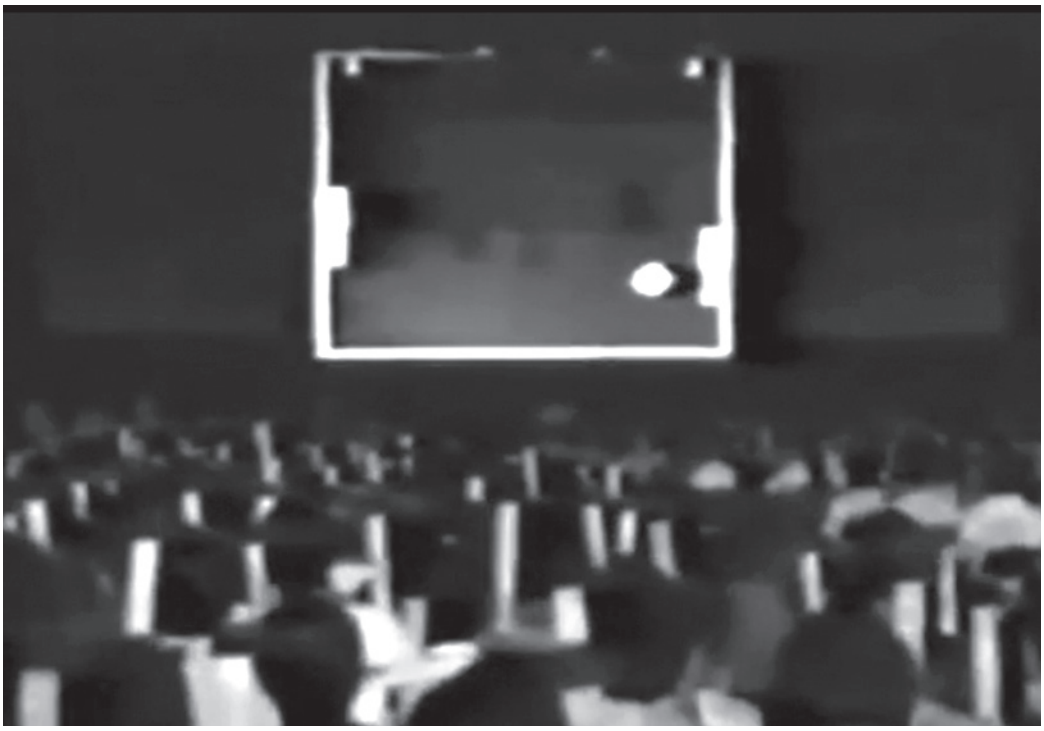
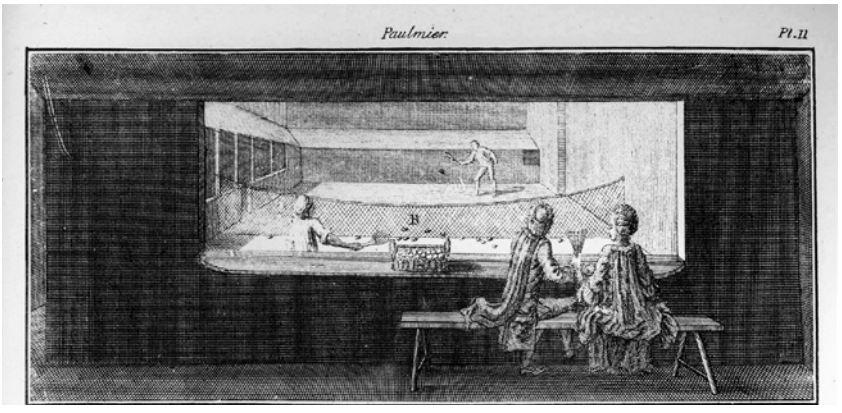


The author of this Bulletin writes, "I went in for all kinds of ball play from a young age—wiffleball, baseball, basketball, volleyball, squash. In my late 20s, as I was coming to the end of a brief career of playing squash on the women's professional tour and just beginning an MFA in Photography and Media at CalArts, I came across an image of an installation in Cadman Army Plaza made by David Hammond. It was a black and white photograph of one of his exaggeratedly tall basketball hoops covered in beer bottle caps that he had picked up off the streets of New York City. It was dated 1986, a year I had spent playing T-ball in that same park. I love this piece—the way it calls up the various material and immaterial factors that make a game accessible or inaccessible, challenging, desirable. And I tried unsuccessfully to retrieve some long-forgotten memory of this particular hoop. But I came to enjoy knowing that I occupied the same park during the same months so many years ago, and that I had failed to retain any mental image of it—that it remained out of frame. It helps me think about the role forgetting plays in any act of knowing, learning, performing, and playing; and about the ways a game holds a player's attention while (or perhaps by) confounding her mastery."

Cover: Footage of the communal Pong experiment at the SIGGRAPH conference, Las Vegas, 1991, taken from Adam Curtis's three-part TV series *All Watched Over By Machines of Loving Grace*, 2011.

Inset: M. de Garsault, *Art du Paumier-Raquetier et de la Paume*, originally printed in Denis Diderot's *Encyclopédie, ou Dictionnaire Raisonné des Sciences, des Arts et des Métiers*, circa 1760s.

One can imagine a scenic afternoon at Hardwick Hall in the summer of 1666, when the game of court tennis was at its height: Margaret Cavendish, prolific British author of works in philosophy, physics, poetry, fiction, and theater, sits with her husband, William Cavendish, First Duke of Newcastle, in a small viewing gallery, peering through a narrow netted opening into a large, enclosed court. Two men, her step-grandson William Cavendish, Third Earl of Devonshire, and Thomas Hobbes, longtime tutor to the Cavendish family, face each other across a sagging net. Hobbes, standing at the service end, his large body turned away from the audience, raises his wooden racket with its bent head, and serves a small ball onto the sloping roof of the far left wall, initiating play. The ball drops into the back half of the hazard court, and Cavendish returns the shot. As the exchange continues, the ball sends echoes off the rackets' strings, the lined stone floor, the four walls, and the penthouse roof. Margaret and William observe each player stretch to strike the ball in turn while they engage a side pursuit, analyzing the vectoral physics of ricochet. She quells his suggestion of a small wager on the outcome of the point with a disapproving eyebrow. Margaret does not approve of gambling, nor of tennis, generally. In her view, the motion is too violent to qualify as a healthy exercise, and it is moreover a perverse investment: one in which those who lose become "Poor by the Sweat of their Brows." But she grants that the activity compels attention. After a ball leaps off the tambour at an unexpected angle, she leans over to whisper in her husband's ear that the incident illustrates her own vitalist theory of matter and motion, soon to be published as *Observations Upon Experimental Philosophy*. A bell tied to the netting of the winning gallery rings, recalling their attention to the game at hand.



Fast forward a few centuries, through the evolution of the sport, the downfall of the aristocracy, and the invention of the digital computer, directly to 1991. In Las Vegas, at the SIGGRAPH (the Special Interest Group on GRAPHics and interactive techniques) conference, Pixar co-founder Loren Carpenter demonstrates a projected game of *Pong* that the crowd plays collectively by using the paddles they have found waiting for them on their seats. In the black and white documentary footage of the event, the camera scans restlessly over the backs of people holding up their individual paddles—red on one side, green on the other—to control the up and down movement of the projected paddles on the large overhead screen. The audience is "effervescent."

Director Adam Curtis uses this footage of a collective *Pong* game to open and close "Love and Power," the first segment of his three-part series *All Watched Over By Machines of Loving Grace* (2011). The scene first appears intercut with an interview of Carpenter himself, who sits next to a silent female companion, talking about the ecstatic response of the crowd when they first realized that their individual paddles were being read by sensors and, depending on whether they held up the green side or the red side, they contributed to the collective movement of their half of the room's on-screen paddle in the up or down direction. To Carpenter, the mysterious amoeba-like capacity of the crowd to successfully come together to play the game demonstrated how a non-hierarchical society of free individuals connected by machines might be able to produce its own order and stability. Curtis uses the example to tell the story of the rise and fall of the Californian ideology.

When the footage returns in a final shot, what was at least a plausibly positive example of cooperative and collective human-machine interaction on first appearance is rendered truly sinister. Curtis's voice intones: "The original promise of the Californian ideology was that the computer would liberate us from all of the old forms of control, and we would become Randian heroes in control of our own destiny. Instead, today we feel the opposite, that we are helpless components in a global system, a system that is controlled by a rigid logic that we are powerless to challenge or to change." We are boxed in: able to play together only if we stay neatly within the given logics, unable to create new logics with each other or with the machines. Curtis is right that the freedom to choose whether

to hold up the red or the green side of a paddle is a narrow vision of freedom. Still, one would be rash to dismiss out of hand the excitement that collective computer game play has generated in the last half century, and rash, again, to dismiss the excitement generated among crowds when they are offered an opportunity to move from the position of spectators to that of players. The problem was not with *Pong* per se, but rather with what the collective play of *Pong* was thought by Carpenter to be capable of modeling. For Curtis, the *Pong* demonstration is little more than a device to critique a misdirected social model; he doesn't ask how the idea originated that a simple game of bounce should come to stand as the example *par excellence* of human interaction with and through machines.

Atari's *Pong* was the first hugely successful arcade video game, but it is just one among many. The early history of electronic games is littered with bouncing balls—from the first bouncing ball programs written for and demonstrated on the Whirlwind Computer at MIT in 1951, to the game of computer tennis that created lines out the gym door during Brookhaven National Laboratory's open house days in 1958, to the tennis and table tennis games that shipped with the first Magnavox Odyssey in 1972, to the Pong-chip (AY-3-8500) which, developed by Atarti and produced by General Instruments, ensured that the hardware-encoded logic of *Pong* was used as the backbone for all kinds of early video games. Executed in both hardware and software, bounce logics were regularly programmed into the frameworks of early graphical user interfaces by engineers who were tackling and toying with making computers and televisions into real-time machines.

Pong does have a rigid logic, in the sense that the game logic is a fairly simple physics engine encoded directly into the hardware with a range of possibilities that feel both simple and apparent even if the set of combinations is infinite. But while *Pong* may seem highly deterministic in its logic, the history of its design points towards a somewhat different story about its approach to computing. Atari founder Nolan Bushnell was an amusement park barker before turning his attention to electrical engineering. In an interview with game historian Henry Lowood, *Pong* engineer Al Alcorn recalls how his boss Nolan Bushnell "designed out the need for the computer, because the computers were so slow at that time … So there was this brilliant leap that Nolan made about how he could

get rid of just a little bit of logic [and still] do the same thing the computer's going to do, just much, much faster, so he didn't need the computer." Bushnell was trying to figure out how to "do" the same thing "the computer" could do, but without "the computer" because computers at that time were enormous and expensive machines. In order even to approach this problem Bushnell had to understand computing as a *process* that did not belong exclusively to any one type of machine or material.

While Curtis merely redirected the SIGGRAPH footage of collective *Pong* play in *All Watched Over*, the scene between Cavendish and Hobbes is speculative from the start. But it is not a far stretch. Long before his fabled encounter with Euclid's geometry, Hobbes honed his estimation of angles on the asymmetrical and enclosed tennis courts that could be found across England and the Continent at the time. He was hired as a tutor by William Cavendish shortly after his graduation from Oxford, and he remained under the family's patronage for the rest of his life. In his writing, Hobbes occasionally used tennis to illustrate arguments, most strikingly in his argument against government by assembly, which he compares to the notion of a group of players carting a tennis player to the ball in a wheelbarrow. Unlike Hobbes, Margaret Cavendish does not seem to have played the game, and in fact openly disapproved of it. But although she wrote disparagingly of the "Covetous Humour, that causes men to Venture so much at play," she found in the ball an excellent object for both poetic and philosophic demonstration. In *Observations upon Experimental Philosophy*, Cavendish uses the example of a ball being tossed by hand and argues that the hand is only "the occasion" that "the ball move thus or thus … [the ball] does not move by the hand's motion, but by its own: for there can be no motion imparted, without matter or substance."

Margaret was wooed by William Cavendish when they both were in Paris during the period when British royalists took refuge after the first English Civil War. She was there as a lady in waiting to the exiled Queen Henrietta Maria. Together with William and William's brother Charles, she was part of the Newcastle Circle, a group of English philosophers inclined towards mechanical philosophy and theories of atomism that included Hobbes, Digby, and Charleton, who were in contact with likeminded continental thinkers such as Descartes and Gassendi. Upon returning to England, Cavendish began publishing poems, plays, and scientific

philosophical treatises. She went on to become the first woman to visit the Royal Society (and the last until 1954). In print, she claimed that she never spoke much to Hobbes, despite their both having been part of the Newcastle Circle in Paris and despite Hobbes's spending the majority of his life under her husband's patronage. This public disclaimer could be attributed to her well known shyness, but it may also reflect her desire to be famous for her own ideas. Sarah Hutton argues in "In dialogue with Thomas Hobbes: Margaret Cavendish's natural philosophy," that a close comparison of their works shows important affiliations. Cavendish is one of the few thinkers who argues along with Hobbes for a materialist philosophy that denies the existence of incorporeal souls in nature. And David Cunning states in the *Stanford Encyclopedia of Philosophy* that "the work of Cavendish is important in that it anticipates some of the central views and arguments that are more commonly associated with figures like Thomas Hobbes and David Hume." Whatever their personal relationship may have been, they publicly shared a materialist philosophy that rejected the existence in nature of incorporeal (unbodied) souls and refused the possibility of vacuums (unmediated spaces).

Logics of bounce look different when enacted in different materials. Computing is just one of many ways of thinking bounce, and for that matter there are multiple ways of approaching the problem of bounce within computing. Hobbes and Carpenter each pick up games of bounce to argue for political structures that sit on opposite ends of the spectrum: an absolute monarchy and a self-organizing social system. But both end up using ball play as a metaphor in ways that oversimplify democratic and collective interaction. In the wake of England's Civil War, Hobbes argues for a single uncontested and incontestable ruler, unfettered by others. He misses the racket as an already assistive device, and cannot imagine his wheelbarrow transformed into the wheelchairs that athletes make such spectacular use of today. If Hobbes is all object—all eye on the ball—Carpenter is all system, so charmed by the way playing through a machine can change a room that he settles for weak, unsubstantial notions of both interaction and freedom. Curtis in turn oversimplifies Carpenter's demonstration in service of his argument against the Californian ideology. Cavendish is the only one who does not use the game to make an overt political argument. But given her insistence that the ball has its own motion, a motion merely occasioned by the hand, perhaps she would allow the

idea that we all occasion each other, and perhaps there is a politics to be imagined here. The hand occasions the ball, but also the ball, the hand. And if we begin to think about what occasions different kinds of motion carefully, about what moves matter and substance into form and place so that they can be occasioned, then we quickly arrive at material relations. That way of looking at bounce helps us see how objects and relations between them are constituted. We are always already with that which is and those who are around us, in and as bodies in motion. Perhaps we need to think not about freedom FROM the opinions of lower status advisers, nor about freedom IN a logical system (or a system-based equilibrium), but rather freedom *with* others of all kinds.

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