Animating Mastery: Navigational Play as Integrative Learning

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Abstract: This research examines mediational processes in digital activities at Projeto Clicar, a program designed to promote the social inclusion of children living and working on the streets of São Paulo, Brasil. It offers a cognitive ethnography of how the program's particular relational habitus, or pedagogical frame, shapes children's participatory appropriation through navigational play in digital learning activities that provide for an integrative sociocultural learning process. Making the relational habitus explicit enables us to observe and clarify the mediational tools and pedagogical strategies that shape children's navigational play and their ultimate participatory appropriation of program activities, as well as their sense of social inclusion among a community of learners.

Keywords: participatory appropriation, third space, relational habitus, navigational play, social inclusion

Introduction and Research Questions

This article looks closely at the sociocultural process by which an educational setting's "relational habitus," or sociocultural and pedagogical frame, establishes the context for participatory appropriation to create the basis for integrative learning through navigational play. We provide an ethnographic account of how one informal digital activity provides for an integrative sociocultural process that enables young people, through the mediation of shared tools and artefacts, not only to acquire specific digital skills, but also to master social and cognitive capabilities by which they transform their participation in program activities from relatively passive consumption of entertainment to more agentive, personal, and mutual engagement with shared bodies of knowledge. In this way, we explore the process of learning as participatory appropriation (Rogoff, 1995) within a cultural system of activity. We suggest that participatory appropriation, as framed by the relational habitus, enables us to sidestep the mystification of learning as something that takes place inside an individual's head and instead focus explicitly on observable aspects of learning.

We examine mediational processes in a program designed to promote the social and educational inclusion of children living and working on the streets of São Paulo, Brasil. For over seventeen years, Projeto Clicar provided informal educational

resources and activities at Estação Ciência, a science museum in the Lapa district of São Paulo, until its recent (2013) closure. In its informal digital and hands-on activities, Projeto Clicar linked these children (aged 5 to 18) to professional educators and older peers (university students from the Universidade de São Paulo).

The children of Projeto Clicar (many of whom were not in school, had never been to school, or had only attended school for a year or two) entered a space where they were able to explore a variety of digital tools and other resources – board games, art activities, picture books, etc. Their participation in these activities was entirely voluntary. There was little or no formal instruction, although there were always educators (including both professionals and trained university students) at hand whom the children could ask for guidance when they were unable to solve a problem for themselves. The children learned to engage in these varied activities through interaction with each other and with the educators, who often participated with them as more experienced partners in the activities. The team of educators was specifically trained not to "instruct" the children, but to ask questions, to guide them gently to work together and build on each other's knowledge.

In this sense, Projeto Clicar represented a separate "world" of activity, an arena of playful activity, a "third space" beyond the constraints of strict surveillance and practical, purposeful pursuits (Gutiérrez, 2008). Importantly for the young people of Projeto Clicar, the program's space was seen by the children as their own. It was a time and place set aside specifically for them, where the rigors of social exclusion and the hard ethos of the streets that they daily experienced were temporarily suspended. It was a space where the participants were free to remove their masks of quasi-adult street toughness and, for a few hours each day, assume the personae of – in short, act like (and actually "be") – children (Underwood, Mahiri, Toloza, & Pranzetti, 2003).

Projeto Clicar made use of computer and board games such as matching games, checkers and chess, Lion King, Pajama Sam, Freddie the Fish, Sim City, various math and word games, as well as other more sophisticated web-based and digital multi-media activities, to provide intensive individual connections with shared artifacts and meanings (including negotiated game rules) and also intensive social connections with others in the program. Participation in the program thus entailed an intense traffic in shared tools, artifacts, and symbols. The specific character of each child's participation, even though initially conditioned by his or her own individual background or life circumstances, was in the course of time framed by the artifacts with which he or she engaged with others, and by the interactions that took place through the mediation of those artifacts. In time, the character of their participation changed – they learned how to make their way through the cultural system that the program framed.

Review of the Literature

The educators at Projeto Clicar pursued a pedagogical strategy based on the work of Freinet (1990, 1993), Freire (1970), and Vygotsky (1978). To understand the charac-

ter of children's playful participation at Projeto Clicar, we follow these same complementary theoretical approaches. In his cultural historical approach to the study of learning, Vygotsky (1978) was especially interested in understanding how human beings moved from lower to higher mental processes. He emphasized the importance of approaching learning not simply as an individual phenomenon, but in its specific sociocultural context. Yet by "history," he did not simply mean a careful description of that context. "To study something historically means to study it in the process of change" (Vygotsky, quoted by Scribner in Tobach, 1997, p. 244, in Robbins, 2001, p. 27). Vygotsky was particularly interested in the transition process from "involuntary" to "voluntary" levels of perception, attention, and memory, and in the transition from these lower mental process to higher processes such as logical memory, creativity, verbal thinking, and regulation (Robbins, 2001, p. 25). This transition often took place in what he called "the zone of proximal development," the space-time field of interaction in which an individual becomes able to do things with others that he or she could not do alone (Vygotsky, 1978).

Lave (1996) and Rogoff (1995) have demystified this process by focusing on learning as individuals' changing participation in sociocultural activities. This transformation is not simply a process of the internalization or acquisition of a social world that is somehow external to the individual; it is instead a process of participatory appropriation, in which the individual is developmentally engaged in "a dynamic, active, mutual process involved in people's participation in cultural activities" (Rogoff, 1995, p.153). In this process, the individual's participation not only increases; the very character of that participation changes as the individual begins to assume and enact new roles and relationships in the activity. As such, learning takes place in the open; it is visible and observable, not only in formal educational situations but even in playful activity. Viewing situated learning as changing participation enables us to capture the learning lives of young people by observing individuals' participant orientations both within and across situations and sites over time (Arnseth & Silseth, 2013).

Such participant orientations can be viewed most clearly in the context of what Stone, Underwood and Hotchkiss (2013) have called the relational habitus. Stone et al. amended Bourdieu's (1990) concept of *habitus* to foreground the intersubjective and agentive character of meaning-making in learning and development. Bourdieu's approach to *habitus* emphasized individuals' dispositions constituted in practice and thus focused on the reproduction of social structures and practice. Stone et al. adapted Bourdieu's approach by using the concept of relational habitus, to emphasize not so much the psychological dispositions of individuals internalizing social structures, but more conclusively the interactive engagement of selves and others in the intersubjective co-production of communicative processes that are constitutive of, as well as constituted by, historically emergent knowledges and practices. The relational habitus is "an ensemble of relations enclosing self, tools, tasks, and others that is intersubjectively constructed and sustained over time in formal and informal learning environments" (Stone, Underwood, & Hotchkiss, 2012, p. 66).

The concept of relational habitus allows for a pragmatic focus on observable communicative processes that are often implicit in learning and development (Underwood, Parker, & Stone, 2013). By specifying the configuration of these elements

and their enactment in a particular learning environment, we are able to describe and analyse individuals' participant orientations and trace their transformation over time. In this sense, the changing participation of the children in the informal activity described below represent a navigational exploration of possibilities and limits, the "relational rights and responsibilities" (Stone, Underwood, & Hotchkiss, 2012) implicit in the relational habitus established by the learning environment in which the children are cognitively and interactively situated for this exploration. We have intentionally focused on an informal activity to emphasize the cognitive development that takes place in navigational play.

By navigational play, we mean playful activity involving the exploratory determination of one's position and direction both in the context of a given or negotiated task or activity and in relation to other participants in the same activity. As Hutchins notes, "The central computations in navigation answer the questions, Where are we? And if we proceed in a certain way for a specified time, where will we be?" (1995, p. 39). These questions are matters of concern for determining how to proceed in any environment. The navigational aspects of play may be seen both in recreational games and in activities mediated by digital media, card and board games, or other hands-on tools, materials, and activities. Until its recent closure, Projeto Clicar was a prime locus for observing navigational play. Importantly, to understand the cognitive implications of navigational play, we have used the approach and methods of cognitive ethnography, which implies specific strategies for observing, describing, and analysing or interpreting the observed interactions involved in navigational play.

Methods

Cognitive ethnography explores the co-construction of meaning and understanding among participants in real-world sociocultural activities. It studies human cognition as it occurs in its sociocultural context. That is, cognitive ethnographies study distributed cognition within social ecosystems that both constitute and are constituted by individual agents' enaction of tasks and activities framed by a particular social setting's relational habitus. Within this context, information, understanding, and meaning are embodied in the joint activity of participants in the setting. The unit of analysis is not the individual, but the activity in which individuals are engaged – that is, the interactive frame (what we call the "relational habitus") among "individuals and artifacts and their relations to each other in a particular work [or play] practice" (Rogers & Ellis, 1994, p. 122).

Analyzing activity in this way enables the researcher to observe the social distribution of cognition and knowledge among participating individuals through their mutual engagement with tools and media over time. Accordingly, cognitive ethnography takes an inductive approach to observation in the field (i.e., in an authentic, "naturally occurring" social situation or activity), while drawing deductively on theoretical concepts, propositions, and hypotheses to orient one's observations. This ethnographic approach calls for observation of the specific physical space of activity (including the physical arrangement of objects and persons), the objects and tools

used (including individual language use and task-oriented dialogue) and participants' actions in the pragmatic transfer and exchange of information and knowledge (Hollan, Hutchins, & Kirsh, 2000).

As a result, in our cognitive ethnography of the relational habitus established (and continually negotiated) at Projeto Clicar, we observed concrete operations and interactions among the children in a variety of tasks and activities. We often selected particular tasks or activities for special observation, and we observed the children while maintaining our engagement with the children in those activities. The process called for careful data collection, and we not only made detailed observations while engaging fully in the activities with the children, but also cross-checked our observations and interpretations with each other as fellow researchers and practitioners, and also with the more experienced participants (the young people served by Projeto Clicar) in the activity themselves. We also conducted observations and analysis of specific activities across time frames, comparing specific instances of the activity and looking for patterns of interactivity among them.

This article presents an ethnographic case study of one child's interaction with others in learning a relatively simple computer game at Projeto Clicar, a program dedicated specifically to children (aged 5 to 18) living and working on the streets of São Paulo, Brazil[1]. Again, the unit of analysis is the relational habitus established by Projeto Clicar as the learning context and pedagogical frame in which individuals and groups engage with each other in navigational play. From 1996 until 2012, Projeto Clicar, supported by the Universidade de São Paulo, an NGO, and Petrobras, was located at Estação Ciência, an old factory converted into a science museum. Estação Ciência, until its recent closure, offered a wide variety of hands-on and digital activities, exhibits, and demonstrations illustrating scientific knowledge and inquiry. This museum offered exhibits and activities for school children and their teachers, but also set aside a portion of its space for Projeto Clicar.[2] Projeto Clicar, as part of the museum, operated Monday-Friday from about 12pm-6pm throughout the year and offered young people who faced severe conditions of social exclusion new learning tools and activities within this inclusive world inside the museum (Underwood, Pranzetti, & Toloza, 2014).

The primary child whom we focus on throughout this article was Paulo, a six or seven year old boy living on the Streets of São Paulo. Paulo visited Projeto Clicar regularly and the observations on which most of this account is based were collected during a three week period. During this time, Paulo was deeply engaged in playing "Lion King," a computer game that consisted of a variety of possible activities, built into the framework of the animated world of Simba the young lion, the hero of the animated Disney film. In this game, players must go through 10 levels, overcome

1 The authors wish to express their profound gratitude to Professor Ernst Hamburger (Universidade de São Paulo), the renowned physicist and visionary Director of Estação Ciência, for his many years of support to Projeto Clicar, to its educators, and to the children it served. We also wish to express our deepest thanks to Marcos Matsukuma (Universidade de São Paulo), and Olga Vasquez (University of California, San Diego), for their cogent and insightful comments and suggestions.

2 As Scheper-Hughes (1992), Hecht (1998), Da Cunha Frontana (1999), and others have noted, the term "street children" masks a multifaceted reality; many have come to use the term "meninos na rua" (children on the street) rather than the former "meninos da rua" (children of the street) to acknowledge this complexity and diversity of life circumstances.

a variety of obstacles and overcome his uncle to become the Lion King himself. In this regard, the Lion King game is potentially transformational in two ways, in that participants are engaged in the activity of furthering the full development of the Simba character, and at the same time, within a relational habitus of small-group collaborative activity, they are engaged in furthering their own social development in relation to their peers. While Paulo sometimes played this game alone, there were often multiple children watching, playing or interacting around the game. Our observations of these interactions were later supplemented and contextualized by additional observations on successive visits to Projeto Clicar over a period of years to form the basis for the present ethnography.

By describing and interpreting the informal learning activities involved in navigating the Lion King game, we attempt to show how program activities mediated children's development over time. We conducted participant observation, using a combination of research strategies in which we engaged directly in everyday activities and interactions with the young people of Projeto Clicar to learn explicit and implicit aspects of their social world (Spradley, 1980; Dewalt & Dewalt, 2010). These strategies included face-to-face observations of activities, the study of appropriate conversational pragmatics appropriate to the site and its participants, and informal conversations and interviews, among other research methods (Briggs, 1986; Pelto, 2013). While this qualitative research stance has often erred on the side of the observation, we focused on the participatory side – what might be called observant participation – because of the specific character of the social setting and our particular roles in the setting of collaborating closely with the program's directors in supporting program activities, in working directly with the children as they engaged in those activities, and in discussing with the directors various strategies for improving and documenting the program. As Directors of Projeto Clicar, Dirce Pranzetti and Cecilia Toloza were professionally active in the site's organizational and pedagogical activities almost daily over a period of seventeen years, while the authors took part in successive ethnographic visits to the site, both together and separately. As such, the research was a collaborative effort between the authors and the directors of the program. In carrying out our respective professional responsibilities, we maintained a vigilant observation, kept detailed field notes, and held many discussions about the learning processes among the children with whom we were participating and observing. This strategy enabled us to confront ethical dilemmas of qualitative research as we focused on examining alternative, inclusionary modes of relation in the co-construction of social activity (Packer, 2011).

We followed this approach in response to ethical and methodological considerations attendant to working in an educational setting which precluded clinical or experimental research design, and which was designed explicitly to advocate for, rather than conduct research on, the young people who took part in the site's activities. Our research was formative, in the sense of seeking to find ways to modify and improve the learning activities at Projeto Clicar. In this sense, our approach was a form of design based ethnographic research, examining learning processes and interventions in those processes, with the objective of generating innovation in educational activity (Brown, 1992; Drotner, 2013). In doing so, we drew on Luria's narrative approach to presenting scientific findings that attempts "to preserve the wealth of living reality"

(Luria, 1979, in Sacks, 1990, p. 183). Luria's approach emphasized the importance of grounding the scientific study of human beings in their concrete existence, in order to elucidate "the role of the historical, the cultural, the interactive, not merely in modifying, but in actually making higher nervous functions *possible*" (Sacks, 1990, p. 187).

Accordingly, we have described the young people of Projeto Clicar as a way to illustrate the strategies by which they learned to create a place for themselves in an otherwise unwelcoming world. Like Projeto Clicar itself, this ethnographic study, following Freire (1970), accepted them as they were, socially and cognitively, and observed what they were able to do both by themselves and in concert with each other. Notably, the authors were not absent as subjects from the descriptions that emerged. As participant observers engaged in the process of observing how the children in the program learn how those activities work, our own participation was obviously implicated. At the same time, it is important to recognize that the children of Clicar were themselves participant observers, engaged in the ongoing task of finding out what one needs to know to operate acceptably and agentively in a given social world. In describing Projeto Clicar as a community of learners, a social world that encompasses educators' guidance, children's independent discovery, and the transformational participation of both in interactive activities (Rogoff, 1994), this cognitive ethnography attempts to unpack the process of participatory participation that took place in the program.

Results

Through participation in a shared system of learning – in a shared community of learners – the children of Projeto Clicar came to connect past experiences with present experience, to remember what had worked and what had failed to work. In short, they came to recognize themselves and others as constituting a shared world (even the unique world of relative safety and ease that the program temporarily represented). As they built on the cumulative experiences with the artifacts and activities they shared in the program, they also came to recognize continuities that situated them as a community of learners, and that defined their place among others in the program – a place where the ethos of the street was not in play, where they could see that they were active players, again and again, where they knew they were welcome and able to return, where they went from being novices to being experts and back again, where they recognized that they were accountable to each other and yet, without question, belonged.

The Relational Habitus: Projeto Clicar and the Lion King Game

An example of the early stages of this navigational process for many of the children who came to Projeto Clicar was observable in their experience of the Lion King game. A number of the smaller children, as well as some of the older children who

were new to the program, often played this game. The favorite activity for these younger children appeared to be very simple at first glance. This involved using the mouse to send Simba, the lion cub, in one direction or another. The possible path was basically two-dimensional; one could direct the lion cub to the right or to the left, but not away from or toward the viewer. Two or three of the children we observed never did anything else (as long as we were observing them) but direct Simba along this linear journey. Minute after minute, hour after hour, and day after day, we watched the children intent on making the lion cub walk along the animated landscape until he came to a barrier – a stream, a cliff, or an ominous larger animal.

For several days we watched Paulo, a newcomer to the program, as he played the game again and again, generally with one or two other children sitting beside him. By moving the mouse and directional keys to guide the pace of the lion cub, Paulo could make the game go faster or slower. In this way, he could make the game more exciting or be more cautious in the face of obstacles that appeared in Simba's path. In the beginning, he usually chose the latter. He peered at the screen and seemed fascinated at first simply by the movement on the screen – the familiar character prancing along the animated landscape totally captured his attention. It was enough for him to watch the character move to the right or left. After a few minutes of this, however, the other, more experienced children would say to him, "Vai! Vai!" (Go! Go!). Paulo then worked the mouse to make the image move a little faster. When Simba came to an obstacle, Paulo worked the mouse to send the lion cub in one direction or another. In doing so, he often glanced down at the mouse or keyboard. Whether doubtful of the connection between the mouse and what was happening on the screen, uncertain of his hand-eye coordination, or unsure of his control over the tool, he momentarily turned his focus from screen to mouse and back again. Usually Paulo made the lion cub turn around and go back the way he had come, to see if the obstacles in that direction were less formidable. But after a while, with some urging from the other children, Paulo began trying to keep the lion cub going in the same direction and by moving and clicking the mouse in coordination, attempted to overcome the obstacle.

Intently, Paulo watched the screen as his right hand guided the mouse, clicking to make the lion cub leap from rock to rock, or from rock to tree limb to rock and thus over the forbidding stream, then on again along the perilous path. Much of the time, another child, or sometimes two or three, sat next to Paulo and watched the game and commented on Paulo's progress or gave him advice or criticism on maneuvering the lion cub. After a while, especially if it was an older child who had taken part in the program for a while, he would say, "this is boring," and stand up and walk away. Nonetheless, Paulo kept his attention on the Lion King game. If others criticized his use of the directional keys and mouse, he would nod or respond monosyllabically, his eyes almost always on the screen, but glancing down from time to time at the mouse. In a fairly short time, he seemed to become fascinated and enlivened that the work of his hands had such an impact on the movements he saw on the computer screen. For a while, this sense of amazement and empowerment was enough to fully engage him throughout the hours he spent at Projeto Clicar each day.

The Clicar educators often sat next to him at some length during the time when Paulo was new to the program and observed Paulo as he played the game. For a while, he made Simba move to the right, now the left, and at first kept the lion cub

walking at a moderately slow pace, until prodded by the others to make things go faster. Paulo leaned back a little in his chair and held his head inclined forward a bit. It was not long before he forgot about the mouse and keyboard. His hands worked them almost by reflex, it seemed. His eyes hardly ever left the computer screen. He watched as the software landscape rolled by, his hand on the mouse. Still, it appeared that Paulo's stance toward the game was somewhat passive.

Paulo followed the animated character as it ambled along and reacted only at the last moment when an obstacle appeared in the character's path. It happened fast, and he reacted with too little movement, too late. As a stream appeared on the left side of the screen, Paulo leaned forward a little. As the lion came closer to the stream, Paulo moved his hand and clicked the mouse, in order to make the lion cub jump from the ground to the top of a rock. He made the leap to the rock but the second leap to a tree branch required a higher leap. Paulo paused Simba on the rock, then made the leap, without success. Paulo had not clicked with enough force to send the lion cub into a higher leap.

Roberto and Antonio, two other Projeto Clicar participants who had been watching Paulo play, commented loudly on Paulo's act. "Demais devagar!" ("Too slow!") He tried again and failed again, then immediately turned the lion cub around to walk in the other direction. He seemed a bit bored and the others did too and said so, "Mais rapido!" ("Faster!"), so he made the lion cub walk a little faster until he came to a rhinoceros. Here again, Paulo failed to click with the needed combination of speed and intensity, and Simba's leap failed. Paulo turned the lion cub around again and sent him in the original direction – to the right. This time, when the lion cub came to the stream, Antonio and Roberto were already instructing him, preparing him. "Mais alto!" ("Make him jump higher!").

Paulo leaned forward, eyes firmly on the screen, hand on the mouse, ready to act. "Now," said Antonio, and Paulo clicked the mouse, and Simba leaped onto the rock and paused to plan for the leap to the first branch. "Now," said Antonio, and Paulo clicked the mouse but again the leap was not high enough. The two others chorused their critique of his action.

"Faster."

"Stronger."

Paulo tried and failed again.

"This is boring," Roberto said. He got up and walked away. Antonio reached over and grabbed the mouse from Paulo. Paulo complained but knew the rules of sharing and let Antonio play for a while. Antonio activated the lion cub to leap onto the tree branch, paused, then leaped to the branch of another tree with another click of the mouse, then jumped down on the other side of stream. Antonio's posture was different than Paulo's. He leaned forward all the time, his chest touching the table on which the computer sat and both forearms resting lightly on the table. He worked the mouse not with his hand alone, but with an action that involved his forearm and even his shoulder, which leaned in to situate his upper arm in a relaxed but ready stance.

We watched to see if Antonio would now take over the game. Turn taking is encouraged at Projeto Clicar, and at time the children physically jockey or briefly

argue for control of the mouse. But sharing is also a value instilled in them from their first arrival, and Antonio leaned back at this point, turned to Paulo, and said, "Como isso" ("Like that"). He passed the mouse back to Paulo. It was clear from watching Antonio and other children more adept at the Lion King game that to make Simba leap effectively from rock to rock or from branch to branch, it was necessary to move him in the right direction and then to click the mouse at the correct moment and with precisely the right force to make the lion cub leap far enough. Hand-eye coordination, together with fairly precise movements of the hands, were crucial to the effective manipulation of the mouse.

Navigational Play

When children like Paulo would first begin to play Lion King, they often approached it initially as a spectator activity. They would sit down and activate the character to watch it move across the screen, at times forgetting to use their hands until the movement on the screen came to a halt. Their perception of the animated landscape with its distinctive flora and fauna appears at first to be elementary, reactive, almost passive. When they sat down next to a more expert player like Antonio for the first time and watched the field of action, they were viewing it as an animated motion picture. Soon, as they began to see that the player was himself causing the action on the screen by working the mouse, their attention became more focused. An observer like Antonio would watch the newcomer staring at the screen, almost entranced by the moving cartoon figures on the screen. At one such moment, Paulo turned to the more experienced player and looked at his face, and then his hands, which were constantly moving in subtle quick movements.

> "How does it work?" he asked.
>
> Antonio shrugged and said, "Like this. Like this. Then click."
>
> Paulo looked at the screen and watched Simba jump over rocks and other obstacles.
>
> "Let me try." Antonio again shrugged and pushed the mouse over toward Paulo.

For novices like Paulo, it was at first entertaining enough to activate the animated character of the lion and cause it to move through a colourful landscape. When Paulo moved the mouse over toward Charles (one of the authors of this article), who had sat down next to Paulo, and invited him to take a turn, Charles wondered if he was perhaps a bit frustrated with the more complicated movements or if he was acknowledging the unspoken rule for sharing the equipment at Clicar. Paulo appeared very willing for Antonio and Charles to take their turns with the mouse, but he was quickly very eager to return to the game soon after he had fulfilled sharing duties. Although Roberto had long since walked away with a sense of boredom because of the level at which Paulo was playing the game, Paulo did not appear to lose his interest in the game. He kept playing and playing. Antonio turned his attention to the activity at the adjacent computer from time to time but always returned to observe the Lion King game and offer bits of advice to Paulo. As Simba approached the stream yet

again and leaped onto the first rock, then the branch, Antonio nodded his head with approval.

"Remember to click", he said. Simba jumped to the next branch. "Now. Stronger!" Antonio urged emphatically. Another boy, Emerson, leaned over from the group at the next computer and began to join Antonio in counselling Paulo. At times, Paulo appeared frustrated. One of the educators stepped in at this point, reminding Roberto that he had once been a novice himself.

"That's what you did before, remember? How did you learn to do it?"

"I just did," Roberto said.

"But how?"

"Well, I watched Antonio and Joao. They were good. I watched them."

"Just like that?"

"Like that. They laughed at me so I wanted to get better."

"So you know how Paulo feels when you laugh at him."

"Yeah, yeah. But it's just for fun." Roberto said. He looked at Paulo

"We want you to know. Like us. We're just laughing because it's funny, once you know how. It should be fun. We're laughing for fun."

They all laughed, including Paulo, who took the mouse and moved the lion cub until it approached a rhinoceros. Then came to a stop. Then he tried to make the lion cub jump over it, but it failed to jump high enough. He started to turn back.

"No." Antonio said. "Don't stop."

He laughed at Paulo and took over the mouse again. He worked the lion cub and made it move nimbly across the landscape.

"Don't go back," he said. "Keep moving. Look ahead and think what's coming before it gets there. So you're ready and you already move when it gets there. Like that!"

He pushed the mouse over to Paulo, who made Simba move again, every now and then glancing at Antonio, who was playing football on the next computer.

Antonio glanced at Paulo and said, "Too slow."

Paulo tried to make the lion cub move faster but faltered. "I can't."

"Take your time," Antonio said. "But be ready for what's coming."

Paulo continued to manipulate the mouse. Occasionally Antonio grabbed it and made the lion cub move faster, saying, "Look." Antonio worked the mouse efficiently, the movements of his hand and arm guiding the mouse about as his fingers clicked it with a variety of subtle accents, stresses and lifts, like a piano player evoking the precise accent of various notes with an economy of exact movements of his hand and fingers. Paulo watched for a minute, then took the mouse and worked the lion cub

along, at times glancing at Antonio in anticipation of his comments and critiques. Antonio continued to play his football game, at times glancing over at Paulo's screen and at his hand working the mouse. Over time, in fact, in a relatively brief period, Paulo began to move the lion cub with greater speed and anticipation. In the process, by watching others and receiving their very minimal comments on his effectiveness in navigating the Lion King landscape, he worked out his own sense of finesse, his own feel for the game.

Participatory Appropriation

Paulo continued to play the Lion King game again and again. It appeared to be the only thing he did at Projeto Clicar over a considerable period. In time, the movement of his hands and fingers changed. The way he held his arms changed. Adapted to a state of readiness, he began enjoying himself at a different level of activity – almost casual in his stance and movements. While at first he had viewed a moving cartoon and turned his attention to the mechanics of how to control its movement, he later began to look for features of the animated environment, to remember trees or rocks or clumps of grass as clues, as telling as his partners' cues, and thus anticipate the specific feature of the terrain that was to appear next. The movement of his hands and fingers became less reactive, less exaggerated in response to something unforeseen in the animated landscape, and subtler, more proactive as he looked ahead and poised for the next leap. Paulo himself began to assume the relaxed pose of a master, his identification with Simba stronger and stronger. On the screen, the lion cub jumped from the ground to a rock, then up to a branch and from branch to branch, quickly crossing streams and evading the larger creatures in his path.

Paulo and the others groaned at his failures but reveled in his successes. Multiplied across about twenty computer screens with one or two, and sometimes three children at each screen, the activity in Projeto Clicar looked and sounded a bit like chaos, yet throughout the shared space, the mode of activity and interaction was the same. The relational habitus within the space of Projeto Clicar was one of mutual anticipation. Individual participation orientations varied individually and changed in time as children became more accomplished at simple games and moved on to more and more sophisticated games and activities, in which they again had to go through the same process, moving from tentative ineptitude to greater and greater mastery, but with increasingly understanding of how they could most quickly navigate the overall program most efficiently through collaborative engagement with each other. This habitus of participatory appropriation was established without any formal instruction, without any explicit rules. The interaction among the children was raucous, sometimes reaching a crescendo that the educators had to call to their attention, but there was rarely any issue of discipline. The young people did not want their own engagement interrupted so they moderated their interactions themselves, through a process of casual discourse by which they set their own and each other's limits and allowances. Knowledge and skill swept through the setting with a self-regulating energy and enthusiasm, as learners became educators and educators became learners again as they moved from activity to activity, mastering one task and tool and game

to enable them to become novices again in another, and in the process realizing that they were always learners and there was always more to learn.

Discussion

Using informal digital activity to provide insight into the process of learning and social and cognitive mastery through participatory appropriation, we have presented a cognitive ethnography that details the relational habitus shaping participatory appropriation at Projeto Clicar. We have seen how the relational habitus provides the context and basis for this learning, as is demonstrated by the mediational tools and informal frame through which the children engage with each other in navigational play. We observed the participatory appropriation and transformation of Paulo's learning, as demonstrated by the shifts and progress in his navigational play, both by himself and with others. We have focused on a few moments of this development to illustrate how, through Paulo's active engagement with mediational tools and his peers, he gained mastery in the world of the Lion King and in the process acquired specific digital skills, while developing the social and cognitive capacities to engage more directly and openly with his peers and with the educators at Projeto Clicar. In this way, it became evident how the relational habitus co-constructed within Projeto Clicar and through its activities provided for an inclusionary framework that enabled its participants to transform themselves.

The Relational Habitus

The Lion King game, a digital activity based on the internationally popular Disney character that Paulo and his companions had seen among the weekly movies sponsored by Projeto Clicar and on posters in the streets of Sao Paulo, and had come to know as a "person" – a persona in a drama of loss and belonging and eventual power – with whom children living on the streets could easily identify, provided an activity which the educators at Projeto Clicar shaped and guided in accordance with the program's relational habitus. While some might lament the intrusion into these children's lives of narrative material from North America's capital of popular culture, the children of Clicar by no means took their weekly exposure to this cartoon medium too seriously. Paulo, Antonio, Roberto, and their *companheiros* approached the Lion King game as a challenge to their dexterity and capacity to anticipate. The recognition of Simba the lion cub was perhaps momentarily significant, but for them, the game was the thing. Simba quickly became unimportant except as their proxy in the game's animated world. The background landscape, which initially seemed to captivate them as spectators, soon faded into relative obscurity as they increasingly focused on the foreground terrain, with its many hazards and cues to action. Remembering those cues and the hazards they foreshadowed, and anticipating the precise moment for clicking the mouse with the exact tactile intensity necessary to achieve the indispensable leap to the next level of activity, resembled more the assiduous

practice of aspiring musicians, with all the associated postures of physical and psychic readiness, and not the often presumed indolence of children playing around and wasting time with computer games.

Even to the authors, the Lion King game at first appeared rather uneducational, with little to offer for children's cognitive development. Working the mouse and directional keys to make an animated character wend its way through a two dimensional cartoon landscape did not at first appear very educational to most of us educators. But after a relatively short time, as we observed children's rapid mastery of the mouse and keyboard, we began to re-estimate its value as a tool for learning. In the context of Projeto Clicar, the children's participation with the Lion King game was voluntary but by no means solitary. A child was rarely alone when playing the game. His or her own participant orientation – the character of his or her participation – was framed by the participation of other children who came and went, or who sat next to each other, or looked over the shoulder of the one who was presently working the mouse. As a result, the child who played the game was continually observed, encouraged, critiqued, teased, prodded, and challenged by his peers, and guided both verbally and nonverbally on how to work the animation more skillfully. In this way, the children, both individually and collectively, were always changing the nature and scope of their participation in the activity – always learning something new about the tricks of navigating this animated world.

Navigational Play

As the children began figuring out, both together and separately, how to navigate this world, they did so not as solitary individuals; instead, they worked together as a distributed system of cognition, similar to what Hutchins (1995) has described in the professional world of pilots and navigators. After the children became captivated by the flickering screen and the African landscape it depicts, and after they became intrigued by the lion cub and by their ability to make it move in different directions, their practice of the activity became a study in navigation – how to establish their own positions and actions in relation to others in their environment. For the children playing the Lion King game, the concerns are equivalent to those faced by pilots and navigators, and are experienced just as intensely, if their expressions, reflex movements, gestures and verbalizations are any indication. The always looming barriers, obstacles, and other creatures that the lion cub must evade or overcome make these navigational questions of immediate and crucial concern, suspending for a while the more perilous barriers and obstacles to be faced on the streets. As he became more and more involved in the game, a child like Paulo again and again needs to establish where he, Simba himself, is situated in the animated terrain, and where he will be in the next few seconds if he maintains the same pace. It is a matter of remembering what has happened before, of recalling specific clues and cues, and anticipating exactly what feature of the landscape is about to appear.

Fortunately for Paulo and others like him, he was not alone in this activity. Others, sitting beside him or looking over his shoulder, were also engaged in the act of remembering and anticipating. They were pointing at the screen, calling out advice,

interjecting warnings, nudging his shoulder, or simply leaning forward in vicarious excitement – a collective excitement that contributed to the affective engagement of the player. At any particular moment, each child was bringing a specialized way of approaching the game – a specialized knowledge of various facets of the game. One of them would focus on recognizing clues for upcoming hazards. Another might be an expert at manipulating the mouse and keys for pacing and making the lion cub leap the right distance at the right moment. Yet another simply knew the game's geography – like a tracker knows a physical terrain – from relatively long experience with it. In a process similar to what Hutchins (1996) describes for bearing takers, bearing time-recorders, and plotters engaged in intricate navigational computations, the children of Projeto Clicar pooled their knowledge. Their personal expertise increasingly overlapped with others.' As the children came and went, as the group playing the game shifted and realigned itself, as experts and novices peered at the screen and squirmed and pointed and talked, they operated together as a functional system, and over time the game became a joint project, a shared body of knowledge, a blending of cumulative experience that became collectively memorable for them, as it informed their present practice in other games and activities, or as it enabled them to play the role of authoritative observer – of cultural broker – for any newcomer to Projeto Clicar.

Participatory Appropriation

When we look closely at how Paulo learned to navigate the Lion King game, it becomes clear that we are seeing precisely what Vygotsky was describing when he wrote about the zone of proximal development and the emergence of higher level mental processes from more elementary processes. Through practice on his own and with others, Paulo accomplished a passage from relatively involuntary to more voluntary perception and attention. The character of his participation transformed from his initial moments of passively perceiving intriguing objects moving on the computer screen to the active recognition of the content, the "nature" of the world it represents, the further recognition that it was possible to have a measure of control over that world, and the subsequent recognition of the tools of power available to him – both the computer accessories (the mouse and keyboard) and the precise physical mechanics of control (his posture, arm, hand and finger movements). Memory – the re-membering of both the physical mechanics of using the mediational accessories and the social dynamics of working with others – enables a further recognition – the anticipation of action in response to upcoming circumstances – and ultimately, a cognitive and kinesthetic stance toward a variety of potential circumstances. In short, with a little help from his friends, Paulo moves from relatively involuntary (or passive) perception and attention to a more intentioned, selective, and instrumental perception of the world of the Lion King, and by implication, the larger social world in which he took part. As Vygotsky noted, this transformation represents the emergence of capacities of a different order, which cannot be reduced to the natural, lower capacities. In this process, Paulo's attention is honed to focus on certain features of that world, to assume other features, and to neglect or ignore other features. His re-

call of the right features, of the objects deemed worth remembering by the others in his immediate social world, becomes "a process of active searching" (Luria, 1979, p. 5). Through the mediation of tools and material culture, as well as the medium of talk ("verbal thought," to use Vygotsky's term), Paulo is actively engaging (and feeling included) in a broader cultural world.

As Paulo and the others moved from their initial perception of moving images on a colorful screen to more voluntary perception of those images and to more intentional attention to their implications and manipulability, they began to approach the imaginary world of the Lion King as second nature. From all appearances, their movements became effortless. They exulted in their power to pace and position Simba, not as a Disney character, but as an extension of their own will, as if they themselves had taken on the task of moving through an animated African landscape. In effect, they became the Lion King, navigating the hazards of the digital landscape with the same anticipation and ultimately, the same sense of self-assured adeptness, as the animated character itself. The confident look on their faces, and the assertive yet relaxed mechanics they employed to control their digital movement (that is, the lion cub's movement) through that landscape, demonstrated their mastery, their appropriation of the sense of the participatory finesse necessary to navigate their way through the world of the Lion King. That world, and their relationship to it as a community of learners, came to make sense. Their progress – steady, observable, almost tangible – illustrated why even the simplest digital media can be so engaging as tools in the world of children, and why programs like Projeto Clicar can be so productive in framing activities that provide an inclusive path to integrated learning and an animated sense of mastery.

Conclusion

Our purpose has been to illustrate the importance of making explicit a theory of learning that often remains implicit in extended education programs as an unspoken cultural system or relational habitus. Making the relational habitus explicit enables us to clarify and observe the mediational tools that enable navigational play and the ultimate participatory appropriation and transformation. Approaching learning as an observable sociocultural process that takes place in the context of a particular relational habitus enables us to begin to map out children's development over time. We begin to view the interactions of learning selves with specific configurations of materials, tools, and others as tangible, repeatable patterns that can be identified as progressive levels of engagement, which indicate not only the acquisition of new skills and knowledge, but also the transformations that take place in individuals' orientation to participation in specific activities framed by the culture, or relational habitus, of an educational program. By making explicit our understanding of what learning is and how it is constituted in extended education programs like Projeto Clicar, we can thus begin to specify pedagogical strategies and tools that promote the social inclusion of marginalized young people.

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