“One code to rule them all . . .”

SUZANNE DE CASTELL

One code to rule them all,
One code to find them,
One code to bring them all,
And in convergence bind them.
(with apologies to J.R.R. Tolkien)

This essay is about the doing of interdisciplinary work, and it simply offers some illustrations, some discussion, and a few implications drawn from one particular approach to the “doing” of that work. I have no doubts that the age of grand, all-encompassing theories is long over; however, what I will argue here, and this by no means original, is that the unprecedented possibilities for representing knowledge of any and all kinds by means of the “one [digital] code” afford us ways of doing interdisciplinary work that promise to bridge qualitative and quantitative methods, human and physical sciences, philosophy, art and mathematics, work and play, leisure and learning, and even, I sincerely believe, what we have come to understand as “body” and “mind.” I’ll end with some thoughts about reconceptualizing what we mean by evidence. A modest scope for a short essay, I realize.
Let me start, then, with a bit of computer game play, in this case drawn from one small game development project we completed for Toronto’s Tafelmusik baroque orchestra, called “Arundo donax: A Baroque Adventure.” The question motivating this essay is, “How can we ever more fully engage with and make innovative and inventive uses of emerging digital systems, codes, and tools without relinquishing the deep and rich fields and forms of mastery thus far evolved from the cultural logics of print?” This question is, I think, to some extent illustrated in that project, which uses online flash-based computer games as a medium to connect young people with a set of traditions, knowledge, and experiences that are largely lost to all but a few of them in the present day. In preparing this work, we did of course do considerable research, listened to great lashings of baroque recordings, and also attended live performances by Tafelmusik, trying to find bridging points from which we could convey, in this digital game-based form, generative connections between what these skilled musicians understood, could do, valued, and wanted to share with a new, yet increasingly distant, generation of potential audience members, in a form of “serious play” (de Castell and Jenson 2003) that would be fun, irreverent, and yet also engaging and challenging for young players, building bridges between these two worlds that might encourage players to learn about baroque music and culture.

Beginning with the larger context, the main game screen, or game “shell,” is a full-screen stylized map of Europe (see figure 14.1). On the map, narratively salient points of interest are clearly marked. At the player’s first login, the point that marks London, England, is highlighted, and players can click there or on any other point on the map that is not grey (three mini-games are greyed out until the narrative is introduced by clicking on London). Once a player has clicked on London, the game begins, in the court of Queen Anne in the year 1704. Henry Purcell, the former composer for Queen Anne’s court, is dead, and his two children, Frances and Edward Purcell, are summoned by the Queen. A brief, sparsely animated cut-scene introduces the narrative and gives players their quest—to play the mini-games, fill out the musical score on the map (representing their progress through the games), and find the elusive Arundo donax plant—no longer available now that England is at war with France—so that the English bassoon and oboe players will be able to make new reeds.
After the narrative has been introduced, players are invited to choose their “travelling costume” and are taken back to the map, from which they can navigate to other mini-games and content. The “incentive” for overall game play is to fill in the musical score, unlocking Tafelmusik tracks that can be downloaded and replayed.

The first game I’ll draw on is a musical inscription game, and the second a baroque dancing game. (Incredibly enough, we envisage adolescents in schoolyards all over Canada fighting over who is the best baroque dancer. . . .) To be noticed in these examples are two things: first, how digital game-based work poses the challenges I emphasized of holding on to traditional knowledge even as we embrace new formations—whether cultural, disciplinary, or other—and second, how working on these games engages us as well in interdisciplinary theory formation, specifically, in this case, epistemic inquiries into media and learning and the question of how game-based technologies for learning and emergent digital epistemologies reform and re-forge relations between learning and play.
It is within this constellation of questions about media and knowledge that our team has been trying to develop what we call, following game designer Raph Koster’s suggestion, a “ludic epistemology” (Koster 2006).

A THEORETICAL ASIDE

The term “ludic epistemology” references the need explicitly to remediate traditional linguistically mediated epistemologies. Its guiding questions are about what it means to encode knowledge in the form of a game and about coming to know as a process of playing. A theory of ludic epistemology is concerned with the distinctive demands of—and the particular constraints upon—knowledge representation in the development of computer-supported game-based learning environments. For people who work in education, as I do, its primary theoretical questions concern the re-mediation of educational knowledge and its representation.

Educational games, by comparison with popular entertainment-oriented games, have in the past tended to steer in directions away from play, pleasure, and genuine enjoyment toward curriculum-driven exercises that leave less, not more, room for playful engagement with ideas than traditional print-based educational media. In games of this order, “curriculum content” is largely derived, ironically enough, from the very same epistemic framework that ludic pedagogy seeks to supersede. The conception of “educational content,” in educational games like this, derives from, depends upon, and develops text-based views of knowledge, teaching, and learning driven, understandably enough, by print literacy’s particular regulations and constraints for knowledge representation. But this is far away indeed from the kinds of digital literacies that have propelled commercially successful video games. What does knowledge representation in general, and school knowledge in particular, look like, once it becomes digitally re-mediated, encoded in games and developed through play?

Issues of knowledge representation, although they have not (yet) received much attention, are central to an educational understanding and use of digital media in general, and digital games specifically. The role and status of the “virtual” (de Castell and Jenson 2003, 9), the relative
weighting of “content/information” over “pedagogy” when education is delivered at a distance (Taylor 1996, 10), the novel intellectual affordances for teaching and learning that digital toolsets are making thinkable and doable (Murray 1998, 11)—each of these and more current trajectories of inquiry are helping us to understand the contours of a culturally and historically unprecedented space in which we are challenged to educate, not through coercion, stratification, and failure (Illich 1983, 12) but through volition, engagement, interest and mastery.

Any rule-bound, game-based environment requires, we argue, that knowledge be reconceived in a play-based digital form. Traditional demands for specified “learning outcomes” frustrate the efforts of educators who are increasingly being urged to look to computer games and play for pedagogical models and instructional tools, since digital games do not invite, and rarely tolerate, the kinds of extended, propositional, and analytical statements that text-based knowledge enables. Understanding more about how the constraints and affordances of digital games work against traditional, text-driven forms of knowledge representation, envisaging what they might work toward, and coming seriously to terms with a “ludic epistemology”—a theory of play-based learning and knowledge—is, we argue, fundamental for transforming and refining emerging conceptions and practices of education.

BACK TO THE GAME

The first two tasks that Frances and Edward Purcell must complete involve establishing their knowledge of the baroque orchestra (see figure 14.2). Next they must demonstrate their skill at writing baroque musical scores. The main objective of this three-level musical inscription mini-game is to introduce the sections of a baroque orchestra in an interactive way and to acquaint players with musical scores from this period. Inspired by the popularity of rhythm-based games, this mini-game is designed so that the player sees a moving horizontal timeline of an original baroque score, in which some notes have been made “active.” The player has to click each “active” note as it passes between two bar lines on the left side of the screen (see figure 14.3).

“One code to rule them all . . .”
The primary concept and mechanics of this game share a lineage with several commercial titles, including Guitar Hero and Rock Band, two popular examples. Its “backstory” is an assignment to rewrite notes faded by the sunlight on Bach’s original score. Musically, it introduces structural elements of baroque orchestration in larger formations than the individual baroque instruments that we introduced in the immediately prior orchestra game. We wanted to help players both to hear and to carefully
attend to both the key “voices” in baroque orchestration, and, in particular, to notice the central role of the continuo part. Our goal was to have players both “hear” and then “see” these musical elements by, in effect, writing parts of the score and, using effective game forms (what Koster, in *A Theory of Fun for Game Design* [2004], terms “ludemes”), to engender something suggestive of the skilled “automaticity” that musicians must develop, albeit not, of course, of the same level or kind. Nevertheless, we think, the fact that there is a developmental, well-paced, challenging element of skill development in play here that is intimately related to and bound up with an authentic aspect of musical competence makes this game an effective illustration of bridging disciplinary educational work using digital technologies. So, in this game, players listen to and follow along with classical music excerpts, closely attending to a horizontally scrolling timeline featuring musical notes that they have to catch accurately with a keypress or with a movement of the mouse, in the case of connected “legato” passages.

**THE GIGUE IS UP: A DIGITAL BAROQUE DANCE GAME**

After completing the mini-games described above, players unlock the last challenge, which takes place in the Hall of Mirrors at Versailles—the court of Louis XIV, the “Sun King”. Here, the game’s narrative reaches its conclusion, as players must literally dance their way into the king’s favour so that he will grant them a supply of *Arundo donax* to bring back to England.

As with the orchestration and inscription mini-games described above, play mechanics are modelled after a popular “music game,” in this case, Dance Dance Revolution (DDR). As with DDR and its multiple PC- or web-based spinoffs (such as Stepmania and Flash Flash Revolution), arrow icons move vertically across the screen, and the player must press the corresponding arrow keys at the appropriate time. Unlike other web-based games emulating DDR, however, where the action plays out across backgrounds of abstract visuals, our game has characters actually dance around the screen in time with the music, so that players are actually “performing” a digitally mediated Baroque dance choreography. Arrow keys move the characters to the left, right, up or down, in a bending and rising...

“One code to rule them all . . .” 331
motion (in dance, the *plié* and *élevé*), while combinations of arrow keys and the w, a, s, and d keys will move the character in the indicated direction to execute either a *pas assemblé*, *pas coupé*, *demi-coupé*, or *pirouette*.

Button prompts are synchronized to the downbeats of the musical tracks, so that, as with real baroque dance, characters perform a step with every beat. We enact different difficulty levels through different types of dances, each with its accompanying audio track: the relatively slow *Menuet* for the first difficulty level, the more up-tempo *Gigue* for the second, and the fast-paced *Bourrée* for the last and most challenging level.

Well-timed keystrokes result in characters moving fluidly in place; the constraints of time and budget did not allow us to develop more “realistic” movement in 3D virtual space. “Misses”—pressing the wrong key, or mistiming a keystroke—cause the character to stumble, but in contrast with DDR (and music-based games generally), characters do not get booed off stage for missing too many steps (though a humorously stylized Louis *XVIII* grimaces at flaws and smiles approvingly at successful steps, with an “approval meter” to register his ongoing reactions), and players are evaluated on their cumulative performance after the dance is completed.

As with our other mini-games, this dancing game privileges a kind of play, which actually engages players in a form of baroque cultural expression, rather than with an exposition of historical facts about baroque dance. This is accomplished through the amplification of player input, which Poole (2000, 17), among others, describes as one of the central pleasures digital games afford. With minimal, but timely input, the player’s character executes complex and fluid movements imitative of the grace, decorum, and precision that were upheld as virtues of formal court dance (and dancers) of the time. Historical fidelity is achieved through representation and play: the stage is modelled after the Hall of Mirrors in Versailles, the characters’ motions around the floor invoke historically authentic baroque dance patterns, the audio tracks are representative of the kinds of dance music favoured by Louis *XIV’s* court, and the character animations themselves are modelled after videos of actual baroque dance enthusiasts performing particular dances and steps.

As with other parts of the game, there was significant negotiation during this game’s development between our design team and the content
experts we brought in as consultants. At issue was the level of technical sophistication and historical fidelity that ought to be included in a game meant to teach children the fundamentals of baroque dance. Should we be concerned, for instance, whether our game conveys the fact that musicians count the phrasing for a Menuet using two-bar mini-phrases with three beats in each bar, whereas dancers count in units of six? And how would such a concern—which is deeply important to those who perform and/or dance to baroque music—be represented in the game?

This small example illustrates the kinds of considerations we had to balance when designing a game that was ostensibly for children but was received and supervised by baroque music experts: two groups for whom what “counts” as useful or engaging knowledge may not always converge. There was also some concern around whether to allow players who had selected the girl character, Frances, to perform the dancing game in her “travelling” costume, which features pants, instead of the more historically accurate corset and broad dress motif of the other three costumes we designed for that character. Here, our ongoing concern with generating non–gender-normative character representations in educational games (discussed more fully in a separate account of the design for a health education game: see de Castell et. al., 2007) came into tension with a perceived need for historical fidelity: women wore dresses at court, and that’s that.

The last project I would like to draw on to illustrate “the scope of interdisciplinarity” is quite different and not at all game-based—but, we hope, no less engaging.

MULTIMODAL ANALYSIS PROGRAM: “DIGITAL HERMENEUTICS” IN THEORY AND PRACTICE

Qualitative research based on audiovisual field recordings has traditionally been represented using a text-based notation system and reported through an argument-driven essayist text, a limited, reductive form of data representation and analysis. This concluding section describes a research tool we have developed that supports multimodally convergent annotations of complex interactions, generating “semiotic scores” to

“One code to rule them all...” 333
draw attention to significant instances of gestural, verbal, and physical exchanges. This visual mapping of multimedia data supports an interpretative analysis based on shared, objective, publicly accessible digital artifacts: this enables a “digital hermeneutics” that begins to bridge qualitative and quantitative analysis.

In the literate past, knowledge was encoded in primarily textual form, and while this is certainly still the case, text is losing its privilege as the dominant medium of representation, communication, and expression. David Olson remarked some time ago on the ease with which we mistake linguistic fluency for cognitive competence, noting that “we often see as intellectual accomplishment what is in fact merely mastery of a particular form of language” (Olson 1994). The technological developments of the past two decades—during which time digital technologies have become increasingly ubiquitous, mundane, and intertwined with almost all aspects our daily lives—have brought about a fundamental epistemic shift, a transformation not only in our notions of what constitutes work, play, learning and sociality, and what separates these activities (if they remain separate at all: see de Castell and Jenson 2003), but also in our notions of what counts as knowledge.

This shift was not unanticipated: Marshall McLuhan, whose own work across media modelled a reflexive appreciation of and responsible engagement with theoretical studies of media forms and functions, helped to wake us up from what he described as “the habits of rigid perspective induced by three centuries of print hypnosis” (McLuhan 1955). Today’s diverse forms of mediation effect transformations of what knowledge is, what knowledge is of most worth, what constitute legitimate processes of coming to know, and who can legitimately assume the identity of knower (Lankshear and Knobel 2003). Once we discover the changes that can be made to knowledge, knowing, and knowers by the forms in which and the tools through which human understandings are mediated, we confront a new kind of imperative: that of “rhetorical responsibility,” that is to say, responsibility for the means we deploy to achieve our knowledge-building and knowledge-sharing purposes, as well as the validity claims we make for such knowledge.
The MAP program

The methodological affordances of digital audiovisual technologies support a retooling that draws qualitative research into closer alignment with the broader epistemic transformations brought about by the widespread integration of digital technologies into our everyday lives. In a world where print is only one of many modes through which meaning is produced, communicated, and shared, we are invited to rethink the notion that our means of mapping and understanding the social must “always be writing” and instead pursue research methods of inscribing, analyzing, and sharing ethnographic knowledge that are similarly multimodal.

A software tool for the multimodal analysis and coding of verbal and non-verbal communications preserved in audiovisual data, MAP (Multimodal Analysis Program) enables users to mount and play a selected audiovisual clip presented above a series of channels, similar in look (and, by extension, in the way it is read) to a musical score. Each user-defined channel in the score represents a distinctive communicative mode and/or hypothesized source of significance in the clip: for example, one participant’s immobility, another participant’s laughter, episodes of group laughter, sudden or sustained instances of quiet, or shifting physical proximity between participants.

The beauty of this tool is in fact its meaninglessness, or, more precisely, its semantic arbitrariness: there is no content to this instrument. In itself, it is completely empty, evacuated of any significance, a set of functions, a bit like zeros and ones or, before that, the alphabet. That means that whatever meanings it can convey are entirely at the discretion of the user, and it also means that its ability to convey meanings is not limited. As users add events to each (differently coloured) channel each time that channel is activated, a semiotic score emerges that charts communicative actions across the various semiotic layers that users have identified as significant. Using MAP, researchers can annotate complex interactions among participants and draw attention to significant instances of gestural, verbal, and physical exchanges and to otherwise unobservable interrelations between and among them. Researchers using the MAP tool create “semiotic scores,” as shown in figure 14.4. This multimodal coding

“One code to rule them all . . .”
of video data means researchers can attend not only to a range of communicative modes, but also to how these communicative modes are coordinated across a period of time. MAP also allows for, and indeed invites, multiple interpretations of the same interaction by differently positioned observers. In the clip illustrated in figure 14.4, for example, tracking attention based on gaze both “captures” and preserves an instance for more detailed scrutiny in greater multimodality than text can afford, which both exceeds the profound epistemic shifts enabled by the stability of print relative to the impermanence of embodied speech (Goody 1978) and suggests particular new hypotheses (in this case, we think, about gender and video game play).

Figure 14.4. The current MAP interface

In making visible the ways we conceptually organize and make meaning of audiovisual data, MAP affords degrees and kinds of researcher reflexivity not readily available through primarily textual techniques of analyzing and reporting on ethnographic research. A means not only for coding an interaction but for representing the coder’s own process of attending to what she or he deems significant in that interaction, MAP allows researchers to work toward a critical understanding of not only
what but how they read and “code” meaning. The iterative and intensive process required to “map” an audiovisual clip, of identifying channels and then plotting instances across these channels, thus becomes a process of “mapping” not only ethnographic meaning but the meaning-making process itself in ways that enable researchers to “reflect on their own subjectivity” (Pink 2001, 10). Using Map, our attention can be better paid to the possibility, central to the very idea of a humane social science, of systematic, relatively well-structured variations in the objective perspectives of differently located interpreters of a shared perceptual event. Map thus provides an exceedingly useful tool for visualizing, sharing, and analyzing data that supports a profound and long-overdue reconception and representation of validity in ethnographic research.

Map offers a robust, refined, and comprehensive tool not only for conducting but also for organizing and, crucially, sharing and objectively comparing multimodal analyses of audiovisual research—both between members of a particular research team and among researchers from different disciplines, projects, and institutions. Its efficacy as a tool for producing nuanced analyses of multimodal communications in educational settings has been illustrated in studies of computer game play and in informal learning environments (Taylor and de Castell 2005; Taylor 2007; de Castell et al. 2007).

EVIDENCE, VALIDITY, AND RHETORICAL RESPONSIBILITY: EXPANDING THE SCOPE OF INTERDISCIPLINARITY

Our main goals in developing Map are, first, to enable us to generate nuanced and fine-grained analyses of audiovisually recorded micro-interactions, with the capacity to integrate textual as well as audiovisual data, convergently, in a way that makes evident, public, and calculable the functional relationship among multiple modes of expression. Digital technologies have provided us, for the first time in human history, with a master code, a code of all codes, capable of representing phenomena hitherto necessarily conceived as different in kind. This has meant that until now, researchers have invariably been unable to perceive the ways
in which and the extents to which multiple modes of communication and expression work together, co-constituting human communication and interaction in ways far more complex than our research tools have thus far allowed us to see. The second goal is to create a comprehensive online database where a global community of social scientists engaged in audiovisual research can store, organize, code, and share their MAP-based analyses. A third goal is to chip away at conceptions of validity that have not served humanities and social sciences well at all and that have systematically undermined our abilities to generate the kinds of relational analyses upon which human social scientific work depends. This benefit does not emerge despite the generation of competing accounts of phenomena but rather precisely because of that, in our ability to demonstrate patterns and regularities in the ways that identity, content, interests, and positionality shape and constrain perception and interpretation—and to show that this inter-rater dis-agreement does not make alternative interpretations any less objective or any less valid. Qualitative researchers have long needed a way to make both objective and, at the same time, relational the phenomena they examine. MAP allows us to do this. These goals, we argue, collectively bring about a technologically driven means of re-mediating conceptions, criteria, and practices of “evidence-based” research and of fostering a “rhetorical responsibility” among researchers interested and/or currently engaged in audiovisual social science research. It combines visual representation of multimodal data with well-structured, computer-supported researcher interaction and interpretation techniques to enable an integration of “situated” (and thus context-relative) human judgment with objective, quantifiable, and fully comparable accounts (“semiotic scores”) of publicly shareable data taking the form of audiovisual documentation of social-interactional events.

As a tool for charting and visually representing the coordination of multiple modes of communicative action across short periods of time—literally “mapping” audiovisually recorded micro-interactions—MAP requires its users to confront and work through their own meaning-making processes: to become accountable for what and how they see, and what sense they make, of the same piece of audiovisual data. With the MAP tool as a central component of a broader online infrastructure whereby researchers can store, organize, and code their own project’s audiovisual data, as well

338  SUZANNE DE CASTELL
as collaborate with other researchers across institutions and disciplines through sharing their analyses of and insights into audiovisual research, MAP creates grounds for a profound reconstruction of our conceptions of evidence and associated practices of “inter-rater reliability,” informing our conceptions and practices of how “evidence-based research” is remediated by new and emerging digital tools. Reflexively, moreover, MAP is a tool for informing and advancing rhetorical responsibility, not only on the part of researchers toward their data but across and within communities of practitioners.

In developing what we are calling a new digital hermeneutics, researchers using MAP can readily access and compare diverse interpretations of data, bringing qualitative research into closer alignment with the broader epistemic transformations that digital technologies have ubiquitously wrought in our lives, and recognize that both research and its objects are, necessarily, multimodal.

To the extent that it cultivates rhetorical responsibility on behalf of its users to their research data and also, potentially, to a global audience of fellow practitioners, MAP can become a means of working toward what Donna Haraway some time ago called “accountable positioning” (Haraway 1988): a mode of scientific exploration in which the researcher confronts and makes public her own meaning-making processes, rather than assuming the “view of everything, from nowhere” that, Haraway says, has to its detriment characterized Western science for centuries.

By enacting these epistemological and ethical considerations around the “doing” of interdisciplinary work, then, our aims are not simply to integrate new media into conventional approaches to knowledge building but to actually challenge our commonly received notions of what counts as “knowledge,” “facts,” and “evidence” as more and more social practices at work, home, play, and school become mediated by technologies that fundamentally displace the monological authority of text, through privileging different and multiple modes of communication. And these examples demonstrate, we hope, something of “the scope of interdisciplinarity.”

“One code to rule them all . . .”
NOTES

1. For an index of the Tafelmusik games, see http://contagion.edu.yorku.ca/Tafelmusik/games/. The research team contributing to this work consists of Jennifer Jenson, at York University, and PhD students Nick Taylor (at York) and Milena Droumeva, Lorna Boschman, and Nis Bojin (at Simon Fraser University). All of our work, including the present paper, is collaborative. We are deeply indebted to the Tafelmusik Baroque Orchestra and Choir (www.tafelmusik.org) both for the opportunity to take on this wonderful project with them and for their patience, their support, and all the many kinds of tremendous assistance—and education—they gave us in the course of the project.

2. Games theorist Espen Aarseth (2003) has argued persuasively that, in a pervasively remediated digital culture, the term “digital” no longer designates anything distinctive, so “digital games” is really now just a very imprecise use of language to designate “computer-supported games and play.”

WORKS CITED


