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CONTROLLERS

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While video game studies has, quite rightfully, focused much attention on game actions and representations depicted on-screen, interactivity and, crucially, modes of input for interactivity, are the literal engine that drives all video gaming. Without inputs and interaction, a game is an inert set of codes. But input and interaction must be structured to produce what both gamers and designers seek most: compelling gameplay. Historically, video game controllers have encompassed a wide range of analog and digital devices that serve as the point of input—the intersection—between gamers and a game. While individual video game systems come with standardized controllers and game interfaces that are intended to be used across a range of game genres, third-party controllers custom-built for specific genres and even specific games, have been part of the industry since its early days. Whether paddles, joysticks, buttons, analog sticks, steering wheels, track balls, keypads, light guns, or other objects, game controllers fundamentally structure the gamer's experience of game hardware and software. The controller is the yoke between player and game. It is the site of physical interactivity that links a player with his or her in-game representation and proxy, be it avatar or blip. It is also the technological degree zero for video games: it distinguishes the medium from other screenic entertainments such as cinema or television (although the TV remote control is a technological predecessor to the game controller). These other forms of screen leisure present fundamentally passive entertainments, even if one uses a remote control to select between choices. With a game controller, which also has pinball and mechanical arcade game controllers as ancestors, a gamer engages with a video game's software program, activating and engaging in real-time with the software. This seemingly humble, seemingly secondary, piece of technology is actual a crucial part of a video game system, both symbolically in the way controllers are used to navigate game content and literally, in the actual connection the controller forges between a game system and a player, as both of these components are necessary—that is, almost primal aspects of the video game medium itself. Indeed, new media theorist Janet Murray describes how a gamer's immersion and agency within a game often arise from one's identification with a controller that realistically mimics an in-game or actual object. As Murray puts it in her groundbreaking book *Hamlet on the Holodeck*: "My own immersion in the *Mad Dog McCree* arcade game depended heavily on the heft and shape of the laser gun controller and on the way it was placed in a hip-height holster ready for quick-draw contests" (1997, p. 146).

In this example, immersive game design extends to seemingly non-essential controller elements such as the light gun holster, which deepen the gamer's engagement with the game's narrative universe. From the earliest keypads, buttons, and joysticks to the

handheld touch-screens and systems that scan and read bodily movement (such as the Xbox Kinect), controllers define what and how we interact with video games. As such, they can reveal a great deal about the cultural priorities and history of the video game industry itself. This essay focuses primarily upon video game controllers designed as part of game systems, not on computer game controllers or the use of computer keyboards as controllers. There is a distinct history of computer game controllers to be told, especially of the specialized controllers designed for specific games or genres, such as cockpit controls or custom joysticks. But the focus here is on game controllers designed to accompany whole systems and be used with a wide range of video, rather than computer games. While game controllers likely always draw the most attention from industry observers and gamers for their shortcomings or as objects to abuse following in-game disappointment, controllers are more than just a punching bag or punch line. Video game controllers indicate how this medium organizes itself around control, space, time, and the changing tastes amongst video game players.

Interaction and Control

Drawing upon philosophies of phenomenology, game scholars Andreas Gregersen and Torben Grodal have developed their theories of video game interactivity around the moments in which gamers fuse themselves both psychologically and physically with a game, often via game controllers. As they put it, while playing video games one enters into: "*an embodied awareness in the moment of action*, a kind of *body image in action*—where one experiences both agency and ownership of virtual entities. This is a fusion of player's intentions, perceptions, and actions" (2008, p. 67). Gregersen and Grodal's analysis of how video games engage both our body image and our body schema, or sense of the self as physically embodied in the world—smartly emphasizes how the body itself is an entity that acts and learns. This goes beyond earlier theories of video and computer game interactivity that segregated bodily engagement from psychological or intellectual engagement.

In a key passage in his critically-acclaimed study *The Language of New Media* (2001), Lev Manovich derisively criticizes the existing scholarship on new media and interactivity, proclaiming that such work mistakes *physical* interactivity for intellectual, thoughtful interaction. In doing so, Manovich, like many before him, falls into the old Cartesian trap of separating the mind from the body. Manovich writes:

> When we use the concept of "interactive media" exclusively in relation to computer-based media, there is the danger that we will interpret "interaction" literally, equating it with physical interaction between a user and a media object (pressing a button, choosing a link, moving the body), at the expense of psychological interaction.
>
> (2001, p. 57)

Yet psychological interaction begins and ends with the physical interaction of the body, because when the subject views or interacts with media, he or she does so from a specific historical and cultural context and as the occupant of a specific materiality (body). Later in *The Language of New Media*, Manovich goes on to discuss video and computer games as exemplary new media objects, but in doing so he mostly abandons questions of how identification functions in regard to new media, creating a telling

absence in his text, especially since he provocatively declares: "Interactive media ask us to identify with someone else's mental structure" (2001, p. 61). Game controllers, as the literal point of contact between the virtual and the physical, are obviously key nodal points for understanding how psychological and physical engagement and immersion have now spilled over and collapsed upon one another, at least during moments of active gameplay. But perhaps the way controllers extend out from games themselves is also evident in the more subtle ways that gamers develop so-called "muscle memory" and can physically remember or be reminded of button sequences or movements from games when away from the console.

What both remote controls and game controllers demonstrate is how deeply physical one's interaction with the television can be. A controller becomes a second-nature component in the hand of the experienced user, who operates it by rote to navigate a game world or engage with virtual foes in a game. Video game controllers, despite their capacity to become unremarked upon and seemingly automatic "extensions" of the gamer/viewer/user, are crucial, tactile points of contact between the media consumer and his or her on-screen, digital proxy, even if that proxy is as mundane as the Xbox Live Home Screen. These are the objects through which gamer agency passes and is transformed into digital signals to be interpreted by software and hardware. Our on-screen identities or characters in a video game are all channeled through such controls.

Controller History

Remote control devices, which had first been attempted as a convenience device for radio listeners, have existed on the consumer television market since shortly after World War II, when television broadcasts penetrated the United States and television sets became reliably available for purchase (Bellamy and Walker, 1996, pp. 18–21). While we might associate remote controls with later eras, such as the 1980s when television styles themselves became more fast-cut and fast-paced, remotes did exist earlier and crucially allowed television users to imagine a way of interacting with on-screen content via a handheld device, paving the way for the kinds of interactivity that video game systems would entail in the years to come.

Beginning with the earliest television video game consoles, such as the *Home PONG* (Atari, 1975) variants sold directly by Atari and under the Sears brand name, video games have included controllers. Often the controller signifies innovation within a video game system, differentiating it from competitors through the ability to offer unique movements and interactions and utilizing increasingly sophisticated technologies to connect interaction to game software and representations. Prior to the release of the early Atari consoles for Sears, Ralph Baer designed and produced the original Magnavox Odyssey (1972). While some components for the original Odyssey blur the line between game controllers and game elements, such as the translucent, color screen plastic overlays that gave the illusion of better graphics, the Odyssey's controllers were quite unique. These "player control units," as they were called, were rectangular boxes with knobs or "paddles" for both horizontal and vertical movement on-screen, as well as a reset button. One of the early elements that Ralph Baer designed for the Odyssey was a light gun that would sell under the name the "Shooting Gallery" as a peripheral to the system. While both SEGA and Taito would release arcade games with joysticks that mimicked airplane cockpit controllers in 1969 and 1973, respectively, it was not until the 1977 Atari release of the Video Computer System or 2600, that a home video

game system would include a digital directional joystick. Before the launch of the Video Computer System, Atari game systems had included paddle controllers based upon the arcade version of *PONG*. Fairchild Camera and Instrument's 1976 *Channel F* is another notable example of early game controller design. While the *Channel F* is most often recognized as being the first game system to include interchangeable cartridges, its controllers were long, slender tube-shaped units with a top that could be pressed like a button or twisted directionally in eight different ways, offering relatively nuanced precision for the era. While some competitors in the 1970s introduced track balls and keypads or membrane keyboards, the aviation and arcade-style joystick quickly became popular. Both Mattel's Intellivision (1979) and Coleco's ColecoVision (1982) home gaming systems had similar game controllers that fused together elements of previous devices such as numeric keypads, knobs, paddles or "circular disks" (Mattel), and small joysticks. Again, both controllers strongly resembled television remote control devices. Mattel was also notorious at the time for promising that their Intellivision could become a fully-functional home computer with the addition of a soon-to-ship keyboard peripheral that the company eventually canceled after numerous production delays.

In the 1980s, the look and feel of controllers shifted most significantly when Nintendo launched its Nintendo Entertainment System (NES) in 1985 after the United States game market had crashed in 1983. Nintendo's controllers didn't look or work like the joysticks of old. Instead, they incorporated a cross-shaped "d-pad" or digital-pad (also known as a directional pad) and two other buttons. In this way, the d-pad allowed for a simpler interface than had dominated the previous era of game controllers. The 1980s were an era of many specialized game controllers custom-made for one or a few titles and for experimentation in controller design, as with Nintendo's cool-looking but limited PowerGlove (1989) that was based on virtual reality technologies. Nintendo's major competitor in the late 1980s/early 1990s, SEGA, was known for its innovative controller design, but the company eventually overextended itself by developing multiple competing consoles for the limited video game market.

Perhaps the next major design overhaul of video game controllers came in 1997 when Sony introduced its first DualShock controller for the PlayStation. Later, Sony controllers, as well as the controllers that Microsoft developed for its Xbox system, held to the same basic elements of the original DualShock. Designed to be held by two hands, the controller includes two motors in its handles that provide vibrational force-feedback to the gamer, as incorporated into game software by designers. The DualShock controller additionally includes two analog sticks to be operated by one's thumbs like a miniature joystick and multiple digital buttons, including directional buttons. All of these elements combine for a handheld device that can appear intimidating and clunky to the non-gamer. But force-feedback-based controllers are precisely calibrated instruments. Indeed, the original, large controllers for the Microsoft Xbox were nicknamed "Fatty" by gamers and quickly downscaled by Microsoft to a smaller size (see Jake, 2003; Caple, 2003). Ironically, these once-criticized early Xbox controllers are now sought after both for retro-gaming and for playing certain series, such as *Halo* (Yoon, 2011). The combination of analog sticks, directional buttons, and additional digital buttons also allows for a greater complexity of gameplay and combination button sequences, as well as for the design and play of games centered around seemingly nonsensical "button-mashing" that often actually demonstrate precise micro-timing of actions by the gamer.

The next major development in controller design wasn't a controller at all but the changes in computer and communications technology that allowed for video game con-

trollers to go wireless. Video game companies, including Atari, had long experimented with wireless controllers that relied upon either infrared or radio frequency technologies. But as game systems grew more technologically sophisticated, infrared or radio-transmitted wireless controllers proved to have significant limitations interacting with game systems that had become advanced computers. Numerous third-party manufacturers developed wireless controllers with varying levels of success, but in 2002, Nintendo introduced its own wireless controller that transmitted signals via radio frequency, the Wavebird, for use with its existing GameCube system. When the next generation of video game systems was launched (the Nintendo Wii, Microsoft Xbox 360, and PlayStation 3), they all shipped with wireless controllers as standard equipment.

In 2003, Sony launched its EyeToy peripheral for the PlayStation 2. The device was manufactured by computer hardware developer Logitech, known for its webcams. The EyeToy works much like a webcam but was meant to create an immersive interface experience for gamers using games written specifically for the controller or games that could be "enhanced" when played with the EyeToy, such as *EyeToy: Play* (SCE London/Europe, 2003) or several titles in Konami's mid-2000s hit *Dance Dance Revolution* series. The PlayStation 3 has a similar motion-detecting camera peripheral known simply as the PlayStation Eye. On its own, the original Eye seems more like a gimmick than a deeply interactive device, but it significantly enabled designers to start incorporating motion detection into games, an element that would become central to both controller and game design during the 2000s.

The 2000s has seen the introduction of major innovations in video game controllers. Debuting in the fall of 2006, Nintendo's Wii Remote, or Wiimote, utilized a motion detection system based on accelerometers in conjunction with an infrared optical sensor as well as digital buttons and a d-pad, allowing the Wii to sense a gamer's bodily actions in ways that previous game systems simply could not. Indeed, Gregersen and Grodal's (2008) discussion of the player's body image in action seems all the more relevant when player actions are now mapped using one's whole body as the controller. Interestingly, the Wii Remote looks much more like a typical television remote control device than its competitors' game controllers. Yet the Wii Remote, along with a range of games such as *Wii Sports* (Nintendo, 2006) or the Wii version of the cult PlayStation 2 drawing-based game *Okami* (Clover Studio/Capcom, 2008), shifted attention toward game genres rooted more decidedly around motion and movement. In 2010, Nintendo updated the Wii Remote by introducing the Wii Remote Plus, a smaller, less cumbersome device that could more easily operate with other specialized Wii controllers such as the Wii Zapper (2007) gun and the Wii Wheel (2008), which comes packed in as part of *Mario Kart Wii* (Nintendo, 2008).

In 2010, Sony entered more decisively into the motion-based play sector of the industry with the launch of the PlayStation Move, a motion-sensing game controller compatible with both the PlayStation 3 and the upcoming PlayStation 4. The PS Move, like the Wii, also uses motion sensing technologies location tracking when used in conjunction with the PlayStation Eye, and a trigger, buttons, analog stick, and directional pad. But by far the most successful motion-based video game "controller" is the Microsoft Kinect, which also launched in November 2010 along with the pack-in game *Kinect Adventures!*, which included five movement-based sports games that users would run, jump, and maneuver through to win. The Kinect uses a combination of an infrared depth sensor/projector, a camera, microphone, and proprietary software to provide motion capture, facial recognition, and voice recognition. The Kinect device is

designed to be arrayed horizontally above or just below the video display that the Xbox 360 is utilizing. When playing a game designed for use with the Kinect equipment, the gamer essentially *becomes* the game controller itself. The widespread popularity and success of the Kinect and the surging popularity of movement-based dance and fitness games that use the Kinect indicates that, perhaps, game controllers might become the tools of a more specialized class of gamers, while casual gamers continue to engage more physically and, upsetting Manovich's predictions, more deeply with video games that they motivate through their own bodily activity.

The Controller-less Future?

While one is playing a game, one enters into a complicated play with not only his or her identity but also with his or her body and its McLuhanesque "extensions." When one engages with digital media, these kind of modifications certainly take place—although no one "true" identity is uncovered *or* left behind in the process. In the case of video games, identity is most substantially modified by the ways that gamers can *control* their digital characters—and also in the ways that gamers *surrender* control over themselves and their characters in order to play. In his book *Terminal Identity: The Virtual Subject in Postmodern Science Fiction* (1993) on science fiction and technology, Scott Bukatman theorizes how contemporary subjectivity is often formed in front of the computer screen or terminal. The embodied computer–human "terminal identity" that Bukatman describes offers up interesting parallels to video games and how they depend upon a gamer's interaction and fusion with the television or computer terminal and an in-game proxy.

Like video games themselves, controllers will continue to paradoxically pull gamers in (at least) two directions at once: toward fully-embodied, physical immersion in games as we become the controller itself and toward the ever-involving, spectacular rattles and shakes of sleeker, all-encompassing virtual reality-based technologies, such as the Oculus Rift video game headset (www.oculusvr.com) or the Reactive Grip whole-hand feedback motion controller (www.tco.utah.edu/newsroom/william_provancher.php).

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