In and out of control: Learning games differently

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Abstract

In this paper we make use of the theoretical resources of actor network theory as a 'frame' within which to organize video data we have been collecting on playing, and more specifically, on girls learning to play, digital games. Through a microanalysis of interaction, we closely examine intersecting trajectories of control -- self, other, and technology -- within the context of game play. Using MAP, a software program that supports multimodal analysis, we offer an illustrated account of the microgenesis of competence in collaborative, technologically-supported gameplay, drawing attention to developmentally significant behavioural regularities which, because they are embodied and not necessarily cognitive-linguistic in character, have not typically been evidenced in research on collaborative learning. A particular contribution of this paper is its study of group play, a relatively under-studied topic in gameplay research, and a perspective that has allowed us to look specifically at the phenomenon of the distributed development of competence central to learning in and through collaborative play.

Introduction

This paper focuses on how shifts in the ways games are played, most significantly through changes to input devices (controllers), impact collaborative play and learning within the game. Our title, "In and out of control" is intended to be multiply referential: in this study, it refers both to the virtually spatialized game's control over its players and to the social/material world's controls over players in embodied physical space. It refers, as well, to player agency, and specifically to players' abilities to resist and re-configure 'correct' gameplay1, and to a fundamentally creative process of renegotiating the terms of play, re-directing both virtual (game-regulated) and actual (materially/socially regulated) forms of control. In this video-based inquiry, we illustrate how the locus of control can shift momentarily to a bystander, then back to the game itself, moving successively through a network of interactional contexts. We show how control of play is negotiated at any given moment across a complex field of potential affordances, demonstrating that, despite many parents' fears, their children have not become zombie slaves to the digital game, but are engaging increasingly skillfully with new media

[1] The question of when 'we are no longer playing chess", or under what permutation of the rules "This isn't playing *Monopoly* anymore," is one which has received considerable discussion. This paper seeks to extend the reach of such questions about what is 'ruly' and what is UN-ruly in play-based learning.

cultural forms and practices to negotiate complex forms of control over their environments, within a (gendered) politics of space, both virtual and embodied.

Through his several analyses of control, Foucault (1961, 1963, 1975) helped us understand how agency can be infused through practices, structures, architecture and the many and varied disciplines of subject formation/social construction. Seen very much in the ways Foucault elucidates, digital games can be understood as *disciplinary apparatuses* which, in the absence of any obvious forms of coercion and 'control', indeed very much with the "willing assent of the governed", regulate human subjects, their purposes and activities. From precisely this standpoint, parental and teacherly concerns are expressed that video games are controlling children, and, as it were, manipulating these all-too-willing 'victims' into a-sociality, inactivity, and alienation from home, school, culture and community, inducing, as many adults think they see, a general apathy, mental dullness, physical immobility and moral and spiritual bankruptcy. That's a lot of bad press…. We here deploy tools and methods of video analysis to demonstrate that and how the 'disciplinary apparatus' of the digital game needs to be recognized as equally conducive to intelligent action, social interaction, to valuable kinds of learning, and to the development of agency through the opportunities it affords players not only to acquiesce to game-based regulation, but to invite and support the development of capabilities to re-form, deform and resist. It is by now something of a cliché to point out that the game-in-the-box is far less and other than the game-in-the-world, that is, the game as skillfully and creatively played, as talked and modeled and written about(Taylor, Jenson and de Castell 2006). This more expansive and more educationally salient analysis of what is taught and learned in gameplay enlarges our vision of digital games and their educational possibilities by making more evident the ways a game's situation and operation within larger frames of gameplay engage and develop mind, culture and activity. It is from that larger conceptualization of digital gameplay that we address the question of how recent controller technologies can offer particularly effective tools, and more widely accessible ones, for collaborative learning and for the development of player agency.

What follows is an attempt to push the methodological boundaries of research on playing digital games, by paying close attention to the ways in which non-skilled players acquire, secure and maintain competence through what is very much a collaborative process, at least in terms of this specific group of players.

In the next section we show how our "digital hermeneutic" methodology, a micro-analysis of videotaped interaction, is informed by the theorization of human-machine interaction afforded by Actor Network Theory. We then give a brief account of girls playing games in the context of a lunchtime, girls-only game club in order to show their movement over a 10 week period from novice to skilled players in a "community of practice". What we hope to make evident in this account is the extensive and intensive learning which is overlooked and obscured by the miscasting of these girls' generation as "digitally native". That term, much borrowed from Marc Prensky (2001) has been invoked canonically to distinguish young people like these from their "digitally immigrant" parents, a rhetorical move naturalizing competences which are, we demonstrate here, developed only through concerted collaborative effort "stretched

across" (Hanks, 1991) a complex network of individual, social, contextual and technological elements collectively constitutive of competent gameplay.

Methodology

The approach that we are taking to the research, analysis and representation of game/player control will be a little unusual, because of this study's distinctive tools and methods.

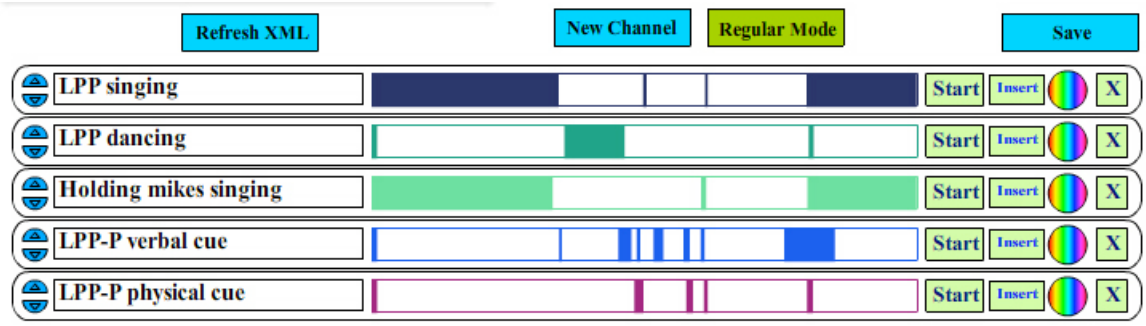

Figure 1: MAP's visual display

Digital hermeneutics is the term we are giving to a dynamic process by which researchers can map multimodal data visually, creating a model that supports interpretive discourse surrounding a shared, objective, publically accessible digital artifact. Ethnographic research based on video field recordings has traditionally been represented using a text-based notation system and reported through an argument-driven essayist text. Hoping to supercede this traditional approach, we worked with a team of student programmers to develop a digitally enabled multimodal research tool, MAP (Multimodal Analysis Program). Using MAP, researchers can annotate complex interactions among participants and draw attention to significant instances of and convergences across gestural, verbal, and behavioural events. Researchers using the MAP tool create "semiotic scores" as shown in Figure 1 (Taylor, 2007:1).

In this paper, the mapping of several short video clips is analyzed in detail as data samples from which to explore developmentally significant iterations of control and collaboration among girls playing video games together, noting, in particular, uncommon and "un-ruly" uses of game controllers.[2] MAP is used to co-relate and re-present a rich exchange between players and bystanders, software and, hardware, demonstrating MAP's usefulness as a research tool, and, in this specific study of new game controllers, illustrating the rich resources of non-traditional controllers as tools for collaborative learning.

[2] This paper is based on work from a larger study, "Education, Gender and Gameplay," a three year, multi-site study of gender and digital gameplay (Jenson & de Castell, forthcoming).

Actor Network Theory

Actor network theory (ANT) is a conceptual framework which investigates human agency as always already 'networked' across an intersecting landscape of affordances, both human and non-human, of context, tools, plants, animals and 'others'. ANT is of particular interest to digital games researchers, for whom it offers a full 'voice,' so to speak, to artificial intelligence in its varied forms and functions. Seth Giddings' paper "Playing with non-humans", which explores the "relationship between the human and the technological" (Giddings, 2007:115) explains why actor network theory appears particularly well-suited to digital games studies, and promising as a standpoint from which to carry out studies in a new field still very much under construction. ANT recognizes, Giddings writes "both the agency of non-humans and, moreover, the *symmetry* of agency between humans and non-humans in any network" (118) and thus calls attention to the ways non-human agents can become full partners in collaborative play.

ANT seems to us to offer a highly suitable approach to studying changes in technology design, in this case, new forms of game controllers which are restructuring users' interaction with digital games. It is our contention that the WAY this restructuring of interactivity is happening suggests considerable changes for both theories and practices of 'serious play', and invites major shifts in the design of games for education and training. By contrast, with the intense interest and attention (and fan base!) that has been devoted to game design and designers across all sectors of game culture, the 'things' players directly interact with, the 'objects' they use to play, and, in particular, the end user's hardware, has not enjoyed comparable airtime. It is an understandable human failing to accord primacy of place to human agents in explaining innovation, though it may in fact be user interface design that turns out to be far more significant for advancing educational uses of digital games and play.

New Forms of Control

Critical theorist Herbert Marcuse in the first chapter of his classic work, "One Dimensional Man", writes in detail about the infusing of power into new forms of control, especially from human agents (like policemen) to things (for instance to technologies like radar, cameras and speed-bumps) which more easily evade discernment than the traditional forms in relation to which we have become accustomed to identifying authority, force, power, coercion, control.

As part of a larger study of girls and digital gameplay, "Education, Gender and Gameplay", we were interested to see how technologically innovative 'forms of control', literally in the form of new kinds of game controllers, would be taken up by EGG's game-club participants (Jenson, de Castell & Fisher, 2007). Our team routinely videotaped game-play sessions and archived extensive digital video data sources within a searchable database. Here, we take advantage of this 'multimedia' data set both to

analyze and to represent one group of young women's engagement with the 'new forms of control' afforded to computer-supported play by a range of innovative and distinctively non-traditional forms of game controller. We looked at how players had both to conform to prescribed game structure, for example by stepping onto a sensor when indicated or vocalizing on cue with a certain pitch and volume, and also how, simultaneously, players would create from these affordances and rule structures *new* and 'unscripted' forms of control: they routinely subverted the game structures and rules by collaborating with each other, by assuming unscripted roles, and by using controllers in unconventional ways.

Distributed play: A re-mediated economy of human/machine interaction

Figure 2: More players than controllers

Over a series of lunchtime sessions, from October and March, the participants were videotaped while they congregated in the school library , to play video games together. In total, 9 girls ranging in age from 9 to 12 played, and 12 hours of video footage were recorded. This period of time also saw a shift in game controllers, from a dance mat, a karaoke style game, and a plastic guitar, all very different input devices than the more classical controller, with multiple buttons and very few "embodied" opportunities other than "button mashing". Over that period, several players emerged as the most skilled in solo gameplay and they tended to be dominant in using the controller to select the moment of play (e.g. choosing which songs to dance, sing, or play the guitar with).

Initially, it seemed the participants, despite whatever controllers they made use of were very much confined to playing within the rules/confines of the game. In other words, they tended to stick very literally to the script provided for them by the designers of the game, meaning that when they played the singing game, the two girls with the microphone would sing, or the girl controlling the dance mat would dance, or a girl controlling a character in *Mario Kart* would steer using the controller. In the games that had different input devices (like microphones, dance mats or guitars) this quickly changed. In a karaoke-style game, for example, a new play pattern quickly emerged – one that marked a different tool/user relationship than prescribed in this game's 'rules'. We saw that more girls were singing than had microphones, offering an enlarged possibility for

collaborative play (see Figure 2) as well as playing very much outside of the confines of the game.

Figure 3: Bystanders and player dance

Figure 4: Three play on single foot controller

Similarly, in *Dance Dance Revolution*, we soon saw more girls dancing than were on the controller (see Figure 3). In Figure 4, three girls are playing on a dancemat designed for a single player, again breaking with the one player/one controller model. Here the physical limits of the controller are imaginatively superseded by the girls in collaborative engagement with the game: more girls are dancing than have a physical relationship with the controller, and game control has given way to player control. The usual relation of one player to one controller is thus reconfigured, marking for this kind of imitative play, a new variety of technologically-supported collaborative activity. What is perhaps distinctive to this form of game-based imitation is that the players are imitating the computer-projected dance-script; they are not imitating one another, as in commoner forms of imitative play. A non-human agent, we might say, has stepped up to the mat and become a co-participant in these girls' collaborative play.

Without taking ANT into account, we could expect to see an increasingly collaborative alignment of performances among co-players as they are all responding to the same projected dance-script, a form of synchronized swimming out of water. Instead, we saw a kind of co-modified development involving attentional multitasking, an intentional following of, and 'tacking' between, **two** trajectories---one socially-oriented, towards the other singers who want to form a more cohesive 'group' singing together, and the other, machine-oriented, aiming to increase correct responses to the dance (or song) script of the game itself.

The changes we see in play from earlier to later play sessions thus represent a *co*-evolution of social and game competences which helps us see and understand how learning happens through play that is supported by the hybrid, networked 'third space' of agency 'stretched across' agents, contexts and tools. Lave and Wenger (1991) characterize the acquisition of knowledge through informal learning situations as legitimate peripheral participation (LPP). As participants become more experienced, their

role shifts to include training newer players to 'master' the game: when more experienced players were bystanders, a position we would normally see as NOT playing and, therefore, as not part of 'collaborative play", they frequently attempted to support novices in learning the game-script by describing and demonstrating game-prescribed movements alongside its 'official' players.

As Hanks points out in his introduction to "Situated Learning", "Learning is a process that takes place in a participation framework, not in an individual mind… It is the community, or at least those participating in the learning context who "learn" under this definition. Learning is, as it were, distributed among co-participants, not a one-person act" (15).

Technology and its interface devices play a role as legitimate agents within the informal network of distributed knowledge acquisition. As researchers have noted, game controllers activated by larger physical movements can offer a more intuitive or realistic interface and increased player control, enabling less experienced players to communicate more quickly with the game itself (Johnson, Gardner, Wiles, Sweetser & Hollingsworth, 2002). In our study, players were offered a variety of game controllers, including standard hand-held peripherals, dancemats, and microphones; interestingly, the performative game-script and realistic microphone controller made these interfaces the most popular among our group of novice girl gamers. [3]

Mapping the patterns of co-developed play

Using our own software application, MAP, we have been able to identify and more precisely individuate specific distinct and necessary STAGES in the co-evolutionary development of collaborative digital gameplay. We noted the following sequential pattern:
Girls attend first to the game (on screen directions and controller- required techniques) to learn game rules and acquire basic skills.
Unless DIRECTED to do so by the 'machine' (game—e.g. 'star power' scoring opportunities/bonus scores), their tendency is to begin to attend to other co-players, pick up their 'cues', and play 'together'.
At this stage we start to see attention shift from machine/screen/game to co-participants, the 'real' co-social world of play[4]. Players work/play together to develop competence, modeling, helping and advising one another, scaffolding, but also responding to and initiating mini-interactions (e.g. unscripted non-game-directed backup singer configurations, or supporting background dancer roles) which are all to do with the traditional, very much pre-digital pleasures and engagements of 'playing with your friends'.

[3] For the first time, two Canadian female players (Manon Desbiens and Rachel Kuta) competed for the championship in the 2008 World Cyber Games Canada finals using the Guitar Hero III controller. (see http://www.game-boyz.com/content/?q=node/9761)
[4] Although as Bart Simon observes, in digital gameplay, play is not possible without the machine/screen/game (2006).

Having developed mutually co-supporting competence, the group, now coalesced as collaborating players who CAN play the game, re-orient attention and activity back to the game/machine/screen. Turning attention back to that 'virtual' reality, away from the 'real' (socially interactive) reality of the playspace their bodies inhabit, they work/play collectively to 'beat' the game, attending to joint opportunities to increase scores, gains and losses of, for example, fan base, leveling up by having all players move to a higher level together. This is the culmination of 'play'; it is when the players, through these rather circuitous routes, while tacking between 'real' and 'virtual' interactions, have co-created collective game competence and can now tackle the game competitively, and 'for real'.

The controller, on this view of things, becomes a device that allows pieces of the network to connect as engagement shifts from the digitally constituted 'virtual' reality of the gamespace to the social and material environment shared with others. Through numerous viewings and repetitions of the prescribed physical movements, the game script becomes familiar and audio cues supplant visual cues as the dominant indicator of scoring opportunities. As players become less engaged with the monitor and more engaged with other players and bystanders, their play extends to include the group within solo game contests.

Video microanalysis takes advantage of a structural similarity to gamer activities in that both take place sequentially and multimodally. Video is recorded in a linear sequence, and thus preserves the temporal. It is its very preservation in a material form which enables the scrutiny required to discern and differentiate the elements which materially constitute the development of the activity and which, outside of real time structuring, can be segmented, rearranged and scrutinized, allowing the 'capture' of what is otherwise fleeting and lost. Raab and Tänzler cite sequential analysis as one of the characteristics of *video hermeneutics*, along with parenthesis of context and analyzing works in contrast to other edited video sequences (2005). However, they base their interpretation on comparisons of still images from an edited television script and represent the context using text-based arguments. We approach *digital hermeneutics* using MAP as a way to examine video in motion, to examine the microgenetic development of player affordances by studying their gestural interactions while playing digital games in a group.

In developing our method of *digital hermeneutics*, we regard an unedited research video clip as a moving image for interpretation, which is then coded into smaller, more manageable 30 second to two minute clips. Because the clips are segmented into brief sections limited to two minutes, they can be viewed online as Flash movies. This initial screening and coding allows researchers using MAP to compare diverse interpretations of the same clip, or the same data. Externally located collaborators are able to locate clips on their local computers as a result of searching by name or descriptive code using a common server.

This affordance of video analysis, it should be noted, parallels the affordances of textual representation whose epistemological significance was long ago elucidated by Jack Goody (1997) in a groundbreaking essay, "Literacy, Criticism, and the Growth of

Knowledge." In that paper, Goody explains, "Writing makes speech 'objective' by turning it into an object of visual as well as aural inspection; it is the shift of the receptor from ear to eye, of the producer from voice to hand" (p. 44). This same epistemological "great leap forward" is afforded by video. In this era of what Ong called "secondary orality" it does so not merely linguistically but multimodally. By slowing down an otherwise fleeting action, we are able to conduct a fine-grained analysis of a sequence of events in time and space in order to scrutinize and isolate sections that are the richest in salient data.

The development of multimodal distributed competence

Having identified distinct developmental phases in the sequence of collaborative play activity, we turn now to a microanalysis of player actions, showing that what begins as game control within the virtual world of the screen progressively transforms into player agency over the material world of self in social interactivity, and demonstrating the way in which competence is 'transferred' from game to player through a progressive internalization of game 'rules' into players' increasingly skillful, embodied competence. We see skill-development far less as any species of 'cognition' than as involving an enlargement of the players' attentional field of perception and action. The process of learning to play a game begins as tightly focused visual perception—player gaze is directed at the screen. Of particular importance to note—and what MAP allows us to retrieve, scrutinize, and demonstrate-- is the sensorial shift (Ong, 1982/2002) from vision to multisensorial embodiment: an integrative multimodal accomplishment.

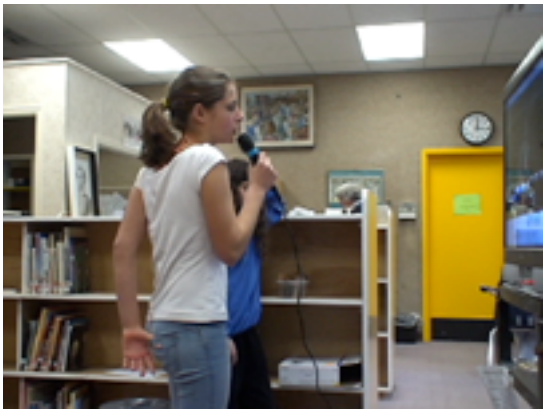

Figure 5: Earlier, a more closed posture

Figure 6: With experience, more open stance

In the first stage of distributed learning, as noted above, the player is attempting to learn the game script. Here it is quite accurate to say that the game 'controls' players---though surely no less than texts did and do 'control' their readers. To begin, the player's attention is directed toward the screen, privileging **vision** as the dominant sense. The body is closed, arms wrapped around it, or with the hand tucked into a pocket (see Figure 5). Interestingly, the player's posture and gestures appear progressively to 'open up' as competency shifts from engagement primarily with the game/screen, to attention to and with other players (see Figure 6).

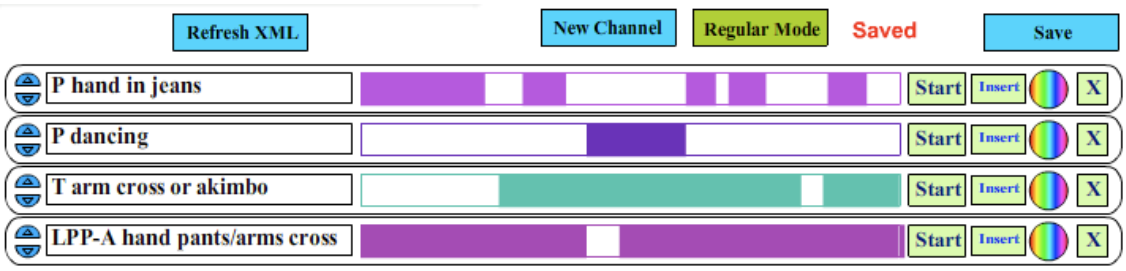

Figure 7: MAP of EGG girl's club in December, noting bodily movements of players and LPP

Now, we begin to detail and illustrate the bodily movements and gestures of players and bystanders, and their relationship with the game script and controller through our microanalysis of the network of interaction by comparing four video clips from three different game sessions in the EGG research study. All four clips contain the same fifty-eight second segment of a song. Under scrutiny are the players and bystanders whose gestures are mapped in Figures 7-10.

Figure 7 contains a MAP from the earliest session, denoting in detail the bodily movements by players of a karaoke-style game, recorded at a rural school that hosted the girls–only gaming club. The player on the left (P) holds the microphone controller in her right hand and sings the song indicated by the game script. As the volume of her singing is at least as loud as the volume of the monitor, her familiarity with the song is strongly indicated. However, she is not so familiar that she is able to look away from the monitor and sing the song by audio cues alone. Additionally, her gesture of hooking her left thumb into her jeans or back pocket is a closed gesture, indicating that she is holding her body back in some way, in a sense preventing the body from driving or being in control of her response to the game script. P's body became more animated while she danced during the middle of the clip; when she began to sing, her gestures again became more closed. The other player (T) was less familiar with the song, singing less loudly. The players discuss who performed poorly and T admitted that she didn't sing aloud during a section of the game. T's closed gestures were either crossing her arm over her chest or standing with her left hand on her hip (akimbo) while her right hand held the controller. The bystander (A) observed the monitor, did not speak or give advice, either verbally or through gesture – during the clip, she either adjusted her clothing or crossed her arms. During this clip, the players are still acquiring basic skills and learning the game, which includes reading the lyrics, decoding the feedback the game is giving them on the pitch of their vocal input, as well as duration of breath. At this time, we argue they demonstrate more closed gestures when singing, with P showing more open gestures when dancing or talking with T.

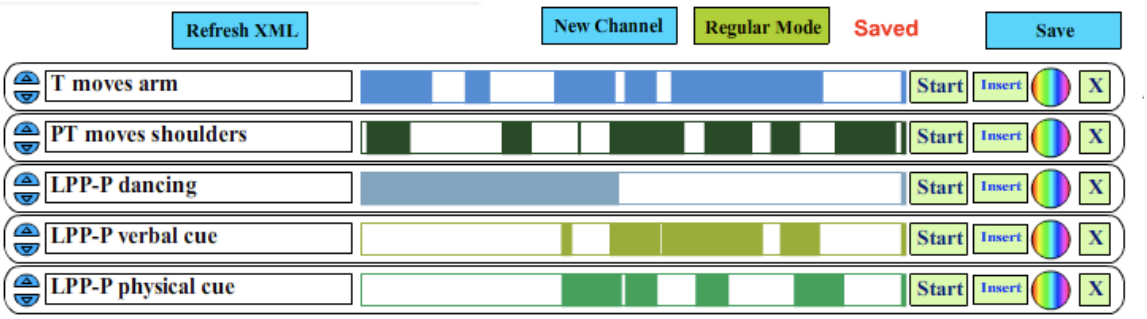

Figure 8: MAP of EGG girls' club, later in December, noting movements of players and active LPP

The second clip was recorded later in the same month, while the karaoke game played the same section of the song (see Figure 8). In this clip, two players (T and PT) hold the microphone controllers, while P, A, and SG are bystanders. Unlike the first clip, T moves her left arm more often, changing position between crossing her left arm over her chest and moving it to her hip. The game script indicates the song to be sung, and attention of all players is directed toward the monitor. All players and bystanders including A are singing along with the group. While A does not seem to be singing as loudly or consistently as the other players, unlike her indicated body gestures in the first clip, she is participating in the song within the atmosphere of group play. P and SG begin to dance in response to the game script, playing a part of the game that those who are holding controllers are reluctant to engage with because of their attention to the monitor. P offers both audio and physical cues to the other players, demonstrating and sharing her knowledge of the responses rewarded by the videogame. Unlike the first clip, P does not use closed gestures; instead she seems free to move, allowing her body to respond to the game script and to other players unencumbered by hesitation – she is playing without a controller, in control of her part of the shared game. Note that when P is giving physical or verbal cues to the others, she is not dancing, having moved gradually from a player of the game script to an advisor of the other players.

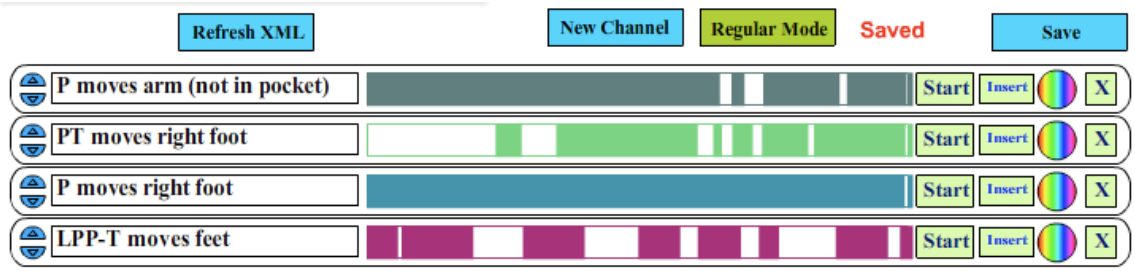

Figure 9: MAP of EGG girls' club in March, noting bodily movements of players and passive LPP

In Figure 9, players have returned to the same song months later. In comparison to the first clip when she also held a microphone controller, P moves her left arm freely, hardly ever putting it into her pocket and only briefly when she does. While PT, the other player with a microphone controller, dances while singing, P has become extremely animated during the song, moving her right foot almost constantly in response to the musical game script and dancing freely. At the beginning of the dance section, PT looks away from the monitor to P, observing her actions. P and PT are the most experienced players of the

karaoke game within the group and this clip demonstrates the ways that they push each other into higher levels of performance. Although T does advise or assist other players elsewhere in the study, in this clip she is silent as PT and P are more experienced than she is. Although she may be monitoring the players' performances peripherally, T's head remains oriented to the monitor. T's movement is most animated during the familiar chorus at the end of the clip.

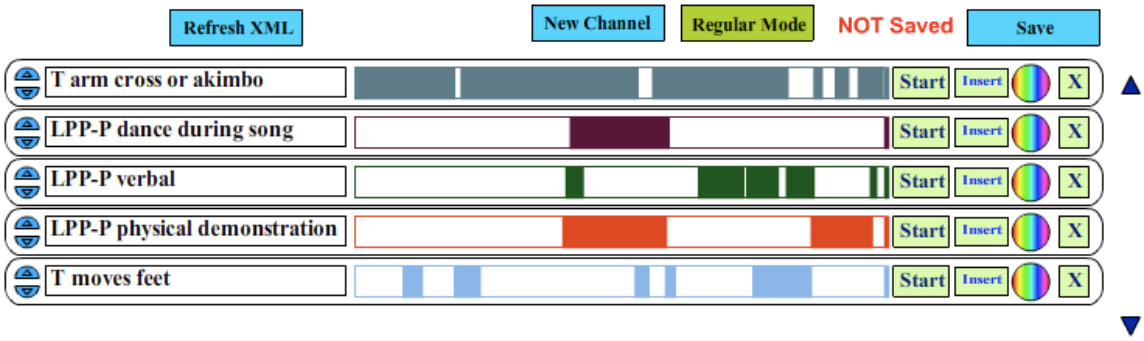

Figure 10: MAP of EGG girls' club in March, noting bodily movements of players and active LPP

Figure 10 is a MAP of the same song, sung immediately after Figure 9, subsequent to players taking turns and exchanging controllers. A and T now hold controllers, although A was not mapped because the position of the camera and other players blocked her movements. Unlike Figure 8, where T shifted position of her left arm, in this clip she held a closed position again for long periods. Figure 8 had an atmosphere of group support, of the whole group singing and playing together, while the March session matched two stronger players (Figure 9), and then two weaker players (Figure 10). Consistent with Figure 8, P offers advice regarding game cues, and demonstrates her knowledge of the dance moves during the game script. Note that P precedes physical demonstrations of the movements with verbal cues.

Within the network of interaction, the game script remained constant, while the activities of players and bystanders developed through direct engagement with each other in the context of gameplay. As players became more familiar with one song's gamescript over time, their gestures became more physically open, their singing became louder, and the more experienced players tended to both vocalize advice and physically demonstrate the singing cues of the karaoke-style game. While the gaming environment in Figure 8 (where players and LLP sang together) seems the strongest example of co-created agency and co-distributed play activity, players did not repeat this spontaneous instance of group singing within this portion of the study.

We have used MAP as a tool with which to study the microgenesis of player competence by examining individual development within a group context based on an examination of videotaped game sessions. Influenced by ANT, we have traced the associations made visible within group play between a group of players and the machine/game/console and have mapped the micro-processes involved in the development of competence. Specifically, we have examined the development of embodied competence as it related to group gameplay. The paper specifically demonstrates that occurrence – it makes visible

what is often invisible – that is the process involved in acquiring a specific skill, or at least the development of a portion of the skill-set involved in digital gameplay. While we are not claiming that this process would be the same for any group of novice players, what we are attempting to show is that the often hidden, taken-for-granted, presumed "hard wired" skills for learning to play games can actually be viewed as a process of "coming to know" about and with not only a group of other players but also the game being played. For these girls, this process involved: 1) attending to the rules of the game (eyes on screen); 2) receiving help from others not in direct control of the game (eyes still on screen, but asking for and receiving help); 3) moving back and forth between the game (on screen) and those "playing alongside" who don't have controllers but nevertheless are "part of the game" (e.g. back up singers, a foot on a dance mat at the correct time); and 4) moving back to "all eyes on the game", though this time with full attention to "beating the game" (in this case collectively through a capitalizing on "leveling up" by more skilled players who are able to "unlock" portions of the game that less skilled players are not able to access on their own, but who nonetheless benefit from and are able to take advantage of a changed environment within the game in order to continue playing).

The significance of making this process visible is not only that it pushes back at the misguided assumption of a "native" competence, an assumption which undermines efforts to understand how the *development* of competence requires familiarity, access, and just as importantly, practice.[5] How technological competence is developed, obscured by Prensky's all too often quoted remark about "children today" being "digitally native", matters in light of the persistence of gender-based differences in technology access and ability, to which digital gameplay gives an important and widely acknowledged head start (2001). Children today MIGHT become competent 'digital natives', but only if they have access to these tools and can and do *learn* to "play" with them. Skill does not come automatically or naturally simply in virtue of having been born into a 'digital age', and understanding how technological skill is worked up and developed is critical, we have come to understand from our several years of research on gender and technology. Through that work we have learned not to embed our findings in characteristics of our subjects, but instead have come to understand technological competence in general and skillful game play in particular as highly relational, dependent not just on characteristics of subjects, but as or more importantly, on access and contexts and tools. We have suggested that one possible methodological safe-guard against the tendency to attribute discourses, actions and characteristics as some "inner truth" about gender could be to employ a conceptual framework, like actor-network theory, which forces us to pay attention to the constitutive role of elements above and beyond embedded 'characteristics' of our research subjects. We have come to realize that many of the characteristics routinely attributed to gender---like the preference for learning with one's friends rather than on one's own, an avoidance of competitive gameplay, a tendency to proclaim ones own inability or to characterize an activity as 'too hard', to express a lack

[5] Prensky (2001) labels the current generation of children (the ones you see here) as "digitally native" and their parents as "digital immigrants". He does so in order to argue that the current generation of students are "hard wired" to think differently and be schooled differently. The obvious problem with such a sweeping generalization is that it simply does not hold, as this work obviously points out.

of interest in computers, to experience 'motion sickness' when playing computer games---all of these now appear to be less characteristic of girls than characteristic of novice players. So studying novice gameplay, and specifically studying how novices learn to play with greater levels and kinds of skill is likely to be very important in developing ways to support girls' more equitable access to and uses of new technologies. Working from an enlarged understanding of how competence is developed within a network of intersecting affordances, therefore, we can better appreciate how changing tools---in the case of this study, how changing game controller hardware---can significantly enlarge access by novices, and hence enlarge access by girls, and why learning to play differently might be a critically important condition, for girls, of learning to play at all.

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