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Toward a Cultural Theory of Gaming: Digital Games and the Co-Evolution of Media, Mind, and Culture

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Digital games are an expanding popular cultural form and the focus of a new field of scholarship that has been concerned with defining games and establishing boundaries between games and other phenomena. Studies of the coevolution of human cognition and culture can throw light on this discussion by putting gaming into a longer human perspective. Although 2 chief theorists of this field, Michael Tomasello and Merlin Donald, have not explicitly focused on games, their work has suggested that games could have played an important role in shaping the human mind and human culture, by expanding and preserving adaptive cultural patterns, furthering symbolic thinking, and expanding and preserving the expressiveness of symbolic media. Digital games can be understood as carrying on the same functions, using the new affordances of the computer.

As T.S. Eliot (1921) so famously remarked, "what happens when a new work of art is created is something that happens simultaneously to all the works of art which preceded it." Marshall McLuhan (1994) noted the same effect in the invention of a new medium: It changes how we see the media that preceded it. The invention and striking global popularity of the new genre of computer games within the new digital medium is having a similar effect, causing us to reconsider older cultural categories such as narrative, games, and play (Aarseth, 1997; Bolter & Grusin, 1999; Laurel, 1993; Manovich, 2001; Murray, 1997). The rapid growth and enormous popularity of computer-based games has made them an object of study in their own right and provoked an active critical discourse about the relation of digital games to earlier media traditions and especially to narrative and film (Wardrip-Fruin & Harrigan, 2004). Some theorists, often called "ludologists," have argued that digital games can

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best be understood as abstract rule systems, divorced from other cultural and symbolic content. In this view, the abstract game *Tetris* (1985) is the model for digital games, and the sexual attractiveness of a Lara Croft game figure or the player's sense of enacting a narrative with compelling characters and a happy or sad ending are irrelevant to the game experience (Aarseth, 2001, 2004; Eskelinen, 2001, 2004; Juul, 2001). For those like myself who believe the symbolic content of games is not so easily dismissed, the extreme formalist position of the ludologists is a useful challenge to clarify the role of symbolic content in gaming, and the connections between games and other cultural forms.

The field of digital game studies has established its own journals and research organizations including *Game Studies: The International Journal of Computer Game Research* and the Digital Games Research Association (n.d.), the latter of which describes itself as the "association for academics and professionals who research digital games and associated phenomena." Some within the field have dismissed the established research into play and games as having little to offer to an understanding of videogames. This is an understandable boundary, given the novelty of the new digital medium and the profound difference it has made in expanding the possibilities of representational forms in general, and of games in particular. However, work such as Brian Sutton-Smith's (1997) studies of children's games and his insightful synthesis of play theory, Bekoff and Byers's (1998) animal studies, and Parlett's (1999) formalistic studies of board games remain relevant to the study of computer games. Theorists who also are game designers explicitly connect the design of electronic games with the theory and practice of predigital gaming (Crawford, 2005; Salen & Zimmerman, 2003). This continuity also is recognized by formalist researchers who have sought to establish game typologies and taxonomies (Aarseth, Smedstad, & Sunnanå, 2003). For example, the "rock–paper–scissors" pattern of risks and trade-offs is a useful reference for describing similar computer game patterns involving three items (Bjork, Lundregn, & Holopainen, 2003).

The continuities between computer games and predigital games is evident in the popularity of computer-based versions of classics such as Solitaire and Scrabble, and in the growth of the videogame industry out of arcade play. We can see a progression from the shooting gallery to the pinball machine to the first person shooter or dancing game. The new encyclopedic, interactive digital medium makes extensive use of conventions from older media, reproducing game boards, playing fields, arcade weapons, vehicles as digital objects, animating human opponents as digital characters, and automating the scoring and rules systems. It also reproduces enduring behavioral patterns associated with gaming such as playfulness, tests of skill and strategy, competition, special rules and equipment, chance, spectacle, and a focus on performance (Caillois, 1961; Huizinga, 1949). The shape of videogames is, therefore, tied to older cultural forms and the pleasures of videogames seem to be rooted in our age-old attraction to games in general.

Games have not been treated as an expressive genre, such as theater, poetry, or folk songs. But their symbolic, social, and developmental value has been recognized in psychological, anthropological, and sociological studies. One obstacle to such disciplinary study is the notorious difficulty of defining games (Wittgenstein, 1958). Recent attempts to provide a definition of games as the basis for serious study of digital games have produced struggles with a few key outlier cases that make it difficult to see the boundaries between games and non-games. For example, we use the term "game" for nonplay activities such as simulation games and the stock market, and for activities that have real world consequences such as gambling (Juul, 2003). Similarly, some games such as baseball or crossword puzzles have endpoints with win–lose or solved–unsolved conditions, but others such as role-playing games or *The Sims* do not (Salen & Zimmerman, 2003). So games might best be described phenomenologically as a spectrum of playful ordered behavior that can be more or less playful and more or less ordered. However, such a solution runs into the even more contested category of play (Sutton-Smith, 1997).

The boundary between videogames and other forms of digital media is also becoming confusing. Videogames exploit all of the four key affordances of digital media: They are procedural, participatory, encyclopedic, and spatial (Murray, 1997). They include elaborate rule systems, rely on active intervention by the interactor and convene large numbers of simultaneous players, include vast amounts of information and multiple media forms, and offer complex spaces to move through. One might argue that digital games are becoming the assimilator of all earlier forms of media culture. They allow players to take on the characters of print fantasy literature or popular films. They incorporate cinematic characterization, lighting, camera angles, and even allow players to make their own movies within the game environment (a new narrative format called machinima). They include music, graphic design, and dialog, and they make wide use of narrative genres such as adventure, romance, gangsters, and superheroes and are rapidly assimilating other new media formats such as bulletin boards, chat rooms, and in-game newspapers and radio stations.

The general cultural pervasiveness of games that have made them so hard to define in the predigital world, has been magnified by the chameleon-like and expanding presence of the new digital games. This dramatic increase in the representational power, formal variety, and social impact of games increases the importance of understanding what games are and why we are drawn to playing them.

GAMES AS JOINT ATTENTIONAL SCENES

Our renewed interest in the distinguishing qualities of the ancient representational forms of games and narrative coincides with a moment of scientific focus and theoretical speculation on the prehistoric origins of mind and culture. One of the central

puzzles of evolutionary theory is the problem of the short time span in which primates developed into humanoids and humanoids developed into human beings. The exact time frame of human evolution is still uncertain, but we know that we share 98% to 99% of our genes with our closest primate cousins, the bonobos and chimps, and there seems to be a scant 6 million years since the family tree diverged. Human-like creatures have only been around for about 2 million years. The last giant step in our evolution, which was largely cognitive and took us from homo sapiens to homo sapiens sapiens, seems to have lasted somewhere between 200,000 and 400,000 years, and seems to have ended as late as 50,000 years ago. These time steps are quite small in the 4-billion-year history of life on earth, and cognitive scientists face the challenge of explaining how we could have gotten so smart, compared to our close primate cousins, in such a short period. There does not seem to have been enough iterations of birth and adaptation and death, for natural selection to have created the dramatic advantages that we hold over other related species.

Michael Tomasello (2000) explained this compressed time scheme as the result of a single change in human cognition: the ability to understand cospecifics (other members of our species) as intentional agents like oneself. This foundational change underpins symbolic communication and allows us to engage in cultural learning. Culture is the key element here, because the human advantage over other species lies in our ability to share and transmit knowledge and patterns of behavior across historical time and in the raising of children.

To make clear the distinction between the cognition of humans and other primates who share much of our sensory experience and our social orientation, Tomasello (2000) listed five actions that nonhuman primates do not do in their natural habitats:

- Point or gesture to outside objects for others.
- Hold objects up to show them to others.
- Bring others to locations so they can observe things there.
- Actively offer objects to other individuals by holding them out.
- Intentionally teach other individuals new behaviors.

Human ontogeny, the development of the individual in childhood, seems to reproduce Tomasello's hypothesized phylogenic achievement. At about 9 months of age a baby begins to recognize when he or she has the parent's attention, and then is able to follow the parent's attention to external objects by following their gaze. By 15 months the baby usually has begun pointing at things to direct the parent's attention to objects of interest. Human infants below the age of 9 months, similar to nonhuman primates, have a limited concept of their conspecifics (members of their species) as having mental awareness and intentionality. But somewhere around their 1st birthday, human infants begin to understand other people as intentional agents or "animate beings who have goals and who make active choices among be-

havioral means for attaining these goals, including active choices about what to pay attention to in pursuing those goals" (Tomasello, 2000, p. 68). Tomasello further believes that the ability to follow on the attention of the adult leads to the child recognizing when he or she is his- or herself the focus of the adult's attention and gaze, and this begins to lay the framework for an understanding of the self as an actor in the social world. This cognitive leap, which happened for the species in relatively recent evolutionary time (the last 250,000 years or so) and for the individual at 9 to 15 months old, forms the basis for the communicative cultural tasks that make up the bulk of human achievement. It is the basis of sharing, negotiating, learning, and symbolic communication.

The framework in which the cognitive achievement of understanding intentionality leads to the acquisition of culturally transmitted knowledge is called a *joint attentional scene*. A joint attentional scene involves two participants, such as a parent and child, who both understand what the other is attending to. In babyhood it occurs in play or in caretaking situations when the adult and the child have a common interest (e.g., food, tickling, stroking, diapering) and exchange gestures, sounds, or looks that each recognizes as intentional and connected to whatever holds their common focus. Once a baby and its parent achieve this ability, the baby's learning increases exponentially. Tomasello (2000) similarly believes that once early humanoids achieved this ability the possibility for cultural breakthroughs increased exponentially.

Tomasello's (2000) insight into the development of human cognition may shed light on one of the more puzzling aspects of games: Why are they fun? What is the primary motivation to engage in them? We know that play is intrinsically pleasurable for animals and humans alike, and there are many theories about its evolutionary value, including rehearsal of adult skills and mastery of a flexible repertoire of responses (Bekoff & Byers, 1998; Sutton-Smith, 1997). We seem hardwired to play—to explore for the simple pleasure of exercising our faculties and exploring the world in nonsurvival ways. This exploratory play seems to serve the purpose of expanding our repertoire of responses and of offering a wider range of cognitive patterns to apply to new situations. But games explicitly limit and channel the intrinsically pleasurable exploration characteristic of play.

In fact, games often ask us to do things that would be work if we were required to do it. I am capable of spending 1 hour or more sorting and matching symbols in a game such as *Gem Drop,* and yet I would find it torture to have to do such tasks for a living. I have known graduate students who spent hours negotiating treaties for imaginary kingdoms in live action role-playing games or coordinating the activities of a team of adventurers in an online multiplayer game. As the administrator of an academic program, it is hard for me to see such tasks as recreation, but to the players they have all the features of a game. What is it about a game activity that is intrinsically enjoyable to those who choose to engage in it? What do games offer in return for limiting the exploratory delights of play?

Perhaps the enjoyment of games is hard-wired into us, selected by thousands of years of cultural behavior to encourage us to seek out situations similar to Tomasello's (2000) joint attentional scenes.

Indeed, the three defining characteristics of a joint attentional scene are similar to the social situation necessary for gaming:

- Shared limited focus on external objects or behaviors (or both)
- Mutually witnessed intentionality among participants within the shared context
- Symbolic communication between participants

The ability to form this joint attentional scene makes it possible to engage in the activities characteristic of games: to treat abstract representations consistently, behave according to negotiated rules, and limit one's actions and attention to the game pieces and game actions to what "counts" in the game by screening out other stimuli and actions. Joint attention organizes two of the core activities of games: turn taking and synchronizing behaviors.

Tomasello's (2000) theory also suggested some of the core adaptive benefits of games, because they reinforce key benefits of joint attentional scenes:

- An understanding of the self both as an agent and an object within a community of other intentional agent–objects
- The ability to shift perspective from one's own point of view to the point of view of others, to imagine what someone else is thinking, and to see oneself from the point of view of the other
- The ability to intentionally teach and learn, which is the foundation of all human cultural development

It is easy to think of a contemporary board game or one of its early precursors, such as mancala or knucklebones, as a joint attentional activity, composed of limited focus, mutually witnessed intentional acts, and symbolic manipulation. Taking turns dropping seeds into a special set of holes in the ground or throwing pieces of animal bone or clay dice, the players are aware of each one's turn, of each one's separate actions and history in the game, and of the relative position of each to one another in the scoring of the game. Watching one another play is an opportunity for passive and active learning, and for metacomments on the play of one another. Board games intensify the opportunity for witnessing the actions of the other player and for keeping track of multiple positions within the same game. Sports games intensify the opportunity for intentional teaching and learning by focusing performance on goal-centered behaviors that are optimized for comparison between players and between turns. Games provide a framework for watching and

critiquing iterative activities and for working collectively for improved performance. These patterns of behavior are then available for survival activities.

If Tomasello (2000) was right, and our ability to form joint intentional scenes was a prerequisite to the acquisition of language, then games may be understood as a foundational element in human culture, as the gestural starting point in the history of representational media. Although he did not mention games, I believe Tomasello's work, considered in juxtaposition to other research on games and children's play, clearly points in this direction. For example, researchers at Duke University have studied toddler imitation games, such as taking turns jumping off a box, which are good examples of how joint attention is established and elaborated between cognitively matched, pre-linguistic children (Didow & Eckerman, 2001). For Carol Eckerman (Malcom, 2000) the important cognitive feature of these games is that they serve as a form of preverbal communication. She interpreted their mirroring interaction as a kind of dialog without language. I expect that the children are using imitation of nonverbal actions as a way of reaching agreement on a topic for their interaction. So, when one child imitates another he or she may say something similar to "let's do this together" and when the first child imitates back it is kind of similar to a confirmation: "Yes, I like this too."

Interestingly enough, Sutton-Smith (1997), citing Kenneth Burke and Gregory Bateson, made a similar suggestion about the function of play biting in animals. He suggested that play might be the earliest form of a negative, prior to the existence of the negative in language. Play, as a way of not doing whatever it represents, prevents error. It is a positive behavioral negative. It says no by saying yes. It is a bite but it is a nip (Sutton-Smith, 1997). In both cases, the urge to play is a means of communicating in a situation in which intelligent creatures have not yet acquired language. A play action is a signal similar to a predator call, except that its referent is to the social world.

Most interestingly, Eckerman (Malcom, 2000) observed how imitation games can lead to the development of language in clearly differentiated steps. To paraphrase and summarize her observations: First, they direct each other: "go," "wait," "jump," and "watch me." Then they answer one another: "my turn" and "you jump." Finally they describe their actions as they do them: "I jump" or "big jump!" while jumping off the box.

The game is organizing their behavior, and providing practice in language exchange and in synchronized expectations and performance. The pleasure of the game lies as much in the communication as in the actions, and it lies particularly in the matching of language to action, and in the choreographing of both into a patterned social interaction. The pleasure of games reinforces the adaptive behavior of symbolic communication around patterned social behaviors. Eckerman was particularly struck by the joyousness of the imitation game. Her work provides a dramatic parallel to Tomasello's (2000) hypothesized moments of evolutionary progress.

You can infer from the laughing and smiling going on that they really enjoy interacting with each other. Perhaps in these imitative interactions they are experiencing both their similarity to others and their separateness. Perhaps they are learning that we each are intentional agents of action and that playing together is a very pleasant thing (Malcom, 2000).

These early games are based on mutually elaborated patterns that serve the same purpose as written rules. They are intrinsically social and can, in fact, be understood as a celebration of the social—of the very presence of other intentional beings. The pleasure derived from sharing attention and witnessing and enacting intentional acts forms the framework for mastering complex physical and social skills. Spectatorship is as much a part of the experience as active performance, and in early games it is an alternating spectatorship: You do, I do; you do, I do. The elaboration of joint attentional scenes into ever more elaborate games sets up opportunities for performance, for presenting the self as a performer in a socially constructed arena, and for incorporating multiple individuals into flexible but predictable group structures.

Seeing the joint attentional scene as the ancestor of all games is another way of answering Wittgenstein's (1958) view of games as exemplary of how messy linguistic categories are. Wittgenstein complained that there is clearly nothing in common between board games, card games, or Olympic games, or between chess, tic-tac-toe, and tennis. Then he added his capper example: The least similar of all these examples is ring-a-ring-a-roses (as it is translated, or Ring Round Rosy, as it is more commonly called in the United States). Recent digital game theorists have argued that Wittgenstein gave up too soon, and they have offered their own definitions of games (Juul, 2003; Salen & Zimmerman, 2003). But they also have trouble making an inclusive definition (as discussed previously), and they exclude Ring Round Rosy because it does not have a winning condition. Yet in the light of Tomasello's (2000) and Eckerman's research, we can think of Ring Round Rosy as the paradigmatic game.

Ring Round Rosy is a variant on the toddler imitation games, but one that is taught rather than improvised, and it is one that is often led by adults, but which children then play on their own. The rhyme belongs to a relatively recent period, first appearing in print in the 19th century, and therefore not referring to the bubonic plague as some have suggested (Opie & Opie, 1973). But the activity of circling, making rhythmical noises, and obeying a symbolic verbal command to fall, could all be part of a preliterate early human game. Ring Round Rosy reflects many elements that make games valuable to the species and the individual that account for the adaptive value of the time that children put into playing them. It involves establishing a shared focus—a circle formed by everyone holding hands in which everyone is therefore focused on one another behaving in a mirroring way. It synchronizes the behavior of the group, which is one of the key requirements for survival in a culture of hunting. It creates a cohesive group, it enacts group cohe-

sion, and reinforces identification with one another and recognition of one another as sharing perceptions and intentionality. The climax "all fall down" is the most difficult part of the game of course, and the pleasure is similar to the pleasure Eckerman's toddlers have in jumping off the box one after another, but with the added excitement achieving simultaneity.

THE COEVOLUTION OF GAMES, NARRATIVE, AND MEDIA

Thinking of games in terms of their possible evolutionary history (their adaptive value) helps us to think about the persistent conflict in game studies between those who emphasize the similarities between games and stories and those who emphasize their differences (Wardrip-Fruin & Harrigan, 2004). It is significant that Tomasello (2000) linked the uniquely human understanding of cospecifics' consciousness with the uniquely human understanding of other unseen underlying causes. Tomasello believed that "human causal understanding evolved first in the social domain to comprehend others as social agents." Although there is "no way of knowing if this is true," he pointed to the cultural evidence that "many of the people of the world, when they are in doubt as to the physical cause of an event, often invoke various types of animistic or deistic forces to explain it; perhaps this is the default approach" (p. 24). In other words, sensing the unseen intentions of other people is linked to an animistic view of the world that creates explanatory narratives of intention for other events as well. Cognitive theorist Mark Turner (1996) would have agreed that an abstract sense of cause and effect is an early human cognitive achievement and precedes the acquisition of language. Turner explicitly identified this cognitive leap as narrative or "parable" making: the abstraction of causal sequences from the observed world. If we accept these theories of early cognition then we can think of games and stories as driving and coevolving with the development of language, leading to the development of more complex social patterns, more complex causal thinking, and more elaborate symbolic culture.

The Tomasello (2000) hypothesis can be interpreted as linking both games and stories to the single moment in which human consciousness first awakened. The moment has two key aspects:

- The understanding of one's fellow creatures as intentional beings, leading to the exploration of joint attention, *which can be understood as the birth of mimetic games*
- The understanding of overt events as the result of invisible causes, which leads to abstract thinking about causal patterns, *which can be understood as the birth of narrative thinking*

These two cognitive and cultural advances have one key effect: the elaboration of symbolic communication, starting with gesture and vocalization and developing into spoken language, *which can be understood as the birth of media*.

The previous italicized phrases represent my interpretation of Tomasello's (2000) theory. Just as culture and cognition coevolve, I argue that the elements of culture are also subject to an ongoing process of coevolution. Mimetic games lead to greater social organization and closer attention to the world, which forwards causal thinking, which leads to more complicated games—both of which produce a demand for more expressive language. This pattern—the coevolution of games, narrative, and language—is visible in toddlers and children. It is imaginable as a narrative of prehistoric human life. It also is visible in the cultural patterns of historical time if we think of human (spoken) language as a medium, and of later symbolic media as coevolving in a similar way with ever more elaborate mimetic and causal (game and story) genres. To knit these different time scales together and motivate these rather broad generalizations, it is useful to turn to the work of Merlin Donald (1991).

Games are hardly mentioned in Donald's (1991) theories of the coevolution of cognition and culture, but his framework, similar to Tomasello's (2000), provides a useful way of thinking about the role they have played. Donald hypothesized that modern human cognition arose in four steps. It started with *episodic culture* (the split from our primate cousins), which we share with other mammals and primates, in which social relationships and even simple tool use develop on the basis of brain function that allows only discrete episodic structure and recall. *Mimetic culture* is the step in which the early hominids can understand one another as intentional, conscious agents and can communicate symbolically. This allows them to form bands, migrate, hunt, make domesticate fire, and make simple tools. *Mythic culture* is when sapient humans communicate through symbolic forms of representation such as oral language, mimetic rituals, and cave paintings. They understand the world in narrative terms. Modern *theoretical culture* is understanding the world in terms of abstract formalisms and is based on massive externally stored memory systems such as print and computers.

The transition between the first and second stage is the one Tomasello (2000) described as bringing an understanding of shared attention and abstract causes. The mimetic stage can be thought of as driven by games and rituals, the elaboration of the synchronized actions, and communications of the humanoids with a capacity for joint attention. Game playing in this stage may have been mostly tied to survival, with the pleasure of synchronization adding energy to the acquisition of skills necessary for evading predatory animals or collectively hunting them. A sustained culture of rule-based coordinated behaviors would reinforce the development of language, which in turn would support more detailed and memorable stories. Mimetic behaviors survive in contemporary society, in pleasurable rituals such as dancing and athletics. The earliest videogames were mimetic in that the

game play was focused on the mastery of simple repetitive behaviors, moving a character through a maze and "eating" pellets. With the elaboration of the medium of videogames to include more detailed graphics and more responsive and complex programming, videogames offer us more complex patterns to absorb and perform. The toddler's pleasure in joint attention and imitation is reproduced in a way by games that challenge us to synchronize our actions with machines, such as the arcade game *Dance Dance Revolution* (Konami, 1998), in which players must keep up with a pattern of dance steps. Similar to an oral culture game such as *Simon Says,* which challenges children to conform their behavior to symbolic codes (spoken commands), *Dance Dance Revolution* presents the dance steps not by example, but in a spatial notation that must be quickly interpreted and acted on. Games such as these may help us to elaborate a common symbolic language with our new electronic joint attentional partners.

The third stage, mythic culture, can be seen as driven by complex narratives—the result of more elaborated oral language and longer traditions of shared experience. Mythic thinking, characterized by heroic legends and ritually transmitted narratives, is apparent in the writings of antiquity that transcribe oral sources and in preliterate cultures. But forms of mythic thinking endure into our postliterate age, often reinforcing affiliations based on common identities as in families, ethnic groups, and political parties. When athletic events become mass spectator sports in which players embody the aspirations of spectator fans, they pass from mimetic into mythic culture, with larger than life performances of super human beings. Videogames often invoke this mythic state of mind by casting the player in the role of superhero or placing the action within a fantasy domain characterized by animism and supernatural "mythical" figures.

The fourth and current stage of human culture, according to Donald (1991), is characterized by theoretical thinking. The transition from the mythic to the theoretical stage is the result of the invention of writing, which was first used as a commercial tool and for talismanic inscriptions of the names of gods and rules. Later it was a way of recording oral culture such as stories and magical spells. It was then perfected by the Greeks as a means of recording the process of thinking and reasoning, thereby allowing for a sustained collective discourse that moves from mythic explanations to reasoned argumentation. In Donald's elegant analysis we move from ape to Einstein in only three steps, which we can think of in terms of symbolic exchange, cognitive strategies, or cultural building blocks: from joint attention to language to writing, from mimesis to narrative to argumentation, and from ritual to myth to theory.

Although neither Tomasello (2000) or Donald (1991) pointed to games as instruments of cognitive evolution, it is striking how often games are part of their arguments. Tomasello's experimental examples with apes and children have usually been in the form of games. Both Tomasello and Donald pointed to children's superiority at games as evidence of fundamental cognitive differences that predate language acquisition.

Human children play rule-governed games by imitation, often without any formalized instruction. They invent and learn new games, often without using language. Apes, similar to other animals, cannot learn similar games. Apes are restricted to games that, by our standards, are very simple. The problem of bridging from ape to human would thus appear to involve a great deal more than pinpointing the arrival time of vocal language (Donald, 1991). But although Donald instanced mimetic games as one of the key components of hominid development, both cognitive scientists stopped short of seeing games as a driving force of cognitive and cultural evolution. Yet the more one thinks about the elements of cultural cognition the more game-like they seem.

GAMES AS CULTURAL RATCHETS

Tomasello (2000) and others accounted for the rapid progress of human culture over a relatively brief time span as benefiting from "the ratchet effect." The process of cumulative cultural evolution requires not only creative invention but also, and just as importantly, faithful social transmission that can work as a ratchet to prevent slippage backward. This is so that the newly invented artifact or practice preserves its new and improved form at least somewhat faithfully until a further modification or improvement comes along (Tomasello, 2000, p. 5).

Games seem to be well-suited to the role of cultural ratchet, preserving patterns of behavior from one generation to the next through the intrinsic pleasure of shared attention and imitation. Game play in itself is a means of transmitting general habits of imitating, sequencing, and synchronizing actions. In a mimetic culture, games may have provided practice in linking language to objects and actions. In a mythic culture, they linked the practice of augury with numerical skills through symbolic gambling games. An ancient game such as mancala, which can be played with seeds and holes in the earth, can serve as a framework for practicing and preserving cognitive skills such as sorting and social skills such as turn taking and bluffing. Many patterns that are rigidly enforced in games are also the basis of general social organization, such as turn taking, following the leader, exchanging property, team formation, conflict containment, and collective focusing on common goals. The win–lose pattern of games seems also to be adaptive in motivating repeated practice and competitive effort.

The formal structure of games as participatory rule systems also can be seen as functioning as a cultural ratchet. The rules of games allow social groups to focus questions of what is allowed, disallowed, fair, and unfair. They offer a symmetrical means of interaction—a way of practicing reciprocity. Games involve a pleasure in inventing, establishing, recognizing, and reproducing patterns of behavior and object manipulation. This close attention to pattern and delight in pattern mimicry has survival value as the basis of skill acquisition and social organization. It is still

the case that we experience nonplay situations as games, meaning that they are enjoyable or compelling as abstract patterns of interaction, when they have clear rule systems, especially those involving relative gain and loss, such as the stock market; the legal system; or even, disturbingly, warfare.

Other game patterns seem to address basic cognitive skills such as sequencing actions, coordinating hand and eye, sorting, matching, counting, and navigating a map. These game primitives are common to the earliest children's games and to traditional games including those known from ancient times, such as athletic contests, dice, and board games. They all focus attention on a limited domain and force us to match our behavior with conscious, shared expectations.

As Donald (1991) pointed out, human cognitive advancement is closely linked to the development of media of communication. Mimetic gestural exchange within the context of joint attentional scenes is a kind of prelinguistic medium. Language brings an exponential increase in our capacity for symbolic representation. Writing increases our ability to order the world, retain consistency of practices over time, record and retrieve information, and shape sustained arguments. But modern theoretical culture requires the massive storage of information and sustained arguments over longer periods of time.

Games have been, and continue to be, useful in directing our attention to all of these media, allowing for exploration of new means of expression and preserving outdated media forms for later reuse. Games can be seen as a means of coevolving our minds and our media, of assimilating new technologies of inscription through exploration of their capacity for symbolic representation, and of preserving and expanding symbolic expression by making symbolic systems the explicit focus of activity.

Board games from tic tac toe to chess allow us to focus on the common interpretation of inscriptions, which is the basis of written language. Games offer practice in symbolic media and often focus on the symbol making. For example riddle games, puns, and nonsense rhymes foreground the arbitrary linkages between sound and meaning in the medium of spoken language. Game tokens hearken back to an archaic counting system, invented ten thousand years ago that was the forerunner of cuneiform writing. Clay tokens shaped like spheres, cones, cylinders, rectangles, and other distinct forms represented commodities such as jugs of wine or heads of sheep in the nascent economies of Near East. Around 3500 B.C. clay envelope-like containers began to appear, marked with token-shaped imprints. By about 3200 B.C. these containers had evolved into clay tablets imprinted with cuneiform symbols (Schmandt-Besserat, 1996). This progression from token to tablet is echoed in the earliest preserved board game, the Royal Game of Ur (c. 2600 B.C.), which includes round tokens with geometrically grouped marking and a playing board divided into squares with similar markings. Progress around the board (it seems to have been a race game) was controlled by throwing three pyramid shaped dice, which are believed to have had binary values (0 or 1). Similar to

the token system, dice (or lots) are among the oldest symbolic media in the world, associated in ancient times with divination, fate, and gambling. The backgammon board resembles accounting tables that functioned as aids to calculation. The use of the computer as an automated game board repeats these patterns both literally and formally: It incorporates images of ancient game boards, and it follows the same pattern of domesticating complex media through game-like exploration.

Digital Games as Cultural and Media Vanguards

I have argued elsewhere that the advent of the computer as a medium with its unique combination of procedural, participatory, encyclopedic, and spatial affordances is an advance in human culture comparable to the invention of print or moving image photography (Murray, 1997). The new digital medium expands our cognitive powers by offering us new ways of representing the world (e.g., through parameterized simulations) and greater powers of organizing information (e.g., multimedia archives accessible through metadata). It also is a medium that is particularly well-suited to games, because the rules of the game can be programmed into the computer and because the user can take on the role of the player. Playing games on the computer is similar to, and different from, predigital game playing. It conflates game and puzzle into a single form in that a game played against a mechanized opponent is really a procedural puzzle. It can eliminate turn taking by providing worlds that are always open to interruption and intervention at whatever pace the interactor is willing or able to sustain. The computer is not aware of our common focus because it is not conscious in the same way a human player is conscious. But it provides us with a partner whose thought processes we are aware of, and who represents the mediated consciousness of an implied human programmer. We engage with the computer as if it were an embodied opponent, but also as if it were similar to a painting or a book—the result of a prior act of conscious representation. Games can be thought of as socializing us into a new cyborg order, establishing rituals of commonality with proceduralized artifacts.

Digital games also capture the promise of digital media to exponentially expand the information- rich representational structures on which our modern culture rests. They let us play with complex representations that are similar to the system models we are building in every domain of human knowledge, from cosmology to global finance to family psychology. The design of *Sim City* (Wright, 1989), for example, rests on models similar to those used by urban planners. Although critics have contested the social assumptions behind those models, the game play provides us with a way of thinking about the interrelatedness of resources within a city and the multiple possible ways a city can grow (Friedman, 1999; Starr, 1994). The cognitive strategies and representational conventions of the systems mode of thought are spread by simulation games such as *Sim City*, just as games in older

media forms spread older visual, verbal, and numerical skills sets and conventions. As the medium in which we create such models becomes more plastic and accessible, we may develop ways of exchanging alternate interactive models of the same phenomena, just as we have developed ways of spreading alternate sequences of verbal reasoning through oral and print culture.

Games also are the means of elaborating and practicing rituals of social organization. The Internet has extended the social power of gaming by allowing hundreds of thousands of people to participate in shared rule-based communities, starting with the text-based "multiplayer dungeons" of the 1980s. The Korean game *Lineage* (Song, 2001) attracts millions of players and lasts over years; *Everquest* (Verant, 1999) and *World of Warcraft* (Blizzard, 2004) sustain hundreds of thousands of players. A common element of these worlds is the negotiation of social rules of behavior, such as property rights and player-against-player killing. Online communities also self- organize around puzzle games such as the one released in connection with Steven Spielberg's (2001) film *AI*. The new category of pervasive games combines Web and mobile communication technologies with geographical positioning to take established game forms such as scavenger hunts and participatory theater into our new information spaces, and to blur the boundaries between the real and the virtual. This massive, team-oriented global gaming activity is an accompaniment to the many global-scale cultural, social, and political processes that characterize the early 21st century.

Games have also become a focus of participatory performance art, calling attention to symbolic content of games often in disturbing ways. The British art collective Blast Theory produces unsettling treasure hunts in virtual and real urban space that require the player to trust strangers (http://www.blasttheory.co.uk). Avant Gaming has announced a reinvention of the arcade game *Dance Dance Revolution* (2001) into *Dance Dance Immolation,* in which players wearing aluminized protective fire suits are rewarded for skillful dancing by propane guns shooting flames in the air and punished by having the flames aimed at the player's face. Although mainstream game design has its fixed genres and predictable titles, the audience is sophisticated enough to recognize the work of auteurs such as Will Wright and Peter Molyneux and to savor innovation in the aesthetics of game play. One of the most popular digital games of the past few years is *Katamari Damacy* (Takahashi, 2004), a hypnotic and surreal screen-based game, in which the player rolls a ball that picks up everything it comes in contact with—furniture, trees, buildings—until it reaches global proportions. Although the designer, Keita Takahashi, was inspired by Japanese children's ball rolling games, the world of the game is quite original, bizarrely supernatural without being conventionally heroic or gothic. The fantasy quality of this world derives from the powerful movement of the ball, which is simply and logically displayed in the virtual world, and yet unimaginable in the world of real objects. *Katamari Damacy*, similar to the wildly popular abstract game, *Tetris* (Pajitnov, 1985), challenges us to develop new spatial manipu-

lation skills by creating compelling concrete images that behave in unreal but logical ways.

The work of Tomasello (2000) and Donald (1991) invites us to think about the history of human cognition as based on a succession of symbolic media patterns: Mimesis brings us language that brings us mythic narrative that brings us writing that brings us theoretical discourse that now brings us the computer. Yet all of these media stages are present at any time because they represent persistent, productive cultural strategies. In fact, we can think of the superset of all media as a single language, a paradigm of symbolic communication, and a union catalog of expressive symbols of every kind. As a species we are in possession of this symbol set, and we are constantly inventing new patterns to express new experiences or previously unseen or unspoken or untheorized phenomena. Our media are coevolving with our collective mind and culture. Donald adopted Vygotsky's (1978) notion of the zone of proximal development to speak about a zone of *proximal evolution,* the space between primate and human cognition or between different stages of human cognition. I would add the concept of a zone of proximal media evolution: a next stage of potential invention for the technologies and conventions of symbolic communication. In the 19th century, the movies were in this zone—capable of being invented because of the convergence of new technologies with ancient story patterns. Similarly, the turn of the 21st century has seen the invention of the multimedia networked computer and the emergence of videogames drawing on millennia of game conventions. In the collective process of inventing new symbolic media forms, we rely on the scaffolding of older media and patterns drawn from other activities. Games are a form of pattern abstraction that has served us well over thousands of years. They are the means of divorcing behaviors and symbols from their real world context and manipulating them as pure symbol systems: Tokens no longer represent sheep, but just a system of exchange across a game board. The computer is the most capacious pattern-making medium we have ever had. We have only begun to glimpse the new symbolic structures that we can build with it: cognitive scaffolds that will help us to organize and advance the traditions of thinking that have now brought us beyond the ability to represent our ideas in purely linear form. Given that games play a key role in giving birth to language in the individual and the species, we should not be surprised that they are playing a key role in elaborating the new symbolic language of interaction, in expanding the zone of proximal development for digital media.

The computer is the quintessential medium of theoretical discourse, but it also brings us back to the basics of mimetic representation. In some ways it is the machine whose attention we are sharing and whose primitive cognition we are cultivating with our expanding repertoire of ritual behaviors. It is tempting to see the current moment as parallel to the origin stories we have been elaborating. Just as games led us away from our primate cousins and into the richly meaningful human world of symbolic culture, so they seem now to be leading us into a new intimacy with the machine. Is the zone of proximal media evolution filled with cyborg crea-

tures waiting to be born? The answer lies, perhaps, in the joyful source of cultural development—the toddler's pleasure in recognizing companionship and coordinating action. Although computers may crash with maddening regularity, they never do it for fun. Although they may act with magnificent global coordination, they do not do it for the joy of it. In other words, it is foolish to worry about people being supplanted by a chess-playing program (which is after all a triumph of the very human activity of symbolic representation). We should instead ask ourselves if it is likely that two laptops, idle and side by side, will one day generate a binary version of Ring Round Rosy.

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