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The Game Player's Duty

The User as the Gestalt of the Ports

Claus Pias

> *On-screen characters, for instance, become submarines, the ball becomes a torpedo; or the characters on the screen might look like skiers. So remember, play the game according to the directives.*
>
> —A GERMAN USER'S MANUAL FOR THE GAME CONSOLE *ODYSSEY*, 1973

In 1793 an unpaid, thirty-four-year-old professor, writing a thank-you letter to his financial supporter, established a new meaning for the word *play*, a meaning that would profoundly influence game theory for the next two hundred years.[1] In a development of his thought influenced by the turmoils of French Revolution, Friedrich Schiller stated that the concept of "playing" could describe the most complex as well as the most basic conditions, such as the "aesthetic state," which he described as "a state of the highest reality so far as the absence of all limits is concerned," and a state in which we would be able to experience a restored "unity of human nature."[2] This broadly defined concept could address questions of both political and anthropological theory. What intervenes and mediates between "life" and "form," "power" and "law," the "real" and the "problematic," the "state of nature" and the "state of reason," is something that Schiller calls "culture," or "the person," or "play." The definitions of these terms overlap since all three act to reconcile opposite tendencies and (depending upon the imagery one uses) mediate "interactions," allow "judgments," or even "balance the scales." "Culture," "the person," and "play" are—to quote Schiller—the arenas where the "material impulse" and the "formal impulse" interact reciprocally, in such a way that "the operation of the one at the same time confirms and limits the operation of the other, and each one severally reaches its highest manifestation precisely through the activity of the other."[3] Thus a kind of general mechanism of communication and control appears as a "game" in which one reaches decisions not only according to aesthetics but also according to the criterion of efficiency, and it describes the functions of art as well as, for example, the functions of "police" *(Policey)*.[4]

The fact that the term *play (Spiel)* can be used here is—despite its Kantian grounding—still so astonishing that Schiller feels the need for some words of justification. Does it not vulgarize the aesthetic, he asks, to equate it with "the frivolous matters which have always been called by this name"?[5] No, is the answer. One must not think "merely of the games being played in *real life* and which are customarily directed only towards very *material objects*."[6] This is not about contemporary "frivolities" like faro or whist, or about tactical exercises like chess or *Kriegsspiele*—indeed not about "games" *(Spiele)* as such but rather about "play" *(Spiel)*, about a playful attitude. Since then, it seems to me, most anthropological game theory has developed on the merits of excluding the materiality of games. Play, whether a natural teaching tool (J. J. Rousseau, etc.), an activity mediating between the inner world and the outer reality (D. W. Winnicott), an act of self-distancing (R. Schechner), a transcending of order and chaos (B. Sutton-Smith), a force that creates community (C. Geertz), a valve for excess energy (K. Groos), a socializing function (G. H. Mead), or a culture-building expression of the life force (J. Huizinga), is presented as a timeless concept, mostly independent of the history of particular games.

From such attempts to create consistent and general game theories one can arrive at methodological as well as historical and systematic questions. The questions are about the things themselves—about what one could call game design or the materiality of games. Anthropological theory since Schiller's time ascribes play to "humankind," and in such a generalized manner that any localized game playing is seen merely as a special case, thus neglecting the importance of all concrete games. Therefore it seems worthwhile to direct one's attention equally to all unusual things, tools, devices, quasi-objects, symbols, bodies, or institutions that are crafted, calculated, constructed, installed, and assembled into "gaming machines." I am using the term *machine* in a Deleuzian sense that refers to "the way in which arbitrary elements are made to be machines *through recursion and communication*."[7] A consideration of the ways and principles of establishing such machines in different domains, such as synchronization of hardware peripherals, human-computer interaction (HCI) design, and tennis games, seems far more promising for understanding what computer games are today than simply relying on "humanity" as the key to everything, the way Schiller and his followers did.

Thus I offer below several historical accounts of the development of gaming machines that, although in different domains of knowledge, are comparable on an archaeological level of discourse. Network protocols, computer games, military commands, tennis coaching, and philosophical statements are neighbors in "that foreign land [of discourse analysis] where a literary form, a scientific proposition, a common phrase, a schizophrenic piece of nonsense and so on are also statements, but lack a common denominator and cannot be reduced or made equivalent in any discursive way."[8] These accounts are developed and composed around the motif of question and answer and around the topic of timeliness and responsibility in communication. The metaphorical (but historical) concepts I am using to describe this similarity are a command called Ping and a game called *Pong.*

Computer games, however, modify Schiller's paradigm, in which "the human being" stood in the center and by playing—according to the dictates of his supposedly essential nature—combined and solved various contradictions in his gestalt. Specifically, something like an interface moves into this center and mediates the contradiction between machine and human, hardware and wetware, thereby both creating and formatting that which the human being as user actually is. At the interface, not only do players take control over a game, but a game also takes control over its players. Therefore I shall emphasize three points: first, computer games can manage entirely without humans; second, the humans or users playing such games are viewed from their least human aspect; and third, the human-machine construct is a mutual test that implements a totally ordinary sense of duty and being on-the-spot, which is normative and "technical" in a Kantian sense.

PING

On our computer center's "modem access to uni-network" Web page, the following memorable passage can be found:

> Simplest test of functionality
>
> In a DOS window, start the TCP/IP-Client Ping with *ping fossi or ping 141.54.1.1*
>
> Ping tests if there is a connection to a target computer. To this end the program sends test packets to the target computer and waits for an answer. Response time is displayed in milliseconds (ms). If the test is successful you see four lines like this
>
> > Reply from 141.54.1.1: bytes=32 time=152ms TTL=253
>
> Now you can use other TCP/IP-Clients.

Ping is a very simple program: it sends a single data packet to a particular IP address and waits for it to come back. *Ping* can thus test the basal function of any network and can provide some answers. The first and simplest answer is that there *is* an answer at all—that there *is* a channel. Second, *Ping* assigns a unique number to each packet and can therefore tell from the returning packets if any have been lost or duplicated or have not been delivered. Third, *Ping* provides every packet with a checksum to detect any damage. Fourth, *Ping* also provides each packet with the time of dispatch (timestamp) from which the duration of the trip can be calculated (round trip time or RTT). *Ping*, however, cannot give any information about why or where communication might fail. It can only say *that it does. Ping* reports only that something has responded too slowly, not at all, or unreliably. In short, it notes lack of response or "irresponsibility" without paying attention to the cause.

Just as all bureaucratic procedures have to become independent of individuality in order to process individuals, the problem of timeliness has to be made independent of personal reasons. The most prominent example in literature might be Heinrich von Kleist's drama *Prinz Friedrich von Homburg* (1809–11). It clearly shows the origins of the concept of punctuality in military command structures. Homburg, a dreamer who is unhappily in love with the prince-elector's niece, has a vision that he is chosen by fortune to achieve great things. Carried by that feeling of elation, he intervenes with his cavalry in a battle *before* the necessary command reaches him. Although his untimely attack causes a glorious victory and he is hailed as the "conqueror of Fehrbellin," the prince-elector court-martials him and sentences him to death. Homburg simply has done the right thing at the wrong time. And by the laws of a pre-Napoleonic battlefield, being unpunctual is a serious case of subordination. As the prince-elector makes clear to Homburg, the "field of battle" is regularly scanned with ordered maneuver sequences. Being incapable of following the "control message protocol" of the plan of action (which is broken down into orders, messages, and signals) is an offense that deserves strict punishment. Both prince-elector and packet transports on networks do not need a genius like Clausewitz whose actions set the standard for later generations; what they need is timely reliability.

But to get back to *Ping:* according to "The Ping Page," *Ping* is an acronym for "packet Internet groper," where *grope* means "feel for," as one feels for a light switch in the dark.[9] So *Ping* sends a signal out into the dark of the network, waits for its return, and analyzes distortions and the echo delay time. This leads directly to another story of the origin of the *Ping* command, as told by the *Ping* programmer Michael John Muuss, shortly before he died quite young.[10] In the early 1980s Muuss, whose last job was with the Army Research Laboratory, was working on echo-sounding methods and modeling problems of sonar and radar systems. He applied this paradigm to a different problem by using the echo-request and echo-reply functions defined in the Internet Control Message Protocol (ICMP)—in his own words, to determine "the 'distance' of the target machine." Thus *Ping* is not an acronym or a noun but rather a verb that describes an action. To radar technicians *RTT* simply means the travel time of the signal, and in U.S. naval jargon *to ping* means to send a sonar impulse. Appropriately enough, network technicians also say, "Ping a server to see if it's up." If it sounds back, there is a target.

The problem of locating one's enemy might be illustrated by a story that Steve

Hayman sent to a Usenet group in 1991. Hayman was confronted with the problem of finding a damaged cable in a TCP/IP network. Tired of wiggling each cable and then returning to his computer to send a Ping, he wrote a small routine that repeatedly kept sending Pings. Because his NeXT computer was equipped with good sound capabilities, he had every echo acknowledged by an acoustic sampled "Ping." With the loud "Ping, Ping, Ping" of data packets moving to and fro in the background, Hayman was able to walk through the building and wiggle each and every cable. He then found the bad one when the sound stopped. Through the "interactive" mobilization of the observer, *Ping* became a digital, monophonic locating procedure based on the difference between sound and silence or presence and absence.

INTERRUPTION (WHIRLWIND)

In 1944 Jay Forrester took over the Airplane Stability and Control Analyzer (ASCA) project from Louis de Florez, who later became the first director of technical research at the CIA. Forrester renamed the project Whirlwind.[11] What had begun as an analogue flight simulator became a digital flight simulator project in 1945 and was reconfigured in 1948 as a real-time early warning system. Finally, in 1950 a cathode ray tube was able to make the incoming radar waves from Cape Cod visible on a screen. This vector display could show lines as well as points and thus could depict text (like Cartesian coordinates) in a kind of cartographic state (i.e., writing letters as graphs). It is worth noting, however, that with the switchover from analogue to digital real time and the temporalizing of complexity, the problem of interaction and thus the question of presence or absence also came up. And this was true for friendlies and enemies detected by the radar as well as for the users detected by the computer. Therefore the computer repeatedly had to interrupt itself while processing the data in order to be able to query both sides. Although radar objects and users had the same logical status, this issue of interruption appeared to be, not a human-machine problem, but rather a possibility condition of machine-machine communication.

The signals entering Whirlwind from the radar array via telephone lines needed to be processed in real time. Input and processing also had to be scheduled discretely. Polling, that is, the temporally regular gathering of data, was conducted through a switch called Interrupt, a hardware line that at regular time intervals interrupted processing and could cause a jump to a subroutine, which was then capable of perceiving, for example, the "environment." Since there is no (inter)action without interruption, communication among input, logic, and output units became a time-critical issue, a matter of mutual and at the same time locally differentiated systematic rhythm. Triggering communication through an interrupt is the most efficient way to coordinate various peripheral devices with different bandwidths. Consequently, what is missing at a particular system location at the time of query, or has in the meantime been rebuffered, simply does not exist.

Whirlwind therefore connected its user as one *device* among many others and located this device in certain time intervals. When the user was not on location there was no input. Whirlwind's successor, IBM AN/FSQ 7 in the SAGE project, perfected this interrupt principle. This was the only way that the fastest computer yet known, with 75,000 32-bit instructions per second, could deal with the slowest component in the system—the user. And the user showed that he was there, being responsible, by answering the question of who the enemy was. The screen depicted flashing moving dots that had to be "hit" with an input device (lightgun). If the operator missed or wasn't fast enough, he was acting irresponsibly and in the worst case "lost" a "life" (not only symbolically) because, on account of its duplex architecture, SAGE could both play games and take control in an emergency.[12]

Here two kinds of rhythmic events can be distinguished: those with entirely predictable outcomes and those whose outcomes are uncertain. Simple examples are the events "clock" and "keyboard," both of which are controlled via interrupts. While the system time's register is increased by 1 every second with near 100 percent probability, the keyboard does not send a return symbol in response to every query, and when it does send a return, it is not sure which of the 102 keys was pressed. Thus clocks are totally redundant but keyboards are highly informative. In Aristotelian terms one might say that watches belong to the category of *automatons* without will and that keyboards implement the paradox causality of *tyche* (fate), in which two fully determined causal chains meet and bring about unexpected results.[13] Computer games are dependent on that kind of *tyche;* the game is a series of events that occur through coincidence but that in retrospect can be seen as nothing other than necessary. And here I shall turn to the more concrete games of *Ping* and *Pong.*

TENNIS FOR TWO

A bouncing ball was already being seen on the Whirlwind screen, thanks to Jay Forrester's team. To demonstrate the speed and graphics of the computer, they placed a glowing dot in the upper left corner of the screen that then, as if it had been dropped like a tennis ball, drew a series of parabolas of decreasing height that appeared across the screen in the real time of the bouncing ball. Following complex wartime ballistic calculations that required a great deal of computer power, this ideal tennis ball took the place in the system of an enemy moving unpredictably and thus became the agent of perhaps the first demo program ever.[14]

Barely ten years later the physicist William Higinbotham was reading the handbook to his computer at the Brookhaven National Laboratory.[15] Higinbotham—who had previously developed the Eagle radar display of the *B-28* bomber and who had been one of the designers of the ignition mechanism for the Los Alamos bomb as well as other measuring equipment—discovered in this handbook a programming example that showed how to depict a trajectory on the five-inch oscilloscope connected to the computer. And since open-house day was drawing near, for which only the customary displays of the incomparable speed and systemic invisibility of computers had been planned, Higinbotham put together a game of tennis based on the bouncing ball.

The oscilloscope shows the side view of a tennis court: one deflection in the middle for the net, two racquet lines on the right and left, and, in the middle, the bouncing ball. The angle of the serve could be set with the aid of potentiometers, and the push of a button provided the serve. Naturally, the visitors to the open house passed over the Chase-Higinbotham linear amplifier and stood in line to play *Tennis for Two*. So the following year an expanded version appeared in which the gravitational constant could be changed to make it possible to play tennis under the conditions found on the Moon or on Jupiter.

It must be noted that there is no direct selection of the moving dot in *Tennis for Two* (as there is in SAGE), but rather a meeting of racquet and ball. Ballistics and timing, Higinbotham's old problems, come together in the racquet, which has to be moved so that it can be hit by the ball. The game player's objective is to be the target and to be ready for the ball because it is the presence of the game player at a specific time that is read and acknowledged as successful communication. Ping. Like all early computer-based games, *Tennis for Two* works only with two players who have to take turns being in the ready position. Ping—Pong. Here "Ping a server to see if it's up" means "Ping the other player to see if he's present." One may also remember Hayman's search for defective cables: the only way that *Ping* makes sense is that it does not have to make sense, only to constantly make sure that there is a channel. The player's communication consists entirely of reporting, "I am here. I am in place. I am ready to be encountered." Playing tennis means becoming part of the "madness of the rapid pace" *(das Rasende des Bestellens)*, which is—according to Heidegger—the very essence of modern technology.[16] But it also means scanning for another device and "simplest test of functionality." And since the computer has only two players at present, its priority is to measure two bodies against each other: playing tennis is the success of form under the aggravating conditions of temporality.

PONG

Two years later, at yet another open house (this time at MIT), three other demonstrations were on display.[17] The first was Forrester's famous bouncing ball on the Whirlwind screen. The second was Peter Samson's production of music on the TX-0. This computer had a loudspeaker under the control of the program that was running; it acknowledged, acoustically, a set bit 14 in the accumulator, so that an experienced programmer could hear which part of the program was being processed. At any rate, Samson had engaged the computer in meaningless loops whose sole purpose was either to set bit 14 or not to set it, and thereby to produce different sounds. While the control sounds of an efficiently running program produced only noise, Samson's amassed use of redundancy enabled meaningless recursion of a data mass up to the speed of perception of human senses, something like sound.

The third demonstration was one that turned John McCarthy's IBM *704* into a kind of color organ. This was an early example of a real hack job: despite its technical virtuosity, it managed to avoid the few available standard languages and made the most of proprietary hardware properties. The IBM *704* had a chain of control lamps, and the whole apparatus concentrated on addressing the individual device components in such a way that the control lights formed a given shape. A program was developed that consisted entirely of letting the lights light up one by one, thus producing a moving point of light that disappeared on the right only to reappear on the left. If a button was pressed just as the last light lit up, the moving point would change direction, as though it had bounced off the end and returned. A signal was thus sent into the darkness of the real, into the world of the user, who, by pressing a button, acknowledged that he was there at the right time. Tyche prevailed. The computer came across something and encountered something if it encountered a user who responded. Something echoed, "I'm up—*Ping* works." And maybe *Pong* too, for the 704's control board had become a kind of one-dimensional tennis match.

Here at the beginning of the 1960s, opinions split concerning *Ping* and *Pong*. The military chose *Ping*, and soon, in the *Dictionary of U.S. Army Terms*, defined *computer game* as a game computers play against and with each other and not with humans.[18] The hackers at MIT chose *Pong* and in two years presented their famous *Spacewar!* game for people to play on and with computers.[19] And because there were no other computer games at that time, *Spacewar!* was used in the Digital Equipment Corporation (DEC) technicians' tapes as a diagnostic tool for PDP-*1* computers.

At any rate, *Spacewar!* had an attentive player in Nolan Bushnell, who studied with Ivan Sutherland and later founded Atari.[20] Having recently completed his studies, he had achieved financial security through a job at AMPEX. In 1970 Bushnell started to re-engineer *Spacewar!* and soon realized that discourse foundations do not function merely by recording existing elements; they also require a certain elegance and an emergent surplus value. Or, in Bushnell's words: "To be successful, I had to come up with a game . . . so simple that any drunk in any

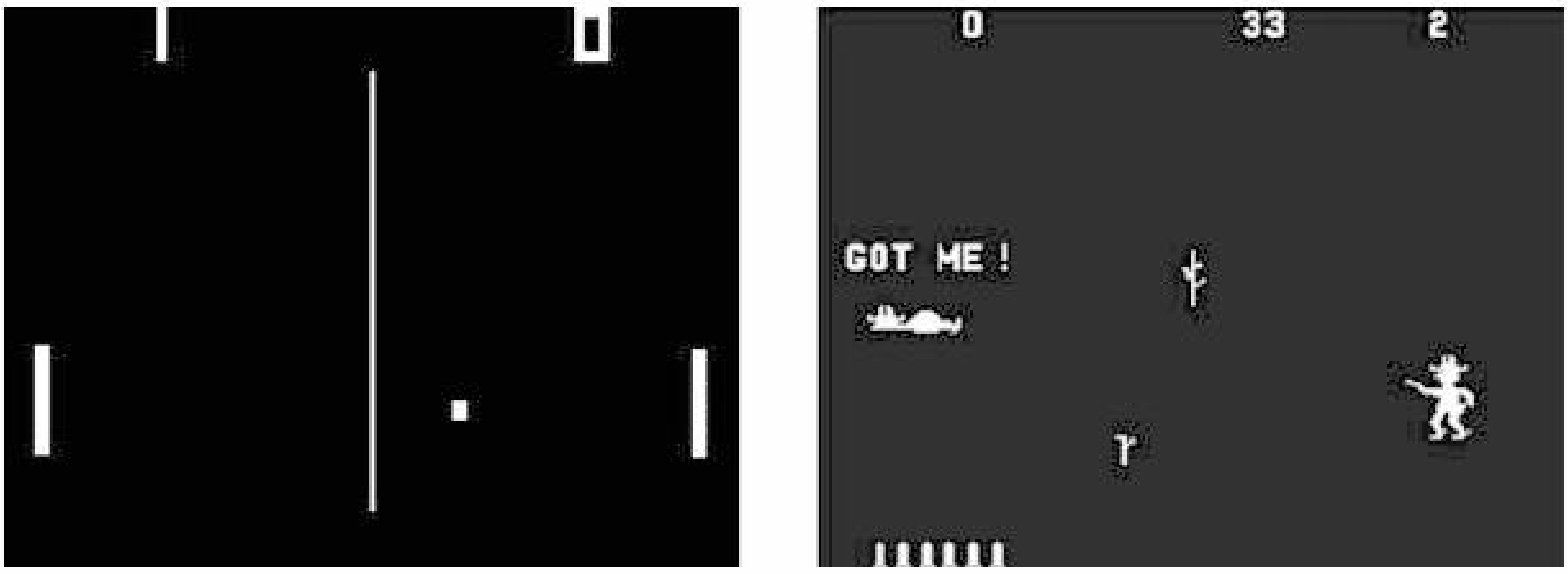

FIGURE 8.1. Screenshots of *Pong* (1972) and *Gunfight* (1975) where the absence of target was replaced with a presence of target. © Atari / © Midway.

bar could play."[21] Three of the elements derived from the MIT demo programs: first, a programmable dot on a screen; second, sound creation via computer; and third, time-critical user responsibility. Three other elements originated in the context of amusement arcades: first, the device did not require an attendant (i.e., everything that was needed to play was included in the device); second, the device did not require two players but had a single player mode; and third, the game had an end, so there was an economic relationship between investment, price, and duration of service. A final element, which came from a very different context, was a patent belonging to Ralph Baer, the senior engineer of the arms supplier Sanders Associates, who in 1968 suggested connecting a television to a computer. This replaced the cartography of vector displays with the pixel texture of raster screens. The whole device, which was more than the seven elements, was the well-known *Pong*.

Pong moved points of light across a screen, emitted sound, encountered its players, needed no external parts, had a single-player mode, kept score, and ran on old Hitachi television sets (figure 8.1). The "point" *(punctum)* of this computer game, as it was now called, since it was no longer made with analogue television technology, was of course the onomatopoetic "Pong."[22] Bushnell, who had studied the first anonymous player in computer game history in Andy Capp's Bar in Sunnyvale one warm August night in 1972, remembers: "The score was 5–4, his favor, when his paddle made contact with the ball. There was a beautifully resonant 'pong' sound, and the ball bounced back to the other side of the screen." First contact—the first "Pong," which at the same time is also a Ping. A "Pong" that acknowledges, as a Ping does, that the channel is up and that the echo reply is functioning. When the data packet or the ball then reaches the other side there is another "Pong," and, as I said above, rhythm becomes established as "the success of form under the aggravating conditions of temporality." Rhythm signals that the communication is communicating.

But rhythm is also, as Nietzsche said, "a compulsion, it produces an insatiable desire to give in, to comply, to join in; it's not just the feet, the soul follows the tempo as well—probably, one suspects, even the souls of the gods!"[23] An archaeological coincidence provides information about just which souls and which gods are involved in the rhythm of tennis in the early 1970s. Around the same time that *Pong* appeared, a book was published by Timothy Gallwey, the former tennis coach at Harvard. On the basis of his Asian experience of enlightenment, Gallwey had invented "yoga tennis" and founded his Inner Game Institute. The book reads:

> We have arrived at a key point: it is the constant "thinking" activity of Self 1, the ego-mind, which causes interference with the natural doing processes of Self 2. . . . Only when the mind is still is one's peak performance reached. When a tennis player is "on his game," he's not thinking about how, when, or even where to hit the ball. He's not trying to hit the ball, and after the shot he doesn't think about how badly or how well he made contact. The ball seems to get hit through an automatic process which doesn't require thought.[24]

The Californian conjunction of hippie esotericism and computer technology at the beginning of the 1970s makes clear what kind of programming we are dealing with in computer games.[25] In the first place, the player does not relate to the machine but rather is an embodiment of a particular kind of communication between devices. Thus players have to accommodate themselves to the communication standards for peripheral devices. Losing consciousness—what Gallwey calls the "second self"—is simply the moment of success in becoming a peripheral device and thus the possibility condition of a computer game. *Pong* seen as a problem of synchronization just reformulates the question that John Stroud posed to the irritated audience at the Sixth Macy Conference on Cybernetics in 1949: the question of a common carrier frequency in human-machine communication.[26]

PING OF DEATH

The homepage of the 3D Shooter clan called Ping of Death, founded in 1997, reminds us that, since Bushnell, computer games have had an ending point called "Game Over," a symbolic death of the player and an end to all communication. The issue of death—in shooters as well as tennis games—has nothing to do with hitting or being hit; rather, it is about the responsibility of timeliness. Like the fear of death experienced by the Prince of Homburg, who was in the right place at the wrong time, the death threat of the computer game results from a temporal displacement. Winning a computer game means making a Homburg of one's opponent. The fact that I am at the place where a shot lands, or that I am not at the place where a ball hits, is an error in my accommodation to the rhythm of the game. *Pong* is then also a game with weapons, a question of projection, as Deleuze would have said. The fact that pedagogical experts obsessed with the images and oblivious to the technology might miss this point is hardly amazing, because it is the goal of my opponent not to hit me but rather to catch my absence.[27] The enemy tennis racquet is a virtuality, a moving empty spot in my sights: the place where I ought to be but that I most probably cannot reach in time. Its target is my improbable timeliness. Its endeavor is to maneuver me into irresponsibility. The ball's trajectory is the projection of a question I will not be able to answer. No Ping, no Pong: Game Over.

Exactly this kind of virtuality of a present/absent target was a prominent topic of operations research during World War II. The methods developed for such issues were applied to tennis by the mathematician T. J. Bromwich in an article published in 1956 in *World of Mathematics*. Dealing with the probability of making a hit in tennis, Bromwich was trying to determine the undeliverability of the ball: depending on maximum and real ball speed and on the opponent's actual position, direction of travel, speed, and maximum running speed, it is easily calculated that there is an economy that determines how to force the opponent into irresponsibility without great effort.[28]

The playing field or tennis court then becomes a probability field. Each hit projects, as it were, a net of statistical curves on the target area and stochastically notches it. As Bromwich was using "classical" operations research methods, we can compare the tennis court to the example of a torpedo heading toward a submarine, which has various evasive options (figure 8.2).[29] The statistical field lines are the same as those in Bromwich's tennis analysis, and one may easily replace the submarine with the second tennis racquet and the torpedo with the ball. The only difference is that with the torpedo points are made by hitting the opponent, whereas in the tennis game points are made by not hitting him.

The submarine question brings us back again to *Ping*. The communications breakdown of not-hitting is also the point of the "Ping of Death." According to the RFC-791 standard, an IP package cannot be longer than 65,535 or $2^{16} - 1$ bytes. From this, 20 bytes must be subtracted for the header and 8 for the echo request, leaving 65,507 bytes remaining.[30] One may therefore send a Ping with a 65,510-byte data packet as a test:

ping -1 65510 any.ip.address

The standard demands that such a packet be fragmented and that each fragment be given an offset and reassembled into a packet again in the target computer. The simple result is that the last fragment is applied to a valid offset (i.e., smaller than 2^{16}), but its length causes an overflow. And even in 1997 in eighteen operating systems (such as Windows 95, NT, Linux, Solaris, Irix, and NeXTStep)

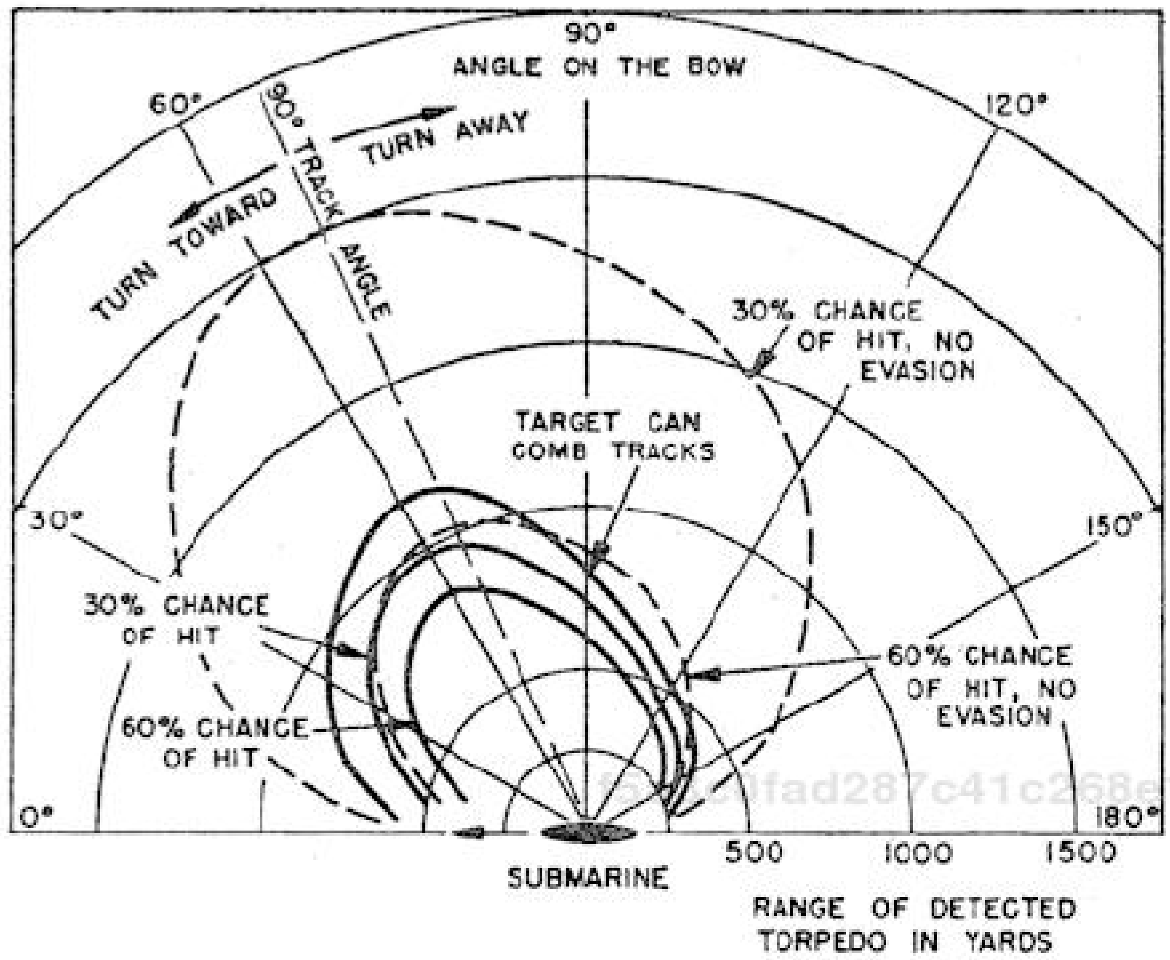

FIGURE 8.2. Maneuver of a submarine evading a torpedo on a map of virtual events. Philip M. Morse and George E. Kimball, *Methods of Operations Research* (New York: John Wiley, 1951).

this not only caused reboots, crashes, hang-ups, or kernel panic but also made routers and laser printers stall.[31]

Not only on the level of the human-machine communication found in *Pong*, but also on the level of machine-machine communication found in *Ping*, the symbolic death lies in the irresponsibility. One causes the opponent not to be able to respond by exceeding his address space, that is, by referring him to a place that is no longer under his control. Undeliverability means ordering someone or something to an impossible place. This issue is a very volatile question in media theory because if an impossible location is given it usually causes the medium to be addressed to itself. Post, for example—understood as that which itself has no address but administers all addresses—appears only and precisely when something is unaddressable. If *Ping* discontinues, then we will have to take a look at our computers.

SMURFS AND FILIBUSTERS

Since we usually don't want to see the medium itself, I shall move on from the general problem of rhythm to the particular aspects of optimal rhythm speed. When we look at the games of the last quarter century that have been resurrected in emulator circles, their old-fashioned slowness shows that accommodation is also a historical process, and a cultural diagnostician looking at such games might well claim that we have become faster. Yet all I want to do—and again between *Ping* and *Pong*—is point out that there is an economy of synchronization. This economy purports—as do all ergonomic theories—that long-term normality is the most probable work to be expected for any given unit of time. It also says that exceeding this to any great extent can be dangerous and becomes a workplace health and safety issue.

Such overwork has been known as denial-of-access attacks for several years and is one of the easiest ways to arouse the concern of workplace health and safety officials. And it is all based on *Ping*. The method is called smurfing, and it is quite simple.[32] A *Ping* packet is sent to the central direct broadcast address of a network, which then forwards this packet to a maximum of 255 other machines connected to this network. All of these obediently reply with an echo, which of course goes, not back to the sender, but to the forged return address of the intended victim that was given in the header. A cheap 28.8-K modem can "ping" 42 64-byte packets per second (multiplied by 255) so that 10,626 packets arrive at the victim's address per second, i.e. 5.2 MBits per second. And with this load, a T1 line (1.5 MBit/s) is dead. Hackers have been known to address more than one broadcast address at a time, so that, for example, with fifty addresses the victim is flooded by an answer stream of more than 530,000 packets. 28.8 KBit/s can become as much as 260 MBit/s. Through purely quantitative excessive demand, a machine can cause the symbol processing of other machines to collapse.

Not coincidentally, there is a historical analogy between too many packets and too many tennis balls. Joseph C. R. Licklider, a psycho-acoustician who attended the legendary Macy Conferences and was, among other things, one of the codevelopers of SAGE's interface design, was the director of the Information Processing Techniques Office at the Pentagon's Advanced Research Projects Agency (ARPA) when he published his classic paper "The Computer as a Communication Device" in 1968.[33] Here, in the beta version of the concept of a future Internet, is a series of small sketches, which suddenly change from organic shapes into the visual language of comic-book drawings. The handshake between two message processors appears, not, despite the hands, as a handshake but rather as the catching of a ball that is then thrown on to the next node (figure 8.3).

Yet Licklider was not so much interested in machine-machine communication as in machine-human communication. After all, despite all the Kapp, Freud, and McLuhan theories of prosthesis, Licklider had approached the situation of "computer users" from the other direction and had spoken of the "humanly extended machine" in order to make this hierarchy collapse. In 1968, while Douglas Engelbart and his colleagues were already testing various input devices according to strict ergonomic rules and thus beginning to gauge the everyday normality of computer screen work, Licklider was thinking about how these would

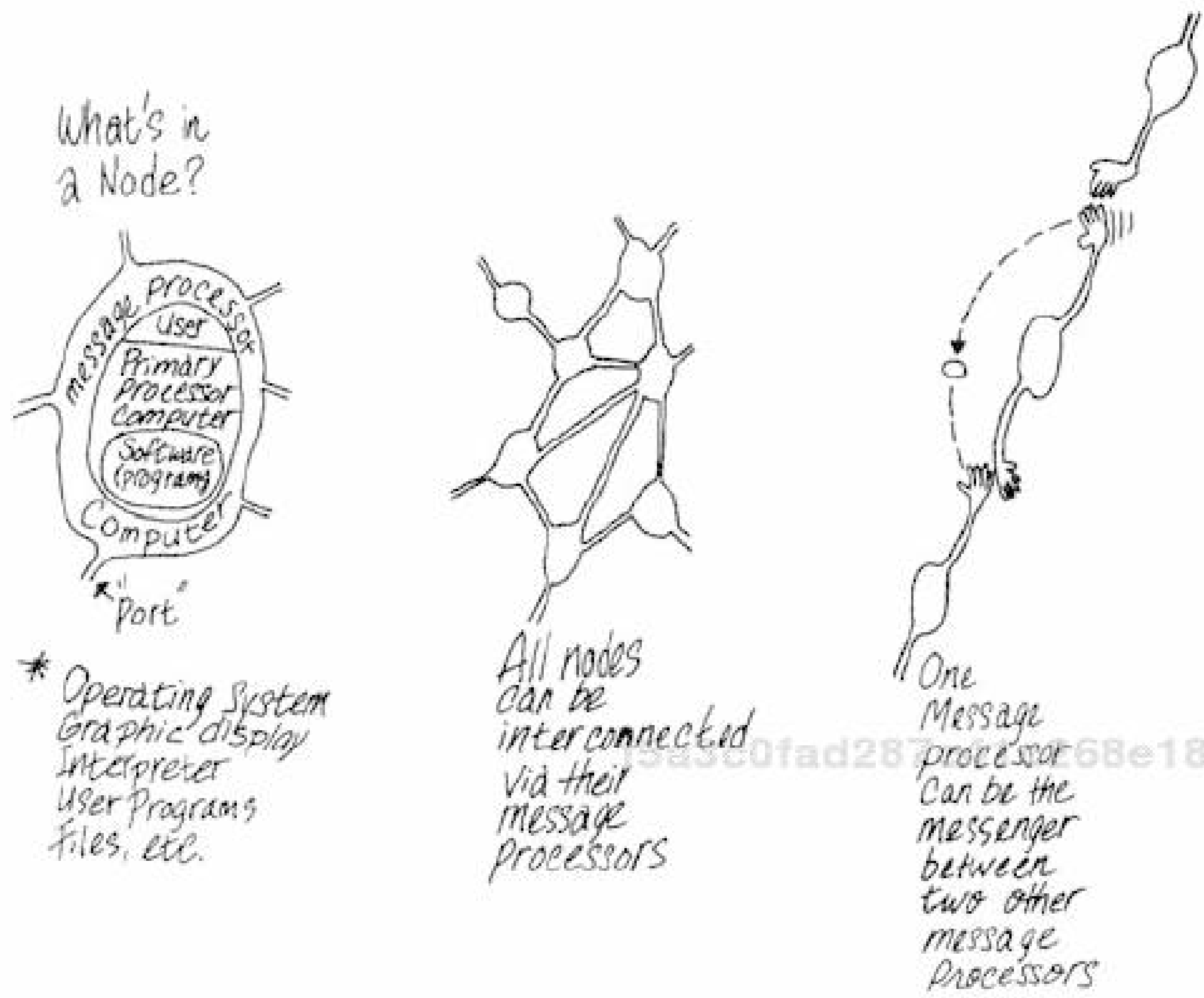

FIGURE 8.3. Illustrations to Licklider's network plans. J. C. R. Licklider, "The Computer as a Communication Device," [1968], reprinted in *In Memoriam: J. C. R. Licklider, 1915–1990* (Palo Alto, CA: Digital Equipment Corporation, Systems Research Center, 1990).

have to consist of both human and nonhuman components.[34] And, naturally, he included this in his mental image of the ping-pong game. Successful communication between machine and human is the alternation of answers; unsuccessful communication, the absence of any answer characteristic of an overload—a kind of denial-of-access attack against humans (figure 8.4). So we have to deal with a "switching" of the extensions, with an oscillation of the term between technocentrism and anthropocentrism and thus with what one could—in philosophical terms—call its "deconstruction."

Lest this all remain in the anecdotal category, let us remember that Licklider not only was interested in a traditional time-study of factory work but also, since 1961, had been trying to convince the Department of Defense of the necessity of a research program devoted to "time and motion analysis of technical thinking."[35] The main argument was that only in an optimized interaction of computer and decision maker would the latter not become a Prince of Homburg:

> Tomorrow you spend with a programmer. Next week the computer devotes 5 minutes to assembling your program and 47 seconds to calculating the answer to your problem. You get a sheet of paper 20 feet long, full of numbers that, instead of

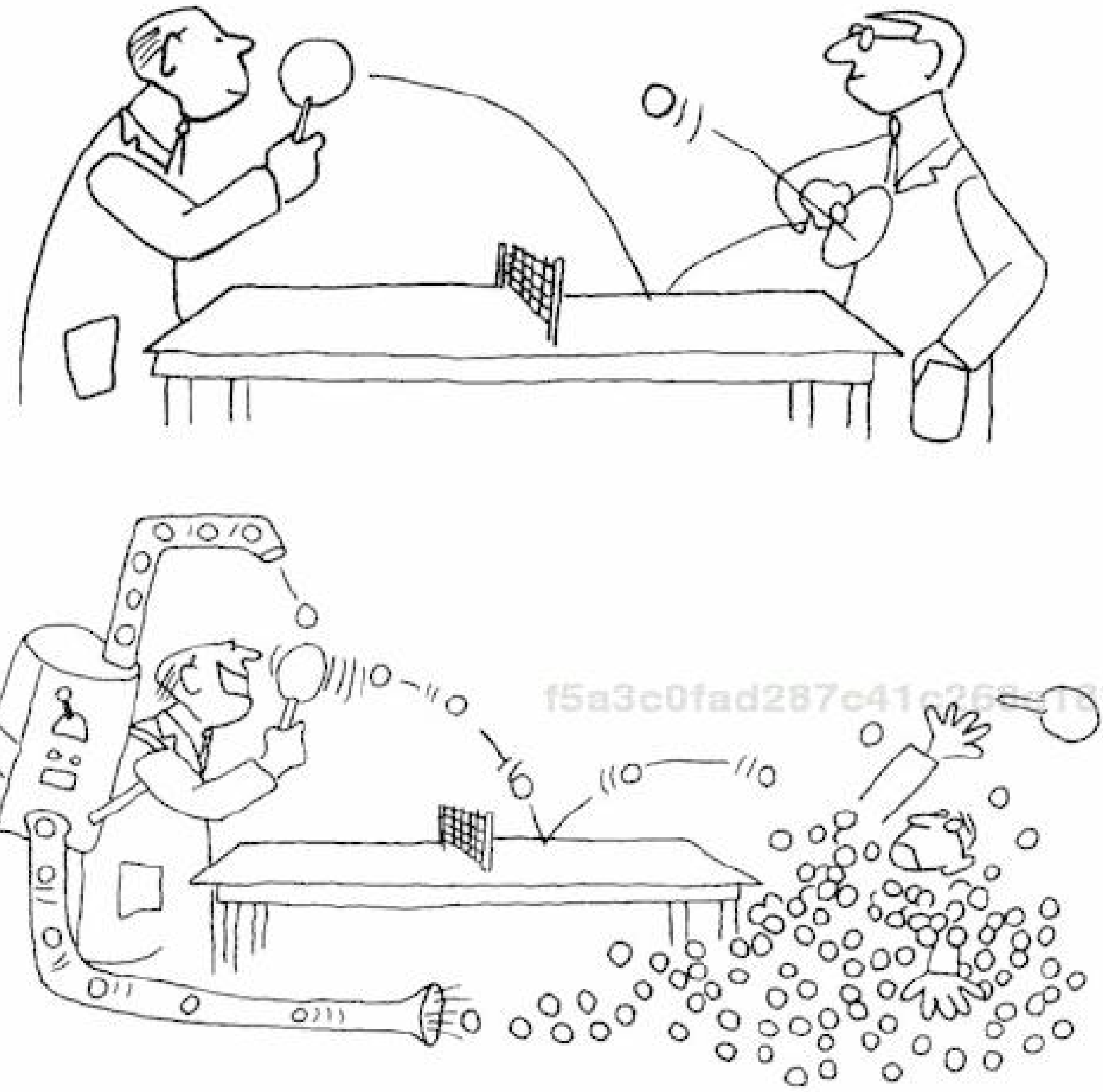

FIGURE 8.4. Illustrations of Licklider's optimized interaction. J. C. R. Licklider, "The Computer as a Communication Device" [1968], reprinted in *In Memoriam: J. C. R. Licklider, 1915–1990* (Palo Alto, CA: Digital Equipment Corporation, Systems Research Center, 1990).

providing a final solution, only suggest a tactic that should be explored by simulation. Obviously, the battle would be over before the second step in its planning was begun. . . . The military commander, on the other hand, faces a greater probability of having to make critical decisions in short intervals of time. It is easy to overdramatize the notion of the ten-minute war, but it would be dangerous to count on having more than ten minutes in which to make a critical decision.[36]

After the cybernetic hope of achieving unity through a mutual sphere of understanding between humans and machines, after Chomsky's cognitive-psychological influence as well as the proposal for the Dartmouth Project on Artificial Intelligence, the concern was now about time-critical thinking together with computers—or, as Licklider called it, "man-computer-symbiosis." Human beings have some major disadvantages when compared to computers, but they also have some unbeatable advantages. From the machine's point of view this means that there are certain gaps to be filled in before symbiotic multivalent thinking can be possible: "Men will fill in the gaps," as Licklider said. The tennis game thus describes the possibility condition for human and machine together to be more than they are separately. The machine addresses the user, its extension, whose program is written, and the other plays something back. The user addresses a machine, whose program he cannot read, but which has, by means of visibility and slowness, made itself commensurable, and it plays something back. Thus Ping-Pong exists everywhere that humans are involved with computers, in the games of fire control systems as well as in Word, in "Igloo White" from Saigon as well as in the control of *The Sims,* in browsing the Internet as well as in navigating through *GTA 4.*

Thus the new media art of the 1990s, with all its supposedly "critical" experiments in interactivity, is not only behind the times but also merely reproduces the military logic of *Ping* or the industrial logic of *Pong.* Stelarc's 1996 *Ping Body,* for example, referred to by the artist as a "powerful inversion of the usual interface," simply reverses the relationships among user interfaces that have become commonplace, ending up back in the Whirlwind era, when humans were explicitly addressed as *devices.*[37] Replacing sender and receiver is—as Baudrillard (despite questionable consequences) so brilliantly has shown—a "strategic illusion" that remains entirely "in solidarity with the reigning practice."[38] *Ping Body* is not provokingly posthuman; rather, it reproduces an everyday life that has already left art behind.

Using *Ping* and *Pong,* I have tried to demonstrate by discourse analysis that there is a sort of responsibility common to games between human and machine as well as between machine and machine. This responsibility is called (in our example) "timeliness," "punctuality," or "being there."[39] This timeliness cannot (as the example of Homburg shows) be a matter of subjectivity. One can't play a computer game as though it had feelings—that would be as absurd as relying on one's sense of time in the day of the time clock. Rather, timeliness is a matter of "duty." But duty (as Kant remarked in *Groundwork of the Metaphysics of Morals*) has nothing to do with inclination.[40] Nor does it have its worth in the intent that would thereby be achieved. Duty is measured entirely according to the principle by which it has been defined and derives the necessity of an action from reverence for the law. I commit myself uniquely to this reverence when I enter a game. Any breach of duty is punished with a symbolic death, the end of the game. A game program is thus not only a set of instructions, a kind of law code for the world of the particular game, that I have the duty to follow when I am in the company of computers, but at the same time also a police agent that precisely monitors my actions. There is no such thing as a wrong computer game in the right.

This fulfillment of duty is subject to the "rules of skillfulness,"[41] or, to use Kant's term, the so-called hypothetical-problematic imperative. The hypothetical-problematic imperative is "technical" and thus belongs in the realm of "art."[42]

And Kant notes that all skillfulness (related to duty) is indifferent toward its objectives: doctors can save lives just as skillfully as murderers can destroy them. Playing to perform one's duty has no other objective than to prolong the playing, that is, not to become guilty of failing in one's duty.

Thus there is reason to assume that, for example, the entire pedagogical debate about violence in computer games und their psychological consequences is looking in the wrong place. It is looking, not at the "technology" and "pragmatics" of playing games or at the actual devices, but only at the iconography of the graphics and the content of the narratives. The splatter of indexed games ultimately says as little about the duties of the game player as the pink dinkiness of pedagogic correctness does, or even less, because we are not in the realms of conscience and morality but in the area of duty and law. The discourse elements of the computer game are not called "killing people" or "catching gold nuggets" but timeliness, rhythm, or control. And these are continuously tested in a symbolic identity of the player.

Digital computers can provide nothing comparable to the human senses—they are much too small and too fast. Thus there is no (inter)action without visual or haptic procedures—the computer has to be "humanized." On the other hand, coupling the real and the symbolic, the cleaving together (or *suturing*) of human bodies and machine logic, can be communicated only at the symbolic level—it is necessary for the human to become "machine shaped." Games are a test of this compatibility. I would therefore use a more Deleuzian machine term—as opposed to "hardware" (which only ever implies a border between soft- and wetware)—that could describe how machines are formed as all sorts of different things (humans, images, sounds, computers, etc.) that become connected through recursion and communication and acquire the ability to function as components of the machine.

Therefore the origins of the traditions associated with playing computer games can be found not only in visual and literary traditions but even more in experimental psychology and ergonomics, and in the theories of "scientific management," operations research, and cybernetics. This is not another appeal to see the circuit diagram as "the only thing that counts" in a computer game and to state a naive technological a priori.[43] I am far more interested in emphasizing technology in a broader sense *without* reducing it to extensions, devices, symbolisms, or functioning trivializations, as philosophers, historians, and anthropologists or constructivists tend to do. I would rather understand technology as a force or a character that organizes relationships, producing something new and unexpected within a strategic dispositive. Technology in this greater sense marches to its own rhythms. It is a transversal phenomenon in that all of its designated aspects are dynamic but it cannot be reduced to any of them. Technology is a relay between technical artifacts, aesthetic standards, cultural practices, and knowledge. In this sense technology doesn't participate in an ever-changing world of devices or, in the broader sense, in cultural technologies, a history of engineering achievements, or a world of activity, either in its aesthetic products or in its socioeconomic impact. It is not that technology *is* something but that it *does* something, and it does it in many places all at the same time: it produces aesthetic, practical, apparative, and epistemic *relationships* whose aesthetic, practical, apparative, and epistemic *consequences* are once again not ordered and not predictable. In this sense technology has also been—since it liberated itself from the arts and trades and became an independent program of discourse—a challenge to anthropological and culture-critical reflections.

We need to understand how this way of thinking about "technology" as such came about, especially in connection with the most recent technological developments. The computer game makes a very good test case because it resists the hegemonic demands of human "play" that control the anthropology of "play" Schiller showed us so long ago. Computer games are a plea in favor of the material intransigence of the concrete found in "games" and for the rehabilitation of the excluded "perversions" and "corruptions" (Roger Caillois) of the game, offering the chance for a critical examination of the genealogy of anthropological game theories whose concept of play merely disguises the fact that their purpose is to remove the paradox from the social organization. To the contrary, games should be taken seriously.

NOTES

1. The German word *Spiel* that Schiller used does not differentiate between "play" and "game." The only way to make a distinction is to use the singular (*Spiel*, play) or plural (*Spiele*, games).

2. Friedrich Schiller, *Über die ästhetische Erziehung des Menschen, in einer Reihe von Briefen* [On the Aesthetic Education of Man, in a Series of Letters], in *Sämtliche Werke*, vol. 5 (Munich: Hanser, 1962), 607.

3. Ibid., 611; Reginald Snell's translation, letters XIII and XIV, in Friedrich Schiller, *On the Aesthetic Education of Man* (1954; repr., Mineola, NY: Dover Publications, 2004), 72, 73.

4. Joseph Vogl, "Staatsbegehren: Zur Epoche der Policey," *Deutsche Vierteljahrsschrift für Literaturwissenschaft und Geistesgeschichte* 74 (2000): 600.

5. Schiller, *Sämtliche Werke*, 5:616.

6. Ibid., 5:617, emphasis mine.

7. Gilles Deleuze and Felix Guattari, *Anti-Ödipus: Kapitalismus und Schizophrenie* (Frankfurt: Suhrkamp, 1974), 498.

8. Gilles Deleuze, *Foucault* (Frankfurt: Suhrkamp, 1987), 34.

9. See "The Ping Page," updated March 2007, www.ping127001.com/pingpage.htm.

10. See "The Story of the PING Program," n.d., http://ftp.arl.army.mil/~mike/ping.html (accessed January 12, 2009).

11. Robert R. Everett, "Whirlwind," in *History of Computing in the Twentieth Century*, ed. Nicholas Metropolis, Jack Howlett, and Gian-Carlo Rota (New York: Academic Press, 1980), 365–84.

12. J. T. Rowell and E. R. Streich, "The SAGE System Training Program for the Air Defense Com-

mand," *Human Factors* 6 (1964): 537; Les Levidow and Kevin Robins, introduction to *Cyborg Worlds: The Military Information Society* (London: Free Association Books, 1989), 13.

13. Aristotle, *Physics* 2.5–6.

14. According to Benjamin Woolley, even with the first game, because the ball was supposed to "fall" into a "hole" on the abscissa. Benjamin Woolley, *Die Wirklichkeit der virtuellen Welten* (Basel: Birkhäuser, 1994), 46.

15. On the occasion of the fiftieth anniversary, the game was reconstructed and can be viewed at "Video of the BNL 1958 'Tennis for Two' Computer Game," n.d., www.pong-story.com/tennis1958 .htm (accessed January 12, 2009).

16. Both of Heidegger's terms are ambiguous: *das Rasende* means both "madness" and "rage," and *Bestellen* means "to appoint" or "to order" and "to till." Martin Heidegger, *Die Technik und die Kehre*, 5th ed. (Pfullingen: Neske, 1982), 33.

17. For more detail, see Steven Levy, *Hackers: Heroes of the Computer Revolution* (London: Penguin Press, 1984).

18. U.S. Army, *Dictionary of U.S. Army Terms*, AR 320–5 (Washington, DC: Department of the Army, 1965).

19. J. Martin Graetz, "The Origin of *Spacewar*," *Creative Computing*, August 1981, www.wheels .org/spacewar/creative/SpacewarOrigin.html.

20. Robert Slater, *Portraits in Silicon* (Cambridge, MA: MIT Press, 1987), 296.

21. Scott Cohen, *Zap! The Rise and Fall of Atari* (New York: Xlibris, 1984), 23.

22. The *Odyssey* game console of the television technician Ralph Baer was analogously constructed and generated the tennis game graphics from the logic of test pattern generators. The *Pong* machine of the computer scientist Bushnell reconstructed this aesthetic with digital means so deliberately and precisely that he later lost a lawsuit. On the details of this "secret" digitalization, see Claus Pias, "'Children of the Revolution': Video-Spiel-Computer als Kreuzungen der Informationsgesellschaft," in *Zukünfte des Computers*, ed. Claus Pias (Zurich: diaphanes, 2004), 217–40. The circuit diagram shows that the "Pong" sound was no more than the extremely intensified crackling in the lines counter. So what we hear when we successfully synchronize ourselves is actually the synchronization of the device itself.

23. Friedrich Nietzsche, *Werke in drei Bänden* (Munich: Carl Hanser, 1954), 2:93.

24. W. Timothy Gallwey, *The Inner Game of Tennis* (New York: Random House, 1974), 31.

25. For a broader discussion of this conjunction, see Fred Turner, *From Counterculture to Cyberculture* (Chicago: University of Chicago Press, 2006).

26. John Stroud, "The Psychological Moment in Perception," in *Cybernetics/Kybernetik: The Macy-Conferences, 1946–1953*, ed. Claus Pias (Berlin: diaphanes, 2003), 1:41.

27. The game manufacturer Midway would soon turn things around. The game *Gunfight* simply replaced absence with presence and the racquets with pixel cowboys to produce a controversial shooter. The tennis ball didn't have to be reprogrammed but could now be visually interpreted as a bullet.

28. Thomas John Bromwich, "Easy Mathematics and Lawn Tennis," in *The World of Mathematics*, vol. 4, ed. James R. Newman (New York: Simon and Schuster, 1956), 2450.

29. Philip E. Morse and George E. Kimball, *Methods of Operations Research* (New York: Wiley, 1951).

30. See "Ping of Death," Wikipedia, http://en.wikipedia.org/wiki/Ping_of_death (accessed January 13, 2009).

31. Collected on "Ping of Death," www.insecure.org/sploits/ping-o-death.html (accessed January 12, 2009).

32. See INFOSYSSEC, "Denial of Service Attacks," n.d., www.infosyssec.org/infosyssec/security/secdos1.htm (accessed July 20, 2010).

33. Katie Hafner and Matthew Lyon, *Where Wizards Stay Up Late: The Origins of the Internet* (New York: Simon and Schuster, 1996), 24; Joseph C. R. Licklider, "The Computer as a Communication Device" [1968], reprinted in *In Memoriam: J. C. R. Licklider, 1915–1990* (Palo Alto, CA: Digital Equipment Corporation, Systems Research Center, 1990).

34. William K. English, Douglas C. Engelbart, and Melvyn L. Berman, "Display Selection Techniques for Text Manipulation," *IEEE Transactions on Human Factors in Electronics* 8, no. 1 (1967): 5–15.

35. Joseph C. R. Licklider, "Man-Computer Symbiosis" [1960], reprinted in *In Memoriam: J. C. R. Licklider, 1915–1990* (Palo Alto, CA: Digital Equipment Corporation, Systems Research Center, 1990).

36. Ibid., 14.

37. Stelarc homepage, www.stelarc.va.com.au/pingbody/index.html (accessed January 12, 2009).

38. Jean Baudrillard, "Requiem für die Medien," in *Kursbuch Medienkultur,* ed. Claus Pias, Lorenz Engell, and Joseph Vogl (Stuttgart: Deutsche Verlags-Anstalt, 1999), 291.

39. The issue of timeliness mainly concerns "time-critical" action games. Adventure and strategy games, however, are "decision-critical" or "configuration-critical." On this differentiation, see Claus Pias, *Computer Spiel Welten* (Munich: Sequanzia, 2002).

40. Immanuel Kant, *Werke in zwölf Bänden,* vol. 7 (Frankfurt: 1977), 26.

41. Ibid., 45.

42. Ibid., 46.

43. Friedrich Kittler, *Grammophon Film Typewriter* (Berlin: Brinkmann and Bose, 1986), 5.