathy, which has about a dozen different sentences with which to respond when you pull the string Chatty Cathy does not take into account the variety of your responses; the computer does. Chatty has a dozen responses; the computer has millions

As a game, the computer can do as much as most of the human players you are likely to know, though it has yet to beat the very best chess players. So we have a toy which is a game, and which is a model of the computer itself. What we fear about the computer (about the space age, flying machines, nuclear bombs, and the R_2D_2 and CP_3O we can come to some terms with in the video games, which reduce these worldly phenomena to our own scale and our own terms. It miniaturizes the heavens, global battles, star wars, tennis games, Pacman, Donkey Kong, Asteroids, Space Invaders, and the like Those who have done

research on the effects of stress on animals have found that it is not the amount of stress that counts, so much as the animal's ability to make some kind of relevant response. If the animal can be usefully responsive, it does not show the impact of the stress to the same degree. It is, rather, the inability to control events that makes one susceptible to stress. Video games are, among other things, a human response to the fear of the great machine. And it is the player's control over the machine that is most emphasized by those who play these games.[11]

In May of 1983 the first world conference on video games was held at Harvard University, Graduate School of Education.[12] Some preliminary and tentative social facts about these games came from that conference: (1) in this first generation of video games children seem to learn them much faster than adults (but whether those children's children will have as much success remains to be seen); (2) by and large, boys and men prefer them more than do girls and women, although this is not particularly exceptional, as that difference has always existed with most of the other kinds of games of physical skill, chance and strategy that have been mentioned (the exceptions being jumprope, jacks and hopscotch, bingo and Twenty Questions); (3) solitary children in families play with them more than those with siblings, but then so do their relatively solitary parents play with the games more; (4) children in video-game families watch less television; (5) in this first generation of games there is much home discussion and conversation about the games; (6) children can carry the games in their pockets, and there is some house-to-house swapping and group gatherings in those homes where new games have arrived.

Again, despite early hysteria about video-game play (arcades as dens of drug dealing; video-game addiction leading to gambling; theft paying for games; and games instigating aggression), none of these fears have been justified by the little research to date. Players tend to be above average in school grades, non-truant, have wider-than-average interests, spend at least half their arcade time socializing with the other players and spend, on the average, less than three dollars a week. As they develop in skill, they may play for long periods of time, even hours, for only 25 cents. It is the adults who learn more slowly

and spend the larger amounts of money. Those who play, child or adult, appear to become less tense and to enjoy the experience as a recreative phenomena.

Undoubtedly, as the games change, the social patterns may also shift; there can be nothing very universal about them. Perhaps of more importance is the research showing that the more popular games have more explicit goals, keep the score for you, have various levels to play from simple to sophisticated, have sound-effects and music, quickly react to your moves, have some built in randomness, have evocative images and fantasy and give you choices and a sense of your own power. Never before in history has it been so easy to specify the character of the game and the characteristics of the playing, as these are all programmed in the first place. When we have in the past analyzed chasing or checkers, it has never been so simple to specify exactly what is required for each move and for each sequence in the games. In some ways, the emergence of video games is the culmination of games as a science, although this has already been anticipated by the work done in professional sports and in what is known as game theory (in games of strategy) and probability theory (in games of chance). Henceforth we should be able to program games to study all of their characteristics and also develop programs to record the nature of the players' responses in a thoroughly systematic fashion

Even more important—seeing that it is possible to analyze computer programs in the same way—it should in due course be possible to specify the way in which playing video games helps with learning how to run computers. What is difficult in all of this, however, as it has always been in analyzing other games, is that even though we can specify the required moves in a game or the required moves in managing a computer, that does not tell us what the required psychology of the player must be. Still, with so much that is specifiable, it ought to be possible to hypothesize and finally reach some verdict on the latter.

Video Game Psychology

What follows is entirely speculative and must be regarded as, in many ways, only a first sketch of the psychology of playing video games and, to some extent, of playing with other toys

1. To the outsider the most obvious characteristic of the player is his/her attention to the game and unwillingness to be distracted or to engage in conversation with the outsider while playing The game leads the player to show persistent attention or *concentration*. It has been known for years, at least anecdotally, that a major task of schooling is to develop such concentration in matters of a symbolic kind. What has distinguished children over the age of about seven years from those under that age has been partially this characteristic of being able to pay attention to symbolic matters for long periods of time When this ability is acquired as part of a person's character, then s/he has the ability to use it when it is necessary in further schooling or in the world of work. Sometimes one is familiar with children who have this characteristic in play (as in baseball, or collecting stamps) but do not seem to have it in schoolwork. Although this may be unfortunate for their school grades, it is nevertheless a sign that the power of persistence is there, if one can get it turned in the direction of school. There are many anecdotes in the literature on the arts, of children unable to persist in schooling, whose attention and character have been captured by some experience in music, drama, story-writing or filmmaking, and who, as a result, have subsequently been able to generalize their new powers, subsequently having little trouble with the rest of their schooling. Already there is an emerging literature of the same sort on video games, that is, of delinquent and marginal persons, who have become attracted by video games, have made them a center of attention and have now gone on to higher work in computer programming. Usually when one has such anecdotes, one is given little information about those who did not succeed in this way. The games are presumably not a panacea for everyone any more than is music, drama or film-making. Still, they do seem to be able to capture more interest than most of the other media or arts available to children. The persistent concentration we are talking about is sometimes mistaken for addiction. But its compulsive quality is the same experienced by those who have fallen in love,

or are taken by some hobby or sport. It is the kind of avocation that depends on the subject concerned. It is not an addiction where what occurs is a surrender to outside forces over which one has no control. We must distinguish such compulsive avocations from addiction. Video games are of this first kind. Our proposal, then, is that video games, like all other forms of exciting play, lead to a compulsive and persistent attendance on the games themselves. In this, they are like all games and all play which has long been noted for holding children's attention when they should be coming inside for their supper, or leaving the playground to go into school. Many parents have sighed with relief when, at last, their children became sufficiently attached to their dolls or blocks or railway trains that they played by themselves happily for hours without bothering them.

The video game as a toy is just the latest in a long series of devices which, in the history of the past 300 years, have drawn the young into the performance of solitary, albeit exciting, activities, giving them the experience of such concentration and persistence—in their compulsive avocations—as to incidentally rehearse them for their future careers in science, research, or any other kind of work where individual and solitary concentration on the task at hand is a requirement.

2. The video game also requires considerable *visual scanning* of the television screen Young children have to learn the literacy of cuts, pans, dissolves, special effects, flashbacks, replays, skips forward, and zooms. It is not that they need to know self-consciously what these things are, but rather that they must know how to interpret the meanings that flow from them when they occur And that is a kind of literacy that takes much of the first seven years of life to master during intensive television watching. One authority has suggested that modern children are better than their parents because they have so much television experience in just such visual scanning There is research which shows that television-viewing, as compared with reading, tends to make the viewer remember and be sensitive more to

moving actions than to ideas. Television viewers are also very familiar with all kinds of visual transformations in cartoons and films. It is feasible (though by no means certain) that extensive television-watching might have prepared modern children for the highly complex task of sorting out the different and complex visual displays in video games. The little funny-shaped things or creatures on the screen have different visual characteristics and different visual movements. They move in either two or three dimensions and are often moving at the same time, so that the player must visually monitor a variety of kinds of movements in order to react appropriately.

3. There are also *auditory discriminations* to be made. Sometimes the sound effects are quite parallel to the visual events and are an accompaniment rather than a complication. But at other times the increase in tempo, or change in melody or dialogue or laughtracks signal new events in the game or the requirement of another kind of response. So the child has to learn to sort out the auditory cues from the visual cues and to take both into account at the same time in responding. By and large, in education in the past, we have tended to correlate visual and auditory influences (musical accompaniment for dramatic movies), and, in general, the video games still do that (e.g., explosions at the moment of missile impact). When games use them separately, however, something much more sophisticated is being attempted—and learned by the child.
4. *Motor responses* are usually zeroed in on by the public witnessing children in arcades pounding away on their levers or their letters. What needs to be kept in mind here is that quite difficult coordinations are required with considerable speed. In the usual case, the direction of the vehicle is to be properly managed by one hand, and the flight of the missiles to be appropriately discharged by the other. When one considers how much time most adults take in learning to drive automobiles, in learning to steer while declutching or breaking or indicating turn signals, it can be appreciated that the video game, early on, requires very considerable and skillful coordination

of a number of motor responses. Still, we have to remember we are dealing not just with motor responses, but with responses in coordination with visual scanning and auditory discrimination.

5. *Perceptual patterns of learning.* On a yet higher level than these other competencies, the child, while playing, must also induce the patterns in space and time, in terms of which the events will occur. Unlike most logical or symbolic analysis (as chess), the player has no time to sit and figure it out. In most video games that are popular, one can learn only under fire, only in the midst of action. By repeated exposure to the experience of achieving or failing to achieve the games' objectives, the player gradually induces the patterns that are there. That is, the player comes to react appropriately—often, however, with no great verbal clarity about why the responses are now the right ones. This is why we call it a kind of perceptual learning of the appropriate patterns. This kind of intelligence is a more basic kind than is usually dealt with in schooling. It's the kind you use when wandering around neighborhoods, exploring new cities, or fixing your own plumbing It's the kind that was probably of greatest importance to the hunters and gatherers of yesteryear. It's the kind we use all the time without thinking about it, but which, with increasing experience, leaves us with the feeling that we know where such and such a place is, or know how so-and-so will react. We have never worked these things out logically but by being in those situations and with those peoples we have implicitly learned about them and how they work. We have learned the rules of the game, although they have never been stated to us and we could probably not easily put them into words. It is not hard to agree that this perceptual intelligence is the basic kind we use every day without even knowing it; it saves us from being run over by automobiles, from losing our way in cities, from getting into danger in the neighborhood and from mistaking the characters of those around us.

In the video game this perceptual intelligence is put to the service of inducing the rules by which these games

are being programmed, although again that is not usually consciously done nor reflected upon consciously. In *PacMan*, for example, you must discover that the monster changes in character—at first, shy and slow, and later, fast and aggressive. In *Space Invaders*, you must realize that when you have shot down a certain number of them, they increase their speed in advancing upon you and the rapidity of bombs they drop on you, and you concomitantly must increase your own speed of launching your attacks. In *Break-out*, you must learn that if you hit the ricocheting ball with some parts of the paddle, it goes more slowly than if you hit it with other parts of the paddle and, as a result, your control is easier.

Whether we talk in terms of motor responses, visual scanning and discrimination, auditory discrimination or perceptual intelligence, all of these competencies, when applied to the special domain of video games, have to work mainly with such basic elements as *direction, velocity, altitude*, two or three *dimensionality*, and *horizontal* and *vertical movements*. The field for the operations of this intelligence is largely a spatial field. And, in being intelligent about these things, the player has to keep in mind several processes at the same time (*serial processing*) There is no room for a kind of approach that does one thing at a time.

In answer to the question of what good this all is, it will be some time before we have the research answers to that. In the meantime, there are several suggestions First, people play games—especially video games—because they are exciting; and they are exciting because they simulate adaptive processes (of conflict, danger, strategems). As such, they pass the time in a more interesting way than would otherwise be the case. The major reason that players have for playing video games is that they are games and that the opponent is the mighty machine.

As far as the public good is concerned, it is probable, but not proven, that play at video games accustoms the player to the kind of activity that computers also require One must sit down in front of a computer-like object and manage it in much the

same way by levers and controls that a computer is managed. As in the case of the computer, there is immediate feedback for right and wrong choices. The management system of both game and computer are thus similar. It would be surprising if skill at one did not transfer to skill at the other; or if the attitude of being at ease with one did not transfer to being at ease with the other. The management of multiple variables, the visual scanning and the perceptual pattern interpretations are also, in general, the same. The persistence and focused attention on the visual screen is the same requirement for both. In both, one must give input to discover the correct responses; one cannot hold back.

Probably the most valuable asset for the experienced videogame player is the development of a motive to "play about" with the computer as s/he has played about with the games. Given the plethoral nature of the computer's possibilities, this kind of open and flexible attitude may be of greater importance in the future management of these machines than simple program control. Bernard De Koven, a game designer himself and the author of *The Well-Played Game*, is of the opinion that this kind of voluntary learning, which is typical of video games and of games with computers, may ultimately transform education with computers, making playing with them central to adaptation rather than merely preparatory or parallel, as is presently the case. Unfortunately, their exploitation in schools has not generally been of this character.

Conclusion

We have used the video machine to examine our original hypothesis that toys as machines were first seen as items of rationality, as human demonstrations of the way God runs the Universe While God plays a little part in modern argument, the debate continues between those who believe computers can capture the essentials of our nature (as thinkers) and those who believe that the computers' function is much more restricted than that.

But we have used the video game also, because, like the toy, it is also a vehicle of solitary concentration. That such a great effort is being made by some to insist that games be put into these machines so that children are required to play with each other is almost a vindication of this view; indeed, some video games permit this alternative. One game inventor has proposed the interesting idea that players should be able to stop the game at any point to consult with each other about alternatives. But all of these attempts, valuable as they may be, merely underline the essential solitary capability of the game itself.

The role of the toy in modern history, we would claim, is both to represent an isolable condition of nature (as does a scientific variable) and to induce solitary activity on the part of the player. The toy is a concrete isolable and with it the player becomes an isolate; in this way an immense change is served upon civilization.

But, in addition, the video game as a toy, although it illustrates a liberation of human beings by technology, also illustrates the tremendous power that technology comes to exercise over human beings. Every parent of a modern videogame child has felt an uneasiness at the way in which this new machine takes the children away from their usual behavior and seems to possess them for hours and weeks and months on end. This toy, as a machine, not only isolates the child; it possesses the child. Dr. Frankenstein may indeed have created his monster, but the monster soon began to destroy everything about it. In similar fashion, many fear that our world may well be taken over by our computer "games" and that it will end (as, nearly, in the movie *War Games*) by the computer possessing us, rather than us possessing them. The paradox here is that we fear that the machine, which begins as something that does us a service by running by itself, may end up doing us the disservice of running us. What brings us more control may end up controlling us. The toy participates in this cultural ambivalence over control just as it participates in the cultural ambivalence over bonding and isolation.