Material Listening:

Materiality and Embodied Interaction in the Digital Music Encounter

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Abstract

My project investigates the nature of experiences with cultural artifacts in the digital environment. Specifically, I am concerned with the interface as a cultural form, and its relationship to content in our encounters with digital music. To speak of the interface as cultural form is to acknowledge its status as a signifier of human value in a world where content is largely immaterial and abstract. I believe current systems designed to manage music collections and represent digital packages do not support the kinds of material, connotative associations that did past media, and I argue that these associations are the precondition for the assignment of value. Hence, music's cultural import is diminishing. This state of affairs, I argue, is largely the result of flawed design assumptions based on outdated metaphors and paradigms. My study seeks to explore the ways in which an interface designed to leverage today's increasingly powerful digital devices might provide for more meaningful, personally resonant encounters with the cultural stuff of music. My research is grounded in New Media theory and relies on notions of materiality and embodied interaction to propose an interface aesthetics that encompasses the dialectical relationship between representation and reality, and reintroduces the possibility of an authentic encounter with music's material culture in the digital age.

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Problem Statement:

How might representational strategies in an interface for digital music express materiality and support embodied interaction in encounters with artifacts and collections?

In what ways might behavioral and visual metaphors derived from prior material culture provide strategies for constructively refashioning screen-based encounters?

In what ways might simulated three-dimensional space support embodied interaction and material impressions through temporal expression of content and relationships?

What do emergent multitouch devices suggest for the development of a new interface aesthetics?

Definitions

CULTURAL INTERFACE: As described by Lev Manovich in *The Language of New Media,* a cultural interface is an interface designed specifically for interaction with cultural data, *e.g.,* music, art, film, books. "In short, we are no longer interfacing to a computer but to culture encoded in digital form" (69-70).

EMBODIMENT: "Embodiment...denotes a form of participative status....[It] is about the fact that things are embedded in the world, and the ways in which their reality depends on being embedded" says Paul Dourish in *Where the Action Is: The Foundations of Embodied Interaction* (18). This philosophically-rooted perspective recognizes our experience of the world as "intimately tied to the ways in which we act in it," as opposed to regarding consciousness and the world as two separate phenomena. Embodiment regards our engagement in the world as the precondition of meaning — meaning is created in and through the phenomena of experience, rather than existing separately, waiting to be accessed by us. "Embodiment is the property of our engagement with the world that allows us to make it meaningful" (126). Value, theory, and action, then come from our participative being-in-the-world, and are dependent upon it. Put another way, "To be embodied involves taking on a spatio-temporal orientation in the world that is experienced as an ability to act directly and meaningfully on that world," as Aylish Wood describes in her book *Digital Encounters* (116). This perspective has vast ramifications for representational and interactive strategies in interface design.

EMBODIED INTERACTION: "Embodied Interaction is the creation, manipulation, and sharing of meaning through engaged interaction with artifacts... we encounter, interpret, and sustain meaning through our embodied interactions with the world and with each

other" Dourish says (126-7). From this perspective, it does not make sense to think of meaning existing, self-contained, as "content" in an interface — rather, meaning is generated and revealed through active, dynamic relationships with the world (or which interfaces are a part).

INTERFACE AESTHETICS: The notion of an interface aesthetics, as described by Søren Pold in his essay, *Interface Realisms: The Interface as Aesthetic Form,* regards the interface "as an aesthetic form in itself," ontologically and epistemologically significant and worthy of consideration as an "aesthetic, cultural, and ideological object" (2005, 6). This perspective is set in contrast to the prevailing mindset of HCI, which regards the interface as strictly functional and ideally transparent.

MATERIALITY: In an interview with Lisa Gitelman for the Iowa Journal of Cultural Studies in 2002, Katherine Hayles says, "Materiality, as I use the term, does not simply mean all the physical, tangible aspects of the construction, delivery and reading apparatus. Rather, materiality is a selective focus on certain physical aspects of an instantiated text that are foregrounded by a work's construction, operation, and content. These properties... emerge from the interplay between the apparatus, the work, the writer and the reader/user." Hayles' notion of materiality is based in literary theory, but holds implications for our understanding of interface: "materiality offers a robust conceptual framework in which to talk about *both* representation and simulation as well as the constraints and enablings they entail," she says in *Writing Machines* (2002, 6). Materiality might be thought of as something that emerges through embodied interaction, rather than something that exists inherently in an artifact, or as a precondition of interaction. From this perspective, the embodiment of the user and the embodiment of the text (or artifact, or interface) are related: Hayles says later in the Gitelman interview that, "Texts have bodies, readers and users have bodies, and meaning emerges from

material engagements with the rich resources of a physically vibrant world as it is crafted through artistic practices and instantiated in artifactual objects and processes. To settle for anything else than a fully embodied and material practice of literary theory and criticism is to risk impoverishing our understanding of the meaning-making practices through which we engage the world."

REMEDIATION: Richard Grusin and Jay Bolter describe the processes, strategies, and discourses through which new media refashion and reinterpret their media predecessors in light of changing technologies as remediation. Remediation proceeds with a "double logic": "Our culture wants both to multiply its media and erase all traces of mediation: ideally, it wants to erase its media in the very act of multiplying them" (1999, 5). What this means is that new digital media "oscillate between immediacy and hypermediacy, between transparency and opacity." New media employ increasingly advanced technology in order to bring users closer to an immediate, authentic experience. Further, "Digital visual media can best be understood through the ways in which they honor, rival, and revise linear-perspective painting, photography, film, television, and print" (15) — valuations of of new media are products of their relationships with the old.

Introduction

Until very recently, design played an integral part of our encounters with recorded music. From Reid Miles' work at Blue Note in the 1950s, to Aubrey Powell and Storm Thorgerson's surreal escapades at Hipgnosis and Peter Saville's groundbreaking reappropriations for Factory, the images that decorated an record's sleeve framed the entryway to a musical experience. In the best instances, artists and designers created lavish, smart visual inductions into the specific logic of the sounds their packages contained. But as record sales became bigger and bigger business, profit-driven corporate decision-making processes forced design compromises and corner-cutting.[1] As new media formats like the cassette and compact disc took hold, the importance of the visual culture of music diminished. In the digital era, we frequently find music almost entirely detached from any image-based representation.

But past encounters with recorded music were only partially about the visual. The physical culture of pop, epitomized by the vinyl LP, is about more than just cover art. For whether lovingly or haphazardly constructed, the packaging and design of an album frames the listening moment as a material one. The flutter of cellophane; the smell of paperboard and ink; the sticky gloss varnish collecting every fingerprint. From the weight of the vinyl to the barely perceptible depth of the groove into which the needle sinks, listening to an LP is an embodied experience. The static crackle that emanates from the physical imperfection of the playback process is the grace note of the undeniable physicality of a spinning slab of vinyl. All these things are constituent parts of a resonant encounter. I call this loose association of physical attributes and connotative

1>>> Sometimes quite literally, as was the practice in marking records for cutout bins at retail establishments.

expressions “material listening” — a phrase by which I point to an experience with recorded music supported by the embodied presence of the listener and the materiality of the artifact. From this perspective, the significant aspects of the past culture are not coextensive with or reducible to the album cover. There is more to the story.

Computer-based digital music collections make only slight nods toward material listening. The dominant mode of experience is disembodied, abstracted from any particular physical form. The paradigmatic model is provided, of course, by iTunes, wherein a lo-res JPEG of the album cover image stands in for the entirety of the material experience of a record. Even this modicum of visual information is highly contingent — operations within the iTunes interface occur in exactly the same way whether or not a user has chosen to add or display album art.

Audio files all but float freely in cyberspace. For the end-listener, the very existence of these artifacts inevitably seems tenuous and sketchy. Where and what is a digital music collection? Like chimera, these songs and albums come from nowhere, endlessly replicable, endlessly replaceable, absolutely impenetrable and ultimately impossible to tell apart. Remanding one of our greatest cultural productions to this abstract prison like some scorned General Zod[2] is a great injustice, and one for which the industry as a whole continues to pay.[3]

I believe design supports value in our human relationships with objects and with each other. And I believe (and it follows) that lack of design, or poor design, might hinder the

2>>> Dru-Zod was a Kryptonian enemy of Superman who was sent the Phantom Zone — an alternate prison dimension discovered by Jor-El. See <http://www.zod2008.com>.

3>>> See Johnston, Maura. “Music Sales Are In Free Fall Right Now, and That Fact Still Matters.” *Sound of the City: The Village Voice Blogs.* 15 Apr. 2010. Web. 30 Apr. 2010. <http://blogs.villagevoice.com/music/archives/2010/04/music_sales_are.php>.

creation and sustenance of meaning; worse, in my view, it might compromise or destroy meaning where it once existed. This kind of design-implicated value downgrade has happened in music. While the audio quality of a digitally remastered recording encoded with a high-quality compression algorithm rivals or exceeds vinyl, the artifact is not ontologically[4] equivalent. A digital file in itself has no material quality; it provides no shelter or support for the emotional projection in which we engage when we commit to an evaluation of a thing. When designed databases and interfaces treat music as nothing but a collection of audio files, then music, disembodied, is ruptured from the culture of meaning. Without the emotional-historical affordances of a material listening experience, the character of our relationship with music is fundamentally compromised.[5]

Existing digital music interface designs nod meekly in acknowledgment of our cultural hunger for material listening. But the aesthetics of these interfaces are derived almost entirely from existing HCI paradigms, already stretched uncomfortably to accommodate emergent screen-based practices. Tried-and-true GUI schema dictate organizational principles perhaps appropriate for simple text and numerical data, but which fail to support an end-listener's experience with a rich, multivalent cultural presence like music. I will go further to suggest that cultural interfaces (in Manovich's sense), by

4>>> I employ an ontological perspective here to emphasize that the question is of the comprehensive status and presence of the artifact in the world, rather than a selective inquiry regarding a particular attribute of its existence. I do not take on essentialist arguments about the nature of music, but suggest that culturally and experientially our relationships with it are conditioned by the embodied ways in which we encounter it.

5>>> A parallel might at first seem to exist in something like a rich text file that contains the words of a classic novel. But even the most basic e-reader or word processing program works to reintroduce material affordances into the user's encounter with that file — formatting, simple text-based graphical representations, and page-turning animations anchor the appearance of digitally remediated text data to the materiality of the screen or device. Music, on the other hand, per its appearance as audio, is not reliant upon any particular representational strategy. The use of a text-based GUI (such as iTunes) to support a musical encounter does not evince materiality. It is an incidental strategy that seeks to hide the interface rather than incorporate the music into its being. Materiality implies a productive ontological relationship between an interface and its content — text is an empty indicator in the cultural context of music.

their very nature, demand a more robust strategy of representation and simulation. As I will argue later, these functional affordances respond to a humanistic imperative.

Materiality matters. Our human understandings are shaped in basic and fundamental ways by our apprehension of the material dimensions of our worlds. *Material* here, following Katherine Hayles, implies an awareness both of the substantial physical qualities of cultural productions, as well as all their incumbent human-touched intentions, motivations, and associations. So, a vinyl LP, for instance, indicates and refers not only to itself (as manufactured physical product) but also to the specific time and place it was purchased, the older brother who passed it down, the carefully constructed mix tape on which its best song appeared, the kiss for which it provided the soundtrack. In short, the material dimensions of an artifact are a substrate into which we make the emotional-historical imprints that are the source of human value in the world.

I am not implying that human valuation cannot occur in an experience with digital music. I am claiming only that this kind of valuation is necessarily intimately tied to lived experience, supported by material encounters, and reinforced when the artifacts in question reflect the distinctly human spatial and temporal characteristics of the collateral relationship. This notion of *embodiment,* which HCI researcher Paul Dourish develops in his 2001 book, holds that meaning is created in and through engaged interaction, and is necessarily a spatio-temporal phenomenon. Embodied interaction happens naturally with physical artifacts, which casually accrue evidence of their histories and inherently reveal and express meaningful connotative implications.[6] As cultural production and dissemination transitions to the virtual spaces of the digital world, these

6>>> A whole cottage industry has emerged to sell "authentic" music stuff like "vintage" t-shirts and "relic" guitars that are deliberately manufactured to exude the "vibe" of actual used products. The aura of an emotional-historical imprint adds value.

material reflections need to be designed into the interfaces through which we encounter artifacts. Ones and zeros don't age or accrue physical evidence of where they've been. They don't have histories, and they are ultimately, infinitely replaceable by other ones and zeros.[7] But interfaces and systems can be constructed that represent and simulate the materiality of the physical world — indeed, digital interfaces may afford entirely new expressions of materiality. Designers today can work to support and frame encounters with recorded music in ways that support material experience and embodied interaction. To be clear, the screen itself has material qualities, and is imbued with affordances that transcend many of the limitations of physical artifacts. But since we tend to regard the screen as a window into another world, the material aspects of the device are only part of the frame (as it were) of experiences with interfaces.

What can design do to reintroduce materiality — a potent substrate for emotional-historical imprints in spatio-temporal encounters — into digital music culture? The answer lies somewhere far beyond the current options, generally limited to album cover images and psychedelic visualizers. Desktop and mobile devices are exponentially more powerful than they were even a few years ago, yet our interfaces yield to paradigms established in the early days of the computer. Technological barriers to graphically-intensive representations and simulations no longer thwart designers. But what logic should we follow? What frameworks can provide guidance as we redesign experiences with cultural interfaces?

7>>> Software that tracks metadata, geodata, play count, etc., does support the appearance of some material qualities in the digital realm — the point here is that the files themselves are not inherently tied to these representations. Whereas my compact disc copy of Fugazi's *In On The Killtaker* is most definitely mine — its case was cracked after surviving a near-fatal car accident with me in 1994. A substitute would not be the same. But the xml file that creates my iTunes library could function to recreate the material aspects of my digital collection even if the audio files were lost or replaced.

A Haylesian take on materiality, coupled with an understanding of embodied interaction, can help us stake the conceptual terrain within which we might begin to re-envision the cultural interface. To propose that a digital album should appear as a material artifact hints at the kinds of connotative associations we might want to accommodate in an onscreen encounter. Instead of an abstract entity represented by a standard text-based GUI, designers might imagine an interface in which digital artifacts become hypertexts; manifold centers of gravity around which all sorts of related subjects, voices, and associations swirl. Indeed, the behaviors afforded by such an interface might indicate heretofore unseen aspects of materiality in music culture. The new artifact could become the immaterial-material substrate, designed to support meaningful exchange through embodied interaction, placing the user in a potent, agency-filled relationship with digital representations of music. As Dourish observes, "the ways in which we experience the world are through directly interacting with it...exploring the opportunities for action that it provides to us" (17-18). Aylish Wood adds that embodiment is, essentially, "a spatio-temporal orientation...experienced as an ability to act directly and meaningfully" on the world (116). Hence, an interface that seeks within this framework to create opportunities for meaningful exchange and interaction must support experiences of discovery through progressive unveiling, all the while maintaining the user's sense of orientation in space and time.[8]

These conceptual directions point primarily to behavioral and representational strategies. The content of the system behind the interface is not foregrounded in these notions. This is partially attributable to the fact that, in a hyper-networked world, we no

8>>> Jay David Bolter and Diane Gromala argue this point in *Windows and Mirrors: Interaction Design, Digital Art, and the Myth of Transparency* (2005): "the most compelling interfaces will make the user aware of her contexts and, in the process, redefine (them)" (27). I take a closer look at this text later.

longer want for content — we are drowning in information.[9] The focus on behavioral and representational strategies inherent in these frameworks is a factor of their recognition that the *kind* of content we need is *meaningful* content — and meaning is not contained within a system so much as created and revealed through its use. The question is no longer "what should we put in the system?" but rather, "how and when should the system show us what we need and want to know and experience?"

Contemporary interfaces already collect information over time about our habits of use, about particular occurrences, about relationships intentionally and unknowingly forged through pattern and chance. This data is used, somewhat, in music-listening environments like iTunes, Pandora, and Last.fm. Networked music interfaces can also serve as portals into other kinds of data about particular recordings, groups, equipment, cultural milieus, and particular music scenes from which sounds originate. And today's dynamic information environments provide real-time information exchange with other listeners and fans. Design should address not simply how to accommodate this array of networked data, but how to leverage it in new representational and behavioral strategies to support material impressions and embodied interactions. Designers, I argue, should proceed with the understanding that data becomes meaningful only in and through our encounters with it. If designs do not support the kinds of material, embodied interactions that allow us to make and express connotative associations and evaluations, the cultural rupture that currently compromises screen-based listening experinces will remain.

9>>> Peter Lunenfeld, in a forthcoming book, goes so far as to diagnose information overload as a cultural sickness demanding "info-triage."

The GUI offers an endlessly permutable space for visual representation of data that can be tracked, tagged, and associated with digital audio files.[10] Imminent file types such as MusicDNA — which wraps a standard audio file in a dynamically updating XML layer — will ensure constant access to this kind of information. Designers will decide when and how and when this data appears and behaves. Designed systems for managing and facilitating music encounters must acknowledge the roles materiality and embodiment play in our personal appraisals and emotional connections with things. Even when these "things" are digital files, the systems we build can function to reflect our human attachments and ways of seeing, providing spaces into which our specific experiences can accrue and accrete into meaning. Design can provide the framework for a digital experience with recorded music supported by the embodied presence of thelistener and the materiality of the artifact. This is the essence of material listening.

10>>> Anne Mangen investigates issues of materiality and embodiment in her doctoral dissertation, a cognitive-phenomenological study of digital narrative fiction. She takes issue with Hayles' notion of materiality for being too locked within the disciplinary and aesthetic boundaries of literary theory, and expands on Hayles in ways that seem compatible with Dourish's phenomenological approach. I will not take up her arguments here, except to note that she positions the GUI in a "peculiarly *ambiguous* ontological status," wherein digital configurations are "*ontologically intangible* and *detached from physicality*" (her emphasis, 225). Mangen is particularly concerned with the reading experience of the digital interface, but her phenomenological explorations shed light on some of issues of concern to the digital music experience as well. For Mangen, the intangibility of the GUI ultimately cannot be overcome — reading onscreen is fundamentally compromised by the screen's innate unpredictability and instability. Music may be a different case, I believe, because its essential modality is that of a distinctively temporal art — it does not rely ontologically on a tangible, stable substrate. My argument regarding the importance of materiality to the listening experience rather invokes the notion of an emergent sense of materiality that might arise through new kinds of representational and behavioral strategies in music-listening interfaces. In a 2009 interview with Alex Beam of the Boston Globe regarding screen-based reading experiences, Mangen observed: "The fact that we do not have a direct physical, tangible access to the totality of the text when reading on Kindle affects the reading experience. When reading a book we can always see, and feel with our fingers and hands, our progress through the book as the pile of pages on the left side grows and the pile of pages on the right side gets smaller. At the same time, we can be absolutely certain that the technology [the book] will always work - there are no problems with downloading, missing text due to technical or infrastructure problems, etc." Since music has no incumbent physical anchor, I argue, designers can leverage the affordances of the digital environment to create new forms that support meaning through embodied interaction while referencing both past visual culture and what is to come.

Background

Interfaces permeate our modern world. They enable us to communicate with the systems and machines we encounter. Increasingly, interfaces facilitate communication between people. They enable us to transmit messages, relay instructions, receive information, and experience feedback. They reflect our positions as users and participants in larger schemas, often while hiding the true complexity of the mechanical and computational scenarios within which they exist. Interfaces populate the landscape with possibilities and constraints, arrays of affordances contingent upon their design as functional artifacts.

The real explosion that marked the induction of the interface into the almost natural order of things was the emergence of the computer. For as the complexity of machines leapt forward, so did the need for devices that would serve as translators — both between machines and between humankind and these new, spiraling cyclones of information. Increasingly, the computer passed data from the material world into the digital realm, where it cannot be accessed without the assistance of an interface (which represents it and provides affordances for interpretation and manipulation).

For decades the design and development of interfaces followed the logic of the machine. Interfaces

Remediation: Understanding New Media.
Jay David Bolter and Richard Grusin
London: The Mit Press, 2000.

Bolter and Grusin articulate a theory of media change that counters the idea that digital technologies are radically different from media of the past. They argue that new media can best be understood in context of the prior media they refashion. Bolter and Grusin refer to this process of refashioning as remediation. New media, they observe, tend to arrive on the scene with a particular agenda: to reform and improve upon past technology. But new media cannot completely supercede its predecessors. It must both be and not be of the culture into which it is introduced… it must both call attention to itself as new and simultaneously disappear as it works to deliver on its promise of reform: "new digital media oscillate between immediacy and hypermediacy, between transparency and opacity. This oscillation is the key to understanding how a medium refashions its predecessors and other contemporary media….each medium promises to reform its predecessors by offering a more immediate or authentic experience…" thereby acknowledging itself as a medium (19). "It is possible to claim that a new medium makes a good thing even better, but this seldom seems to suit the rhetoric of remediation and is certainly not the case for digital media. Each new medium is justified because it fills a lack or repairs a fault in its predecessor, because it fulfills the unkept promise of an older medium…. In each case that inadequacy is represented as a lack of immediacy, and this seems to be generally true in the history of remediation….The rhetoric of remediation favors immediacy and transparency, even though as the medium matures it offers new opportunities for hypermediacy" (60).

Importantly, Bolter and Grusin state unequivocally that "all mediations are themselves real…real as artifacts (but not as autonomous agents) in our mediated culture" (55). Establishing the ontological status of the interface supports the possibility of material encounters in a digital environment.

were not seen as relational devices, but as components of the mechanical systems they inhabited. (The nature of early computer interfaces certainly also indicated the highly specialized cast of the individuals who might have encountered these machines — punch cards and early programming languages spoke languages the common person could not easily understand.) When the potential user base began to expand and aesthetic considerations came into play, the design decisions were modernist — emphasizing clarity, cleanliness, and universal access.

In 1984, the Macintosh personal computer introduced the GUI —the Graphical User Interface — to the public at large. The GUI made explicit the functional relationship of the designed interface to the human user. Design decisions made by the team at Apple "remained true to the modernist values... straight lines and rectangular windows...files arranged in a grid," as media theorist Lev Manovich recounts in *The Language of New Media* (63). But these design decisions were geared towards an end goal of an interface that existed as an independent device in the spirit of the machine to which it related. The computer behind the interface, to be sure, was still a mechanism operating under the edicts of digital code. The Macintosh GUI was significant in that it did not derive its operational rhetoric from the rules of the machine. It was designed to function explicitly as a translator, enabling communication between human and machine. To situate the interface as a thing with its own ontological status indicates a

Where the Action Is: The Foundations of Embodied Interaction
Paul Dourish
London: The MIT Press, 2001.

Dourish begins his book by noting an observation from his colleague Matthew Chambers that computer science is based entirely on a pre-1930s philosophical worldview. Traditional HCI relies on formalized, rationalized, mechanical explanations and reveals itself as allied with a positivist, reductionist tradition (vii). "HCI," he says, "from its very beginning, took on the trappings of the traditional computational model and set out its account of the world in terms of plans, procedures, tasks, and goals....the model of HCI I set out here is one that places interaction at the center of the picture. By this I mean that it considers interaction not only as what is being done, but also as how it is being done. Interaction is the means by which work is accomplished, dynamically and in context" (4). This interaction-centered perspective is called embodiment. "Embodiment...denotes a form of participative status....[It] is about the fact that things are embedded in the world, and the ways in which their reality depends on being embedded," he says (18). Rooted in the phenomenological philosophies of Husserl and Heidegger, embodiment recognizes our experience of the world as "intimately tied to the ways in which we act in it" (in contrast to the Cartesian perspective, which regards consciousness and the world as two separate phenomena). Embodiment holds that our engagement in the world is the precondition of meaning. "Embodiment is a foundational property, out of which meaning, theory, and action arise" (126).

Embodiment leads Dourish to argue for a framework for interaction that locates meaning in engaged encounters with artifacts. Creation and sustenance of value come through our embodied relationships with the world. From this perspective, it does not make sense to think of meaning existing, self-contained, as "content" in an interface — rather, meaning is generated and revealed through active, dynamic relationships with the world (or which interfaces are a part).

subtle but profound paradigm shift. For the first time, consideration of specific human needs and desires began to take prominence in interface design. The human moment of encounter was thrust into the fore as a new priority. The logic of the machine was no longer the arbiter of the interface.

If the GUI opened the door to a new relationship between human and machine, almost three decades later we're still trying to figure out how to step through it. The aesthetic of the Mac GUI quickly set the standard for how an interface might look, but few scenarios since have radically pushed to re-envision how an interface might afford a more expansive human experience — one that might empower us in new ways to create, nurture, and share new meanings, reinforcing our essential humanity. In some ways, even today we remain dangerously close to serving the machine.

The emergence of New Media as a category and concept warranting critical investigation indicates a positive shift in the landscape. Researchers and theorists now regard the computer and digital media as indicative and predictive of modern culture, picking up the trail Marshall McLuhan blazed half a century ago. Indeed, the computer has become a medium much like television, radio, or print (a radical transformation of function made possible by

Windows and Mirrors:
Interaction Design, Digital Art, and the Myth of Transparency
Jay David Bolter and Diane Gromala
London: The MIT Press, 2005.

There is a profound disconnect the complexity of our contemporary experiences with the world and the design of most interfaces, which often function as if reality needs no mediation at all. The prevailing paradigms in interface design are guided by what Bolter and Gromala call the myth of transparency (49) — the idea that the experiences we have in mediated environments should resemble as closely as possible an unmediated experience. In other words, most interface design strives to make the interface invisible. Bolter and Gromala argue that this strategy offers little help to us as we try to make sense of the world.

The "desktop" metaphor is design's "prime expression" of the perennial desire for transparency, Bolter and Gromala say (41). "The task of the GUI is to convince the user that the computer is her desktop" (44). A user "thinks she is opening a folder by clicking on it, but her clicks are really launching a series of computer instructions to fetch binary data from memory or the disk, convert that data into a graphic form, and display it on the screen as the "contents" of the folder" (43). Further, in the standard GUI, information is accessed through windows, which encourage a "looking-through" the interface into the realm of truth beyond. The problem with windows is that they do little to further a looker's sense of where she stands in relation to the world she encounters. Rather than placing the individual at the center of experience, windows remove people from the heart of being by fixing their positions as onlookers, capable only of receiving fixed, established truths from afar.

Bolter and Gromala offer an alternative paradigm: the interface as mirror. They show that total transparency is not only impossible to achieve, but undesirable in that it often leads to alienation and confusion. Digital interfaces, they argue, actually reflect our presence whether we want them to or not. Bolter and Gromala suggest we should embrace this and move towards interfaces that call us into active relationships with information, recognizing that meaning is created and the world becomes real in the moment of experience and engagement. "Digital interfaces…reflect the user in context…the most compelling interfaces will make the user aware of her contexts and, in the process, redefine (them)" (27).

precisely the introduction of the GUI). Incorporation of graphics and sound — and more recently, the network we call the Internet — has allowed the computer to rise to claim the mantle of "the 21st century's culture machine," according to Peter Lunenfeld (forthcoming MS). But as a culture machine, the computer is fundamentally unlike TV in the last half-century. TV streams information to be consumed whole by viewers. The computer, on the other hand, per its nature as interface, always contains the possibility of communication between user and machine — and in fact now enables communication between users and other users and machines on the Internet.

The ubiquity of the computer raises a level of alarm, for as a culture machine it holds as much power to do harm as good. The messages it transmits through explicit and implicit channels can spread uncontrollably and unpredictably through modern society. Part of the work of New Media criticism is to mine digital media for clues as to how these messages are transmitted, and to look into the future and theorize about how we might design interfaces that work better, are more satisfying and sustainable. Additionally, New Media theory elucidates and expounds upon the principles upon which interfaces should build if they are to serve the better nature of the humans who use them. Key to the promise of interface design is understanding notions like materiality and embodied interaction.

"Interface Realisms: The Interface as Aesthetic Form."
Søren Pold
Postmodern Culture, 15.2, Jan. 2005.

In this essay, Pold sets out to "establish the interface as an aesthetic and critical framework for digital art" (1). He believes the interface itself is a cultural form, a carrier of aesthetic significance; and that contemporary culture can aptly be described as an "interface culture" — a term he takes from Steven Johnson. The notion of interface culture acknowledges that cultural production now occurs principally in terms of remediation. Cultural forms like montage, videogames and websites reveal that contemporary refashionings and adaptations are actually layered remediations of earlier media, and that our reality is in fact a multivalent and hybridized digital reality. Paradoxically, this reality is, in Johnson's terms, "cyberspace…for all practical purposes, invisible, outside our perceptual grasp.... [a] parallel universe of zeros and ones [which] runs through the conduit of the computer interface, which means that the most dynamic and innovative region of the modern world reveals itself to us only through the anonymous middlemen of interface design" (Johnson, 19). Pold suggests this places the interface in "an active and dialectical relationship between reality and representation," as a mediator whose ontological position is somewhere in between us and the digital reality we increasingly encounter. He believes positioning the interface this way accounts for its essential aesthetic realism, and helps us understand it as "an active and constructive reaction to a heterogeneous, mediated, complex, and symbolic reality" (9).

In another piece, Pold expands on Lev Manovich's notion of the cultural interface: "Far away from the invisible, transparent and user-friendly interface, and in connection with the computer as a cultural medium, interfaces appear that are experientially oriented, seductive, musical, narrative, theatrical and artistic — a development that is significant well into commercial web design and experimental interface design" (2010). Pold's interface aesthetics provides further rationale for expressions of materiality and embodied interaction — frameworks that support meaning — in these digital encounters.

New Media Theory foregrounds humanistic concern for cognition and agency through critical evaluation of interface design. A theme that surfaces in many of these investigations is transparency. In *Windows and Mirrors: Interaction Design, Digital Art, and the Myth of Transparency,* Diane Gromala and Jay David Bolter argue that reflective, mediated interfaces hold the most potential for sensible, coherent encounters with machines. Through examinations and case studies of contemporary experimental digital art, they argue that transparent interfaces — often thought to be ideal affordances for accessing truth because they 'stay out of the way' — often leave people feeling lost and alienated. "If we only look through the interface, we cannot appreciate the ways in which it shapes our experience," they observe (27). Bolter and Gromala argue that incorporating reflective aspects into an interface design can help us leverage our contexts as grounds from which we may extend our understandings.

John Thackara is another writer on design who places a premium on design's humanistic potential. His book, *In The Bubble: Designing in a Complex World,* evokes principles including locality, situation, and conviviality to encourage designers to critically assess their assumptions about the world. Evoking Henri Bergson, Thackara seeks to emphasize the importance of real, lived, narrative time — experience, roughly — over speed, which he believes can undermine "the foundations of professional knowledge" in situations where reflection is integral to understanding (38). In terms of interface design, this emphasis clearly echoes the value structure in

The Secret War Between Downloading and Uploading: Among Other Tales of the Computer as Our Culture Machine
Peter Lunenfeld
Unpublished MS

Lunenfeld argues that we've developed a sort of "cultural diabetes" from decades of unhealthy and unsustainable consumption habits — too much, too often, too one-sided, too unreflective. "Television," as Lunenfeld describes it, "is a one-way spigot of privatized media gushing 24/7 into the home, commercial spaces like restaurants and supermarkets, even schools" (17). And now, the networked computer, the "21st century culture machine" (combining the means of production and distribution and the site of reception in one beige box) has geometrically amplified the problem. Lunenfeld proposes two powerful notions as potential solutions: "stickiness" and "unfinish." Combine them, he says, and we can create rich, perpetually expanding interconnections; meaning where there was none. We need to carve out space for mindful downloading and meaningful uploading (finding peace in the war that rages in the title of the book). Focus, context, and "info-triage," as Lunenfeld describes, can help us understand that the choice not to engage with information can be just as valid as the constant choice we have between options (which are literally endless). Lunenfeld's argument further justifies embracing materiality as a richly associative conceptual framework, and embodied interaction as a way to support and sustain meaning in interface encounters. Potentially, these frameworks can help us advance the cause of human value and meaning in the digital culture wars.

embodied interaction, which places a premium on the user's spatiotemporal orientation and engagement in meaning-making processes (rather than regarding meaning as something to be accessed, as quickly as possible by the user).

Peter Lunenfeld's upcoming book, *The Secret War Between Downloading and Uploading: Among Other Tales of the Computer as Our Culture Machine,* takes on contemporary patterns of interface-enabled media consumption. He argues that regarding the computer as a transparent entertainment server is making us sick (literally and metaphorically), from overconsumption. We are losing sight of our essential human capacity as creators of meaning, he insists. For Lunenfeld, failing to regard one's world critically and meaningfully — to "move beyond downloading" — is essentially to relinquish one's rightful claim to humanity. We are human explicitly because we find, create, interpret, and sustain meaning in the world, he argues, and too many of our emerging relational patterns with computers do not meet this bar. Lunenfeld proposes a new design emphasis on creating affordances for what he calls *stickiness:* "A sticky object or system has affordances that allow other meaningful objects or systems to latch onto it, to expand or bore within it" (28). With new connective, dynamically-updating technologies like the MusicDNA filetype, the techno-

Writing Machines
N. Katherine Hayles
Cambridge: The MIT Press, 2002.

Hayles' thesis in ***Writing Machines*** is that the technologies by which and through which we apprehend writings are integral to, and partially constitutive of the meanings those writings manifest. In essence — ***materiality.*** But materiality, for Hayles, is not coextensive with physicality. To speak of a work's materiality is to reference an admixture of physical attributes and human intention. Materiality is culturally anchored, and context-based. To get to the heart of the notion, Hayles introduces a kind of media-specific analysis: "a mode of critical inquiry attentive to the specificity of the medium in which a work is instantiated" (L. 3). I believe Hayles arguments about literature and texts are applicable in many ways to other cultural forms, and I seek to expand them in this project to support my own arguments about digital music artifacts.

Interestingly, accounts of materiality quickly lead Hayles to descriptions of the circular relationship between a reader and a text. Particularly in technotexts — works that foreground the technologies used to produce them — relationships between readers and literary works become the precondition for consideration of those works. Technotexts "mobilize reflective loops" between the imaginary worlds they create and the material apparati that support their physical embodiment. In other words, to speak of this kind of text is immediately to call into consideration the particular culture and context of the subjectivity that regards it. The reader creates the text through her experience with it, as the text creates the reader through making possible her experience. This subjectivity is, then, supported in its being by the specificity of its encounter with the text. The text becomes the medium in which the processes of mind then run: "...we become part of a cybernetic circuit. Interpolated into the circuit, we metamorphose from individual interiorized subjectivities into actors exercising agency within the extended cognitive systems that include non-human actors" (51). Literature enables us to become new beings. Texts, when considered as material (in Hayles' sense), perform human subjects "who cannot be thought" — who would not exist in this manner — without the "intelligent machines" that dialogue with us in this cybernetic circuit (63).

Not only can a consideration of materiality anchor an account of a reader's emotional and imaginative response to a work; it also helps us to appreciate the connections between our minds and the world. Literature is, in this sense, an extension of the body, enabling aspects of existence not possible before it. Hayles writes: "... books are more than encoded voices; they are also physical artifacts whose material properties offer potent resources for creating meaning. Indeed, it is impossible not to create meaning through a work's materiality. Even when the interface is rendered as transparently as possible, this very immediacy is itself an act of meaning-making that positions the reader in a specific material relationship with the imaginative world evoked by the text" (107). The intentional construction of the literary artifact induces meaning-making; draws meaning into the world. The conceptual framework Hayles articulates places the mind in a reciprocal relationship — a cybernetic circuit — with media, shifting humans from being mere receivers to active participants in a vivid circle. This account of materiality holds vast implications for the ways in which we might conceive of digital music artifacts — instead of simply sounds to be consumed, we might view digital music artifacts as technotexts that produce and sustain meaning in and through our encounters with them. Occurring onscreen, digital music artifacts should foreground the affordances of their ontological support structure in order to leverage their materiality in the value-encounter.

logical supports are in place for interface design that can express the stickiness of our most valued cultural forms.

Literary theorist Katherine Hayles has also explored how designed artifacts can function as "potent resources for creating meaning" (107). In *Writing Machines,* she examines several contemporary text-based interfaces (or *technotexts*), and argues for a conception of materiality that acknowledges how the physicality of and intentions behind an expressive interface contribute to its meaning-making potential. Technotexts, Hayles claims, actually suggest that "the appropriate model for subjectivity is a communication circuit rather than discrete individualism...narration remediation rather than representation, and...reading and writing inscription technology fused with consciousness rather than a mind conveying its thoughts directly to the reader" (130). She thus models a picture of the human being creating meaning in dialogue with an interface, rather than simply receiving meaning through passive consumption. This picture of materiality meshes with an embodied understanding of human experience to indicate the kinds of representations and behaviors interfaces should support in order to maximize their function as "potent resources for creating meaning."

Some of the most explicit formulations of humanism as a guiding force in design have come recently from the realm of videogame research and theory. Game designer and researcher Jane McGonigal explicitly advocates for multiplayer games as "the ultimate happiness engines" (keynote lecture at the 2009 Game Developer's Conference). The essence of the well-designed multiplayer game, she argues, directly meets the four requisites most psychologists associate with the profile of a happy person: engagement in satisfying work, the experience of being good at something, time spent with people we like, and the chance to be part of something bigger. McGonigal's appeal to a substantive version of human happiness represents a basic embrace of humanism as a guiding principle for design.

Georgia Tech Professor Ian Bogost, in his book, *Persuasive Games,* looks at the ways in which videogames "mount arguments and influence players" (viii). He claims that, as designed objects and systems, videogames express their points of view much in the same way as art, poetry, literature — through discourse that aims "to get to the bottom of human experience in specific situations" (340). Games, through their design, make claims about processes fundamental to human existence through their selective interrogation of them. Encountering a videogame is like encountering a work of art — when it works well, it reveals to a viewer, participant, or player a world to be learned, sorted through, reckoned with, evaluated, and embraced or denied. A game can remind and affirm or call into question our values. In this sense, Bogost, like the other theorists mentioned above, represents a view of humans as volitional, empowered beings creating meaning in dialogue with the designed systems they encounter in the specific context of the world they inhabit.

Thematically, writing and thinking in diverse sectors of the New Media criticism have begun to cohere around a humanistic impulse. Much like art, literature, music, and philosophy, design is concerned with getting to the heart of what it means to be human, according to theorists such as Lunenfeld, Bogost, Bolter, Gromala, et. al.. Insofar as design is expressive of a particular viewpoint, it fits into the class of the humanistic arts. Interface design, especially, seems necessarily to incorporate an expressive vision, as it makes philosophical claims about our being and its relationships to the world that are manifest in the ways in which we envision encounters with machines.

Sometimes implicit, sometimes explicit, the ontological and normative arguments that emerge in New Media theory indicate a common interest in keeping human experience and value at the center of contemporary design practice. As the technological land-

scape continues to evolve, how can we ensure our core values are not damaged by ambivalent market forces? How can we facilitate the growth of structures that support us as humans, and help us find and create meaningful, sustainable existences? Seen in this light, the humanistic impulse in New Media criticism presents a stark alternative to the market and machine-centered interface design of decades past. Valuing materiality and embodied interaction reminds us that we are the source of meaning in the world, and that interfaces should work for us, rather than the other way around.

Precedent

A number of existent and emerging interfaces and technologies provide precedent for my thesis. The intent of this chapter is not to provide a comprehensive look at all of these. Rather, I discuss specific instances of interfaces and supporting technologies that engage the kinds of cultural data that comprise aesthetic, valuative experiences such as music listening. I hope to establish a backdrop against which the conceptual frameworks of materiality and embodiment become more clear as directives for design, insofar as they help identify the general ways in which our experiences with artifacts function as the precondition for meaning and value. Taking inventory of what seems to be working (or not working) in the current cultural interface scene provides a point of reference moving forward.

The standard bearer for the contemporary digital music experience is **iTunes,**[11] Apple's integrated software solution for managing music collections.[12] Though the behaviors and strategies of representation within the iTunes interface are generalized and applicable to other kinds of media within a user's library, the system was designed principally to support encounters with music artifacts. The scale of behaviors within iTunes is oriented towards affecting a number of equivalent datapoints — managing a *collection*

11>>> iTunes was based on an earlier interface called SoundJam, developed by Jeff Robbin and Bill Kincaid in 1999.

12>>> iTunes runs on Windows as well. In addition to music, its interface and database manages videos, TV shows, podcasts, and apps for the iPhone, so it is really more of a full-service media system than a music player. It is also integrated with the iTunes Store, so a dimension of the experience is monetized (though purchasing content through that porthole is not requisite).

takes precedence over rich experience with any individual artifact.[13] The smallest divisible unit a listener encounters is the individual track, which references an audio file, a set of tagged descriptors, and an image. Since the system exists for the audio file, the visual content and behavioral affordances available to the user at this scale of interac-

iTunes 9

tion is limited. Interaction with a particular album or song in iTunes involves a subset of behaviors derived from those available in the larger system. Practically every inter-

13>>> It would be fair to make the inference that iTunes regards the experience with an individual artifact to be a moment where interface transparency is desired, so that music/video might be consumed in an unadulterated fashion. This premise is flawed, I hope to show.

action is based on filtering data according to a specified value or selecting an item from a list.

In terms of visual affordances, iTunes provides a few integrated view options. (I will look more closely at one of these called Cover Flow in a moment.) It relies primarily on adaptive, customizable reconfigurations of hierarchically structured data. It is designed to manage many files, not to prompt a rich interaction with any one artifact. Visually, iTunes represents an album or song with a single square JPEG image. This image is scalable in Grid View and Cover Flow but can be completely hidden in the default list view, which means the user has the option of encountering her music collection entirely rendered as text. A corresponding spreadsheet-style database of textual information displays particular metadata in a customizable view. The user experience is limited by a window within the OS (with the exception of Cover Flow, which can be displayed full screen, and the iTunes Visualizer, which functions as an add-on to the interface experience). ITunes is an example of a cultural interface that prioritizes database functionality at the expense of embodied interac-

iTunes 9

tion. The text-based GUI assumes that the system's important content is all contained within the database, and that the interaction patterns best suited for encounters with the data are filtering and selection. In other words, iTunes does not support spatiotemporal understanding wherein relationships, associations, and outcomes are unveiled in the midst of an encounter. It privileges the all-at-once, endlessly permutable and reconfigurable dataspace of the computer over the particular, subjective experience of the user.

Apple developers seem to be aware that a richer visual approach might improve the quality of the user experience in iTunes, as they have progressively introduced new aesthetic approaches with each new update. These new view options add some color, however they have not fundamentally altered the interface experience. To reintroduce a resonant model of materiality and to support embodied interaction will require more than a new coat of paint.

Cover Flow is an animated, three-dimensional graphical user interface designed by Andrew Coulter Enright, developed by Jonathan del Strother, and purchased by Apple in 2006. Its central browsing metaphor was modeled, Enright acknowledges, after the physical, material, embodied notion of flipping through LPs in a bin:

Cover art displayed within an interface like this feels far more like a "real" object than identical cover art displayed as a flat graphic...the cover image isn't a feature of the album/song, the image is the album/song and consequently the cover is the music. It becomes a true signifier as opposed to a decoration. Music and its consumption by humanity haven't always been just about the waveform. Let's restore some of the elements that were created both to satisfy our non-aural senses, and to be signifiers for Music itself. ("Dissatisfaction Sows Innovation," Blog post, 2004)

Apple first integrated Cover Flow into iTunes 7, but now include the graphical interface in the Mac OSX Finder, Safari, and iPhone OS (surprisingly, it's not in the newly-released

iPad). Similar interfaces can now be found in other non-Mac and web-based applications. I believe its adoption is a sign of a real desire for materiality and embodied interaction on behalf of the community of users. Its appeal lies in the spatial representations and behaviors it introduces into the browsing experience. Cover Flow is visually impressive, but most people acknowledge that the interface is less than ideal for browsing a collection.[14] The horizontal scrolling/flipping behavior in the Cover Flow GUI works as a method of locating an artifact only if a user is able to quickly identify an album by glimpsing a sliver of its cover. Flick the scroll bar and items in a collection fly by faster than most users can apprehend them. Often, the sheer number of covers one must "flow" past when browsing a collection is flabbergasting. The Cover Flow behavior proves cognitively difficult to employ. The sensation is less like browsing and more like spinning a roulette wheel — it is exceedingly difficult to know where to stop scrolling. The physical basis for the interaction, as Enright describes it —flipping through records in a bin — is useful when dealing with a collection of physical artifacts because materiality provides additional cues: album weight, sleeve construction, spine color, thickness, whether a single or gatefold package, whether in plastic bag or not...even the approximate location of an album within the array of records in a bin might be known in advance of the interaction. With Cover Flow, none of this material information

Cover Flow

14>>> "CoverFlow may not be the best idea; it's a very pretty navigational tool, but anyone with a CoverFlow-capable iPhone or iPod will tell you that after a couple of showy test runs, the feature hardly ever gets used. It's just not the most efficient way to browse," Dan Nosowitz of *Fast Company* wrote in March, 2010, after Apple unveiled a new model for the App Store that employs the technology.

translates. The collection is rationally organized, to be sure, alphabetically or by some other objective criteria. But our interactions with material collections in the real world are aided by a number of subtler cues.

Even if the Cover Flow interface was more manageable, the mere addition of the macro-level side-scrolling visual behavior does not significantly change the nature of the digital music encounter within iTunes. The Cover Flow GUI, though neatly and efficiently animated, provides only momentary cover for traditional database interaction patterns. Collections remain at arm's length, ordered in a list (which can be sorted according to various criteria, as in a standard database), and from this list one selects the file to be read (which stands in for the act of "playing a song"). Additionally, Cover Flow has little to contribute to the micro-level encounter one might have with any particular artifact in her library. A user can look, admire from a distance, and perhaps briefly pretend that the artifacts in Cover Flow are "true signifiers" (as Enright suggests) but within the GUI they cannot be independently accessed, examined, moved, manually sorted or grouped. The user's agency, compared to a material interaction with a physical artifact, is severely diminished in Cover Flow.

iTunes LP attempts to address some of iTunes' inadequacies. Introduced by Apple last fall, iTunes LP is a deluxe format intended to provide listeners with an experience simulating the visual and informational richness of a vinyl LP. (It also seems to be designed to incentivize the album purchase, as its features are available only if a user pays for the entire package.) An iTunes LP features DRM-free[15], high-quality audio in AAC format, bundled in a custom WebKit-powered site that provides access to special-

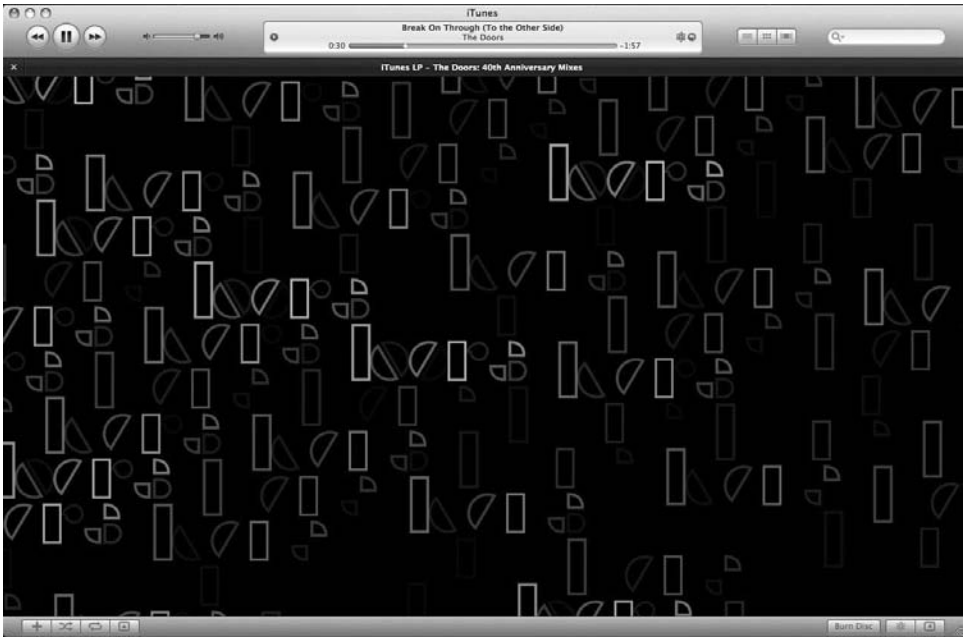
15>>> User discretion over the use of iTunes store purchases was long restricted by Digital Rights Management software, which limited how users could experience and share the music they bought. DRM's frustrating limitations became such a part of the fabric of the iTunes experience that "DRM-free" is now a selling point. To be fair, Apple was required to implement DRM at the behest of record labels, was rumored to despise it, and eliminated its restrictions as soon as the labels acquiesced.

ly-designed visualizers, photos, liner notes, videos, lyrics, and interviews. Problems with this young format are well-documented. To date, less than fifty albums are available in iTunes LP. Initial development costs for artists wishing to try the format are purported to be prohibitive (widely rumored in the tens of thousands of dollars). Additionally, the iTunes store prices for these "packages" vary, but seem generally to be several dollars higher than a standard album download. The experience itself trades between moments of thrall and moments of annoyance — for every pleasant surprise, an expected functionality is compromised. According to tech writer Jay Robinson, "there is no way to ask iTunes to send you to the currently playing song...unless you leave the LP view you cannot rate the song or view any other metadata....if you leave the iTunes LP interface to browse your library, then want to return to the LP..." the only way is to begin again from the start ("Some Notes on iTunes LP," Blog post, 2009).

iTunes LP

It also appears that the quality of the encounter — though wrapped in visual decor — remains entrenched in retrogressive GUI aesthetics. The visual cues and presentation

of material in the iTunes LP environment most closely resemble the menu design of a DVD. Against wallpaper backdrops, menus appear which govern page-based navigation. The genre of experience is actually perhaps more akin to what one might find on a website promoting an album. And in most cases, the visual work on these designs is heavy-handed — especially in the case of classic albums, which come across almost as if they've been rebranded for a theme park ride. Splashy logos and identity systems prevail. No longer do you own a copy of *The Doors* — you enter *Doorsworld,* where every aspect of your experience is governed by some perverse Morrisonian logic.



iTunes LP

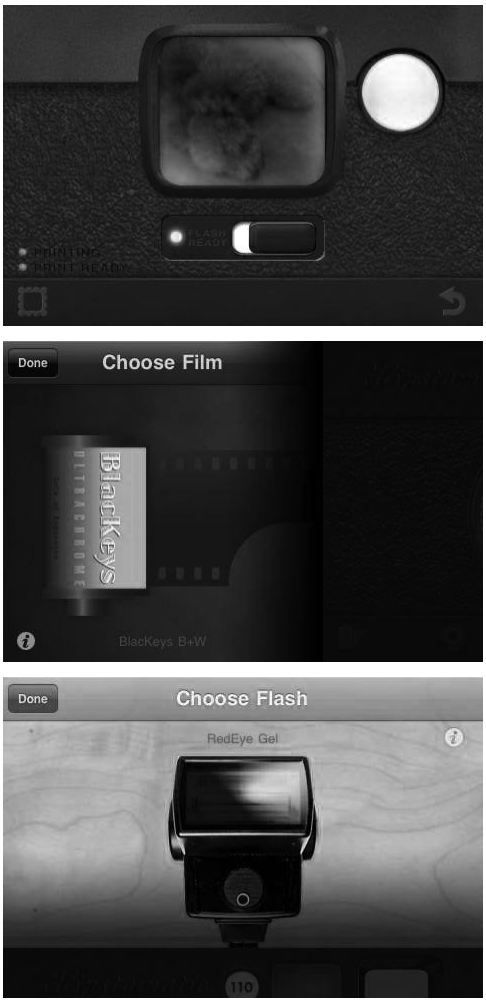
Content in an iTunes LP is local to the WebKit package, which results in LP files close to 500MB in size, more than five times the size of a typical digital album. And currently, iTunes LPs cannot be played on iPod or iPhone — a missed opportunity, considering experiences on handheld devices are more conducive to intimate explorations of content. (Music encounters on desktop computers tend to be subordinated to back-

ground processes.) ITunes LP represents another failure of cultural interface design in that it relies so heavily on the same linear, hierarchical file structure that weighs down the standard iTunes interface. Every passage into an extra feature of the "album" occurs through menu-based selection. The frame may look different, but the logic of the experience is essentially the same. In terms of embodied interaction and materiality, iTunes LP lacks.

Hipstamatic for iPhone

New multitouch application designs for mobile devices such as the iPhone and iPad present particular promise in terms of forging constructive dialogue between representation and reality. Some of the most popular applications for the iPhone employ materiality and embodied interaction to strong effect. Emblematic of these is **Hipstamatic**, a camera application for the iPhone. In contrast with the integrated iPhone OS

camera, which is a transparent interface marked by a single button,[16] Hipstamatic hypermediates the act of taking pictures with the device. Upon launching the Hipstamatic app, the iPhone effectively *becomes* a camera. The screen-based representation recreates an original Hipstamatic 100 — an eight-dollar plastic camera from the early 1980s. The behavioral logic of the interface is particular to the customs and affordances of the iPhone — through simple directional swipes in particular contexts, a user unveils the operation of the device. Superficially accurate representations of various lenses, film canisters, and flashes are selectable options in a spatiotemporal experience. The user is reminded that the experience is happening for her, as the patterns and combinations explored over time yield qualitatively different outcomes and provide context-specific feedback. The way the parts of the simulated camera rotate, reveal, and hide specific information at certain moments in the experience orients and grounds the user as she participates in the interaction.



Hipstamatic for iPhone

16>>> The iPhone's integrated camera does feature an animation of a shutter closing when the photo button is depressed. This moment is clearly a nod to materiality, but Hipstamatic goes farther and is more effective at creating an embodied interaction, I argue.

Certainly some credit for the success of the Hipstamatic app must go to the design and material character of the iPhone itself — Apple's device effectively acts as a cipher for each application it hosts. Yet software and hardware work in concert to produce an experience. Hipstamatic exploits this dualism by integrating its material representations and interface behaviors with the physical constraints and affordances of the device on which it lives. The visual design of the app intentionally invokes a play of reality and representation. It oscillates between these modalities to gently leads a user into a mindspace where she is fully aware of the device *qua* device, yet simultaneously and immediately able to engage her imagination and interact with the simulation in an emotionally gratifying way. The scale of interaction relates well to the available physical affordances of the iPhone's particular design — the fact that the device seems to "become" a camera is an illusion supported by the believability of the actual physical dimensions of the device.

A closer look at the visual design of the Hipstamatic interface reveals particular aspects of its aesthetics and design strategies that maintain a sort of *productive ambiguity* in the impression it imparts.[17] First among these is the app's successful representation of a simulated dimensional object: the camera appears to have a front and back, and both sides are interactive. This representation, importantly, oscillates between representation as such, and actually *becoming* the interface. The interface exploits the intangibility and ambiguity of the screen to shift the user productively between reflective and transparent modes of engagement. Looking *through* the interface to submenus of text-based information, she coincides with her considered, higher-order goals; looking *at* the interface, believing its representation and cognitively engaging with the simulation,

17>>> I borrow the phrase "productive ambiguity" from Jon Caramanica of *The New York Times*, who used it to describe a play between reality and representation in a recent video by rapper Rick Ross (2009).

the user is immediately present and prereflectively involved. The interface's ontological status is established in this dialectical play. It is supported by the fact that what is represented is not purely decorative or inconsequential to the encounter that happens in its presence. The functionality of the representation lures the user to engage with its illusion, granting a suspension of disbelief that opens the door to emotional immediacy. Merely *showing* the front and back sides of a camera, to be sure, would not yield the same effect — it is the integration of representation, functionality and reflective, contextual orientation into the image that makes the simulation sustainable. The material presence of the interface emerges from this integration and its incumbent oscillating expressions of representation and reality, showing and being. At any moment in the interface encounter, a user's particular orientation and embodied presence is reinforced by the hidden side of the camera, which asserts its reality from the darkness precisely through its integrated necessity in terms of the experience as a whole. The necessary spatiotemporal character of this experience is psychically grounding and cognitively reassuring. The interface references the user's "familiarity and facility with the everyday world" (Dourish, 17) through its design. This active oscillation, as an interactive principle, stands in stark contrast to the standard GUI, which seeks to remain transparent and ideally to make every functionality accessible to the user from every vantage.

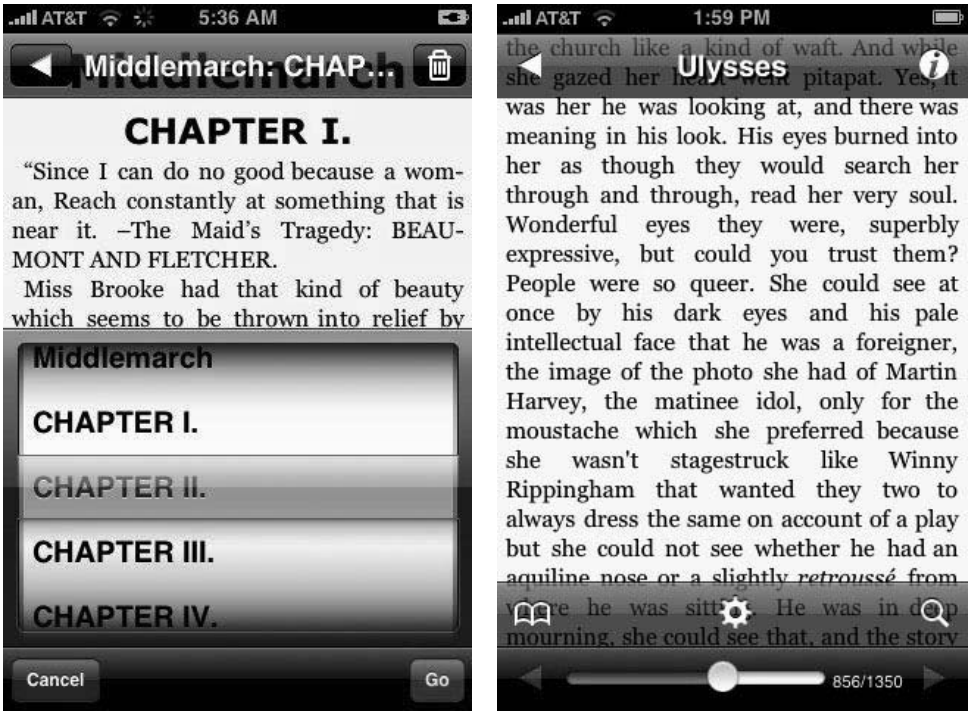
The Hipstamatic interface design intentionally injects mystery into the potentially mundane experience of taking photos with a cell phone. In this designed experience, the emerging genre of multitouch behaviors become affordances that allow a user to reconfigure an artifact, thereby affecting the outcome of the photographic process in minimally predictive ways. The user discovers how the interface works through the spatiotemporally oriented process of exploring the simulation it presents. The integration of surface-level behaviors that mesh representation and functionality with deeper

computational significance entices the user, situated in an active, agency-filled encounter, to believe the simulation of a camera to be a *real thing*. She progressively unveils and evaluates possible outcomes through the interaction. The Hipstamatic app even leverages the device's physical constraints to further reinforce the impression of the simulation: processing delays are masked behind simulated meters indicating elapsed time in "warming up," "developing" and "printing" processes. The peculiarities of the images produced by iPhone's low fidelity VGA camera further the Hipstamatic's surprising and evocative photographic outcomes. Yet the affordances of the digital medium mean the Hipstamatic does not burden a user with the mechanical, chemical incumbencies of past photographic process — all the permutations of lenses, flashes, films, and shooting conditions that might challenge an amateur confronting a physical camera are neutralized by a digital experience that makes learning fun and efficient. All these representational and behavioral strategies foreground the physical construction, content, and intent of the interface — its *materiality.* The interface's careful articulation of a play between showing and being makes for a compelling simulation into which we want to enter, and within which we are rewarded on our own embodied terms.[18]

A quick look at other popular iPhone apps reveals that some of these representational and behavioral strategies are making their way into other digital interfaces. Many of the most popular apps for the device share certain characteristics that can be interpreted and understood in terms of the conceptual frameworks established by ideas like materiality and embodied interaction. These apps usually engage the physicality and technological affordances of the device in ways that integrate the representations and aesthetics of the interface with the real-world occurrence and presence of the screen.

18>>> A further aspect of the materiality in this interface is granted by its productive capacity and creative outcomes: the photographic filters that result in the Hipstamatic's intentionally leverage the iPhone's VGA camera hardware to make the most of the artifact's physicality in resonant, evocative images.

Stanza, an e-reader app, for instance, effectively transforms the iPhone into a book — the representation onscreen during the reading experience is of a formatted page,



Stanza e-Reader for iPhone

which appears to "turn" when the reader advances. Its representation is meant to impart the impression of an encounter with a real artifact.[19] The first-level user experience with the simulation is supported by a rich array of sublevel options the reader can call up at any time — a simple tap on the center of the screen reveals icons that lead to functional menus and informative hypertextual spaces. The center tap also calls up a scroll bar that orients the reader in space and time from her current reading spot vis-à-vis the rest of the text. Stanza's interface aesthetics and design strategy oscillates the user experience back-and-forth between a reading space of immediate, active engagement and a more traditional menu-based space that prioritizes higher-order

19>>> Amazon's Kindle is another popular e-reader inhabiting a proprietary device. It shares many characteristics and behaviors with Stanza for the iPhone. See footnote 10 for a bit on Anne Mangen's critique of e-readers.

functionality. It recognizes the importance of the immediate embodied encounter with a material artifact, and structures the primary user experience to be in this mode. Second-order, reflective, menu-based experiences are positioned behind the immediate reading experience, yet are always already accessible and integrated into the primary encounter.

In terms of the connotative and associative terrain inherent in the framework of materiality my thesis references, a recently announced technological innovation holds a great deal of promise. **MusicDNA** is an emerging audio file format that functions essentially as an XML wrapper for standard music files. MusicDNA is compatible with standard audio file types such as FLAC, AAC, and WMA, and backwards-compatible to existing mp3 players. It supports an expanded set of dynamically-updating metadata that in theory could provide integrated, immediate access to other content, as well as 32 points of analytic criteria regarding the character of the audiofile (like mood, genre, density, energy, etc.). Stefan Kohlmeyer, the CEO of Bach Technologies (the company developing MusicDNA), states that the format seeks to "bring back the full entertainment experience to the end user, which is currently not delivered by mp3" (YouTube Interview, Jan. 24, 2010). The "full entertainment experience" Kohlmeyer refers to is something like a *material* encounter. The dynamic content MusicDNA could fold into an audio file transcends the limitations of material culture — imagine purchasing an LP that has ongoing, self-updating access to tour dates, creative content, critical perspective, merchandise, social networks. Theoretically, MusicDNA could situate any particular piece of music in a dynamic context framed by the listener.

Kohlmeyer suggests this file type might interface with a new generation of music players. A MusicDNA player prototype appears to rely on some of the visual and interactive conventions from iTunes. But by acknowledging conceptual frameworks mani-

MusicDNA Prototype Player

festing materiality and supporting embodied interaction, this kind of dynamic database might introduce an entirely new genre of screen-based material experience. The productive, associative, connotative aspects of the mobile, networked device could be foregrounded in a music encounter that establishes itself as a new resonant space wherein an embodied user synthesizes meaning from the manifest array of datapoints around her. In this vision, the onscreen experience with a hyperreal music artifact could become even richer than the physical encounter that previously served as the guidepost for our understanding of materiality.

My visual studies in the following section suggest some ways in which designers might begin to integrate dynamic data into a user experience with a digital music artifact. The implications of emerging file types such as MusicDNA are vast. But as we begin to

explore representational and behavioral strategies for accommodating the new affordances of digital music files, my hope is that humanistic critical and conceptual frameworks like materiality and embodiment will inform our work. These humanistic perspectives can help designers move past over reliance on outdated GUI principles. Integrating material impressions and embodied interactive strategies will assist designers in developing interfaces that support the creation and sustenance of meaning in digital encounters with cultural artifacts like music.

Studies

So, what might it mean for an interface actively to address and engage its materiality? What kinds of interactions might be described as embodied? Cover Flow offers an integrated spatial arena for interaction, but its limited conception of agency keeps the user at bay. When an interface design inadvertently precludes a user from actively entering the illusion it creates, a spell is broken. The subtle magic that enables an interface to oscillate between representation and reality is the precondition for digital materiality. Without materiality, there is a rupture in our technocultural world. We are alienated from our devices, which suddenly appear intangible and tenuous. Our ability to experience things in and through their interfaces is compromised. In terms of cultural interfaces, this proposition is frightening — if we let technology hamper our ability to embrace the products of our culture, we risk losing hold on that which makes us human. Embodied interaction offers a way to navigate this terrain. It cues us to devise ways to seduce a user into the reality of a representation by shifting playfully between showing and being. As Aylish Wood observes, embodiment "...involves taking on a spatio-temporal orientation in the world...experienced as an ability to act directly and meaningfully on that world" (2007, 116). Our interfaces need, at crucial moments, to reflect our embodied presences in order to ground us in our centers of consciousness and human agency (the loci of valuation and meaning-making).

In the studies that follow, I explore representational and behavioral strategies for an interface that supports material listening. I am concerned primarily with the first-order, immediate impression an interface imparts — these studies focus on ways a music listening experience might maintain the kind of careful play between showing and be-

ing that entices a user cognitively to engage with a simulation. I suggest that representations are never *just* representations — they populate the manipulable world the interface creates, and provide the functional hypertextual connectivity that supports a personalized experience, rich with connotative associations and expressions. The interface, then, is always simultaneously something to be looked at and looked through. A screen-based encounter with a cultural artifact in some ways may never rival a physical interaction — it is impossible for a screen to reproduce the myriad sensations and physical cues of an experience in the analog world. But as cultural artifacts are increasingly remediated into digital lives, we must believe that there is an emergent materiality and possibility for embodied interaction with the screen. I intend for these studies to show how representational and behavioral strategies supported by technological innovations like multitouch tablet computers might soon reintroduce the possibility of resonant encounters with cultural artifacts onscreen.

STUDY ONE (for images, see pp. 71-74, http://www.vimeo.com/11501760)

In my first study, I illustrate a screen-based encounter with the 1984 album *Zen Arcade,* by Hüsker Dü. Initially, the animation shows a two-dimensional representation of the album cover, as it might appear in iTunes, for instance. I then propose a way in which a 2D image might seamlessly transition into a diorama-like three-dimensional space. Silhouetted figures come to the fore, and the background scene is read in multiple levels of depth. The logo and album title now sits in intermediate space. Drop shadows and a cinematic shift in camera angle accentuate the relief. A slight shimmer applied to each of the layers in the diorama works to create a sensation of an active space.

The conceit in this study is the identification of user point-of-view with the cinematic presentation of data in the interface. A consistent Albertian perspective and aesthetic

realism are set in contrast with behavioral representations that have their own logic, derived from real-world experience, but refashioned into a coherent system. The very act of representing the artifact in a simulated space introduces a material quality to the encounter (though this representational strategy, as we have seen, is not sufficient in itself to establish *materiality*). My visual approach in this study references what Apple achieved with Cover Flow; I seek here, however, to accompany the three-dimensional representation with a new set of behaviors that encourage a user to identify with a particular spatiotemporal orientation to the data in the system. The representation is not *just* a representation — it is integrated with the functionality of the interface. A user is not left to look *through* the interface at the images inside; the window instead becomes her perspective as she enters the virtual space of the interface. The user — whose perspective is synthesized and oriented by a unified camera — actually dives into the composition, passes into the space of the image, and peers down into a sublevel where a photographic representation of the actual label of the vinyl LP begins to spin. A graphic and text-based menu appears, from which the four sides of the double album can be accessed in any order.

The illustration shows the user gesturing to shift her orientation, which pans the camera up and out of the area where the record plays. The perspective settles with the album cover diorama to the right. The simulated space within which the user is oriented is reinforced by an image of a shelf of records lined on what would be the left wall of the interactive zone. Against the backdrop of the collection, other artifacts related to the particular album encounter (videos and photos, in this illustration) appear in an intermediate layer.[20] With a tap and drag, the user selects photos to examine and

20>>> These represent the kinds of associated data a dynamically updating audio file like MusicDNA might support. Each datapoint theoretically could represent a hypertextual link to other networked data, so that a photograph might lead to others by the same photographer, information about the locale, or outtakes from the series.

then sends them back into the intermediate space. She gestures to pan back to the album cover, leaving some of the ephemera on view — they remain on the surface of the interface, between the user and her oriented perspective in the three-dimensional space. (At any point, I propose, a user could hide, rearrange, or more closely examine these artifacts.)

Where iTunes or Cover Flow would display a single static JPEG image, we now see the album cover activated in a functional three-dimensional diorama overlaid with hypertextual collected ephemera. I suggest that the intermediate zone where collected ephemera resides is a space within which a user might make connections between a particular artifact and others in a collection. This study illustrates the *Zen Arcade* album receding into the background as other albums by Hüsker Dü appear and animate. The user also encounters followable paths of derivative artifacts: seven-inch singles, bootleg tapes and CDs, and later albums by other bands featuring members of Hüsker Dü. Other connotative associations might be represented and considered... records from the SST label, from the early 80s Minneapolis scene, from bands influenced by Hüsker Dü. Such a system might even be able to reference tagged ephemera from a user's unique experience with the band or with the *Zen Arcade* album. Other records acquired at the same moment in history, scans of ticket stubs, mixtape covers, or personal photos from times when *Zen Arcade* was on the playlist are the kinds of artifacts a user could archive and encounter in the context of her own collection. These connotative trajectories could be called up from a local or networked database. Any artifact could represent a unique entry point into another embodied interactive space where a user might make further connections. The interface behavior of "diving in" to a simulated space is a dynamically tiered mode of exploring one's collection, the relationships within it, and its relationships to other cultural artifacts outside of one's local system. The association of the user's perspective with a cinematic camera in a three-dimen-

sional interface helps orient the user in space and time — one of the foundational criteria of an embodied experience.

Even the preliminary results of this study confirmed my suspicion that a dimensional representation might offer possibilities for cognitive engagement with an interface not afforded by a text-based GUI. But there seemed to be points at which this system limited user agency in such a way as potentially to break the illusion of active engagement. This happens in Cover Flow, for instance — artifacts are represented in animated three-dimensional space, but their position is fixed. The interface accommodates only a few behaviors, and the result is that Cover Flow never achieves the productively ambiguous oscillation between showing and becoming integral to a successful interface. In this first study, I introduce a greater array of behaviors, but a complete picture of user agency feels problematic. In retrospect, the representational strategies here are insufficient to create a sense of material presence within the interface. The artifacts represented never transcend their tenuous status as intangible, contingent images. Without a sustainable material impression or a full sense of agency, a user encountering this interface would potentially remain distracted by the limitations of its representational strategy.

STUDY TWO (for images, see p. 75, http://www.vimeo.com/11501784)

The hindrances imposed on my first study by a limited user agency and inadequate material representation were not immediately apparent to me. My second study instead sets out to address a different set of issues: are there ways in which the cultural stuff of music might be better displayed onscreen? Perhaps my first study was too tied to straightforward representations of physical artifacts. Were there new affordances in the digital representative environment I should explore? Should I be bound to repre-

senting physical culture so literally? I was also keenly aware that not every two-dimensional album cover image would lend itself as easily to the kind of extracted diorama 3D effect I employed in the first study. How would I simulate an active three-dimensional space from a two-dimensional album cover image that didn't allow that kind of manipulation?

This study illustrates an encounter with another album from the Hüsker Dü canon — their final document, 1987's *Warehouse: Songs and Stories* (coincidentally, *Warehouse* was another album originally issued on double vinyl). The source image is impressionistic, again, but rather than a flat, comic-style illustration, the cover of *Warehouse* is a sumptuous photograph of organic branches and doric columns, bathed in saturated color. Without the original source material, it would be exceedingly difficult to isolate spatial layers from this image. I opt in this study for an additive method of introducing dimensionality to the album cover. I place a synthetic translucent layer in offset 3D space in front of the album cover, through which a refracted light source slowly paces. This creates a dimensional representation that remains true to the image's original character, but I now feel it limits the interface's ability to create a material impression. Again, as with Cover Flow, a mere representation of space is not sufficient to establish materiality or to support embodied interaction. Nothing about the dimensional strategy of representation in itself transcends the constraints of the screen; without introducing a play that shifts representation into the field of *being,* an image remains distinct, intangible, immaterial.

This study takes a couple of steps forward in other ways, however. Representation of the digital package's audio contents goes a little farther in leveraging the particular affordances of its context to foreground its construction as a digital interface. This is a component part of the materiality of the interface — since the experience is in fact a

screen-based one, an open acknowledgement of its digital character is cognitively grounding for a user. To this end, I represent the four sides of the double album as stylized, manipulable tabs that emerge from the package, as contents in a virtual sleeve. Touching a tab reveals a sub-sequence of the original LP. This album-side listening experience is material information frequently overlooked in a digital music listening interfaces — no systems of which I am aware acknowledge the experience of encountering an album as sub-cycles of songs (even though artists did — and sometimes still do — carefully consider these album sides as they sequence their records).

Another way in which this study evokes the material presence of the artifact is by representing the relative length of the songs on the album. On a vinyl LP one may visually assess the approximate and relative lengths (and tones) of individual tracks by comparing how wide the concentric rings are, and how close together the grooves. Most graphic representations of time in existing digital systems do not allow for assessment of these kinds of material relationships — playheads and elapsed time are interpreted within the unchanging domain of the particular window within which this information is displayed.

My first study overlooked the passive listening experience, as well. Music listeners, clearly, are not always interested in visual interaction with an artifact — often, they desire just to listen, or to listen while doing something else. My first study illustrated listening time only as exploratory/investigative time. What visual affordances might a new digital environment offer for unobtrusive, time-based listening? In this second study, I illustrate a moment where the visual cues from the album cover evolve in time. Textual and graphic information about the content of the album might be subordinate from this perspective — this study illustrates the song sequences retracting to the right side of the view. In this passive-listening mode, the interface might optionally, selec-

tively present other kinds of information. This study illustrates the lyrics to the current song appearing in time as the audio plays.

STUDY THREE (for images, see pp. 76-77, http://www.vimeo.com/11501805)

Sensing, perhaps, that my second study had inadvertently limited the sensations of agency and cognitive engagement I sought to create, I moved in my third study towards evoking space around the album cover rather than within it. I was concerned, as well, that the "psychedelic punk" source material of my first two explorations might have influenced my visual decision-making processes. My third study involves a record from a different milieu. Grand Funk Railroad's *Grand Funk*, usually referred to as "the red album," has a different feel from the impressionistic album covers I'd used in the first two studies. Its high contrast image and text suggested a similar spatial strategy to those I had already explored, but in this study I attempted to focus on reconfiguring the hierarchy of graphic elements in space. I hoped I might expand the user's sense of agency and spatiotemporal orientation by centering the zone of interaction in a space less constrained than the confines of my first study.

This study illustrates the user's entry into three-dimensional space with a sort of title sequence wherein the graphic elements from the original image change scale and surge into the foreground as a momentary hyper-collage. Next, the graphic elements in the foreground fade as the two-dimensional cover recedes into an unbounded, simulated space. This 3D territory is loosely marked by a reemergence of album-associated graphic elements floating in loose arrangement. The song sequence from the record and a group of associated archival photos emerge from the represented sleeve. I am here attempting to reinforce the idea that the album cover image is a digital

"package" containing not only music, but liner notes, photos, and other ephemera.

The user's perspective again is defined by the cinematic camera — to select a song, she zooms into the simulated space and flips through the titles. Once a song is chosen, the camera automatically re-centers on the original perspective. The current selection is represented at the top of the window, and a needlelike playhead indicates the its progress. From this point of view, I imagine other associated material might be accessible through an organized slider that indicates what is in the user's collection (and what is available elsewhere). The study illustrates a default view of the band's albums in a chronological arrangement. I position this information as supplementary, associated data. It is accessible from the simulated space of the album being considered, but should a user makes the choice to explore this data, she would be taken into another three-dimensional zone described by another loose association of graphic elements taken from the album art.

In many ways, this third study feels like a less successful retread of some of the ideas I explored earlier. It reveals a couple of interesting new moments: the shift in hierarchy of the graphic elements from the original package speaks to the materiality of the permutable digital representation, and the slightly more open simulated space is potentially evocative of a greater user agency. But the interactions and behaviors illustrated do not impart a compelling sensation of embodiment — there is nothing of consequence to learn through acting in this space. It comes across like a three-dimensional version of iTunes LP, and it seems clear its novelty could wear quickly on a user. The study is not very successful at orienting the user's relationship to the interface or drawing the user into its world.

At this point, it became clear that enticing a user into a dimensional simulation would take more than a refashioned image. I would need to push harder on the representa-

tional and behavioral strategies I sought to employ to create a sense of agency and embodiment in this simulated world. It was also time to begin to think more carefully about how the micro-level encounter with any particular artifact related to the larger collection.

STUDY FOUR (for images, see pp. 78-82, http://www.vimeo.com/11501818)

My fourth study centers around an album from yet another subcultural scene. It illustrates an encounter with Bob Dylan's 1965 album, *Highway 61 Revisited.* The exploration begins by preliminarily sketching an encounter with the larger system — an assortment of images representing perhaps the user's recent listens or current rotation (the parameters of the entry point of the system I envision will be customizable). I illustrate what it might look like to navigate and explore this subset of items from a collection using multitouch gestures, and I show how the system might be able to configure and represent these artifacts hierarchically according to scale and placement in z-space. Ultimately, these representational and behavioral strategies will be an integrated part of the user's embodied experience, as they facilitate interpretive and connotative exchange with the system.

As the scenario proceeds, the user selects *Highway 61* from the assortment of albums circulating in the initial mix. The two-dimensional representation of the album cover centers in the screen as the other records fade away. Then, with a simple gesture, the user dives in. Like my first and third studies, this experiment also breaks the photographic and typographic elements off of the two-dimensional plane into simulated space, but the perspective of the user is more dramatically and potently represented here than in my earlier explorations. I seek to engage the user more fully in the encounter, and to expand the sense of agency within the represented environment, now

free of the bounds of the square image. The user's perspective, synthesized by an Albertian window, sweeps, pans, and zooms into the simulated space to emphasize the ruptured graphic elements and the new, abstracted compositions in which they result. The affordances of the screen-based environment are more successfully allied here with my representational strategies, and a material sensibility does seem to begin to emerge. With each directional gesture, the camera comes to rest at a new location in the composition. The user finds herself in a familiar yet novel space, where the graphic elements from the 2D album cover are activated to reconstruct an experience with a provocatively different resonance. The user's experience is something like looking into a refracted viewfinder that reveals only a small part of the original artwork at a time. This representation is particular to the digital environment, and it places the user in a particular orientation vis-à-vis the interface, which does seem to oscillate between representing information and becoming that which is represented. The result, when it works best, is to evoke a simulated space (on its own terms) that refashions prior media into an environment where the groundwork is laid for at least the possibility of new kinds of interaction.

STUDY FIVE (for images, see pp. 83-88, http://www.vimeo.com/11059929)

The prototype interfaces I modeled in earlier studies overlooked a significant aspect of the material resonance present in encounters with physical artifacts. The images I was using had been scrubbed clean of any visual evidence of their physical presence. Admittedly, I am focused on materiality as being something other than physicality, but to ignore the poetic qualities of a subtler, physically-referenced representational strategy would be folly. The screen's ability to display detailed information speaks to its materiality through the act of representing intricate levels of physical detail in high-resolution imagery. In the age of the transparent interface, it is common for digital representations

of music artifacts to be as interchangeable and nonspecific as the audio files themselves. These representations ideally have no mark of physical presence — they are graphically perfect, pure of taint, abstracted from art that was at one point intended to be printed and live as part of a package.

I believe existing systems' inability to represent the subtler physical details of remediated artifacts is another factor contributing to the difficulty many have with personally connecting to digital music. One of the things this fifth study seeks to do is reintroduce a detailed level of visual information to digital representations of cultural artifacts, with the intent of evoking a fuller sense of presence in our readings of them. To this end, I integrate photography and video of actual physical artifacts into the digital encounter. I also seek to orient the user through a progressive unveiling of aspects of an artifact in scenarios centered less on navigating simulated space than on an active relationships within these territories. Through experimenting with more thoughtful representational strategies and promoting new interface behaviors in this study, I hope to shed more light on how an interface might impart a fuller sense of agency and consequence within its represented environment.

I begin this study like the previous one, with a user encountering a subset of a collection (which could represent items recently viewed, listened to, or selected at random). These artifacts are represented photographically as a stack of records, identifiable by their spines rather than their covers. Interestingly, the spine is a convention of physical culture that has not been exploited in prevailing digital representations. The visual cues offered by a spine connect with a listener's sense of the artifact as a coherent, particular presence — the spine is part of the artifact's design and identity. Often, the graphic and typographic qualities of an album integrate with the visual impression created here. These cues give a listener a way quickly to identify an artifact when it is

filed on a shelf with several others. Digital interactive environments have not leveraged this convention; as we have observed, the album cover is the only visual material existing systems regard as important.

This study does not fully investigate the possibilities associated with digital representations of a spine, but suggests the convention may provide affordances here similar to those it provides in the real world — an alternate way to recognize artifacts, and simultaneously to apprehend larger cross-sections of a collection. In the animation, with a sweeping gesture, the user flips the stack of records to one side for a view of the front covers. Next, she shifts the orientation of the artifacts to that the stack of records appears floating in space, in an array that allows her freely to orient and shuffle them. This behavior is specific to the digital environment, and forms a constituent part of the materiality of the interface, as a new, context-specific way to view and access the contents of a group of artifacts. The user stops shuffling the records and the topmost album comes to the fore as others fade. The representation of the artifact again reinforces its materiality through its behavior as a digital package — the simulation shows the album cover as a sleeve which holds a representation of the actual vinyl record, which the user plays by removing it and sending it to the lower part of the screen (as if placing it on a turntable). In this way, the album cover begins to gain significance and status — it is not coextensive with the music it contains, nor is it simply a sign that points to a group of songs. Its representation functions in concert with the music recordings it contains to establish a full material presence with which a user can connect. It is essential to the digital music encounter (as it is the physical) in that the album functions as a vehicle for the aural component of the experience. As a material support, it provides an emotional-historical anchor for our personal apprehensions and evaluations.

Behaviors accommodated by this imagined system oscillate suggestively between cueing animated effects and filmic interludes. The idea is that such a system might hold a number of possible presentations of visual data, which it could present in response to gestural cues in a way that makes a user's encounter feel particular and specific to her style of interaction. These behavioral and representative strategies are similar to those employed by designers of the 1983 videogame *Dragon's Lair,* wherein simple interactions reveal cinematic cutscenes that propel a user through an encounter. (This is a convention now commonplace in narrative videogames, but *Dragon's Lair* remains the archetypal example of the kind of productively ambiguous interface experience I seek to model.) In other words, interaction in this system plays with the distance between actual agency and the illusion of it — at times, the user's gestures affect the system's representations in real, one-to-one ways; at other times the user is cueing a predetermined scenario aimed to guide her forward in a quasi-narrative experience. Framing these narrative dimensions of an interface experience necessarily situates a user in a particular spatiotemporal relationship with a system, which, as we have established, is both necessary and sufficient to support embodied interaction.

This study too, then, relies on constructing and maintaining an oscillating balance between representation and reality, showing and being (insofar as representation implies distance, a looking *through*, and reality implies closeness, immediacy, and looking *at*). There are several moments where this study falters; moments where a user might be pushed away from immediate engagement and become too cognizant of the interface as construction. Some level of commitment to the illusion created by an interface is necessary for a material expression wherein a mediation may be regarded as real. This study offers a glimpse of how photographic and filmic realism may play into the aesthetics of an interface that supports a productively ambiguous encounter. But the study

plays too fast and loose with its behavioral and representational strategies. The range of possibilities presented to a user needs to be more succinct and evocative.

FINAL STUDY (for images, see pp. 89-96, http://www.vimeo.com/11379156)

The possibilities and provocations presented by these studies do not imply a one-size-fits-all approach to cultural interface design. Each of the above explorations employs a particular set of representational and behavioral strategies designed to support materiality and embodied interaction. Each holds some promise, but ultimately seems too specific, relying on the particularities of the visual material of the albums in question. A material listening interface needs to accommodate a broad range of artifacts with distinct visual character, while providing an adaptive yet coherent structure within which a user may explore, learn, reflect, associate, read, listen, and play. These activities suggest an encounter in which representational strategies may shift according to context and user intention. As Suguru Ishizaki describes in *Improvisational Design,* "A designer's task...is to anticipate potential changes in the context and specify the communicative forms that design agents should perform according to their immediate situations" (9). In dynamic information environments, we must look towards developing systems that support forms in flux, content that changes constantly, and experiences that tailor themselves to users as they express their presence over time. An interface that accommodates material listening, then, needs to be both simple enough to invite a user into its logic and robust enough to support an array of unpredictably dynamic artifacts. The idea of a system that supports only a single graphic image per artifact (a la iTunes) will quickly be outmoded by dynamic filetypes like MusicDNA, which will expand the notion of what a digital package entails. My project is not to provide an exhaustive account of how such information might be accommodated by an interface, but rather to explore how the frameworks of materiality and embodiment might help

immediately to support meaningful encounters with interfaces beginning to negotiate these demands. An interface that accommodates dynamic information through performative design agents is more than compatible with the notions that have guided this investigation. Materiality and embodied interaction should thrive in these emerging information environments.

My final study is not a revision of an earlier piece, though it builds on some of the most productive aspects of my initial studies. It sketches a system that incorporates representational strategies that could accommodate artifacts with different visual characters — artifacts which, in turn, operate as packages with diverse contents. Interaction with and exploration of these contents supports connotative associations and meaningful encounters for users. The operations and behaviors of the system should allow for a high level of personalization in terms of what is represented (and how). All of this is not explicitly enumerated by the animation, so I will take the opportunity here to say a little more about how I envision this system to work.

As the user encounters the system, she is situated between the artifact last encountered and the rest of her collection. She may continue listening/exploring where she left off, or browse her collection according to other criteria. The study illustrates a user choosing to view "recent" plays, which calls items from a virtual shelf out into an intermediate zone of interaction. Several vinyl 45s and a cassette with a hand-drawn cover are among the artifacts the system presents. The user gestures to see more items, which shuffle themselves to provide new perspectives on relationships and associations that may have gone unnoticed — in this case, perhaps she is prompted to think of the late 90s Washington, DC scene when she notices records from her recent Teenbeat kick in the mix with a Slant 6/Make-Up split single.

Not immediately finding what she wants to hear, the user returns all these records, tapes and CDs their place with a swipe. A simulated shelf holds her collection. It rotates into view as each artifact floats to its context-based position. Alphabetical cues indicate approximate positions of selections from the user's "recent" plays, in place on the shelf, in context with the rest of her collection. If the user chose to view "all" she would see her shelf fill with artifacts. I propose the alphabetical default display is only one among an array of options. For the user truly to feel a sense of agency in the simulated world before her, she should be able to order her collection as she sees fit. (Manual, animated, drag-and-drop arrangement of a collection is impossible in iTunes, and it certainly circumscribes the user's relationship with her music.)

Next, with a gesture, the user flies towards her shelf as all her "recent" plays emerge in an ordered fashion from their recessed positions.[21] From this orientation, the user can visually explore and easily navigate her collection. Touching and sliding a record or other artifact plays a song or album, and allows the user a better look at the cover if she desires. She can completely remove an artifact from the shelf and rotate it to see the back. Every representation is functional; the interface experience shifts back-and-forth between *representing* a collection or artifact and *being* a collection or artifact.

The user can also move into a particular experience with any individual artifact in her collection. The specific media from which the digital file was ripped is represented (with the advent of mp3 blogs, it is increasingly common for listeners to have audio files of recordings that originated on vinyl or cassette). The user gestures to send it to an intermediate "cloud" space, where she engages in a personal encounter with the

21>>> I chose to employ this partial cover view over a simulated spine because viewing an adjustable portion of the album cover offers more flexibility to the user — a spine is necessarily a limited view and would perhaps not function as well as a quick visual identifier.

artifact. At this point, the representation is effectively real — the user is enticed to regard the simulation as a fully present artifact with a productively ambiguous ontological status. Full views of the album's artwork and sleeve contents are available; so is a potentially infinite array of dynamic associated data. This study illustrates a series of images of The Stooges taken from the publicly-constructed database of Last.fm's artist page. In theory, the user could access any number of image banks, and even build her own. Any one could be dynamically linked with a particular album or artist.

Information from choice blogs and newspapers, tour schedules, official and unofficial archives, and social networks, for instance, all could be accessed and keyed into a customizable display. The selective, context-based appearance of this data, in time, according to the user's expressed preference, serves to orient the user in an agency-filled relationship with the interface. The rich associative information helps establish the material dimensions of the listening experience in ways only a dynamically networked experience can. Perhaps in the near future we will begin to grasp an emergent materiality in screen-based experiences with cultural artifacts, based not only on physical cues but also on the particular, customizable experiences users construct and live through embodied interactions with material listening interfaces.

Reflections

One of the non-negotiable constraints involved in any attempt to re-envision the screen-based encounter with music is the ubiquitous two-dimensional square image — the album cover. The square album cover was once a formal imperative derived from the media the covers were designed to package and protect; discs of celluloid, shellac, vinyl, and finally, polycarbonate-encased aluminum. These discs held information that would be translated into sound. Album and CD covers rarely strayed from the square format — notable exceptions like Public Image Limited's *Metal Box* were infamous for the distribution and display problems they caused for retailers.

Today, though, music travels without incumbent form. Digital files have no natural shape or dimension. They are ones and zeros, and we apprehend them only through their graphic representations onscreen. But the cultural stuff of music remains tied to the two-dimensional square — the album cover stands guard over the material connection listeners historically have had with recorded music.[22]

A lonely JPEG, however, cannot substitute for the physical, material experience of interacting with a vinyl album. Insofar as meaning is created in and through our embodied relations with material artifacts, the current shape of the digital music encounter lacks

22>>> Indeed, even with the advent and acceleration of screen-based musical experiences, there are strong reasons to believe the physical album cover and its screen-based representation will continue to play a role in musical encounters. Purely digital releases require a graphic representation in order to function in a GUI — a strictly practical requirement most easily met by the square JPEG. Current screen-based digital listening environments generally support only a single JPEG as visual accompaniment for the audio file. In any case, artists and fans seem nowhere near consigning physical music culture to the dustbin. In creative and listening communities, interest in vinyl records is surging. Independent record stores (the last music retail spaces standing) now largely stock vinyl LPs, often packaged with a digital version of the recording, either as a download or a compact disc.

basic affordances for support of human value. Culturally, the way we regard music has changed in the digital era, and not all for the good. What, precisely, has changed?

The act of listening to recorded music has an inextricable visual dimension, as Philip Auslander observes in his book *Liveness:* when, "through virtue of technological mediation," sound is abstracted from sight, "the aural experience nevertheless evokes a visual one..." (85). (Evan Eisenberg[23], and Richard Meltzer[24] are among the voices he cites in support). Beyond the visual, I argue, there are aspects of encounters with recorded music that relate to our distinctly human way of understanding the world as embodied consciousnesses. As humans, we don't just listen to music — we live it. Our encounters with recorded music are material listening experiences.[25]

Design's neglect of the supporting visual and material components of the music listening experience has been a major contributor to the diminished cultural import of music. As Brian Eno remarks in a recent BBC4 Documentary, "music doesn't play an ideological role" in the lives of today's youth — "the currency is devalued." Eno suggests that what young people today really enjoy about music is not so much the *music*,

23>>> "Stereo...arrays the musicians before you in an empty space. You can almost pinpoint them, but they're not there. ...The introduction of stereo did not simply double the listener's pleasure; it changed the phenomenology of the phonograph by adding a spatial, and hence a visual, aspect....every mode of record listening leaves us with a need for something, if not someone, to see and touch....one adores the album cover.... Fetishism...seems the highest fidelity" (64-7).

24>>> "Required [when 'listening to a standard guitarist on record'] is a mental picture of the guy facing you and occasionally moving around; in conjunction with this you visually change the situation and sit behind him or turn the stage around, or you put yourself right in his shoes" (229).

25>>> Vivian Sobchack evokes a similar argument concerning embodiment and film: "We do not experience any movie only with our eyes. We see and comprehend and feel films with our entire bodily beings, informed by the full history and knowledge of our sensorium. Vision is not isolated from our other senses. Whatever its particular capacities and discriminations, vision is only one modality of my lived body's access to the world and only one means of making the world of objects and others sensible – that is, meaningful – to me. Vision may be the sense most privileged in cinema, with hearing a close second; nonetheless, I do not leave my capacity to touch or to smell or to taste at the door, nor, once in the theater, do I devote these senses only to my popcorn" (64-65).

per se, but the communal experience of it, the pleasure of exchange (*Brian Eno: Another Green World,* 2010). In some ways, such a shift is the inevitable outcome of the way music is represented by current digital interfaces. Stripped of its natural physical anchor, music has been reduced to an immaterial digital chimera — endlessly replicable, impersonal, and free of the material-emotional resonance found in embodied artifacts.

The cultural shift to which Eno eludes is not altogether lamentable. Society can celebrate the growth in community-oriented exchange enabled by digital devices and networked environments. But this exchange need not preclude the possibility of material resonance in artifacts swapped, shared, published. Nor is it incompatible with embodied encounters with the interfaces through and within which we experience music in these new ways. Recently published critical and speculative essays on archaic formats — cassettes and CDs — point to a reemergent interest in music's physical culture and fetishism not only of album art, but of the media themselves. Taken in context of a general decline in music's presumed value, these writings suggest that contemporary digital culture lacks some crucial ability to support certain kinds of personal connections with its artifacts.[26] Present digital music culture is fundamentally compromised. Materiality and embodied interaction provide conceptual frameworks for design that may help restore it.

Concerns over the loss of value echo through adjacent cultural domains where aspects of previously rich material encounters with artifacts are weakened by ineffective or inadequate remediative strategies. Newspapers, magazines, books...I argue that the material dimensions of an experience with a cultural artifact are integral to the creation

26>>> See Tom Ewing, "Poptimist #26," http://pitchfork.com/features/poptimist/7772-poptimist-26/; Hegarty, Paul, "The Hallucinatory Life of Tape," *Culture Machine*, http://www.culturemachine.net/index.php/cm/article/viewArticle/82/67; Hogan, Marc, "This Is Not a Mixtape," http://pitchfork.com/features/articles/7764-this-is-not-a-mixtape/; Straw, Will, "The Music CD and Its Ends." *Design and Culture* 1.1 (2009): 79-91.

and sustenance of meaning and value. In embodied interactions with a material culture, artifacts themselves become repositories of meaning — substrates onto which we imprint, and through which we generate and read essential emotional-historical information. When digitally remediated experiences fail to support a material encounter, they hamper audience ability to connect immediately and authentically. Such digital experiences demote valuable cultural forms in exchange for efficiencies and qualities that cannot on their own support meaningful human experience.

My thesis investigates refashioning and reintroducing some of the aspects of the material encounter with music into the equation of the digital experience. But what does it mean to talk about materiality within the confines of a medium that is a simulation? This is the acknowledgement of Baudrillard's *hyperreal.* Søren Pold helps us see how aesthetic realism in an interface culture elevates the ontological status of the digital encounter. Jay David Bolter and Richard Grusin also insist on the reality of mediations, with evidence drawn from modern art (58-59) and rock music (42). Establishing the ontological status of mediated experiences with and in simulations supports the proposition of locating materiality in a digital encounter. The material aspects of an interface are not reducible to the haptic and physical qualities of a device. The quality of a human-digital encounter is informed and conditioned by the representational and behavioral strategies that comprise the design of the interface that supports the experience.

Bolter and Grusin argue that new media interfaces employ oscillating representational strategies of transparent immediacy and dense hypermediacy to refashion earlier media into intelligible, meaningful structures that aim to support authentic emotional responses. How might these strategies play out and balance productively in a digital interface designed to afford a material encounter with a cultural artifact like a music recording? Bolter and Grusin importantly situate this question within a historical dis-

course that acknowledges the relationship between new media and its predecessors. They also, crucially, establish the reality of mediation for us as human users. If we can say that mediations are themselves real as artifacts, the possibility at least exists for a substantial, immediate material encounter with digital music. The challenge for design, then, is to refashion the resonant aspects of material encounters with music artifacts and collections into a digital interface that supports authentic experience. Authentic experience can be read in terms of the notion of *embodiment* articulated by Paul Dourish and others — since we are, in fact, embodied consciousnesses, we perceive, encounter, create, and sustain meaning in our engaged interactions with the world. So, the process of refashioning the resonant aspects of physical culture into screen-based digital experiences is not simply a matter of image-based representational strategy — it must take into account the embodied nature of our understanding and relationships with meaning.

Dourish's notion of embodiment locates meaning in the mutual relationship between our activities and the world. It does not establish particular guidelines for design, but rather elucidates general principles in terms of a conceptual framework within which design might take into account an embodied perspective on interaction. "The core idea of an embodied interface is the ability to turn action into meaning," he says (183) — a new system through which we encounter cultural artifacts like music, then, should take into account that meaning is not passively transmitted from the system to us. It should reflect and locate the user in a spatiotemporal relationship to the world it represents, and establish the user as an active agent in that world. It is through our interaction with such a system that we understand how it works, and what it is, dynamically and in context. Dourish's perspective complements Bolter and Grusin in that it demands we consider not only remediative strategies of representation but also the kinds of affordances that best leverage our "familiarity and facility with the everyday

world" (17) as we design interfaces. My thesis studies consider how emerging multi-touch technology in tablet computers (such as the iPad) might help enhance both the material aspects of our encounters with digital representations of cultural artifacts, and our embodied interactions with them. The visual aspects of this investigation, then, enlist both representational and behavioral strategies.

I am working toward prototyping a system that constructs a simulated space within which embodied interactions with music artifacts and collections might occur. Such an interface, I propose, excavates an emergent materiality that leverages the affordances of the digital environment. Oscillating between showing and being, this kind of interface maintains a productive ambiguity that lures users into a mode of full cognitive engagement. In the midst of fully engaged, embodied interaction with material digital interfaces, we may discover and reclaim meaningful relationships with cultural artifacts. This is the promise of reintroducing material listening into encounters with digital music.

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Images


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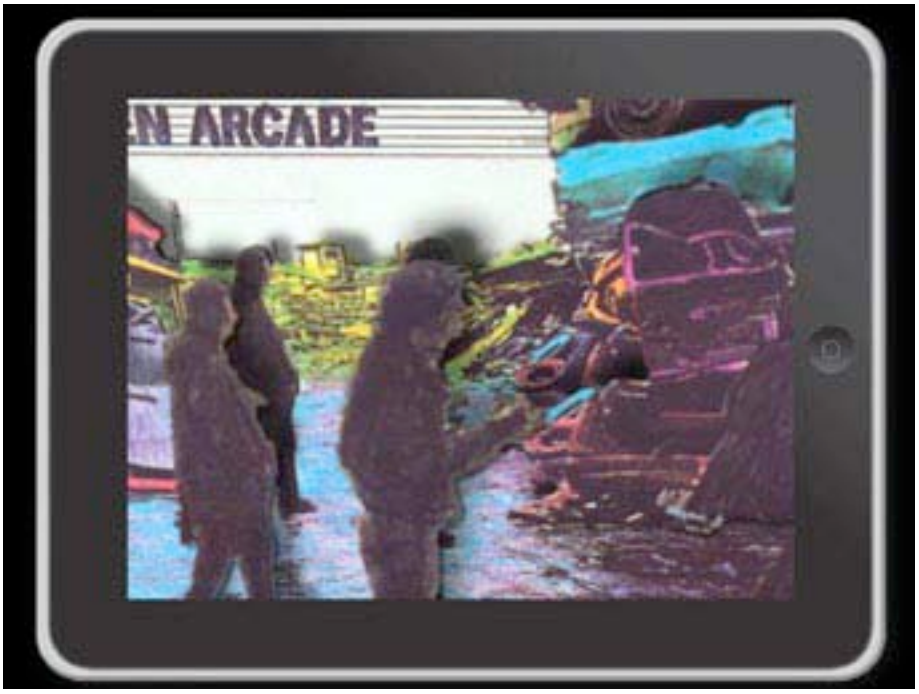
ZEN ARCADE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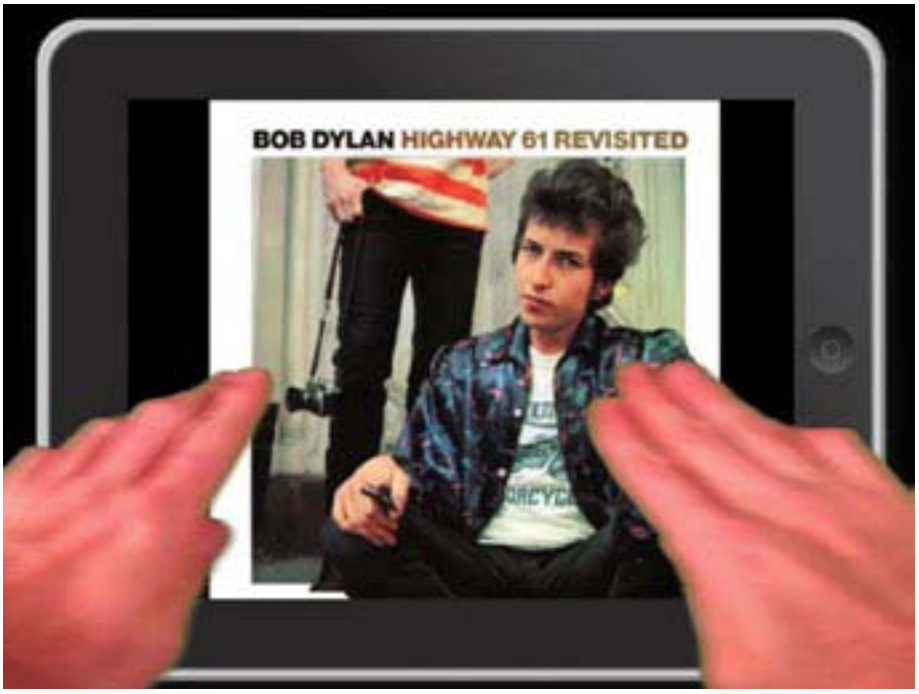
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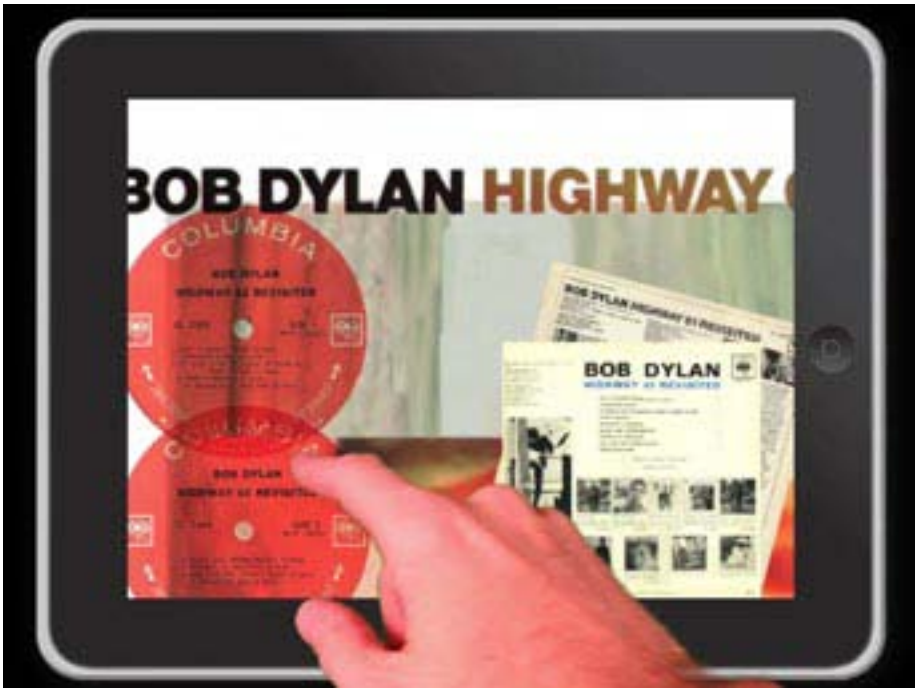
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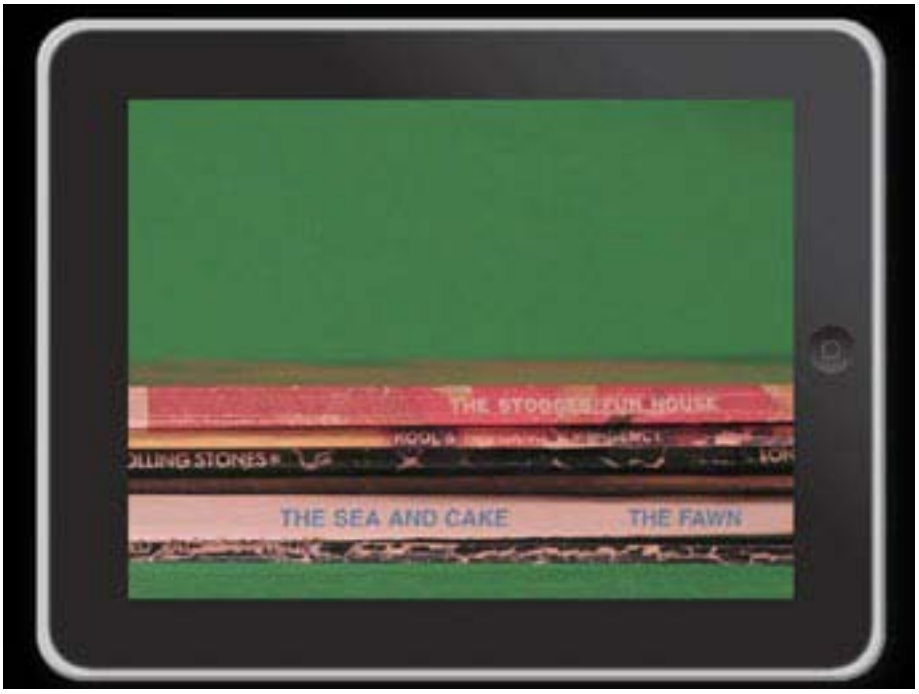
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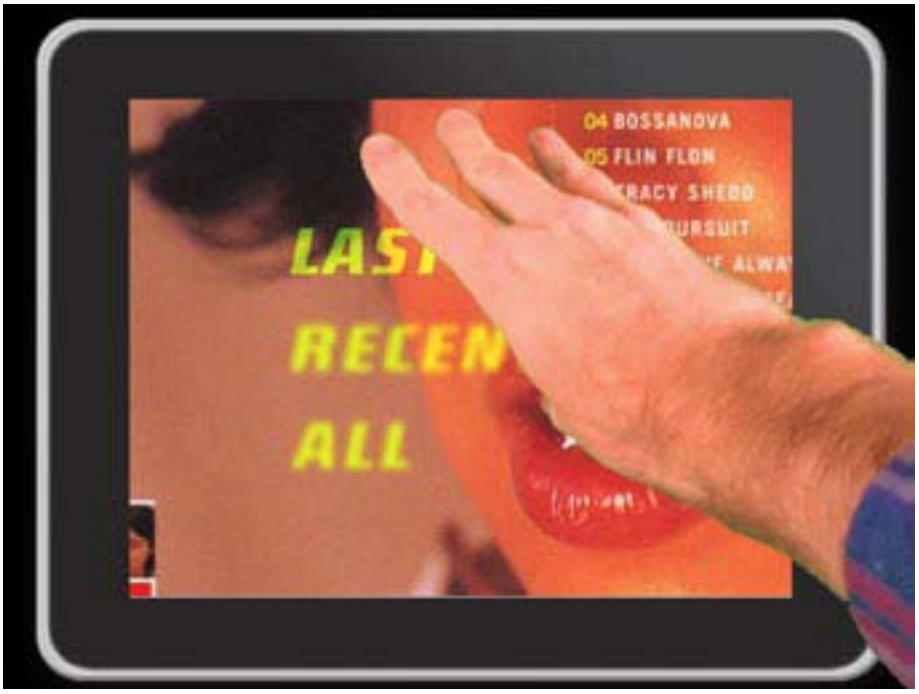
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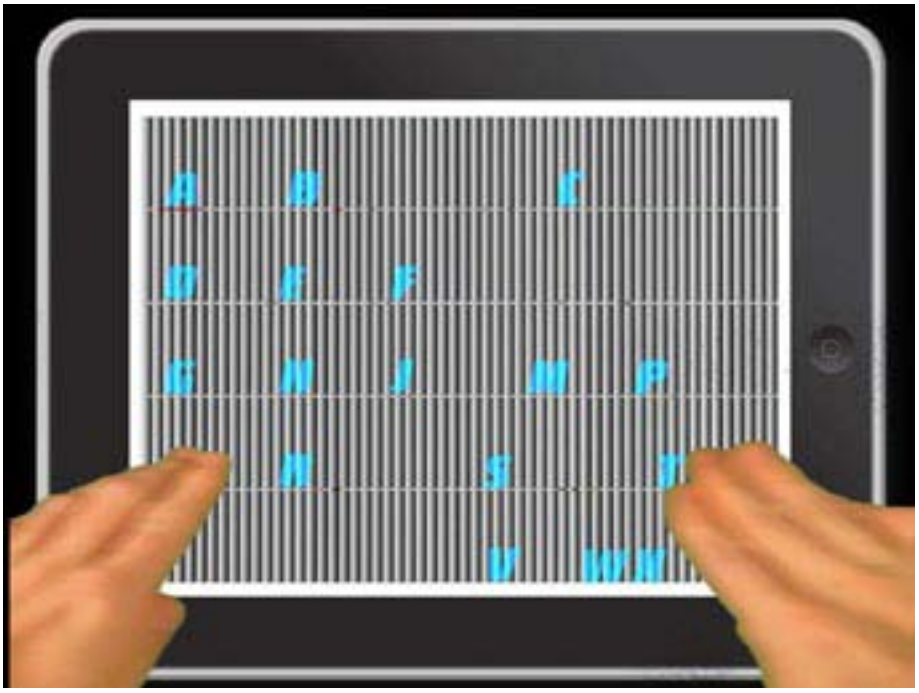

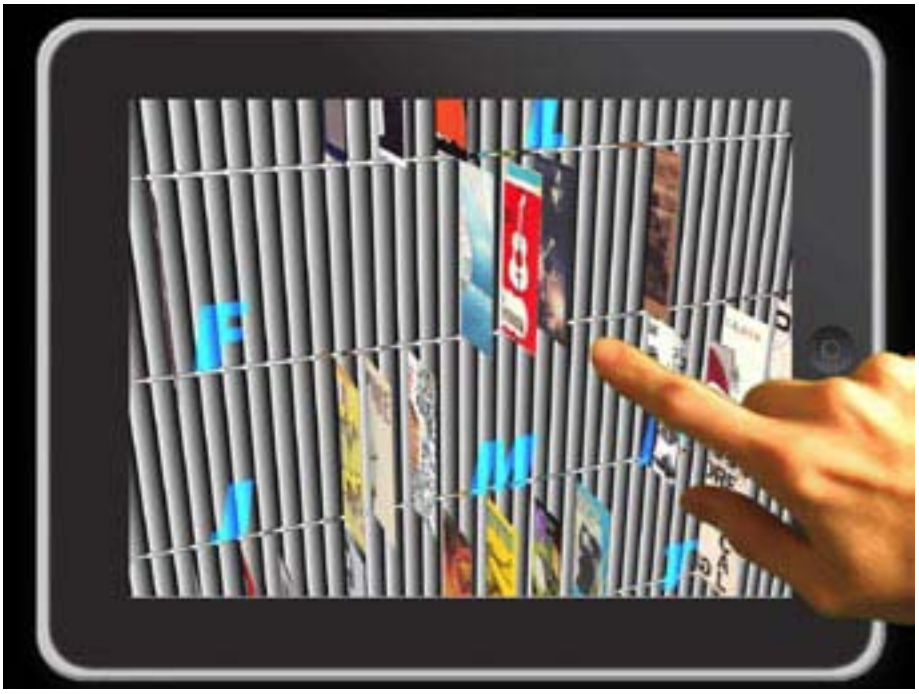


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