Chapter 3

Nintendo's Art of Musical Play

Roger Moseley and Aya Saiki

> My way of thinking is to make old things possible with current technology.[1]
> (Gunpei Yokoi)

The audiovisual elements of North American and European digital games have often been conceptualized in the light and shadow cast by cinematic and televisual theories, operations, and discourses.[2] In the wake of "blockbuster" console games such as the post-apocalyptic *Gears of War*, which inspired (as well as reflected) recent Hollywood themes and techniques, screen-based analogies now extend to almost any game designed for optimal play in the hushed darkness of the home theater.[3] Critics craving legitimacy for digital games routinely invoke *Citizen Kane* as a litmus test for software with the potential to transform the medium from a conduit for childish entertainment to an art form capable of sophistication, ambiguity, beauty, and profundity.[4] Why should this be so?

One reason has to do with media technology. Over the last two decades, both films and games have been distributed on optical media (especially DVDs and Blu-ray Discs), enabling the domestication of content whose exorbitant data and hardware requirements had previously driven customers to attend cinemas and arcades. Particularly in the United States, these new economic conditions helped promote the ideal of privatizing public experiences: both the cinema and the arcade could be brought home with minimal loss of quality. In the gaming realm, this model had been established by the Atari VCS/2600 (1977), which found success by bringing Japanese arcade hits such as *Space Invaders* and *Pac-Man* into the living room, despite the shortcomings of the domestic versions in comparison to their arcade counterparts.[5] Only at the turn of the millennium, with the introduction of ever-growing plasma and LCD screens, audio receivers capable of Dolby Digital and DTS surround sound, and the burgeoning capacity and 3D graphical power of DVD-based consoles such as Sony's PlayStation 2 and Microsoft's Xbox, did console games break decisively from the arcade paradigm and simulate cinematic techniques and effects as a matter of course. Games developed for the subsequent

generation of consoles, such as *Heavy Rain* and *Alan Wake* for Sony's Blu-ray-equipped PlayStation 3 and Microsoft's Xbox 360, respectively, aimed to present narrative-driven gameplay with cinematic production values.[6] In doing so, they conformed to Lev Manovich's definition of visual culture in the computer age: "cinematographic in its appearance, digital on the level of its material, and computational . . . in its logic."[7] Accordingly, the qualities of photorealism and sonic immersion have been embraced by many as a self-evident *telos* for the future development of the digital game.

Manovich makes a compelling case for cinema as the master trope that informs the structure of "new" media. When applied to prominent console games in the Western marketplace, his argument draws further support from Marshall McLuhan's famous declaration that "the 'content' of any medium is always another medium" and Jay David Bolter and Richard Grusin's more recent theory of remediation.[8] As a generalization about the medium of the digital game *in toto*, however, it is problematic for at least two reasons. First, it fails to reflect global diversity, based as it is on European and North American theories and practices.[9] Second, its privileging of the cinematic underplays other configurations of audiovisual elements in the medium's historical and archaeological records. Moreover, while Manovich observes that attributes such as digitality and interactivity that are broadly ascribed to "new" media can also be found in film, he does not take full account of the way that interactivity is integral to the ludic systems of digital games.[10]

In all these regards, it is telling that Japanese media artist Toshio Iwai, who developed the multimedia "art game" *Electroplankton* for Nintendo's handheld DS system in 2005, locates the origins of the medium in the pre-cinematic technologies of the flip book and the music box.[11] In his view, digital game systems are "musical instruments with which one can play with moving images and music simultaneously."[12] For Iwai, the manually activated flip book marks the "starting point of the moving image," while the music box represents a corresponding breakthrough in the transduction of sound into image (and vice versa).[13] Iwai thus considers antique technologies associated with cel animation and musical recreation to be more directly relevant to the digital game's prehistory than film or television.[14]

Insofar as player input is routed through fingers and thumbs (via controllers and discrete systems) and conveyed through gestures (relayed by Nintendo's Wii controller or registered by Microsoft's Kinect multimedia sensor) or even vocalizations (captured by Kinect and the DS), digital gameplay has more to do with musical performance than with spectatorship. Whether instrumental or vocal, the rhythmic corporeality of ludic performance suggests that investigations into its origins should pay as much heed to the history of sound and music as to image and text. We thus propose that the complex ways in which games negotiate between sound and image should be reflected by critical methods flexible enough to register and interpret a broad range of audiovisual formations at the interfaces of bodies and code. In order to map complex

cultural configurations, such methods should be genealogical (in that they acknowledge epistemological and discursive prerequisites instead of relying on the notions of origin and causality as self-evident) and media-archaeological (in that they are concerned with the persistence and transformation of material phenomena across time and space).[15]

As a step toward developing such a method, we focus here on hardware and software developed, manufactured, and/or published by Nintendo that either overtly thematizes such issues, tacitly raises them, or serves as evidence for the technological, cultural, historical, and national(istic) factors that inform them. The worldwide success of a game franchise such as *Pokémon* indicates how digital games can be rooted in a specific cultural context and yet migrate freely across borders.[16] While the global influence and prestige of Nintendo's digital games is widely acknowledged, however, they have rarely been considered in relation either to (inter)national contexts or to media archaeology. The labyrinthine history of the medium resists the casual ascription of cause and effect or of originality and imitativeness. Similar elements can be found in different ecosystems, and the perception of affinities and discrepancies is preliminary to assembling a relational method that can account both for local idiosyncrasies and for the transnational logic of capitalism and control that has driven interactions within, among, and beyond East Asian and Western nations since World War II.[17] This process is made more complex by the rhetoric of exceptionalism that often infiltrates national discourses, which can itself be understood to respond to the dynamics of globalization.[18] By recognizing this, we wish to avoid essentializing Japanese and Western approaches to the design, reception, and representational attributes of digital games without reifying the differences between them. While not discounting paradigms derived from Western perspectives on games, we thus propose that supplementary discursive strategies will be necessary to explain how gaming experiences have been configured by Nintendo's employees.

In pursuit of a "Japanese way of playing," Rupert Cox concludes that those who play "accept the context which constrains their action and the ludic structure which frees it."[19] Along similar lines, digital game scholar and former Nintendo developer Akihiro Saito has observed that the perception of affordances where others see constraints is characteristic of a playful mindset that pervades Japanese visual and literary culture.[20] Art historian Nobuo Tsuji claims that a playful shuttling between the childlike and the orderly, the artistic and the artisanal, and the decorative and the functional has distinguished Japanese culture for centuries.[21] In considering the question of how relatively simple devices (such as the Game Boy) can sustain complex phenomena (such as *Pokémon Red* gameplay), Saito invokes the refinement, precision, and ambiguity wrought via the relatively crude technology of Edo-era woodblock prints (*ukiyo-e*) and the intricacies that emerge from the rigorous compression of the *haiku*.[22] Saito maintains that the carefully designed interfaces of Nintendo's games draw on the spaces and rituals of *motenashi* (hospitality), such

as the artful arrangement of flowers in the *chashitsu* (tea ceremony room): for him, it is no coincidence that "the birthplace of Japan's hospitality culture" is Kyoto, where Nintendo was founded in 1889.[23]

A related facet of play that is global in scope and yet holds distinct significance within Japan is the concept of miniaturization.[24] From rock gardens and *bonsai* to cars and transistor radios, the operations of shrinkage, compression, and folding, often related to portability, on the one hand, and microcosmic consolidation, on the other, have been central to Japanese aesthetics and cultural practice.[25] Akin to Johan Huizinga's notion of the "magic circle" in which play takes place, tightly circumscribed spaces such as the *chashitsu* are understood to be separate from the everyday world.[26] The strict protocol that governs behavior there nonetheless gives rise to extraordinary and unrepeatable events.[27] In such contexts, miniaturization concentrates the magical qualities of objects: by making them "manageable [and] accessible to handling," as Rolf A. Stein writes of East Asian miniature gardens, "magical instruments share the nature of the work of art; the work of art shares that of a toy."[28]

Stein's formulation encapsulates the nexus of qualities that we identify in Nintendo's systems. From the Game & Watch (1980) to the Wii U (2012), portability, scale, instrumentality, and illusions of magic wrought by the manipulation of technology have been of central importance to Nintendo's playful enterprises. While portability and scale might appear to apply primarily to handheld devices, Nintendo has applied the same philosophy to its home consoles: the GameCube was furnished with a handle, while both the Wii and Wii U consoles that succeeded it are markedly smaller than their direct competitors. This indicates an attentiveness to gamespace that redefines the role of the screen: rather than taking place on the screen, Nintendian gameplay takes place through, between, and beyond screens. This idea, articulated independently by Nintendo's celebrated game designers Gunpei Yokoi and Shigeru Miyamoto, indicates how the screen need not operate as a cinematic or televisual fixture, but can function simultaneously as an interface, a reflective plane, and a barrier.[29] In different configurations, the screens of the DS and Wii U systems are portable, multiple, foldable (in the case of the DS), touchable, and usable as a surface for writing, drawing, and painting. In all these regards, they are closer to *byōbu* (Japanese folding screens), such as those painted by Edo-period artist Ito Jakuchu, than to the silver screen.[30] As such, they help define a space analogous to the *chashitsu* in which unexpected and delightful encounters may take place.[31]

Ludomusical Instruments

As for audio, the paradigm of high-fidelity musical reproduction associated with the home theater and even the compressed formats and mobile listening practices associated with Sony's Walkman and Apple's iPod are perhaps

less relevant here than the idea that the Nintendian gaming device is itself akin to a musical instrument such as the harmonica or melodica, both of which were widely used in post-World War II Japanese music education programs.[32] Like the harmonica, Nintendo's Game Boy (released in 1989) offers a distinctive timbre, located mainly in the upper portion of the audible frequency spectrum, that has been modified, extended, and repurposed by dedicated users to perform musical feats that far exceed its capacity as defined in its original design specification; like the melodica, the 3DS system (released in 2011) affords digital, gestural, and pneumatic input and can be played in different orientations.[33] Nintendo's controllers and handheld systems are not mere representational systems, computers, prosthetic extensions of the body, modes of communication, or vehicles of fantasy (although they are all those things). As objects that are played, they also form loci of performance; as technological nodes in historico-cultural networks, they embody the concept of instrumentality both in a specifically musical sense and within a broad Heideggerian framework.[34] Music informs the playing of games just as games enable the playing of music.

Examples of this duplex configuration are strewn across Nintendo's output. Within the mythos of the *Legend of Zelda* franchise, musical instruments (such as the eponymous Ocarina of Time from the N64 game) perform supernatural functions such as warping through time and space, unlocking sealed gateways, and healing physical and psychic trauma.[35] These functions are activated through the reproduction of sequences of notes imparted to the player after the fashion of memory games such as Milton Bradley's iconic *Simon* (1978).[36] Music is thus instrumental as an agent that helps the player accomplish gameplay objectives. Conversely, however, the Ocarina of Time can be played as an instrument for its own sake; beyond the five notes required for gameplay purposes, the player can produce a chromatic scale by means of button combinations, and can even add vibrato. This facilitates a strictly musical performance by way of the N64 controller. In this sense, perhaps the most obviously instrumental among Nintendo's products is *Wii Music*, an improvisatory music "game" offering 66 instruments sounded by mimetic motions and techniques that players enact via the Wii remote and nunchuk controllers.[37] Miyamoto, who coproduced the software, encouraged people to think of it "as a new kind of instrument . . . that allows you to become a creator . . . and a performer of music."[38]

Across a broad array of genres and titles, the instrumentality of Nintendian gameplay can, in our view, be described as ludomusical, a term that indicates the playfulness to be found at the manifold intersections between music, toys, and games. Reflecting on the ways in which such ludomusical relationships are structured, Koji Kondo, the composer for *The Legend of Zelda* and *Super Mario Bros.* for the Famicom/Nintendo Entertainment System, has observed that both characters' movements and sequenced music in digital games are synchronized to the CPU's clock.[39] Kondo wrote the music for *Super Mario*

Bros. after playing the game repeatedly to gauge how Mario ran and jumped, identifying the character's unique "rhythm" in order to create a satisfying counterpoint between music and gameplay. While the music was initially "inspired by the game's controls," it ultimately creates a positive feedback loop by choreographing the player's digital performance.[40] While working on *New Super Mario Bros.* for the Nintendo DS more than two decades later, Kondo, in his role as music director, went a step further by choreographing the behavior of non-player characters.[41] As they dance and jump in time to the music, they directly affect gameplay mechanics and make rhythm a strategic resource for players; at the same time, their "performance" breaks the fourth wall, foregrounding a playful theatricality redolent of *kabuki*.[42] Tellingly, the theater serves as the master trope for Nintendo's poetics of play, as revealed by *WarioWare: D.I.Y.* for the DS, which enables players to create games by producing and combining graphics, cel animation, sequenced music, and scripted artificial intelligence.[43]

Toys & Time, Game & Watch

When questioned by a journalist as to whether *Wii Music*'s main mode qualified as a game given its lack of an overarching goal, intermediate objectives, quantifiable progress, and fail states, Miyamoto acknowledged that the software was indeed not a typical game: it was "more interesting" in that it was more akin to a musical toy box.[44] Miyamoto's retort prompted consternation from Western critics wary of the rhetoric of infantilization that has long dogged the digital game medium.[45] The analogy need not be interpreted in derogatory terms, however. For Giorgio Agamben, the toy performs an invaluable and unique cultural function: it "makes present and renders tangible human temporality in itself, the pure differential margin between the 'once' and the 'no longer'."[46] Crucially, it does so along both diachronic and synchronic axes by either "dismembering and distorting the past or miniaturizing the present." For Agamben, toys materialize the historicity of objects by subjecting them to "a particular manipulation." On the one hand, this manipulation foregrounds the contingency of the past by reducing previously functional objects to iconic symbols; on the other, it reveals the absurdity and ephemerality of the present by shrinking its most significant artifacts to the Lilliputian scale that they will assume in the future as triggers of nostalgia.

Agamben has traditional toys such as dolls, pistols, spinning tops, and hobby horses in mind, but his quasi-anthropological musings on the historical narratives that toys simultaneously evoke and conceal have special relevance for what Brian Sutton-Smith dubbed the "machine toy concept."[47] Nintendo's technologies entail not only miniaturization, but also retrogression. This is one reason why their games possess a potent affective charge that, as Woodrow Phoenix writes of Japanese toys, not only triggers "a cascade of forgotten or inaccessible memories," but can also function as a direct "link back to intense

personal experience."[48] Supplementing the national predilection for smallness, Nintendo's approach to technology can thus be seen to emerge from its long history as a toy company. Unlike Microsoft and Sony, Nintendo's past is not defined solely by electronics; established as a playing card manufacturer in 1889, Nintendo made products ranging from board games to dollhouses prior to the Japanese release of the Famicom in 1983. Many of Nintendo's most successful toys were created under the supervision of Yokoi, who joined the company in 1965 and quickly established himself as an ingenious designer.

Nintendo's Game & Watch systems, manufactured between 1980 and 1991, are commonly perceived to mark the company's definitive transition from toys to digital games. Competition between Sharp and Casio in the digital calculator market had flooded the market with liquid crystal displays (LCDs), and Yokoi reputedly came up with the idea of a handheld game when he saw a salaryman playing with a calculator on a bullet train.[49] Using LCD technology, he devised games in which characters and objects could be depicted using the same techniques by which numbers were assembled from segments on a calculator display. To make the games more functional and appealing to adults, he added a clock function by incorporating a crystal oscillator.

When they entered the marketplace, Game & Watch systems exhibited a peculiar mixture of cutting-edge and antiquated technologies, reflecting a philosophy that Yokoi termed "*kareta gijutsu no suihei shikō*," which can be translated as "lateral thinking with withered/seasoned technology." He believed that novelty and fun were more easily attainable through the radical repurposing of mature, inexpensive technology than by the adoption of the latest technical innovation for its own sake.[50] Yokoi's approach thus maps onto Agamben's synchronic axis by deploying familiar technologies in economical, unexpected, and playful ways. At the same time, Yokoi claimed that his ideal of play harked back to children's games such as tag and hide-and-seek, in which delight emerges from the unpredictable ebb and flow of improvised engagement rather than from the strict observance of rules and investment in a victorious outcome.[51] This type of play unfolds within Agamben's "differential margin between the 'once' and the 'no longer'." For Yokoi, "lateral thinking with withered/seasoned technology" thus assumes a dialectical relation to the principle of "making old things possible with current technology."

In visual terms, Game & Watch systems operate on the principles of hand-drawn stop-go animation rather than on the projection or modeling of an image; they are thus closer to flip books, *manga*, and *anime* than they are to film or CGI. Their rudimentary audio output consists of simple beeps, the function of which is more important than their timbral quality: as developer Hirokazu Tanaka observed, since Game & Watch gameplay is defined by a reliance on rhythm, the beeps are necessary "so the player can have timing indications."[52] Like all of Nintendo's digital systems, the Game & Watch invites players to test and refine their abilities to perform with precise rhythm

and synchronization. Both functions of the Game & Watch, the "trivial" game and the "serious" timepiece, are predicated on timing and calculated according to the pressing of buttons, on the one hand, and the oscillations of quartz, on the other. It might be tempting to conceive of the former as human and the second as mechanical, but the distinction is hard to maintain. As Claus Pias argues, an electronic clock's display is a concession to human perception while, conversely, a player's button presses must be measured and converted into machine code to be processed; if communication is to occur, the human must become "machine shaped," and vice versa.[53]

By yoking play to a metronomic clock, the Game & Watch foregrounded not only ludomusical rhythm but also what Pias describes in Kantian terms as "the game player's duty."[54] Pias cites Nietzsche's observation that rhythm is "a compulsion" that produces "an insatiable desire to give in, to comply."[55] Digital game players thus twist the continuum posited by Roger Caillois from *ludus* (which entails voluntary submission to the arbitrary and intransigent conditions of the CPU) to *paidia* (associated with a childlike or contrarian delight in disregarding or defying rules) into a Möbius strip: rather than being opposed, the two terms are supplementary.[56] Nintendo's *Rhythm Tengoku* for the Game Boy Advance takes advantage of this property by demanding the synchronization of musical events with ludicrous or fantastical animated imagery.[57] The comic and surreal discrepancy between the game's cheerily syncopated musical idioms, overseen by pop music producer and composer Tsunku, and their quirky visual counterparts is characteristic of *paidia*, but the game's measurement of the player's button presses to within 1/60th of a second demands *ludus* in the form of metronomic precision if progress through the game is to be optimally achieved.[58] The minimal input bandwidth (usually restricted to a single button) and quick-fire iconographic juxtapositions that distinguish both *Rhythm Tengoku* and its direct antecedent, *WarioWare, Inc.: Mega Microgame$!*, support Pias's contention that "the discourse elements of the computer game are not called 'killing people' or 'catching gold nuggets' but timeliness, rhythm, or control."[59]

After the young Toshio Iwai had familiarized himself with the ludic systems of *Super Mario Bros.*, he started playing the game in a manner that responded to Kondo's methods of choreographing music and action: "I started playing around and producing sounds by making Mario jump, which made me feel like I was playing instruments while playing the game."[60] Iwai had a similar experience "shooting along to the background music" of Namco's *Xevious*, released as an arcade game in 1983 and ported to the Famicom the following year.[61] The game features invulnerable spinning tiles known as Bacura, which emit a high-pitched metallic sound when struck by the player's blaster. This sound was adopted as a musical element in the track "Xevious" produced by Haruomi Hosono (a member of the electronic music band Yellow Magic Orchestra) as part of his pioneering album *Video Game Music* (1984). In turn, Hosono's track inspired players in arcades to try to reproduce its catchy rhythms

by shooting Bacura despite (or owing to) the futility of doing so.[62] Here, again, we perceive *ludus* and *paidia* brought together by, and as, music. Shooting Bacura for the sonorous effect could be interpreted as whimsical, contrarian, masochistic, or virtuosic; in any case, it flies in the face of the self-interest and relentless pursuit of optimal strategy associated with game theory. In terms of both score and utility, it is pointless.

The "pointlessness" of this kind of ludomusical play echoes Stein's conflation of the toy with artistic creation, pointing toward an aesthetic that Iwai's media art has consistently exhibited. The influence of *Xevious* can be clearly perceived in *Otocky* (1987), an improvisatory music-themed shoot-'em-up with a procedurally generated soundtrack developed by Iwai for the Famicom Disk System.[63] Although *Otocky* was in many respects structured as a traditional game that tallied the player's score as he or she navigates a succession of levels, dealt with patterned enemy attacks, and fights "bosses" in the form of notes, Yoshikazu Tozuka reports that players perceived the game as "a kind of children's toy that produces sounds."[64] For its part, *Electroplankton*, which has been described as both "touchable media art" and a "set of 10 small musical toys," presents the player with biological and physical metaphors that invite the kinesthetic (re)actions of touching, scribbling, drawing, blowing, speaking, and singing.[65] In creating the software, Iwai drew on his audiovisual media installations *Music Insects* (1990–1992) and *Composition on the Table* (1998–1999), as well as the experience of his ludomusical toying with *Super Mario Bros*.[66]

As a media artist, Iwai possesses formidable credentials: his avowed influences include pioneering figures in the domains of experimental film, video, music, and multimedia such as Norman McLaren and Nam June Paik and he has collaborated with Hosono's Yellow Magic Orchestra bandmate Ryuchi Sakamoto.[67] One might thus be tempted to align Iwai's intermedial and ludic sensibility with that of the Fluxus movement, which became a cultural force in Tokyo and Osaka in the early 1960s. Iwai has chosen, however, to situate himself closer to Yokoi's toy-like aesthetic than to the art world proper.[68] Upon being awarded a prize by the Multimedia Content Association of Japan, Iwai revealed the Proustian imperative that motivated him: "I've been longing for the feeling of my childhood in the digital world."[69] Iwai's pursuit of *paidia* via digital channels is matched by Yokoi's commitment to recreating the pleasures of childhood through the misappropriation of "serious" electronics, "making old things possible with current technology." Whether framed as "toys," "games," or "art," the creations of Iwai and Yokoi share the nostalgic orientation of Agamben's diachronic axis. Beyond that, however, their material forms index a common media-archaeological heritage that informs the ludomusical experiences they afford. The task of plotting the genealogical nexus that connects these objects and their ontologies is beyond the scope of this chapter, but we will conclude with a preliminary attempt to situate a handful of them in relation to one another.

Congas, Buttons, Barrels, and Hammers

In recent years, the emphasis on the gritty verismo characteristic of many big-budget Western digital games has extended across the audiovisual continuum. A particular set of modelling, lighting, and animation techniques has been naturalized and coupled to the recording and digital manipulation of acoustic and electric instruments in order to represent the "real": "immediacy" is mediated via cutting-edge technology that strives to render itself imperceptible. In contrast, the sprite-based artwork and overtly sequenced sound of many Japanese games, both classic and contemporary, embraces technological limitations by making them visible and audible rather than seeking to transcend them. To account for this state of affairs, Yokoi's philosophy of "lateral thinking with withered/seasoned technology" might be considered within the broader context of Japan's volatile cultural and economic status in the aftermath of World War II, which forced artists and designers to operate within tight constraints. At first, there was a reliance on North American resources: legendary *manga* and *anime* artist and producer Osamu Tezuka pared down Walt Disney's filmic animation techniques for television in order to save time and money, and Nintendo adopted Disney characters to destigmatize playing cards and bring them into family homes. In both cases, however, imitative measures taken at least in part for expediency's sake had unintended and far-reaching consequences: Tezuka developed a repertoire of limited animation techniques that defined the nascent medium of *anime*, while Nintendo gained access to a broad demographic that would sustain Yokoi's innovations in the world of toys.[70]

In the late 1970s and early 1980s, the material conditions of the digital game demanded the manipulation of two-dimensional sprites, which (as Space Invaders demonstrated) were easily and effectively adapted from *manga* and *anime* tropes. Meanwhile, the proliferation of inexpensive musical instruments such as the Casiotone keyboard reflected an approach to composition and arrangement that was attuned to sequencing, modularity, and automation, all of which were integral to the production of digital game soundtracks by Japanese composers. The technological restrictions of hardware—or, rather, the discipline they impose and the ingenuity they foster—have encouraged many Japanese developers to eschew the pursuit of verisimilitude in favor of creating compelling gameplay from robust mechanics, manifested audiovisually by minimalistic or abstract semiotic strategies.

As Takuya Mori observed of anime (and as the invocation of abstraction and minimalism implies), the stripped-down, miniaturized aesthetic of games such as *Rhythm Tengoku* and the quantization of image, sound, and haptic input that drives their digital gameplay confound distinctions between the mainstream and the avant-garde, commercialism and experimentalism, and toys and art.[71] A genealogical approach to Japanese digital games must therefore take account both of correspondences between technological formations and

of the political and economic forces that shape their material manifestations and cultural functions in any given context. To illustrate how such an investigation might proceed, let us briefly consider a material object manufactured by Nintendo that is at once a musical instrument, a digital device, a locus of play, and the materialization of an epistemological concept.

In 1972, Nintendo released a product, billed as "a new kind of instrument from the electronic age," that constitutes an intriguing point of contact between Nintendo's history as an "analog" toy company, its future as a digital game company, and the musical technologies that connect the two.[72] Ostensibly inspired by Yamaha's popular Electone series of electronic organs and the popularity of Latin music in Japan, the Ele-Conga was effectively a battery-powered drum machine featuring five buttons that triggered the sounds of a snare drum, maracas, claps, and, of course, congas (see Figure 3.1).[73] The Ele-Conga was a toy insofar as its membranophonic form was a mere skeuomorph, but at the same time it was a serious instrument that could be connected to an external amplifier for live performance. It was accompanied by sheet music featuring patterns that instructed players how to recreate familiar dance rhythms, and an optional accessory known as the Autoplayer could be programmed to reproduce such patterns by way of the hand-cranked revolution of paper discs punched with holes corresponding to the five triggers.

Figure 3.1 Nintendo's Ele-Conga and Autoplayer (1972); photograph reproduced with the permission of Erik Voskuil (beforemario.com)

At first glance, the Ele-Conga might be dismissed as an oddity that has little bearing on Nintendo's hugely successful digital game enterprises of the 1980s, and yet its attributes are significant in light of subsequent developments of ludomusical instrumentality. On the one hand, the notion of grafting such a digital interface onto a toy-like drum can be understood to presage Namco's *Taiko no Tatsujin*, a successful series of rhythm-action games that made its arcade debut in 2001.[74] In 2003, Namco adapted *Taiko no Tatsujin* for Nintendo's domestic audience by developing *Donkey Konga*, a rhythm-action game for the GameCube that was bundled with a pair of barrel-shaped bongos. As well as riffing on the iconography of the original *Donkey Kong* arcade game created by Miyamoto alongside Yokoi in 1981, *Donkey Konga* and its bongos could be interpreted as a punning tribute to the Ele-Conga.[75] On the other hand, the particular configuration of the Ele-Conga's keyboard-like interface, which takes the form of the five adjacent buttons designed to be played with one hand, resembles the layout and function of Harmonix and Red Octane's *Guitar Hero* controller, which made its debut in 2005 (Figure 3.2).[76]

For its part, the Autoplayer (which Yokoi added as a concession to players who, born to early to have devoted themselves to *Guitar Hero*, lacked the dexterity to produce complex rhythms manually) harks back to the distant past even as it looks forward to the flourishing of rhythm-action games at the turn of the millennium. Most immediately, its hand-cranked operation and circular discs evoke the phonograph; in contrast to the analog and pits and grooves of vinyl records, however, the Autoplayer's paper discs sequence playback by digital means. The archaeology of this reproductive method can be traced via nineteenth-century technologies of musical automation associated with music boxes, fairground organs, and player pianos—including an analogous "music disk" devised by Claude-Félix Seytre (Figure 3.3a)—to water organs such as the famous sixteenth-century instrument at the Villa d'Este in Tivoli.[77]

At this juncture, we might recall that Iwai was inspired by a "hand-cranked antique music box" that used "paper cards, punched like the rolls on a player piano."[78] He considered it revelatory for the way it transduced music into visible and kinetic form, and it is no coincidence that the same mode of encoding sound via marks on a moving surface was adopted by rhythm-action games such as *Taiko no Tatsujin* and *Guitar Hero* in order to instruct players in lieu of conventional music notation. The Ele-Conga and its Autoplayer thus combine the hardware and software elements necessary for the mechanical reproduction of sequenced musical data.

As Iwai indicated, and Kondo demonstrated in *New Super Mario Bros.*, such data can easily be transduced into synchronized kinesis via centuries-old technology. In 1650, Athanasius Kircher published a design for a water-powered organ (Figure 3.4), inspired by the Villa d'Este instrument, which demonstrates how digital data could choreograph both musical

Figure 3.2 (*a*) The Ele-Conga's buttons; photograph reproduced with the permission of Erik Voskuil (beforemario.com); (*b*) Gibson SG controller for *Guitar Hero* (Sony PlayStation 2), developed by Harmonix (Mountain View, CA: RedOctane, 2005)

performance and movement.[79] The four blacksmiths on the left constitute a tribute to Pythagoras, who reputedly stumbled upon the principles of tuning while listening to the relative pitches of hammers ringing out from a forge. As it revolves, the pinned barrel of Kircher's organ programs three of the blacksmiths to hammer out a never-ending pattern, just as Jumpman's acquisition of a hammer in *Donkey Kong* triggers a looping triadic ostinato. Barrels, hammers, and bodies in repetitive motion: these elements are embedded in Kircher's organ as they are in *Donkey Kong*.[80]

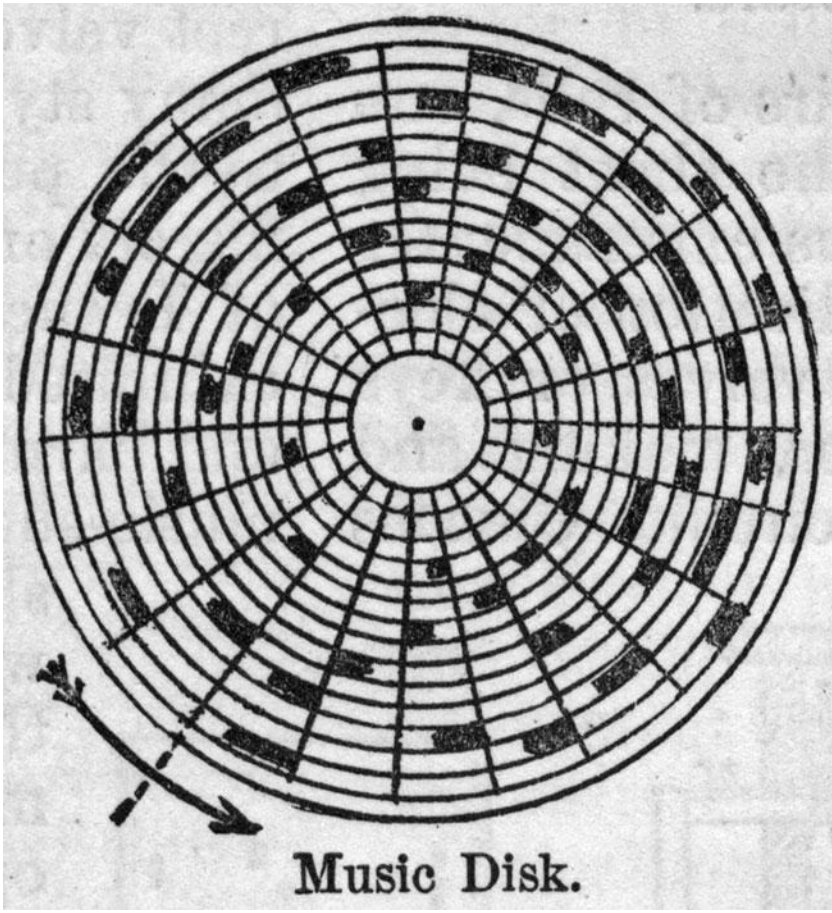

Figure 3.3 (*a*) Claude-Félix Seytre's "music disk" (1842), reproduced from Charles R. Brainard et al., *Appletons' Annual Cyclopaedia and Register of Important Events of the Year 1885* (New York: D. Appleton & Co., 1886), 615

A more direct morphological relationship can be perceived between Kircher's organ and the music creation mode in Nintendo's *WarioWare: D.I.Y.* (Figure 3.5). As well as featuring a keyboard and animated humanoids, *WarioWare: D.I.Y.* allows the player to pin his or her virtual barrel (which performs a complete revolution every eight measures) with note markers, just as Yokoi had provided purchasers of the Ele-Conga's Autoplayer with the "withered technology" of blank paper disks (also capable of storing eight measures of data) and a hole punch.

As the Autoplayer's hole punch suggests, the digital epistemology that underpins the sounding motion of Kircher's pinned barrels and Seytre's

Figure 3.3 (*b*) Paper disk for the Ele-Conga's Autoplayer; photograph reproduced with the permission of Erik Voskuil (beforemario.com)

revolving disks also had significant ramifications in the realms of material and visual culture: it enabled the automation of textile production via punch cards, a technique pioneered by Basile Bouchon and Jean-Baptiste Falcon and substantially refined by Joseph Marie Jacquard in 1801. The mosaic-like arrangement of information on these cards can be seen as a "prophetic relic," to adopt Alan Liu's formulation, of the grid of pixels that configured the sprite designs of raster-based digital games such as *Space Invaders* and *Donkey Kong*.[81] Moreover, Jacquard's innovation played an important role in the history of computing itself: from Charles Babbage's Analytical Engine (conceived under Jacquard's influence in nineteenth-century London), via IBM's electric accounting machines (mass produced in the United States throughout the 1950s and 1960s), to the globally ubiquitous optical drives of today's machines, generations of computing devices have been designed to process data stored on punch cards and their disk-shaped successors.

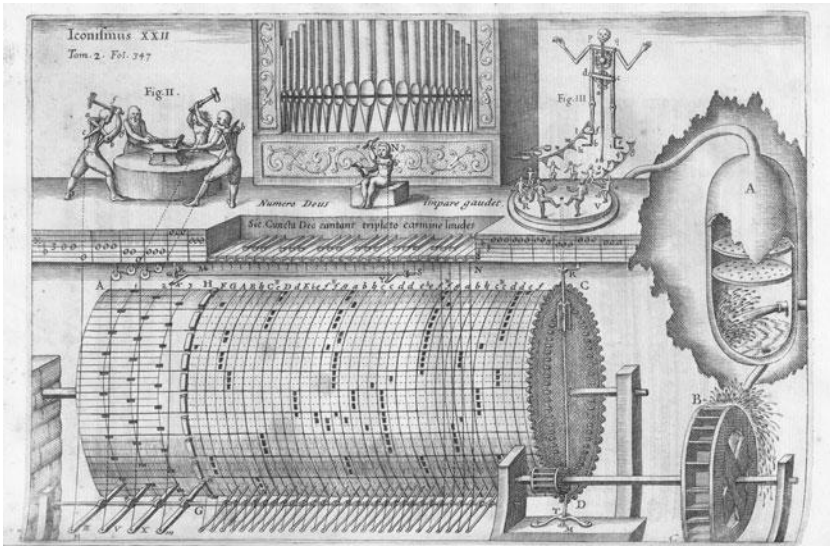

Figure 3.4 Athanasius Kircher, illustration of a water-powered organ, *Musurgia universalis, sive Ars magna consoni et dissoni*, 2 vols. (Rome: Corbelletti, 1650), 2: plate between pp. 346 and 347

While it might therefore be possible to posit tenuous connections between Kircher (a prominent member of the Society of Jesus), the music boxes brought to Japan by Jesuit missionaries in 1549, the global dissemination of computer technology in the latter half of the twentieth century, the young Iwai's formative encounters with digital media, and Yokoi's aesthetics of ludo-musical play, such links need not take the form of unidirectional vectors of transmission from Europe and North America to Asia.[81] Rather than betokening causal relationships and replication, the migration of these technologies across time and space can facilitate and represent ideas, beliefs, and practices that are quite distinct. Unlike the Ele-Conga, *Donkey Kong*, and *WarioWare: D.I.Y.*, Kircher's organ was far from a vehicle of play: the macabre figure of the skeleton, serving as a *memento mori*, reveals a deadly serious theological agenda.[83] Like many of Kircher's spectacular and sometimes outlandish inventions, the organ was conceived to arouse awe, fear, and piety rather than frivolous delight.[84] Conversely, while Japanese sprite designers may have had to accommodate the same technological affordances and constraints as their North American and European counterparts, they could also draw on the rich representational traditions of artists such as Jakuchu, as well as the immediate context provided by *manga* and *anime*.

Placing the Ele-Conga in musical, ludic, and technological relief reveals that the foundational attributes of digital games are intimately bound up with how sound has been conceived, captured, stored, organized, transmitted,

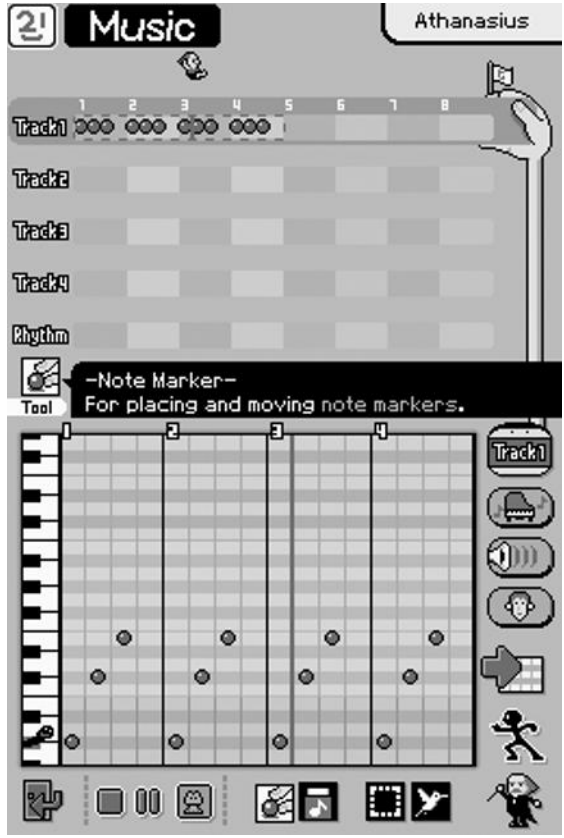

Figure 3.5 Screenshot of music creation mode from Nintendo's *WarioWare: D.I.Y. [Made in Ore]* (Nintendo DS), developed by Nintendo and Intelligent Systems (Kyoto: Nintendo, 2009–2010)

recreated, and transduced by mechanical means. This ontological latticework provides an archaeological basis for paying careful attention to the sonic and musical aspects of digital gameplay. In Foucauldian terms, it can be analyzed as a digital *dispositif* that functions, as Hiroki Azuma has written of *otaku* culture in Japan, as a database of elements assembled from within Japanese culture and far beyond.[85] When these elements have been arrayed by Nintendo's developers into ludic programs, they have shown themselves to be capable of sustaining diverse yet distinctive forms of playful engagement. Recognizing the importance of digitization and mediation, however, need not overdetermine the outcomes of historical and cultural analysis. From the flip book to *anime*, from toys to works of art, and from congas to taiko drums, the course of each element that plays into Nintendo's ludomusicality can be traced along paths that wind through space and time.[86] To take full measure of a

phenomenon as complex and multifarious as Nintendo's art of musical play, we believe it necessary to bring diverse discursive modes into productive contact at the points where these paths cross.

Notes

All websites were accessed November 4, 2013.

1 Gunpei Yokoi, *Monozukuri no inobēshon: "Kareta gijutsu no suihei shikō" towa nani ka?*, ed. Yohei Kusanagi and Yuki Kageyama (Tokyo: P-Vine Books, 2012), 44. Translations from the Japanese are our own unless otherwise indicated.
2 See, for instance, Sacha A. Howells, "Watching a Game, Playing a Movie: When Media Collide," in *ScreenPlay: Cinema/Videogames/Interfaces*, ed. Geoff King and Tanya Krzywinska (London and New York: Wallflower Press, 2002), 110–121.
3 *Gears of War* (Microsoft Xbox 360), developed by Epic Games (Redmond: Microsoft Studios, 2006). Convergence between digital games and films has been manifested by the central role played by ludic tropes and techniques in films such as *eXistenZ* and *Gamer*, not to mention the substantial takings of films based on the *Tomb Raider*, *Prince of Persia*, and *Resident Evil* franchises, their uniformly negative critical reception notwithstanding. While televisual correspondences might be less conspicuous, episodic adventures such as *CSI: Fatal Conspiracy* (Microsoft Xbox 360 and Windows, Sony PlayStation 3, and Nintendo Wii), developed by Telltale Games (Montreuil: Ubisoft, 2010), rely heavily on narrative structures and devices specific to the medium.
4 The trope's dissemination is monitored on http://thecitizenkaneofvideogames.tumblr.com.
5 *Space Invaders* (arcade cabinet), developed by Taito (Tokyo: Taito, 1978); *Space Invaders* (Atari VCS/2600), developed by Atari (Sunnyvale, CA: Atari, 1980); *Pac-Man* (arcade cabinet), developed by Namco (Tokyo: Namco, 1980); *Pac-Man* (Atari VCS/2600), developed by Atari (Sunnyvale, CA: Atari, 1982). The VCS and its faux-teak veneer might be considered alongside the VCR, which achieved mass market success soon after its release in 1975: while both machines could provide compromised approximations of media adapted from the arcade and the cinema, respectively, both were closer to the technologies, aesthetics, and social functions of video and television. The legal definition of the term "video game," as determined through litigation involving Ralph H. Baer, one of its pioneers, in the 1970s, stipulates that a television be involved (as opposed to a non-raster-scan display). For an account of how this came to be from Baer's perspective, see Ralph H. Baer, *Videogames: In the Beginning* (Springfield, NJ: Rolenta Press, 2005), 5–17.
6 *Heavy Rain* (Sony PlayStation 3), developed by Quantic Dream (Tokyo: Sony Computer Entertainment, 2010); *Alan Wake* (Microsoft Xbox 360), developed by Remedy Entertainment (Redmond: Microsoft Game Studios, 2010).
7 Lev Manovich, *The Language of New Media* (Cambridge, MA and London: MIT Press, 2001), 180.
8 Marshall McLuhan, *Understanding Media: The Extensions of Man* (New York: McGraw-Hill, 1964), 8; Jay David Bolter and Richard Grusin, *Remediation: Understanding New Media* (Cambridge, MA: MIT Press, 1999).
9 Consider, for instance, the perspective of renowned Japanese game producer Keiji Inafune: "I think Western designers have a much stronger . . . influence from film . . . Now that technology has advanced, Western designers view it as [an] opportunity to branch even further [toward] the idea of film scoring, while Japanese

designers continue [with their] approach to instrumentation that developed during the 8-bit era." Quoted in Kurt Kalata, "Clash of the Cultures," *1UP* (January 18, 2007), available online at www.1up.com/features/clash-cultures?pager.offset=5.

10 Manovich, *The Language of New Media*, 49–61.

11 *Electroplankton* (Nintendo DS), developed by indieszero (Kyoto: Nintendo, 2005).

12 Toshio Iwai, *Iwai Toshio no shigoto to shūhen* (Tokyo: Rikuyosha, 2000), 64.

13 Iwai, *Iwai Toshio no shigoto to shūhen*, 70.

14 "For me, the existential meaning of the flip book and the digital game are directly connected, bypassing the history of film and television. For example, I thought that the Game Boy was an electronic flip book when it was released. It could be carried around easily and played anywhere. The touch of one's fingers was directly registered via moving images and sound. I think the Game Boy restored the value of the flip book, which had been dormant for more than a century, by returning it to our hands in electronic form." Iwai, *Iwai Toshio no shigoto to shūhen*, 64.

15 On the concept of genealogy, see Michel Foucault, "Nietzsche, Genealogy, History," in *Language, Counter-Memory, Practice: Selected Essays and Interviews*, ed. and trans. Donald F. Bouchard (Ithaca, NY: Cornell University Press, 1980), 139–164. On media archaeology, see Erkki Huhtamo and Jussi Parikka, *Media Archaeology: Approaches, Applications, and Implications* (Berkeley and Los Angeles: University of California Press, 2011).

16 On *Pokémon*, see Joseph Tobin, *Pikachu's Global Adventure: The Rise and Fall of Pokémon* (Durham, NC and London: Duke University Press, 2004); and David Surman, "*Pokémon* 151: Complicating *Kawaii*," in *Gaming Cultures and Place in Asia-Pacific*, ed. Larissa Hjorth and Dean Chan (New York and London: Routledge, 2009), 158–178.

17 In this regard, digital games might instructively be set alongside Zen Buddhism and the complex history of its remediation between Japan and the West. See Shoji Yamada, *Shots in the Dark: Japan, Zen, and the West*, trans. Earl Hartman (Chicago and London: University of Chicago Press, 2009). For further perspectives on issues of authenticity and reproduction, see Rupert Cox, *The Culture of Copying in Japan: Critical and Historical Perspectives* (Abingdon and New York: Routledge, 2008).

18 Examples of such rhetoric in Japan include the concepts of *nihonjinron* (theories and discourses on "Japaneseness," which became especially influential in the years following World War II) and, more recently, *Garapagosu-ka* ("Galápagos syndrome," used to refer to a specialized and geographically isolated evolutionary "branch" of a global product).

19 Rupert Cox, "Is There a Japanese Way of Playing?," in *Japan at Play: The Ludic and the Logic of Power*, ed. Joy Hendry and Massimo Raveri (London and New York: Routledge, 2002), 169–183.

20 Akihiro Saito, *Gēmunikusu to wa nani ka: Nihon-hatsu, sekaikijun no monozukuri-hōsoku* (Tokyo: Gentosha, 2007), 204–207.

21 Nobuo Tsuji, *Playfulness in Japanese Art* (Lawrence: Spencer Museum of Art, University of Kansas, 1986), 9–14.

22 *Pokémon: Red* [*Pocket Monsters: Red*] (Nintendo Game Boy), developed by Game Freak (Kyoto: Nintendo, 1996); Saito, *Gēmunikusu to wa nani ka: Nihon-hatsu, sekaikijun no monozukuri-hōsoku*, 204–207. On the playfulness, wit, and humor that characterize *ukiyo-e*, see Donald Jenkins et al., *The Floating World Revisited* (Honolulu: Portland Art Museum and University of Hawaii Press, 1993).

23 Kenji Ono, "'Gamenics' and its Potential: Interview with Akihiro Saito," in *Game Usability: Advice from the Experts for Advancing the Player Experience*, eds. Katherine Isbister and Noah Schaffer (Burlington, MA: Morgan Kaufmann, 2008), 357–379.

24 On miniaturization in Japan, see O-Young Lee, *The Compact Culture: The Japanese Tradition of "Smaller is Better"*, trans. Robert N. Huey (Tokyo and New York: Kodansha International, 1984); and Mitsukuni Yoshida, Ikko Tanaka, and Tsune Sesoko, *The Compact Culture: The Ethos of Japanese Life* (Hiroshima: Toyo Kogyo, 1982).
25 See Yoshida, Tanaka, and Sesoko, *The Compact Culture: The Ethos of Japanese Life*, 26–31.
26 Johan Huizinga, *Homo Ludens: A Study of the Play Element in Culture* (Boston: Beacon Press, 1955), 10.
27 Although Huizinga claims that "there is no formal difference between play and ritual" (p. 10), Émile Benveniste drew a chiastic distinction between them: while rites transform events into structures, play transforms structures into events. Émile Benveniste, "Le jeu comme structure," *Deucalion* 2 (1947), 161–167. This latter formulation might be applied to the notion that the tea ceremony is a form of play that depends upon strict rules in order to create singular and unrepeatable experiences (summed up by the maxim *ichi-go ichi-e*, commonly attributed to sixteenth-century tea master Sen no Rikyu).
28 Rolf A. Stein, *The World in Miniature: Container Gardens and Dwellings in Far Eastern Religious Thought*, trans. Phyllis Brooks (Palo Alto, CA: Stanford University Press, 1990), 52.
29 Yokoi was interested in digital gameplay that could break through the frame of the television screen, as manifested by several accessories that he designed for the Famicom, known in the West as the Nintendo Entertainment System. See Takefumi Makino, *Gēmu no chichi, Yokoi Gunpei den: Nintendo no DNA o sōzō shita otoko* (Tokyo: Kadokawa Shoten, 2010), 183–185. More than 20 years after the appearance of the Famicom, Miyamoto expressed a similar outlook: "I've always thought that games would eventually break free of the confines of a TV screen to fill an entire room." Kenji Hall, "Online Extra: Meet Mario's Papa," *Business Week* (November 6, 2005), available online at www.businessweek.com/stories/2005-11-06/online-extra-meet-marios-papa).
30 See, for instance, Ito Jakuchu's late eighteenth-century *Birds, Animals, and Flowering Plants in Imaginary Scene*, a pair of six-panel folding screens composed of more than 86,000 pixel-like squares. (For comparison's sake, the two screens of the DS incorporate 98,304 pixels.) On Jakuchu, see Nobuo Tsuji, *Playfulness in Japanese Art* (Lawrence: Spencer Museum of Art, University of Kansas, 1986), 63–74.
31 On the multiple functions of the folding screen in Japanese culture, see Oliver Impey, *The Art of the Japanese Folding Screen* (Oxford: Ashmolean Museum, 1997).
32 See Junko Kitagawa, "Music Culture," in *The Cambridge Companion to Modern Japanese Culture*, ed. Yoshio Sugimoto (Cambridge: Cambridge University Press, 2009), 261–280. The melodica, or keyboard harmonica, is a portable, mass produced instrument that has a rectangular body with a keyboard interface and a mouthpiece through which one blows in order to produce sound. A short mouthpiece is used when the instrument is held horizontally and another with an extension tube when it is played vertically.
33 Nintendo's DS and 3DS systems respond to the player's breath via their built-in microphone, while the 3DS also contains a gyroscope and accelerometer that recognize gestural input. On the Game Boy's important role for circuit benders and on the chiptune scene, see Karen Collins, *Playing with Sound: A Theory of Interacting with Sound and Music in Video Games* (Cambridge, MA and London: MIT Press, 2013), 108–120.

34 On Heidegger's concept of instrumentality, see Martin Heidegger, "The Question Concerning Technology," in *The Question Concerning Technology and Other Essays*, trans. William Lovitt (New York: Harper & Row, 1977), 3–35.

35 *The Legend of Zelda: The Ocarina of Time* [*Zeruda no Densetsu: Toki no Okarina*] (Nintendo 64), developed by Nintendo (Kyoto: Nintendo, 1998). The Ocarina of Time can be placed in an organological context provided by the Magic Flute from Mozart and Schikaneder's eponymous opera, which similarly acts as a charm, a summons, and an agent of transformation and protection. On instrumentality, mechanization, and mediation in *Die Zauberflöte*, see Carolyn Abbate, "Magic Flute, Nocturnal Sun," in *In Search of Opera* (Princeton, NJ and Oxford: Princeton University Press, 2001), 55–106.

36 *Simon* (portable electronic game), developed by Ralph H. Baer and Howard J. Morrison (East Longmeadow, MA: Milton Bradley, 1978).

37 *Wii Music* (Nintendo Wii), developed by Nintendo (Kyoto: Nintendo, 2008). For more details on *Wii Music*, see Steven E. Jones and George K. Thiruvathukal, *Codename Revolution: The Nintendo Wii Platform* (Cambridge, MA, and London: MIT Press, 2012), 134–137. *Wii Music*'s emphasis on multiplayer musical performance can be placed in a Nintendian lineage that includes *Daigasso! Band Brothers* for the DS (Kyoto: Nintendo, 2004) and its sequel, released with a "DX" suffix in Japan (2005) and retitled as *Jam with the Band* for its European release (2008). Means of producing, performing, and recording music are supplied by many of Nintendo's games and products, including *Mario Paint* (Nintendo Super Famicom [Super Nintendo Entertainment System]), developed by Nintendo (Kyoto: Nintendo, 1992), and even the inbuilt camera and sound applications for Nintendo's DSi handheld system.

38 Quoted in Daniel Terdiman, "Video game legend Miyamoto talks *Wii Music*," *CNET* (October 27, 2008), available online at http://news.cnet.com/8301-13772_3-10075394-52.html.

39 *The Legend of Zelda* [*The Hyrule Fantasy: Zeruda no Densetsu*] (Nintendo Famicom/Famicom Disk System), developed by Nintendo (Kyoto: Nintendo, 1986 [FDS]/1987 [Famicom]); *Super Mario Bros.* (Nintendo Famicom/Famicom Disk System and arcade cabinet), developed by Nintendo (Kyoto: Nintendo, 1985 [Famicom]/1986 [FDS and arcade]); Koji Kondo, "Painting an Interactive Musical Landscape," presentation at the Game Developers Conference 2007, summarized in English by Vincent Diamante (March 8, 2007), available online at www.gamasutra.com/php-bin/news_index.php?story=104002. In his presentation, Kondo invoked synchronization between game and music via the CPU clock as a factor in his preference for sequenced sounds over recorded musical performances.

40 Quoted in Chris Kohler, "VGL: Koji Kondo Interview," *Wired* (March 11, 2007), available online at www.wired.com/gamelife/2007/03/vgl_koji_kondo_/.

41 *New Super Mario Bros.* (Nintendo DS), developed by Nintendo (Kyoto: Nintendo, 2006).

42 According to Adam L. Kern, *kabuki* "routinely breaks the fourth wall, closing the gap between stage and audience for a variety of calculated reasons: playfulness; a bid for authority or authenticity; dramatic effect, and so on." Adam L. Kern, "*Kabuki* Plays on Page—and Comicbook Pictures on Stage—in Edo-Period Japan," in *Publishing the Stage: Print and Performance in Early Modern Japan*, ed. Keller Kimbrough and Satoko Shimazaki (Boulder, CO: Center for Asian Studies, University of Colorado, 2011), 163–189. In *Super Mario Bros.* and many subsequent games, Mario breaks the fourth wall at the moment of "death," which is treated as a comic event: he turns to face the audience before detaching himself from the ludic plane of action.

43 *WarioWare: D.I.Y.* [*Made in Ore*] (Nintendo DS), developed by Nintendo and Intelligent Systems (Kyoto: Nintendo, 2009–2010). The explicit theatricality of *New Super Mario Bros.* and *WarioWare: D.I.Y.* can be traced back to *Super Mario Bros. 3* (Nintendo Famicom), developed by Nintendo (Kyoto: Nintendo, 1988), which features paraphernalia such as curtains, stage machinery, and costumes. Kabuki-style theatricality was also foregrounded in *Paper Mario RPG* [*Paper Mario: The Thousand-Year Door*] (Nintendo GameCube), developed by Intelligent Systems (Kyoto: Nintendo, 2004), in which battles take place on a stage before a rowdy audience.

44 Miyamoto made his comments in response to an unidentified journalist's question at the E3 Nintendo Developer Roundtable event in 2008; they were reported by Michael McWhertor, "Miyamoto: *Wii Music* is 'More Interesting than a Video Game'," *Kotaku* (July 17, 2008), available online at http://kotaku.com/5026431/miyamoto-wii-music-is-more-interesting-than-a-video-game.

45 See, for instance, Alan Kim's review, posted October 30, 2008 (www.gamesradar.com/wii-music-review/). *Wii Music* has its share of devoted and eloquent apologists, however, such as Jacob Crites, "The Brilliance of *Wii Music*," *Game Observer* (February 16, 2010), available online at www.gameobserver.com/features/inside/all-platforms/the-brilliance-of-wii-music-part-1-220/.

46 Giorgio Agamben, "In Playland: Reflections on History and Play," in *Infancy and History: The Destruction of Experience*, trans. Liz Heron (London and New York: Verso, 1993), 73–96.

47 Brian Sutton-Smith, *Toys as Culture* (New York and London: Gardner Press, 1986), 58; see also Susan Stewart, *On Longing: Narratives of the Miniature, the Gigantic, the Souvenir, the Collection* (Baltimore: Johns Hopkins University Press, 1984), 57–60.

48 Woodrow Phoenix, *Plastic Culture: How Japanese Toys Conquered the World* (Tokyo and New York: Kodansha International, 2006), 9. In an interview, Miyamoto acknowledged these qualities of Nintendo's games: "What's really important is viewing Nintendo almost like a toy company where we're making these things for people to play with. As a consumer, you want to be able to . . . have those things from your youth that you can go back to and experience again." Quoted in Tom Phillips, "Miyamoto: Nintendo's game ownership policy should operate 'like a toy company'," *Eurogamer* (June 13, 2013), available online at www.eurogamer.net/articles/2013-06-13-miyamoto-nintendos-game-ownership-policy-should-operate-like-a-toy-company.

49 Gunpei Yokoi and Takefumi Makino, *Yokoi Gunpei Gēmukan Returns: Game Boy o unda hassōnyoko* (Tokyo: Film Art, 2010), 101. This was not an isolated occurrence: the ludic potential of calculators was explored in publications such as Koichi Kishida's *Dentaku de asobu hon* [*Book for Playing with the Calculator*] (Tokyo: Subaru Shobō, 1977), and the calculator provided current Nintendo president Satoru Iwata with his point of entry into the gaming world. Megan Farokhmanesh, "Iwata joined gaming because computers 'were going to change the world'," *Polygon* (October 28, 2012), available online at www.polygon.com/2012/10/28/3567254/iwata-joined-gaming-because-computers-were-going-to-change-the-world.

50 Yokoi and Makino, *Yokoi Gunpei Gēmukan Returns*, 199–200. Nintendo continued to espouse Yokoi's philosophy after his departure from the company in 1996 and his untimely death the subsequent year; in particular, the DS and Wii systems bear his hallmarks. See Osamu Inoue, *Nintendo Magic: Winning the Videogame Wars*, trans. Paul Tuttle Starr (New York: Vertical, 2010), 122–145.

51 Makino, *Gēmu no chichi, Yokoi Gunpei den: Nintendo no DNA o sōzō shita otoko*, 130.

52 Quoted in Florent Gorges and Isao Yamazaki, *The History of Nintendo 1980–1991: The Game & Watch Games, An Amazing Invention* (Triel-sur-Seine: Pix'n Love Publishing, 2012), 23. The beeps were deemed so integral to gameplay that they could not be silenced by the player (despite any annoyance they caused to others in the vicinity).
53 Claus Pias, "The Game Player's Duty: The User as the Gestalt of the Ports," in *Media Archaeology*, ed. Erkki Huhtamo and Jussi Parikka, 164–183.
54 Pias, "The Game Player's Duty: The User as the Gestalt of the Ports," in *Media Archaeology*, ed. Erkki Huhtamo and Jussi Parikka, 179–180.
55 Friedrich Nietzsche, *Werke in drei Bänden* (Munich: Carl Hanser, 1954), 2: 93.
56 Roger Caillois, *Man, Play, and Games*, trans. Meyer Barash (Urbana and Chicago: University of Illinois Press, 1961), 27–35. For a summary of Caillois's taxonomy of play and its applicability to music, see Roger Moseley, "Playing Games with Music (and Vice Versa): Ludomusicological Perspectives on *Guitar Hero* and *Rock Band*," in *Taking It to the Bridge: Music as Performance*, ed. Nicholas Cook and Richard Pettengill (Ann Arbor: University of Michigan Press, 2013), 279–318. Nintendo's longtime president Hiroshi Yamauchi, who ran the company from 1949 until 2002, approvingly cited Caillois's taxonomy in terms of its relevance for digital games in general and *Space Invaders* in particular. Quoted in Gorges and Yamazaki, *The History of Nintendo 1889–1980: From Playing Cards to Game & Watch*, 189.
57 *Rhythm Tengoku* (Nintendo Game Boy Advance and arcade cabinet), developed by Nintendo with J.P ROOM (GBA) and Sega (arcade) (Kyoto: Nintendo, 2006 [GBA]/2007 [arcade]). Three examples will serve to illustrate the whimsical variety of the game's scenarios: in one, the player plucks "facial" hairs from an onion that stares back at him or her with small round eyes; in another, the player assumes the role of a monkey who must clap hands in response to a pop singer's performance along with other monkey fans; in a third, the player participates in a call-and-response love duet with a fellow moai. Additional gameplay modes include a set of "Rhythm Toys" whose lack of rules, points, time limits, and purpose is characteristic of *paidia*.
58 In developing *Rhythm Tengoku*, Tsunku (whose real name is Mitsuo Terada) espoused the didactic goal of "improving Japanese people's sense of rhythm," and he approached Nintendo with the project specifically because he thought of them as a "play" company rather than a "game" company. Quoted in "Shachō ga kiku *Rhythm Tengoku Gold*," *Nintendo*, available online at www.nintendo.co.jp/ds/interview/ylzj/vol2/index.html. He has asserted that "there's a clear link between music, rhythm and play, and these things conspire together to draw the player into the game world naturally." Quoted in Chris Kohler, "J-Pop Producer Tsunku Perfects Music Games With *Rhythm Heaven*," *Wired* (April 10, 2009), available online at www.wired.com/gamelife/2009/04/qa-japans-pop-i/.
59 *WarioWare, Inc.: Mega Microgame$!* [Made in Wario] (Nintendo Game Boy Advance), developed by Nintendo (Kyoto: Nintendo, 2003); Pias, "The Game Player's Duty: The User as the Gestalt of the Ports," in *Media Archaeology*, ed. Erkki Huhtamo and Jussi Parikka, 180.
60 Iwai, *Iwai Toshio no shigoto to shūhen*, 64.
61 Iwai, *Iwai Toshio no shigoto to shūhen*, 64; *Xevious* (arcade cabinet and Nintendo Famicom/Famicom Disk System), developed by Namco (Tokyo: Namco, 1983 [arcade]/1984 [Famicom]/1990 [FDS]).
62 Yoshikazu Tozuka, foreword to Chapter 6, in *Gēmu Ongaku*, ed. Yoshikazu Tozuka (Tokyo: Exceed Press, 1999), 136.

63 *Otocky* (Nintendo Famicom Disk System), developed by Scitron & Art and SEDIC (Tokyo: ASCII Corporation, 1987). For more information on *Otocky*, see Bruno de Figueiredo's encomium to the game (August 2009), available online at www.hardcoregaming101.net/otocky/otocky.htm.

64 Tozuka, foreword to Chapter 6, in *Gēmu Ongaku*, 136–137. It is telling that Ikinari Myūjishan [Instant Musician] (Nintendo Famicom), developed by Tokyo Shoseki, and Doremikko (Nintendo Famicom Disk System), developed by Konami, were released alongside Otocky in 1987: both games foreground music-driven improvisatory play, but whereas the former features an onscreen keyboard activated by the regular Famicom controller, the latter can also be played with a special keyboard-shaped controller (one of the earliest of its kind). In different ways, all three games blur the distinctions between gameplay and musical performance.

65 The first quote is cited in James Burns, "Inside *Electroplankton*," *N-Sider* (July 24, 2005), available online at www.n-sider.com/contentview.php?contentid=317&page=1. The second is taken from Fares Kayali, "Playing Music: Design, Theory, and Practice of Music-Based Games," Ph.D. dissertation (Technische Universität Wien, 2008), 66. On *Electroplankton* as an "art game," see Martin Pichlmair, "*Electroplankton* Revisited: A Meta-Review," *Eludamos* 1/1 (2007), available online at www.eludamos.org/index.php/eludamos/article/view/vol1no1-8; and Axel Stockburger, "Sound-Image Relations in Video and Computer Games," in *See This Sound: Audiovisuology Compendium*, ed. Dieter Daniels, Sandra Naumann, and Jan Thoben (Cologne: Walther König, 2010), 129–139. *Electroplankton*'s two modes, dubbed "performance" and "audience," suggest musical roles for the player instead of enforcing ludic rules.

66 Iwai adapted the concepts and mechanics behind *Music Insects* in the form of *Sound Fantasy* (Nintendo Super Famicom), developed by Nintendo (unpublished, 1994); the game was canceled by Nintendo, but reworked for the PC and published as *SimTunes* (Microsoft Windows), developed by Maxis (Emeryville, CA: Maxis, 1996). In *Electroplankton*, the influence of *Music Insects* can be perceived in "Tracy," Composition on the Table appears as "Luminaria," and Kondo's "invincibility" music from *Super Mario Bros.* is featured in "Beatnes."

67 Most prominently, Iwai and Sakamoto collaborated on *Music Plays Images X Images Play Music*, a multimedia performance staged in Mito in 1996 and Tokyo the following year, where it was billed as *MPIXIPM*. The program included *Ongaku no chesu* [Music Chess], an apparent homage to John Cage and Marcel Duchamp's *Reunion* (1968) featuring a "game board" that functioned as a real-time step sequencer. (In strictly morphological terms, the "game" played by Iwai and Sakamoto in Tokyo was closer to peg solitaire than chess.) In association with Yamaha, Iwai proceeded to develop the Tenori-on (2007), a portable electronic instrument that operates along similar lines.

68 Yokoi was the executive producer of *Sound Fantasy*. Although the game was canceled, Iwai was struck by Yokoi's receptiveness to its facilitation of a "play with sounds" rather than normative gameplay or composition. Iwai describes himself as in sympathy with Yokoi's ideas, which he came to appreciate fully after his death in 1997: "I thought maybe my job is much closer to the work that Mr. Yokoi had been doing than to art." Iwai, *Iwai Toshio no shigoto to shūhen*, 67.

69 The quote was cited in Iwai's online profile as winner of the Multimedia Content Association of Japan's Multimedia Grand Prix in 1997; the profile is no longer accessible.

70 On the "modernity" of limited animation, see Thomas Lamarre, *The Anime Machine: A Media Theory of Animation* (Minneapolis, MN and London: University of Minnesota Press, 2009), 184–206.

71 Cited in Lamarre, *The* Anime *Machine: A Media Theory of Animation*, 188. A discussion between Iwata and the developers of *Minna no Rhythm Tengoku* [*Rhythm Heaven Fever/Beat the Beat: Rhythm Paradise*] (Nintendo Wii), developed by Nintendo and TNX (Kyoto: Nintendo, 2011), is revealing in this regard: it emerges that eliminating intermediate frames of animation (just as Tezuka had done) improves the synchronization of image, sound, and button-pressing, yielding superior results to those obtained from the use of three-dimensional models and "realistic" graphics. "*Shachō ga kiku Minna no Rhythm Tengoku*," *Nintendo*, available online at www.nintendo.co.jp/wii/interview/somj/vol1/index.html.

72 Quoted in Gorges and Yamazaki, *The History of Nintendo 1980–1991: The Game & Watch Games, An Amazing Invention*, 146.

73 The genesis of the Ele-Conga is briefly described in Gunpei Yokoi and Takefumi Makino, *Yokoi Gunpei Gēmukan Returns: Game Boy o unda hassōryoku*, 40–43.

74 *Taiko no Tatsujin* (arcade cabinet), developed by Namco (Tokyo: Namco, 2001).

75 *Donkey Konga* (Nintendo GameCube), developed by Namco (Kyoto: Nintendo, 2003); *Donkey Kong* (arcade cabinet), developed by Nintendo (Kyoto: Nintendo, 1981). The appearance of the *Donkey Konga* bongos might also reflect the fact that Cuban congas were often made from salvaged barrels. The bongos were subsequently repurposed by Nintendo's *Donkey Kong: Jungle Beat* (Nintendo GameCube), developed by Nintendo (Kyoto: Nintendo, 2004), a platform game in which players control Donkey Kong's movements by striking the bongos and clapping their hands (an action registered by the bongos' built-in microphone). *Donkey Kong: Jungle Beat* thus approaches the ludomusical fusion of rhythm and gameplay described by Kondo in relation to *Super Mario Bros.*, but from an angle that explicitly foregrounds instrumentality and performance.

76 *Guitar Hero* (Sony PlayStation 2), developed by Harmonix (Mountain View, CA: RedOctane, 2005). On *Guitar Hero*'s controller, see Kiri Miller, *Playing Along: Digital Games, YouTube, and Virtual Performance* (Oxford and New York: Oxford University Press, 2012), 86–93.

77 On the relationship of this technological lineage to digital games, see Moseley, "Playing Games with Music (and Vice Versa): Ludomusicological Perspectives on *Guitar Hero* and *Rock Band*," 297–300.

78 Deanna Morse, "Pre-Cinema Toys Inspire Multimedia Artist Toshio Iwai," *Animation World Magazine* 3/11 (1999), available online at www.awn.com/mag/issue3.11/3.11pages/morseiwai.php3.

79 As Jessica Riskin points out, Kircher's organ can be placed in a long tradition of mechanical clocks and organs that animated doves, roosters, biblical figures, angels, devils, and skeletons, among other things; the earliest documentation of such devices dates from the mid fourteenth century. Jessica Riskin, "Machines in the Garden," *Republics of Letters* 1/2 (2010), 16–43.

80 The most direct manifestation of Donkey Kong's ludomusicality was never released. *Donkī Kongu no Ongaku Asobi* [*Donkey Kong's Musical Play*], developed by Nintendo and announced for the Famicom in 1983, was to feature Jumpman and Pauline hammering piano keys while Donkey Kong strummed the bass; a collaborative karaoke mode was also planned. On other aspects of Donkey Kong's lineage, see Neil Lerner's essay in this volume, 1–29.

81 Alan Liu, "Transcendental Data: Toward a Cultural History and Aesthetics of the New Encoded Discourse," *Critical Inquiry* 31 (2004), 49–81.

82 See John W. O'Malley, *The First Jesuits* (Cambridge, MA: Harvard University Press, 1993), 76–77.

83 Despite its allusions to Pythagoras and Virgil, the organ's Christian symbology is made evident by the musical ubiquity of the number three and the Latin text directly above the keyboard.

84 On the proselytizing motives behind Kircher's media techniques, see Friedrich Kittler, *Optical Media*, trans. Anthony Enns (Cambridge, MA and Malden, MA: Polity Press, 2010), 76–81.
85 Hiroki Azuma, Otaku: *Japan's Database Animals*, trans. Jonathan E. Abel and Shion Kono (Minneapolis, MN and London: University of Minnesota Press, 2009). On Foucault's concept of the *dispositif*, which has been variously translated as "apparatus," "ensemble," and "system of relations," see Foucault et al., "Le jeu de Michel Foucault," *Ornicar?* 10 (July 1977), 62–93.
86 On the relationship between layering in *anime* and calligraphy, see Miho Nakagawa, "Mamoru Oshii's Production of Multi-Layered Space in 2D Anime," *Animation* 8/1 (2013), 65–83.