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CREATIVITY IN AMATEUR MULTIMEDIA: POPULAR CULTURE, CRITICAL THEORY, AND HCI

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Abstract: *The last decade has witnessed the emergence and aesthetic maturation of amateur multimedia on an unprecedented scale, from video podcasts to machinima, and Flash animations to user-created metaverses. Today, especially in academic circles, this pop culture phenomenon is little recognized and even less understood. This paper explores creativity in amateur multimedia using three theorizations of creativity—those of HCI, postructuralism, and technological determinism. These theorizations frame a semiotic analysis of numerous commonly used multimedia authoring platforms, which demonstrates a deep convergence of multimedia authoring tool strategies that collectively project a conceptualization and practice of digital creativity. This conceptualization of digital creativity in authoring tools is then compared with hundreds of amateur-created artifacts. These analyses reveal relationships among emerging amateur multimedia aesthetics, common software authoring tools, and the three theorizations of creativity discussed.*

Keywords: *amateur multimedia, creativity, HCI, aesthetics, YouTube, machinima.*

INTRODUCTION

Pop culture has for years been loosely associated with mass media, specifically popular television, movies, fashion magazines, and so on. Yet control over popular culture by mass media is clearly eroding. Easy-to-use multimedia authoring tools, massive libraries of digital assets (including Google images), and community sites that encourage free uploads of multimedia creations have come together to enable a phenomenon—amateur multimedia—whose scale is incredible. Today this pop culture phenomenon is little recognized and even less understood in academic discourses.

Some quick numbers demonstrate the reach of amateur multimedia. Nearly 325,000 multimedia files have been submitted to Newgrounds[1], an amateur Flash community; YouTube[2] features approximately 65,000 new videos per day, many of which are amateur; Machinima.com[3] contains over 2,300 films shot and produced within video games; and Second Life[4], a massively multiuser participant-created 3D world, indicated on its home page that it passed 2 million subscribers in December, 2006.

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Some individual works are achieving impressive distribution: The Numa Numa Dance[5], a low-budget video released on Newgrounds, exceeded 13 million downloads, spawned a subgenre—6,000 imitations to date—in its own right, and wound up on national news in the US. The phenomenon began when a young man danced, in his chair and in front of a Web cam, to a popular Romanian dance song, "Dragostea Din Tei." His infectious joy, though it displayed a certain amount of self-conscious irony visible to any Newgrounds regular, combined with the song's catchy melody to create a sensation that appealed to people both in- and outside the Newgrounds community, albeit in different ways. The video drops in seemingly random images, which are in fact references to other amateur animations from several similar communities. Using such images is a means of demonstrating one's membership in other communities, as is the viewer's understanding the references and their significance. The song, his dancing, and some of the memes he quotes all became memes in later animations (Paolillo & Bardzell, 2005).

Amateur multimedia is the locus of tremendous artistic innovation. The history of machinima is one example. Emerging from the gaming community's use of the unheralded recording feature in *Doom*[6] in 1994 that matured in *Quake*[7] in 1996, the art of filmmaking in virtual reality—which often involves storytelling, acting, and bragging—occurred in ways unanticipated by the games' publishers that inadvertently spawned it (Salen and Zimmerman, 2004). Since then, the genre has flowered to the point that popular games, such as *The Sims 2*[8], bundle machinima tools with the game, and new machinima genres, from music videos to sit-coms, have appeared. Entire Web sites, such as Machinima.com are devoted to it, and these feature long-running series, such as the seminal machinima sitcom, *Red Vs. Blue*[9]. As the tools improve, aesthetic values have also started to appear, as communities learn not only how to use the technology to make these movies, but more importantly how to make them *well*.

This paper explores the enabling factors, especially the role of multimedia authoring tools, in the recent explosion of amateur multimedia. It takes cues from both human-computer interaction (HCI) and cultural studies discourses, arguing that neither one on its own is sufficient to understand the continued development of the phenomenon.

HCI practitioners have explored how software interfaces can enhance and support users in general and creativity in particular. Its analytical tools for examining the relationships between tools and a concrete group of users vis-à-vis a well-defined explication of tasks both solve and create problems. The ability to specify these relationships explicitly greatly facilitates the design of systems; yet that same explicit specificity also defines creativity *a priori* in cybernetic terms more friendly to computers than to the culturally diverse and rich practice of creativity.

Critical theory—an umbrella term that encompasses literary theory, continental philosophy, and communication theory, among others—offers sophisticated theoretical resources for the study of cultural artifacts and their use in the communities that create them. Many of these theories ground themselves in the materiality of the cultural artifacts they study; yet the material layer for which these theories were once developed were largely textual. The movement of cultural artifacts from the physical to digital poses a deep challenge (and some risk) for critics studying digital media with these theories.

To improve our understanding of the intersections of creativity, technology, and culture, this paper investigates three relevant traditions of theory that address these overlaps: HCI, poststructuralism, and theories of technological determinism, especially in media. From there, the paper uses a semiotic approach to explicate the materiality of the software authoring tools

that people use to practice creativity, presenting a snapshot of creativity derived from software interfaces today. Finally, it explores the relationships between specific tools as implementations of this snapshot relative to the work of amateurs using these tools.

THEORIZING CREATIVITY

Creativity—its nature, conditions of possibility, inputs and outputs, and processes—plays a major role in virtually all academic, professional, and artistic domains. As a result, it is heavily, and heterogeneously, theorized. Indeed, it is reasonable to ask the extent to which different domains' use of the word *creativity* are talking about the same concept.

To construct a basis for comparison across disciplines, some characteristics of creativity considered include the following:

- *Agency*. Who or what causes creative activity? Does it occur in an individual's cognition, distributed across a social network, performed during an encounter with existing creative artifacts (e.g., texts), and so on?
- *Supports and scaffolds*. What characteristics, external to acts of creativity, appear to support them? Can heuristics create environments encouraging to creativity? What is the role of free association, play, and experimentation? To what extent do specific technologies, cultural logics, and communities predetermine creativity possibility?
- *Artifacts*. What kinds of artifacts are particularly understood or marked as the result of creativity? How are they marked (e.g., by the creator, a community, or discursive features in the artifact itself)? How are they recognized as marked?

Obviously, these three characteristics are far from a philosophical theory of creativity. Their intention is to be functional and to enable a broad comparison among different theoretical traditions of creativity.

Creativity in HCI: Toward a Science of Innovation

Genealogically, HCI developed alongside cognitive science and computer science, and was most often put in service of professional productivity software. Certainly, HCI has expanded beyond these roots, and yet this genealogy often leaves a mark on its conceptualizations of creativity. HCI often is (self-)described as a scientific discipline, which divides human-computer interaction into users (Beyer & Holtzblatt, 1998; Kuniavsky, 2003), tasks (Annett & Duncan, 1967; Crawford, 2003; Rheingold, 2001), and interfaces (Schneiderman, 1998).

HCI often characterizes creativity in rationalistic, intentional, and scientific ways. For example, Schneiderman (2002, 2003) proposes a creativity framework for, in his words, "generating excellence" with four parts: collect, relate, create, and donate. With it, he hopes to capture the social, iterative, associational, and distributional characteristics of creativity, especially as described by cognitive science. Evident in this perspective is an effort to model creativity, which is seen as a social activity, with certain structural features that take place in environments conducive to creativity. All of this is in service of what Schneiderman calls "evolutionary creativity," which he illustrates as follows: "doctors making cancer diagnoses, lawyers preparing briefs, or photo editors producing magazine stories" (2002, p. 238). Here,

and pervasive throughout the essay, Schneiderman's notion of creativity appears to be paraphrasable as professional innovation: His interest is not artistic self-expression and, as we shall see, he is not alone in understanding creativity in terms of professional discourses.

Greene's (2002) essay in the *Communications of the ACM,* titled "Characteristics of Applications that Support Creativity," abstracted features of creativity-supporting software, based in large part on user observations of an art appreciation public kiosk application, "Explore Modern Art." The language of the essay communicates a number of predispositions concerning creativity. Greene, an IBM HCI researcher, writes that, where creativity is concerned, there "should be no big penalties for mistakes, and there should be meaningful rewards for success" (2002, p. 102), thereby introducing a strong notion of correctness, a concept that appears throughout the essay. She also emphasizes the importance of system feedback, because it "promot[es] a sense of *control*" (Greene, 2002, p. 102; italics added). Appreciation of modern art is developed through games that involve users in acts of "*classification*," which, when done correctly, involve the "reward" of "more *information*" (p. 103; italics added). The researcher describes how the visitors of the art appreciation system would "develop a *hypothesis*" to help them iterate toward correct choices (p. 104, italics added). In Greene's essay, creativity is a computer-supported experience of art defined in terms of conventional (art historical) interpretation, as opposed to a direct, subjective experience of art (Sontag, 1981/2001). Again, creativity is understood as it relates to professional discourses, in this case the discourse of art history and its pedagogical presentation to museum-goers.

Even analyses of group creativity in HCI contexts that seek to go beyond rationalist-individualist notions of creativity nonetheless operate in a rationalist mode. For example, Farooq, Carroll, and Ganoe (2005) construct a classificatory system to model creativity phenomena and subsequently design corresponding software/interface features explicitly intended to support the modeled phenomena.

The notion of creativity that emerges from these mainstream HCI essays places its agency primarily in the intentional activity of the individual (though the individual is presumably a member of relevant groups). It sees the ecology of creativity as a community of expert practice comprising research, dialogue, and artifact exchange, facilitated by social and computer environments that forgivingly compel an iterative and basically scientific (correctness, discrete information, classification, hypothesis) approach toward truth. Its artifacts are the documents and discourses produced by domain experts, measured in large part by a correspondence theory of truth, that is, the extent to which the creative discourses correctly map onto external reality.

Poststructuralist Creativity: The Death of the Author

In his 1969 essay, "What is an Author?" Michel Foucault treats the notion of the author as a discursive construct, used to explain and control the meanings of texts. Instead of a historical person, or even a single narrator, Foucault introduces the notion of the "author-function." The author is understood as a discursive category that establishes the "mode of being" for a given discourse, by which Foucault means the ways that "the author's name manifests the appearance of a certain discursive set and indicates the status of this discourse within a society and a culture" (Foucault, 1969/2000, p. 211). The author has lost her or his humanity and become a feature of the discourse.

The role of the author-function is, among other things, to control the polyvalence intrinsic to texts, such that the author, rather than performing the *creative* role of bringing the text into the world, performs the role of *constraining* the meaning of the text within a society. For example, if a newly discovered poem is identified as one of Shakespeare's, the meaning of the poem is controlled because the interpretation of the poem must be subordinated to the body of Shakespeare's works, their historical development, and Shakespeare's biography. In other words, the attachment of Shakespeare's name to the poem affects our understanding and use of it much more deeply than anything the poem itself may be understood to say on its own.

Alongside Foucault's notion of the author-function is a theory of writing. According to this theory, "Writing unfolds like a game that invariably goes beyond its own rules and transgresses its limits. In writing, the point is not to manifest or exalt that act of writing, nor is it to pin a subject within language; it is, rather, a question of creating a space into which the writing subject constantly disappears" (Foucault, 1969/2000, p. 206). Therefore, writing is a destabilizing force that threatens to transform the discourse in which it operates and to swallow up its own author. It is important to remember that Foucault is not limiting his analysis to literary texts; he explicitly includes scientific and academic writing, thus making claims about the same types of discourse in his theory as the ones Schneiderman (2002) describes.

But what a contrast! Where creativity for Schneiderman is located in cognition, which he extends to include "distributed cognition," for Foucault cognition understood as a mental process tied to the individual subject does not appear to be anything other than a fabrication wrought by psychology. Where Schneiderman (2002) and Greene (2002) concentrate on intentional uses of information to discover truth, Foucault (1969/2000) denies the possibility of a unified author or even a unified work, let alone truth.

The unity of the author is a post hoc construct, according to Foucault. Even in a mathematical treatise written by a single author, Foucault sees a number of speaking selves: "The self that speaks in the preface to a treatise on mathematics—and that indicates the circumstances of the treatise's composition—is identical neither in its position nor in its functioning to the self that speaks in the course of a demonstration, and that appears in the form of 'I conclude' or 'I suppose'" (Foucault, 1969/2000, p. 216). One of these selves is the historically accidental self, who composed the treatise in such-and-such circumstances; another is a universal self, the any-scientist who, using the same mathematical symbolic system and axioms, will arrive at the same results. Even those rare authors—such as Marx and Freud—who go beyond "mere science" to achieve the elevated status of "discursive founders" are important not because of who they were or the ideas they introduced, but rather because they "have produced … the possibilities and the rules for the formation of other texts" (Foucault, 1969/2000, p. 217). In other words, discursive founders achieve their elevated status because they produce new discursive grammars, entire new sets of rules for others to transgress in their own writings.

In this conceptualization of writing, creativity occurs at the level of discursive rule-transgressing. The role of the historical human in this process is greatly diminished, not because humans are not involved in textual production, but because the individual is at the wrong level of granularity for analysis. A given historical individual authoring discourse does so within complex interactions involving several selves and the clash of languages.

Related, but not identical, to Foucault's notion of authorship are theories of "intertextuality" put forward by Julia Kristeva and Roland Barthes. Intertextuality is the notion

that a text is a "tissue" of (mis)quotations from other texts, considered to be more than mere collages, but transformative, of the sign systems from which they are derived (McAfee, 2004). The writer "stages" these intertextual pastiches but has no authority to control or regulate the responses, leaving behind "play," that is, an unpredictable and emergent clash of texts and constructions of meaning, and *jouissance* as its consequence (Orr, 2003). Such theories clearly inform more recent theories of new media, including Bolter and Grusin's (1999) concept of "remediation," which characterizes "new" media as "refashionings" of "old" media.

The poststructuralist notion of the death of the author distributes the loci of creativity across different authorial selves, different discursive rule systems, and human pleasure. Dangerously polyvalent pleasure, experienced in the vistas opened up by transgressive innovations in the rules of discourse, replaces truth and unity in the poststructuralist account of creativity. Creativity's agency lies in the juxtaposition of sign systems (in which authorial identities are implicated), which occurs in the context of play, and results in artifacts that are significant not for what they say, but for the ways they materially contribute to the generative capacity of the discursive rule-set from which they operate.

Technologically Determined Creativity

Perhaps the foremost theorist of technological determinism is Jacques Ellul (1964/2003, 1980/2003), who argues that individuals, science, and government are all "conditioned" by technology. The production of knowledge and the operations of the state involve relations between people and resources, and yet all of these are mediated by technology. However, technology has its own logic—Ellul (1964/2003) identifies it as the endless pursuit of pure, rational efficiency in every field of human activity—and though technology transforms virtually all fields of human activity, it is itself unaffected by them. Like Schneiderman (2002, 2003) and Foucault (1969/2000), Ellul (1964/2003, 1980/2003), too, is making claims about the origins and generation of knowledge in scientific discourses, but he situates the agency in the fierce pressures of technology as it overwhelms and often replaces the comparatively meek procedures of science and governance.

Ellul's (1964/2003, 1980/2003) emphasis on technology's mediation of the production of knowledge recalls the work of Walter Benjamin, whose essay, "The Work of Art in the Age of Mechanical Reproduction" (1936/1968), unpacks the meanings, social relations, and perceptual transformations caused by the emergence of mechanically reproducible art, such as film. The transition from nonmechanically to mechanically reproduced art changed the relationships among art producers, consumers, and works themselves. Benjamin contrasts the production and consumption of the stage versus film and notes that whereas plays on the stage are viewed from within a space-time continuum that links performance, viewing, physics, perception, and cognition, the production of film and its consumption occur in different spatiotemporalities, changing, for example, the relationships between the viewers and actors. Film's use of shots and cuts also disrupts space and time, presenting images to human perception that are external to our own physics; for example, a cut between a long shot and an extreme closeup moves our view instantaneously across space without requiring any time. As a result, according to Benjamin, our cognitive experience of the art also changes; whereas painting allows spectators to control their own stream of consciousness and reflect on what they see, cinema's moving images disrupt association and contemplation, dominating viewers' thoughts.

Benjamin's (1936/1968) technological determinism is not as full-blown as Ellul's because technology is but a part—an important one, to be sure—of the substructure-superstructure system that dominates a cultural mode in Benjamin's Marxist theory. Nonetheless, Benjamin's essay demonstrates how changes in technology alter techniques of production, which in turn transform the experience and meaning of art, and thereby the nature of culture itself.

Benjamin's (1936/1968) arguments are developed further by self-described technological determinist Marshall McLuhan, whose claim that "the medium is the message" (1964/2003) characterizes media as "extensions of ourselves" that "alter sense ratios or patterns of perception steadily and without any resistance" (p. 31). The result is that "subliminal and docile acceptance of media impact has made them prisons without walls for their human users" (p. 34). For McLuhan, media, and the technologies that enable them, replace the senses, where the senses are understood to form the basis of knowledge and understanding.

More recently, new media theorist Lev Manovich (2006) has made arguments with technological determinist underpinnings. For example, in a draft of an as-yet unpublished essay, Manovich largely credits Adobe's After Effects as spearheading a revolution in media:

> [A]s software remixes the techniques and working methods of various media they simulate, the result are new interfaces, tools and workflow with their own distinct logic. In the case of After Effects, the working method which it puts forward is neither animation, nor graphic design, nor cinematography, even though it draws from all these fields. It is a new way to make moving image media. Similarly, the visual language of media produced with this and similar software is also different from the languages of moving images which existed previously. (Manovich, 2006, p. 20)

For Manovich, the emergence of new visual languages is enabled not by an iterative, rational approach to innovation, as cognitive science might suggest; neither does it emerge from an evolutionary history of discursive transgression, as a poststructuralist approach might suggest[10]. Rather, it is made possible by certain forms of productive convenience built into authoring tools that unleash visual languages and cultural logics that exceed any human intention, whether at the level of the individual or the group of experts.

Common to the technological determinist arguments is the notion that technology mediates our perception of and interaction with the world; as a result, it *constitutes* the meaning and significance of our actions. The act of creativity is understood as the capitalization of how media technologies alter sense ratios and the scale of human understanding; that is, creativity entails the act of discovering and extending the hidden logic of technological media forms.

Towards a Notion of Digital Creativity

This snapshot of three traditions of creativity obviously skims over the nuance of the traditions. Not all of HCI, for example, aligns itself with scientific rationalism. But the broad brush strokes should at least suffice to demonstrate three very different, yet mainstream in their respective domains, theorizations of creativity. I began this discussion by asking whether there was any creativity shared by all three of these traditions, or if instead we are left with three creativities,

each of which manifesting itself as a domain-centric construct whose purpose is to mark certain artifacts as having introduced a discursively acceptable un-thought into that domain.

To answer this question, it is useful to consider what the three traditions share in common. All consider creativity in the context of professionalism and *knowledge production*. Creativity is not simply about painting a pretty new picture or expressing a personal emotion; it contributes to discourses about the world and our place in it. All three traditions also understand creativity as situated within *systems*—networks of software-supported experts, discursive sign systems, or systems of production and consumption. All of these implicitly reject romantic notions of the individual creative genius and pure self-expression; implied in this is a rejection or at least dilution of individual intention as the prime mover of creativity.

Clearly, in spite of their differences, the three conceptualizations have commonalties. One approach to improving our understanding of the theories is to put them into a dialogue with a domain of creative practice. I suggest that amateur multimedia might be particularly instructive in this regard because it is a large-scale phenomenon, fueled by recent advances in end-user software, with an incredible variety of readily available artifacts. Further, the very amateurism of the artifacts is likely to reveal the influences of authoring software interfaces, methods, and constitutive contributions toward a visual language or cultural logic, especially when compared to professional multimedia, in which the creative agency of the professional designer is more likely to resist or at least obfuscate the agency of the software.

Questions one might ask include the following: What are the social and technical conditions or structures necessary for the generation of these artifacts? What is the discourse of amateur multimedia? What is the minimal unit of meaning? In what ways does its production establish relationships between authors, viewers, technologies, meaning, and ideology?

CREATIVITY, ACCORDING TO AUTHORING SOFTWARE

A key first step is to understand how creativity is implemented in multimedia authoring software. Each program has ways it encourages authors to work. For example, Photoshop greatly rewards users who take advantage of layers, opening up avenues of possibility for compositing, nondestructive experimentation, and long-term editability. This in turn makes certain meanings (especially meanings created by the juxtapositions of spatial compositing) more easily realized than others. To what extent do contemporary authoring platforms encourage in the same ways (constituting and compelling a notion of digital creativity), or do different applications suggest different notions of digital creativity?

The second step is to study works of amateur multimedia looking for artifacts of the authoring tool's projection of creativity. Case studies at the end of this paper explore these relationships, but let us first explore what creativity means according to multimedia authoring software.

Methodology: Paradigmatic/Syntagmatic Analysis of Multimedia Authoring Platforms

To discover the notion(s) of creativity projected by authoring software, I sought a common descriptive language with which I could analyze the different platforms. Continuing prior

work in this area (Bardzell & Bardzell, 2005), I used a pair of related concepts from semiotics: paradigms and syntagms. First developed by Barthes (1967/1990) using concepts derived from Saussure (1915/1966), this concept has been deployed in film theory (e.g., Metz, 1971/1974) and in new media theory (Manovich, 2001) to identify ways that elements of sign systems are used together to create meaning that goes beyond the aggregated meaning of the individual elements. Typically, these concepts have been deployed to study cultural artifacts in the traditional sense (films, texts, video games), but I used them to study multimedia authoring platforms (which are, after all, cultural artifacts).

A *syntagm* is a "grammatical" sequence of signs. "Sally kicks the ball" is a valid syntagm in English, but "ball the kicks Sally" is not. Syntagmatic connotation in film theory refers to ways that meaning originates from certain sequences of shots, for instance, in parallel editing, which goes beyond the aggregation of the denotative meanings of each of the shots. A *paradigm* is a replaceable unit, which is to say a class of unit, within a syntagm. Thus, we can change "Sally kicks the ball" to "Roger kicks the ball" or "Sally composes a poem" simply by making paradigmatic changes (replacing the subject noun with a different subject noun, etc.).

To study the use of multimedia authoring interfaces, I applied these concepts to explore the legal *sequences* of actions designers could follow, and to explore the *paradigmatic classes* of options within those sequences. I used this approach to study several common multimedia authoring tools, making a conscious effort to represent different kinds of multimedia art:

- Adobe Flash: a 2D animation program often used for Web ads, cartoons, and simple applications;
- Electric Rain Swift 3D: a simple and inexpensive 3D modeling program;
- Adobe Fireworks: an image editing application commonly used for Web graphics;
- Apple GarageBand: a music composition application, which relies largely on a library of pre-made loops, often used in podcasts;
- Apple iMovie: a consumer-level video editing application, renowned for its ease of use, but which lacks a deep feature set;
- Activision's Advanced Movie Maker: a simple machinima production and post-production application, which comes bundled with the video game, *The Movies*;
- Linden Labs' Second Life: a participant created massively-multiplayer online game/social space, which has its own simple 3D modeling environment, scripting language, and import capabilities; used to create 3D "builds" such as clubs, cities, and homes.

Obviously, I focused on tools used by amateurs. While Final Cut Pro is far more sophisticated than iMovie, I see little evidence that Final Cut Pro is regularly used by amateurs on, say, YouTube, while evidence abounds[11] for the use of iMovie and Windows Movie Maker. In each platform, I authored the kinds of artifacts I found in amateur communities, recording the sequences of actions I took as I did so.

Results: Syntagms of Multimedia Authoring

The similarities among these programs were striking, regardless of the genre they were intended to produce (music, animations, digital photographs) and the overall sophistication of

the program (e.g., Flash is much deeper than iMovie). Manovich (2006), too, finds structural similarities across a diverse range of authoring platforms, especially in their particular use of layers and compositing and, more abstractly, space and time. He explains these similarities genealogically, demonstrating how they derive from prior traditions of media production (film, multitrack audio recording, graphic design, etc.). Manovich stops short of spelling out these similarities as a *system*, though he clearly sees many of the particular elements as related.

In this section, I provide a sample syntagmatic analysis, which I explicate using Flash and other programs as running examples. I also sketch out the system of syntagms common to multimedia authoring programs to provide a more general view of multimedia authoring applications.

A Sample Syntagm: Preparing Static Art Elements

In the following discussion, I understand a syntagm to be a more or less stable sequence of actions required to accomplish a particular design task. As a running example, we will explore the syntagm of preparing a simple art element, a common process in all of the multimedia authoring applications I studied. In these applications, this syntagm comprises the following sequence (and assumes a document has already been created):

1. Identify a location in space and time in which to work;
2. Create the element;
3. Specify the element's relationship to the remainder of the composition.

A paradigm is the set of possible actions that constitute one step in that task. Thus, in the syntagm of preparing art elements in the music composition application GarageBand, the first paradigm—location of space and time in which art creation takes place—includes as options a layer of the main timeline, the loop browser, or the Real Instrument audio import interface. Flash, an animation program, also has the location in space/time paradigm, though its particular options differ: One may situate artistic creation in a blank portion of the canvas, in a new layer, in a new symbol, in the Import dialog, and so on. Likewise, in iMovie, users may create new content in various locations: video import in the monitor in camera mode, image/audio import in the Media section of the library, setting in and out points in the clip library, compositing titles and video using the timeline and the Titles tab of the Editing section of the library, and so on.

We can also see various paradigmatic options for the second step of the syntagm for preparing a simple art element: creating the element. In GarageBand, users can record themselves singing or playing acoustic or digital instruments (e.g., MIDI keyboards and guitars) or they can choose loops from GarageBand's extensible loop library. In Flash users can draw a new element with one or more of Flash's drawing tools, such as the Line or Pen tools; they can create a visual element from simple units, such as ovals, rectangles, and stars; and they can create instances of complex, ready-made elements, such as the data-driven Accordion component. In iMovie, users can create new content by importing video, images, and audio they already have; they can design titles, transitions, and special effects; and they can even prepare their videos for burning to a standard DVD, complete with chapters and menus.

Stated more abstractly, we can see patterns emerge among the paradigmatic options. Art is created at different levels of elemental complexity. For example, users can create art *from*

scratch (that is, starting from a blank canvas, without any predeveloped content) in this second step of the syntagm: plotting out vectors with the Pen tool in Flash or Fireworks, plotting points and creating a 3D object out of them with the Lathe tool in Swift 3D, recording a guitar riff into GarageBand, or recording digital video and importing it into iMovie. But users can also take advantage of computer automation when creating art. They can create art *from primitives*, which are more complex basic elements than vector points or individual piano notes. These include 8-beat drum beat loops in GarageBand; seven-sided stars created with the Polystar tool in Flash; cubes, cylinders, and cones, available in Swift 3D and Second Life; or titles and optical effects (such as transitions) created with the Titles tab of the Editing section of the library in iMovie (Figure 1). Most programs can import external files, which are effectively used as primitives. An even more advanced use of computer automation in the creation of art includes the creation of art *from components*, which are visual elements of significant complexity, the details of which are often presented as a "black box" to their users. Examples include Flash components, such as the data-driven Accordion component or the Media Playback component; standards-compliant 3D models, such as chairs, hammers and race cars, available to many 3D programs, including Swift 3D; 3D humanoid avatars, which Linden Labs (makers of Second Life) distributes to Poser animators, who want to design their own animations for use in Second Life; and fully themed filming sets, such as the Old West Saloon, used in Activision's Advanced Movie Maker for *The Movies*.

For brevity, we need not explore in depth the third step of the simple art creation syntagm, which involves specifying its relationship to the remainder of the composition. Suffice it to say that timelines (for specifying temporal relations) and canvases (for specifying spatial relations in 2D space) and virtual cameras or viewports (for seeing and positioning objects in 3D space) are nearly universal interfaces for handling this step. Object nesting (building complex objects out of grouped simple objects) is another way of specifying relations. The organizational mechanisms may have different names—other names for the canvas include artboard, page, stage, slide, and monitor—but they are experienced and used in deeply similar ways (e.g., zooming, panning, etc.).

Figure 1. Transitions between shots, such as Radial shown here, are selected from lists and added as primitives in iMovie.

Identifying syntagms in a software application resembles task analysis, a practice common in HCI, with a few key differences. First, the sequence of behaviors is studied from the point of view of the interface, rather than the intentionality of the user; syntagmatic analysis is not, at least at the most superficial level, human-centered. Another difference is that the use of semiotic vocabulary facilitates the standardization of the resulting descriptions, such that they are more easily compared with those of other applications. Finally, the semiotic vocabulary shifts the focus from the accomplishment of a discrete task with the software as an instrument of human will toward a notion that *meaning* emerges from the interaction between the sign system in the abstract (what Saussure, 1915/1966, calls *langue*) and its actual, everyday use in practical contexts (*parole*). The semiotic lens provides a tool to reconfigure and reinterpret a technique from HCI (Andersen, 2001).

How do the three paradigmatic options for art element creation (i.e., from scratch, from primitives, and from components) yield *meaning* when placed into practice? Each of them implies different interfaces and user behaviors, which in turn shapes the nature of the art created, and hence its meanings. Creating art elements from scratch often involves specialized tools (Pen, Pencil, Brush) and even hardware (MIDI keyboards, Wacom graphics tablets, MiniDV video cameras). They often assume traditional artistic ability, the ability to create art competently with one's hands. Using primitives, in contrast, is automated within the software interface, commonly involving simple customization tools, such as position, scale, skew, and distort, and dialog boxes (number of points on star, text and background color for video title, file location for imported bitmap file). The creating from primitive paradigmatic option works best when the user has a sculptor-like ability to perceive relations between simple elements and complex final forms, along with the ability to work from the former to the latter. Creating elements with components usually involve relatively technical configuration interfaces—wizards, palettes, inspectors (windows that reveal the properties of art objects, such as positioning, color, and duration)—to enable authors to use them in flexible ways; for example, the Tree component in Flash simplifies and automates creating interactive tree widgets, such as navigation systems, in the Flash Player—if the user can understand its inspector (Figure 2).

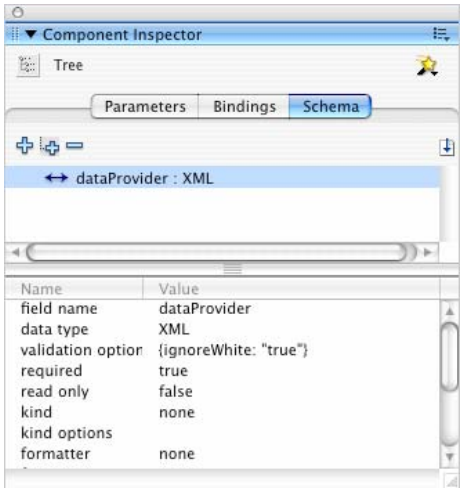

Figure 2. Flash components automate the creation of programmatic interactions, but still require technical skills.

Clearly, the three paradigmatic options can be seen as more or less appropriate for the creation of certain kinds of art. For example, a Flash artist seeking a painterly look should make heavy use of the drawing tools (though doing so may have adverse implications for animation later on). But the theoretical ability to rationally match interface paradigms to artistic outputs aside, we need to recognize that each implies its own skill sets—and this is especially crucial for amateur multimedia. How many amateur Flash artists are both accomplished at draftsmanship and also able to programmatically bind live XML data to a tree component? Not many. And that means that individual amateur Flash works tend to privilege one art creation paradigm option over others, not because users rationally match their paradigmatic choices to the materiality of their art and their message, but rather because users choose the tools with which they are the most competent.

Summary Sketch of Multimedia Authoring Paradigm Categories

The preceding section offered a close look at a single paradigm (art element creation) within a single syntagm (art element preparation), more or less common to all of the platforms studied. In this section, I sketch what I regard as the primary syntagms of multimedia authoring, by identifying some of the common paradigms that can be found in many, if not all, of the platforms (Figure 3).

I begin with a distinction: Many of the syntagms involve the creation, ordering, and customization of art elements at a material level; the rest of the syntagms are in a sense external to the art elements themselves, having more to do with the authoring or playback environments (e.g., view, export).

Syntagms pertaining to the materiality of the art itself reflect the hierarchical and object-oriented nature of modern computing. That is, some of the syntagms are specific to lower-level elements (e.g., the individual lines that make up a drawing, primitives that make up a model, individual shots of video, and individual loops within tracks of audio); some of the syntagms are specific to higher-order elements (vector-drawn faces or animation scenes, full 3D models, complete video sequences, major sections of music compositions).

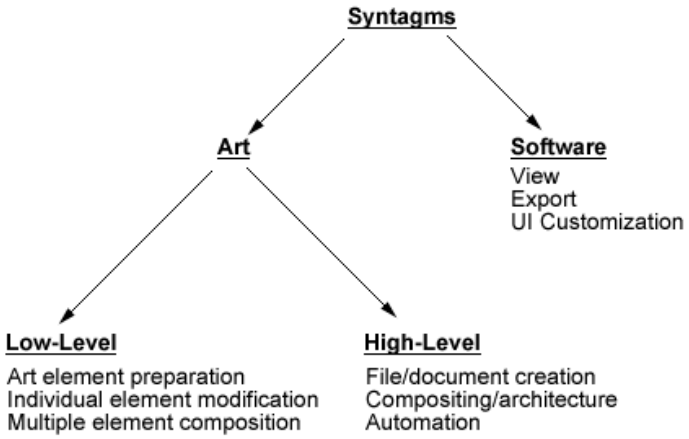

Figure 3. A sketch of syntagms common to most multimedia authoring platforms.

Syntagms of art manipulation at the lower level include the following: *art element preparation*, discussed earlier; *individual element modification*, which includes filters, effects, color palettes, sound envelopes, textures, animation presets, size, scale, position, distortion, lighting, audio extraction, among others; and *multiple element composition*, which includes operations such as flatten, union, blend modes, opacity, layers/arrange, masks, grouping, text on a path, motion guides, lighting, and video optical effects.

Syntagms of art manipulation at the higher level include *file/document creation*, including resolution and aspect ratio, margins, tempo and key, frame rate, color mode, and so on; *compositing/architecture*, such as external media import, including libraries, timeline blocks (e.g., scenes), project managers, and object hierarchy management; and *automation*, such as batch processing, global find and replace, Magic Movie (an iMovie feature that automates the entire moviemaking process, from importing raw footage, inserting transitions, and outputting to a DVD), distribute-to-layers/frames, symbol (class) manipulations that affect all instances (objects), and recording and saving macros.

Syntagms not pertaining to the materiality of the art, but rather to the authoring platforms themselves include the following: *view*, including zooming, panning, perspective, custom cameras, units of measurement, scrolling, VCR controls, onion skinning (which allows a view of multiple frames of an animation), and layer toggles (such as lock, visible); *export*, file optimization, codecs and compression, resolution, file type, and so forth; and *interface customization*, which includes custom toolbar/palette layouts, saving one's own primitives and components into the interface for later use, and even scripting custom interface commands/features via built-in application programming interfaces (APIs), the custom scripting environments that enable advanced users to configure and extend interfaces and commands to suit their needs or automate certain tasks.

Each of these syntagms contributes to the construction of art and meaning. For example, initial choices when creating a new document do not merely set the document edges; they establish the relationships among the elements within the composition and even with the audience; for instance, setting a 16:9 aspect ratio makes even a still-blank composition more cinematic than a 4:3 aspect ratio.

The Reconfiguration of Art as Data

Of deeper significance is that, with superficial variations, all of the applications investigated had just about all of the syntagms listed above, and few or no syntagms not listed. The implication is that all of these applications, then, have a similar language of creative expression and correspondingly project a similar notion of creativity. Indeed, the object-oriented nature of modern computing is the prime mover, as it underpins the nature and structure of artistic data (conceptualizing art as composed of data is the critical step here). Here I am echoing Manovich's (2001) first principle of new media, which is its "numerical representation," and specifically how it grounds the possibility of algorithmic manipulation of art in the first place. That the materiality of art is now data gives rise to the possibility of algorithmic manipulations of that data, and these possibilities for algorithmic manipulation make possible tasks and interfaces. Given that all forms of digital art have the same basic material (data), it is therefore not surprising that for all their apparent diversity, multimedia authoring applications are so fundamentally similar.

This particular view contrasts with the more traditional notion that interfaces are built out of metaphors and practices derived from traditional analogues to design so, for example, the notion of layers in many software applications replicates the acetate layers once used in page layout. Obviously, software interfaces *do* make use of traditional design techniques, but it is also evident, especially if one considers the evolution of a given program over time, that software applications tend to move away from their design origins and toward the logic of computing. For example, whereas Photoshop 1 in many ways was a digital darkroom, Photoshop CS2 (which corresponds to version 9) is loaded with automation features (such as batch processing and "magic" pixel selection tools), application interoperability (e.g., Adobe Bridge, the File Browser, import/export features), nondestructive editing, vector drawing, 3D perspective grids, and other characteristics quite alien to the darkroom. That most of these latter features are common to many types of authoring application suggests that the underlying data of digital art is the grounds for a profound convergence of artistic production, organization, and storage across media forms—photography, animation, film, page layout, illustration, and 3D modeling—hitherto quite separate.

CHARACTERISTICS OF DIGITAL CREATIVITY

Several characteristics emerge that define creativity as it is practiced in multimedia authoring applications. These can be derived inferentially from the semiotic analyses of the authoring platforms themselves and seen empirically in artifacts from amateur communities. In this section, I present several principles of digital creativity that have been derived from this double-process.

HCI and Creativity: The Usable is the Message

Among its accomplishments, HCI has demonstrated that usability is strongly correlated to success. In amateur multimedia, this would suggest that the easier or more visible a feature or tool is in the interface, the more likely it is to be used. One simple example illustrates this point: Flash has a robust toolset for the design of gradient fills. A gradient is a color blend that transitions subtly from one color to another, and are often used to fill in the outlines of simple shapes. Gradients are also used to fill circles to produce the illusion of 3D, where a bright color near the center of the circle corresponds to the location of the light source striking the ball, and then the color gradually becoming darker as it moves away from this spot, simulating shadows. The issue is that many amateurs do not know what gradients are, much less how to mix them. Yet a small selection of gradient presets is built into the Color Mixer palette, a default collection of color presets readily available in the interface. On Newgrounds, one sees these particular gradients unusually often, in their default colors, even though the user is only two clicks away from choosing a new color.

A more significant example is the lack of layers in consumer video editing applications, such as Apple iMovie and Windows Movie Maker. Layers are used in many multimedia applications, from image editors to animation and high-end video editing. Layers enable spatial compositing, such that one element against an otherwise transparent background can be placed on top of another. That iMovie lacks layers means that it is impossible to have

more than one image track. Certainly, multiple image tracks are common enough in other applications, and we are accustomed to seeing spatial compositing in much of our media today, from news tickers and channel overlays to digital effects in Hollywood films. Conceptually, everyone making amateur multimedia has mastered this concept, and in Flash communities, its use is rampant. But at YouTube, a site with hundreds of thousands, if not millions, of amateur videos, spatial compositing is uncommon (not counting posts of professionally produced video, such as segments from *The Daily Show*[12].

Though spatial compositing is uncommon in iMovie and Windows Movie Maker, temporal compositing is the norm. iMovie has a timeline, which makes it easy to manage art assets—discretely defined video shots, titles, and transitions—temporally. More difficult is temporal compositing involving separate audio and video tracks, such as sequences with a master shot and some cutaways with a continuous audio source. Predictably, amateur YouTube videos comprise sequences of shots in which the audio and video are locked together, sprinkled with occasional transitions and titles. They also frequently display jump cuts (which occur when two similar shots are cut together, creating a jarring jump in the video) considered bad form in serious film editing. The most evident reason for jump cuts is that amateur YouTube videos are usually made with a single camera and operator (usually the same person as the actor/director), making multiple camera angles, and therefore the kinds of cuts useful in preventing jump cuts, prohibitive. This is consistent with the phenomenon that amateur YouTube videos tend to be personal, confessional, and intimate. They are not cinematic and often not even narrative. YouTube, along with Grouper[13] and podcasting, is the locus of the birth of a major new nonnarrative genre of film, perhaps the first since the documentary.

An interesting genre commonly seen at YouTube and Grouper is the *mashup*, a predominantly audio form that remixes two or more songs together. That these audio remixes are posted at YouTube and Grouper—both video sites—means that the mashups need to be presented as videos, that is, with image tracks. In many cases, the "videos" feature a single title screen that statically accompanies the song for the full 3 to 4 minutes of its duration. Others, such as "Mashup History"[14], enhance this by creating a simple slide show with few than a dozen slides that show as the song plays. Creating content from scratch in iMovie or Windows Movie Maker takes too much effort; mashup artists resort to primitives (in the form of built-in titles) to fill in the gaps.

Poststructuralism and Creativity: Found Art Drives Meaning

A staple of graphic design for decades has been the use of stock art—high quality photos and illustrations that designers could purchase and use in their newsletters, magazine ads, and billboards. Digital media, by virtue of its object-orientation, is portable. Today, Google Images already functions as Everyman's version of professional stock art services, such as PhotoDisc or Getty Images. More radically, many applications are able to insert a number of different types of media in their "documents." In the mid-1990s, when I first saw video in a PDF document, I was amazed; today, I expect music, video, photographs, and interactive menus and data visualizations during my browsing.

The logic of multimedia encapsulation can go in two directions: quantity and quality. By quantity, I refer to, for example, Flash movies that composite video, photos, text, music, and

so on into single aesthetic works. By quality, I refer to the ability of an encapsulated medium to contribute to the elaboration of new aesthetics in the parent medium. An example of this is machinima, whose emergence is founded on an as-yet unresolved clash of cinematic and video game logics, and they tend to fall into what I call "cinematic" versus "ludic" categories of machinima.

Cinematic machinima features narratives shot in the world of a particular video game. Many of these films continue with the aesthetic of the game. Thus, Halo machinima makers use Halo's sci-fi environs and guns to make futuristic action adventures; makers of machinima from Activision's The Movies, which parodies B-movie genre films, often make melodramas. Many cinematic machinima films use the logic of cinema to expose and parody the absurdity of games, such as *Red Vs. Blue*, a sit-com shot inside of a Halo multiplayer map, in which its characters often try to understand game conventions (such as unmotivated combat) in literal-minded, real-world ways.

Ludic machinima feature the logic of video games, which includes game rules, physics, and, above all, play (Aarseth, 2004). Machinima featuring play with game physics abound on the Web, including videos of people blowing their avatars' bodies to improbable heights[15], clearly not a part of primary game play but rather for sport. In this type of film, the found art is the physics engine of the video game, and it is used in the same kinds of surprising ways that, for example, a photo of Michael Jackson is used in a Flash video; that is, the use of the video game physics engine, like a photo of a celebrity, is used in ludic machinima to create commentary through its juxtaposition with other media.

Technological Determinism and Creativity: Creativity as Primitive Art Management

In multimedia software, the smallest meaningful unit is the art element, which may be a vector line, a sound loop, a video shot, optical effect, a primitive (such as a cube or text box), a layer of a bitmap image, and so forth. Digital creativity involves the composition of such elements in a process in which these elements are created discretely separate from one another but, more importantly, remain discretely separated, no matter how organic the final composition appears. Such a process involves *management* as one of its core skills, and all of the authoring environments contained interfaces—sometimes centralized and sophisticated interfaces—to support management. These interfaces include timelines, layers, and libraries. In some regards, the management of assets as parts of a whole is more important than the individual assets themselves, because it is possible to create a sophisticated message quickly with low production costs (and, of course, low production quality).

This logic of management in multimedia interfaces is greatly facilitated by another seemingly unrelated feature: primitives. While hand-drawing is possible in Flash, it is also laborious. So are custom modeling in 3D, MIDI keyboard- or guitar-playing for GarageBand, and cinematic shooting, pacing, and editing in iMovie. It is often far simpler to obtain an approximation of a compelling design with primitives, which, as long as they are juxtaposed with other primitives, bear meaning capably if not beautifully. The result is meta-commentary and humor, in the sense that Johnson (1997) describes, when he argues that increasingly media is becoming an interface to other media; for example, comedy shows such as *The Daily Show with Jon Stewart* provide a comedic interface through which to watch the news;

likewise, the animated comedy *South Park*[16] offers an interface through which to experience and make sense of popular culture.

One popular genre that demonstrates the use of primitives and management as an approach to "quick and dirty" satirical content is the Flash subgenre of animutation. This genre was created by then-13-year-old Neil Cicierega at an amateur Flash portal called Albino Black Sheep[17]. His original video, "The Japanese Pokerap,"[18] was widely imitated in amateur Flash communities. In addition to imported bitmap graphics and music (in this case, from Pokemon), animutations make significant use of layering, interpolated animation ("tweens"), simple drawing, shape primitives, and mouth cutouts, as can be seen in "Hyakugojyuuichi"[19]. It is hard to imagine the emergence of the animutation—especially in the hands of a 13-year-old—if Flash were not strong at making available visual building blocks quickly and easily or managing them in space and time.

Interestingly, other amateur Flash communities feature Flash movies and games with a distinctly different look. For example, the use of bitmaps, which is dominant at Albino Black Sheep, is comparatively sparse at Newgrounds. Newgrounds features much more vector art, and its music taste tends toward heavy metal, as opposed to Pokemon. Nonetheless, Newgrounds Flash, for all its superficial differences, is produced in more or less the same ways as Albino Black Sheep animation, and it carries many of the same meanings. Specifically, Newgrounds animations often feature complex yet silly juxtapositions of popular media icons, from pop stars to video game heroes, in videos made with conspicuously low production values that rely heavily on primitives carefully managed in space and time. The well-drawn, emotionally serious animation at Newgrounds is the exception, not the rule.

AMATEUR MULTIMEDIA DISCOURSES

Earlier in the paper, I summarized three traditions of theorizing about creativity—HCI, poststructuralism, and technological determinism in media. One of their commonalties was their shared focus on discourse, as opposed to self-expression or the sharing of emotional pleasure. If amateur multimedia is to be considered creative, it must have a discourse. If so, what is the discourse of amateur multimedia?

Clearly, one of its discourses is innovation in the rebalancing of production quality and expense on the one hand and meaning-making on the other. Many professional media producers do not have the luxury to make work with low production quality, because it looks unprofessional. Amateurs have demonstrated in staggeringly diverse ways that low-production quality work can nonetheless bear culturally important meanings, from Numa Numa to All Your Base Are Belong To Us[20], a hugely popular video that inserted a poorly translated English line from a video game dialogue into culturally important images, including street signs, product ads and packaging, Microsoft Windows error messages, political images, driver's licenses, and so on. The core strategy of this phenomenon is the remix, and this aesthetic is encouraged by the technical ways that multimedia software uses art.

A related phenomenon is the development of a certain kind of humor. It is the humor of juxtaposition, parody, and commentary. It deflates the icons of the mass media and subjects them to puerile fun. This discourse has become so powerful that it is making its way into the

mass media. An example of this is the strange story of "Star Wars Kid,"[21] a portly high school student who videotaped himself swinging a stick around at imaginary enemies. His friends posted the tape on the Internet, where it quickly became a meme. Hundreds of others remixed the video, using video compositing to place all sorts of cultural references on the same stage as the fighting student. In the late summer of 2006, Comedy Central's Stephen Colbert[22] fused mass and amateur media, when he shot a segment of himself swinging a stick around, in a clear reference to Star Wars Kid. But Colbert went a step further by shooting the segment in front of a green screen, knowing full well that amateurs would key out the green screen and juxtapose his fighting video with other videos, such as "Stephen Colbert Vs. Rancor."[23] Colbert's use of intertextuality is particularly interesting, because rather than limiting himself to quoting earlier texts (however transgressively), his use of the green screen ensured that he would be quoted in future texts. That is, Colbert tried—and succeeded—to replace Star Wars Kid with himself; YouTube now features dozens of Colbert's "green screen challenge," and he regularly plays them on his show, *The Colbert Report*.

Another way we can see the discourse of amateur multimedia is to see amateur theorizing on amateur multimedia. This can be seen in the meta-amateur multimedia videos one can find on the Internet. These videos promise to show how to create amateur multimedia. Some of them are done with humor—amateur multimedia becomes a part of its own joke. Some are done seriously, with the apparent hope of teaching newcomers how to produce their own media. An example of this phenomenon is Keaton's "Making an Internet Cartoon Tutorial,"[24] available at Albino Black Sheep. This tutorial offers eight prescriptive and self-mocking steps on how to make an animutation, before offering a mock-paradigmatic example of an Internet cartoon (Figure 4).

The logic of computing has altered the ways professionals produce new media, a trend Manovich (2001) has explored already. But it has also altered the ways amateurs produce new media. As the Colbert example (and others, such as the release of a revision of the Newgrounds game *Alien Hominid*[25] on the Xbox, Playstation 2, and GameCube; a new sequel, *Alien Hominid HD,* has also been announced for the Xbox 360) shows, amateur multimedia has entered the mass media mainstream after years of merely causing our e-mail

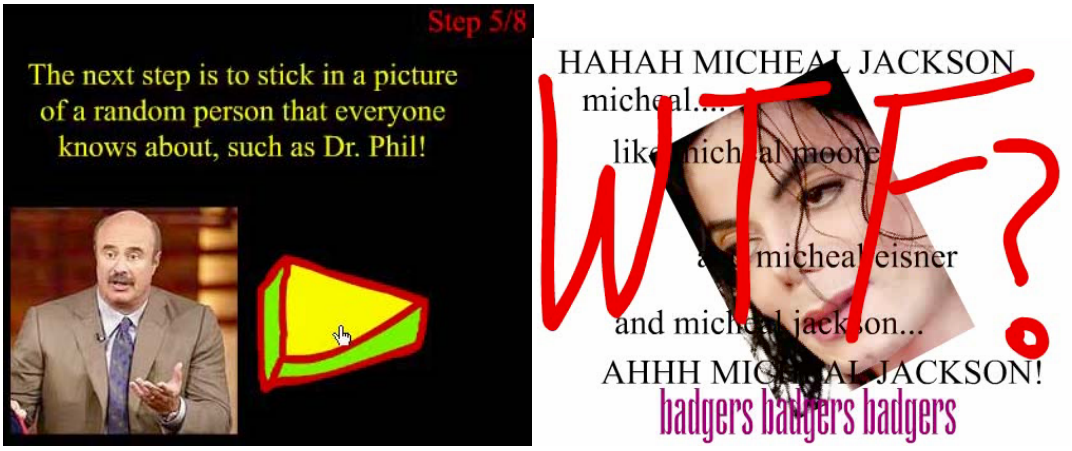

Figure 4. Two frames from Keaton's "Making an Internet Cartoon Tutorial," an amateur discourse on amateur multimedia. Used with permission.

inboxes to be filled with "you've got to see this" messages. I have tried to show here that the multimedia authoring tools themselves are built on a shared, implicit language of creativity. This language certainly reconditions the professional artists who use them, but it probably affects amateurs even more. As a result, the interfaces of a handful of software applications have come to make possible and also shape a massive cultural phenomenon.

ENDNOTES

1. For more information on Newgrounds, see http://www.newgrounds.com/
2. For more information on YouTube, see www.youtube.com/
3. For more information on machinima.com, see www.machinima.com/
4. For more information on Second Life, see http://secondlife.com/
5. The Numa Numa Dance, retrieved December, 22, 2006 from http://www.newgrounds.com/portal/view/206373
6. For more information on Doom, see http://www.idsoftware.com/games/doom/doom-ultimate/
7. For more information on Quake, see http://www.idsoftware.com/games/quake/quake/
8. For more information on Sims2, see http://thesims2.ea.com/
9. To see the first episode of *Red Vs. Blue*, http://www.machinima.com/films.php?id=275
10. Indeed, Manovich singles out Bolter and Grusin's (1999) notion of remediation as failing to account for the new visual language caused by changes in authoring tools.
11. Many YouTube videos have credits that specify the software used. In addition, built-in titles and transitions are often used with their default settings, making them identifiable to the observer.
12. For more information on *The Daily Show*, see http://www.comedycentral.com/shows/the_daily_show
13. For more information on Grouper, see http://www.grouper.com/
14. Retrieved December, 22, 2006, from http://www.youtube.com/watch?v=iJ9zn0Bxoa0
15. Retrieved December 22, 2006, from http://www.machinima.com/films.php?id=204
16. For more information on *South Park*, see http://www.southparkstudios.com/
17. For more information on Albino Black Sheep, see http://albinoblacksheep.com/
18. Retrieved December 22, 2006, from http://www.albinoblacksheep.com/flash/pokerap.php
19. Retrieved December 22, 2006, from http://www.albinoblacksheep.com/flash/pika.php
20. Go to http://allyourbase.planettribes.gamespy.com/video1_view.shtml to see the All Your Base Are Belong to Us video.
21. Go to http://www.ebaumsworld.com/starwarskid.html to see the original Star Wars Kid video.
22. Comedy Central, an American cable television network, can be found at http://www.comedycentral.com/. Its site for Stephen Colbert can be found at http://www.comedycentral.com/shows/the_colbert_report/index.jhtml
23. See, for example, http://www.youtube.com/watch?v=C8Mkm3QtwgE, retrieved December 22, 2006.
24. Retrieved December 22, 2006, from http://www.albinoblacksheep.com/flash/internet.php
25. The original Alien Hominid game can be seen at http://www.newgrounds.com/portal/view/59593. The official site for the console game can be found at http://www.alienhominid.com

REFERENCES

Aarseth, E. (2004). Genre trouble: Narrativism and the art of simulation response; New media as story, performance, and game. In N. Wardrip-Fruin & P. Harrigan (Eds.), *First Person: New Media as Story, Performance, and Game* (pp. 45–55). Cambridge, MA, USA: MIT Press.

Andersen, P. B. (2001). What semiotics can and cannot do for HCI. *Knowledge-Based Systems*, *14*, 419–424.

Annett, J., & Duncan, K. D. (1967). Task analysis and training design. *Occupational Psychology*, *41*, 211–221.

Bardzell J., & Bardzell, S. (2005). Fostering creativity in learning media: Applying insights learned from creative design software. In P. Krommers & G. Rocjards (Eds). *Proceedings of World Conference on Educational Multimedia, Hypermedia, and Telecommunications 2005* (pp. 907–915). Chesapeake, VA, USA: AACE [Association for the Advancement of Computing in Education].

Barthes, R. (1990). *The fashion system* (M. Ward & R. Howard, Trans.). Berkeley, USA: University of California Press. (Original work published in 1967)

Benjamin, W. (1968). The work of art in the age of mechanical reproduction (H. Zohn, Trans.). In H. Arendt (Ed.), *Walter Benjamin: Essays and reflections* (pp. 217–252). New York: Schocken Books. (Original work published in 1936)

Beyer, H., & Holztblatt, K. (1998). *Contextual design: Defining customer-centered systems*. San Francisco: Morgan Kaufmann.

Bolter, J. D., & Grusin, R. (1999). *Remediation: Understanding new media*. Cambridge, MA, USA: MIT Press.

Crawford, C. (2003). *The art of interactive design: A euphonious and illuminating guide to building successful software*. San Francisco: No Starch Press.

Ellul, J. (2003). On the aims of a philosophy of technology. In R. C. Scharff & V. Dusek (Eds.), *Philosophy of technology: The technological condition* (pp. 182–186). Maldon, MA, USA: Blackwell Publishing. (Original work published in 1964)

Ellul, J. (2003). The "Autonomy" of the technological phenomenon. R. C. Scharff & V. Dusek (Eds.), *Philosophy of technology: The technological condition* (pp. 386–397). Maldon, MA, USA: Blackwell Publishing. (Original work published in 1980)

Farooq, U., Carroll, J., & Ganoe, C. (2005). Supporting creativity in distributed scientific communities. *Proceedings of the 2005 International SIGGROUP Conference on Supporting Group Work* (pp. 217–226). New York: ACM Press.

Foucault, M. (2000). What is an author? (J. V. Harari, Trans.). In J. D. Faubion (Ed.), *Michel Foucault: Aesthetics*; *Essential Works of Foucault 1954–1984* (Vol. 2; pp. 205–222). London: Penguin. (Original work published in 1969)

Greene, S. L. (2002). Characteristics of applications that support creativity. *Communications of the ACM*, *45*(10), 100–104.

Johnson, S. (1997). *Interface culture: How new technology transforms the way we create and communicate*. San Francisco: HarperCollins Publishing.

Kuniavsky, M. (2003). *Observing the user experience: A practitioner's guide to user research*. San Francisco: Morgan Kaufmann.

Manovich, L. (2001). *The language of new media*. Cambridge, MA, USA: MIT Press.

Manovich, L. (2006). After Effects, or Velvet Revolution in modern culture, Part 1. Unpublished manuscript, retrieved September 9, 2006, from http://www.manovich.net/

McAfee, N. (2004). *Julia Kristeva*. New York: Routledge.

McLuhan, M. (2003). *Understanding media: The extensions of man; Critical edition* [Monograph], W. T. Gordon (Ed.). Corte Madera, CA, USA: Ginko Press. (Original work published in 1964)

Metz, C. (1974). *Film language: A semiotics of the cinema* (M. Taylor, Trans.). Oxford UK: Oxford University Press. (Original work published in 1971)

Orr, M. (2003). *Intertextuality: Debates and contexts*. Malden, MA, USA: Polity Press.

Paolillo, J., & Bardzell, J. (2005, June). *Humor, multimedia and the Internet: The "Numa Numa" phenomenon.* Paper presented at the International Society of Humor Studies Conference, Youngstown, OH, USA.

Rheingold, H. (2001). An interview with Don Norman. In B. Laurel (Ed.), *The art of human-computer interface design* (pp. 5–10). Boston: Addison-Wesley.

Salen, K., & Zimmerman, E. (2004). *Rules of play: Game design fundamentals*. Cambridge, MA, USA: MIT Press.

Saussure, F. (1966). *Course in general linguistics*. C. Bally, A. Sechehaye, & A. Riedlinger (Eds.; W. Baskin, trans.). New York: McGraw Hill. (Original work published in 1915)

Schneiderman, B. (1998). *Designing the user interface: Strategies for effective human-computer interaction* (3rd ed.). Boston: Addison-Wesley.

Schneiderman, B. (2002). Creating creativity: User interfaces for supporting innovation. In J. M. Carroll (Ed.), *Human-computer interaction in the new millennium* (pp. 235–258). Boston: Addison-Wesley.

Schneiderman, B. (2003). *Leonardo's laptop: Human needs and the new computing technologies*. Cambridge, MA, USA: MIT Press.

Sontag, S. (2001). *Against interpretation and other essays*. New York: Picador. (Original work published in 1981)

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