PROJECT MUSE®

Emergent Narrative in Interactive Media

Richard Walsh

Narrative, Volume 19, Number 1, January 2011, pp. 72-85 (Article)

Published by The Ohio State University Press
DOI: 10.1353/nar.2011.0006

For additional information about this article
http://muse.jhu.edu/journals/nar/summary/v019/19.1.walsh.html

Access provided by University of Bath (2 Dec 2013 04:46 GMT)

Richard Walsh

Emergent Narrative in Interactive Media

The connections between the concepts of emergence and narrative are manifold, complex and significantly non-obvious, but in one context at least they come together explicitly: the term "emergent narrative" has an established currency in computer game studies as a potential (and desirable) effect of interactive media. Indeed for many it is the holy grail of contemporary computer game design, offering as it does the prospect of reconciliation between the conflicting values of narrative satisfaction and player autonomy. In the academic context of digital media studies, this same promise of synthesis has put emergent narrative in the front line of a long-running debate between ludologists and narratologists about the relative importance of game and narrative paradigms. My argument here suggests that emergent narrative is not the unifying concept it appears to be for computer game studies, though it does have interesting possibilities in that field; more fundamentally, though, I want to argue that this seemingly very specific concept helps to clarify the incommensurability of emergence and narrative and has implications for our larger understanding of the process of narrative sense making. The discussion begins with an introduction to emergence and some indication of its problematic relation to narrative. I then turn to emergent narrative itself, outlining the history of the concept and some difficulties of definition. I argue that these difficulties arise from confusions about the nature of simulation, and I make a case for understanding narrative and simulation as distinct and, in certain respects, antithetical modes of representation. This view of simulation undermines the narrative status of current notions of emergent narrative, despite the support those notions draw from the field of narrative theory; the argument has im-

Richard Walsh is a senior lecturer in English and Related Literature at the University of York, where he teaches primarily narrative theory, early film, and American literature. He is the author of *The Rhetoric of Fictionality: Narrative Theory and the Idea of Fiction*, which proposes a fundamental reconceptualization of the role of fictionality in narrative and in doing so challenges many of the core assumptions of narrative theory. His current research is concerned with narrative in its broadest interdisciplinary contexts and seeks to negotiate between its ubiquity and its limitations by situating it in relation to complex systems and the concept of emergence. He is the leader of the Fictionality Research Group at York and director of the Narrative Research theme within York's Centre for Modern Studies.

NARRATIVE, Vol 19, No. 1 (January 2011)
Copyright 2011 by the Ohio State University

plications for both the concept and the field, which I expound in terms of the relation between simulations and fictional worlds. Following this critique, I make a positive case for the possibility of genuinely emergent narrative, understood as a particular use of simulation, and I conclude by extending the discussion to non-digital contexts and the lessons emergent narrative might offer to our larger understanding of narrative production.

The concept of emergence is used across a remarkably diverse set of disciplinary contexts, from theoretical physics to social science, economics to cognitive psychology. The essence of the concept is readily conveyed, but it becomes slippery upon closer examination, for reasons that will partly appear in the following discussion; while it does service as an explanatory term in many contexts, it is as likely to appear as a theoretical problem. Emergence is a feature of complex systems: the term refers to phenomena or behavior produced by a system but not apparent from an inspection of the elements of the system and the laws governing it. Aphoristic definitions of emergence commonly draw upon Aristotle's discussion of unity in the definition of substance, where he writes, "the totality is not, as it were, a mere heap, but the whole is something besides the parts" (*Metaphysics* 1045a); or, they cite Philip Anderson's influential argument against the "constructionist" interpretation of scientific reductionism, "More is Different"; or, perhaps more suggestively from a narrative point of view, they characterize an emergent system as "a pattern in time" (Holland 1; Johnson 20, 27, 104–105). It is more helpful for the purposes of this discussion, though, to think of emergence in relation to a distinction of levels: a system's emergent phenomena require description at a level of organization above that which provides the base-level description of the system itself. These two descriptions are non-continuous—the higher-level description cannot be reduced to the terms of the lower level—but an adequate account of the emergent phenomenon requires both. One of the most commonly invoked and accessible examples of emergence is Conway's automaton, otherwise known as the game of Life.[1] "Life," because the laws of the system are supposed to model basic parameters of survival; for this reason it is doubly suited to my purposes here, serving to illustrate not only the concept of emergence but also that of simulation, which will become important later. The game of Life is a cellular automaton based upon a two-dimensional orthogonal grid of cells, each of which may be either live (black) or dead (white). The rules governing the system are as follows:

1. A cell becomes live if exactly three of its eight neighbours are live (reproduction).
2. A cell dies if it has fewer than two live neighbours (isolation), or more than three live neighbours (overpopulation).
3. Otherwise, a cell remains in the same state.

These rules are applied to each generation of the system; depending upon the initial configuration of live cells, a number of persistent patterns can emerge, some of which are extraordinarily complex. Some of the simplest are illustrated in Figure 1: those on the left (*a* and *b*) are "still lives," which persist unchanged once established;

those on the right (*c* and *d*) are "oscillators," which cycle through different forms (in these cases, with a period of two—the left-hand form and the right-hand form).

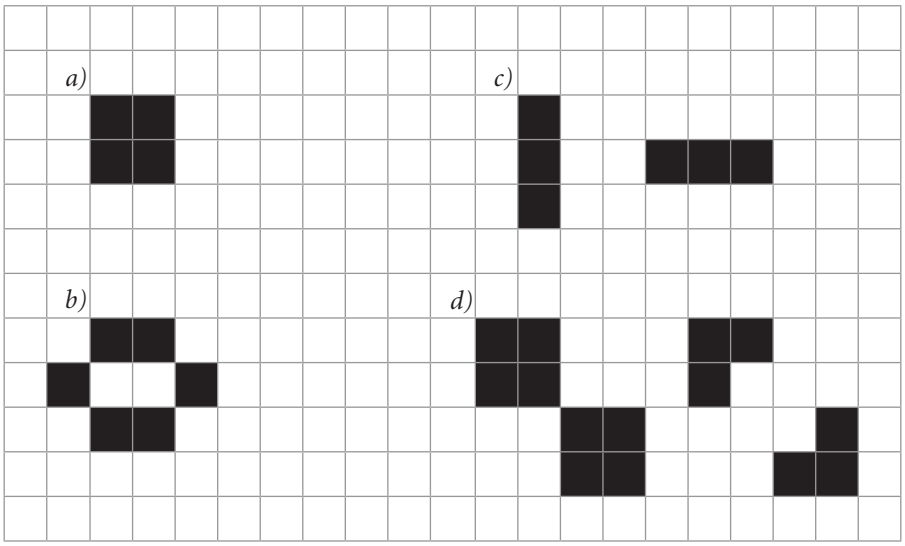

Fig. 1

These patterns are emergent phenomena—in fact they have established names: *a)* block, *b)* beehive, *c)* blinker, and *d)* beacon. They have to be described as spatial configurations, in terms that are not commensurate with the rules that describe the underlying system, although these rules determine them entirely. More complex emergent phenomena exhibit emergent behavior, as with the pattern in Figure 2, which is known as a glider. It has a period of four (steps *a*, *b*, *c* and *d*), but with each cycle it shifts along and down one cell in the grid, so that configuration *e)* is a return to *a)*, displaced diagonally from its original position.

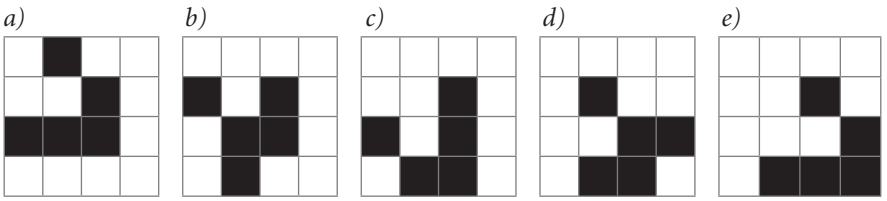

Fig. 2

Once again, the glider's existence and behavior are simply the result of applying the system's rules to each cell for each step in the sequence. Nevertheless, those rules and the initial configuration in *a)* do not in any way constitute a description of the persistent, moving entity we call a glider; nor can it be said that the phenomenon is predicted by these systemic specifications. The specifications can serve no such func-

tion because they are in practice opaque to inspection and because their implications cannot be determined, in principle, in any simpler way than by doing the iterative calculation involved—which is formally identical to running the cellular automaton and seeing what happens. It is also worth noting that the glider's existence and behavior lend themselves to narrative description at a level of organization above that of the individual cells; in fact, a plausible definition of emergent behavior in a system would be that which becomes narratable at a higher level of organization.

The definition of emergence in terms of levels of organization implies, of course, that other levels may be discriminated; and indeed such a hierarchy of emergence does appear in the game of Life, as for instance with a set of elaborate cell formations known as "glider guns," which produce an endless series of gliders. The name "glider gun" is not just symptomatic of a relaxed attitude to mixing metaphors at MIT; it is indicative of the different levels of organization, and of emergence, involved. The base system, the game of Life, may generate one emergent system, the "gun," which itself generates further emergent phenomena, the "gliders."[2] The incommensurability of the metaphors is in keeping with the incommensurability of the levels of organization to which they apply. In the same way, a narrative representation of emergent behavior is a gross misrepresentation when considered at the level of the underlying system. We identify an agent we call a glider, and we say the glider moves diagonally across the field, and from an analytic point of view we are wrong in all important respects. The phenomenon we describe in this way does not persist as an entity but as a pattern in time. There is no composite agent, and nothing moves in any direction. Any conceivable narrative of the higher-level behavior would therefore misrepresent what is happening in the system, while any description of the system itself, with its multiple simultaneous recursive operations, necessarily defies narrative form. Our propensity for narrative misrepresentation of complex phenomena is something with which narratologists are already familiar, in the context of the theory of evolution by natural selection, from Porter Abbott's work on the subject ("Unnarratable Knowledge"; "Emergent Behavior"). The laws of natural selection represent the base level of a complex system from which genes, organisms, species, ecosystems, and the whole of natural history are emergent phenomena. Narrative accounts of evolutionary processes attribute agency to one or other of these phenomena and so inevitably traduce the way the laws of natural selection operate. Here, as with the game of Life example, narrative description misrepresents in that it relates only to the emergent level. Emergent phenomena themselves relate (discontinuously) to both the emergent level and the systemic level beneath; an adequate account of them requires (at least) two non-equivalent descriptions.[3]

Narrative has figured as an unexamined term in this discussion so far, but I am not assuming a ready consensus about what narrative actually is. In fact, the question of what counts as narrative will be central to my argument, though I am deferring that issue for the moment on the assumption that a broad notion of narrative will suffice to open the question and make intelligible the subsequent points at issue. The question, then, is this: I have invoked narrative in relation to the description of emergence, but what can we learn from those situations in which narrative itself can be viewed as an emergent phenomenon?

One familiar example of emergent narrative by another name would be dramatic improvisation. The story produced by a group of improvising actors is not determined from the top down, by a playwright or director; nor is it the creation of any one actor. Instead, it emerges from the interactions among the members of the group—that is, the elements of the system. However, this straightforward notion gets more complicated in the context of digital media, which is where the specific concept of emergent narrative has been developed. It has been current since 1995, when Tinsley Galyean offered this account of it: "We all construct narratives out of our daily activities to help us remember, understand, categorize and share experiences. It is this skill that many interactive systems exploit. They give us environments to explore. We, by combining the elements of these spaces with our goals (the user's goals), allow a narrative to emerge. If any narrative structure (or story) emerges it is a product of our interactions and goals as we navigate the experience. I call this 'Emergent Narrative'" (27). In Galyean's account the notion of interaction essential to emergent narrative is conceived as the interaction between a user and a simulated environment. Ruth Aylett has developed the idea of emergent narrative as a product of interaction in a different sense, that is, the interaction between the user and digital agents, or bots, *within* a simulated environment. This model was originally developed as part of a project based upon virtual Teletubbies (the 90s children's television characters), whose very restricted set of behaviors lent themselves to digital automation. The two models of emergent narrative have slightly different implications, and I shall take both into account; the essential concept they share, however, is interactivity. Interactivity is certainly a prerequisite for emergence; more specifically, interactivity must be understood as reciprocal and recursive. As with Conway's automaton, it is the repeated interaction of mutually modifying elements that produces non-linear complexity out of simple rules. Each cell in the automaton both affects and is affected by its neighbouring cells with every iteration of the game of Life rules. Note that interactivity has to be understood in relation to the base level (the reciprocal effects of neighboring cells upon each other); the interaction of higher-level phenomena (gliders, glider guns) only occurs through the medium of the base-level system. A rigorous definition of interactivity along these lines helps to explain why some superficially interactive forms of narrative are not candidates for emergence. Hypertext narration, at least in its most elementary, forking-path form (on the "choose your own adventure" model) does not qualify as emergent narrative: it is not a system the user interacts with in the full sense, so much as one the user navigates through, choosing among a number of prewritten narratives.

But even as formulated by Galyean and Aylett, the concept of emergent narrative is problematic—not with respect to emergence but with respect to narrative. The core of the problem is the nature of simulation and how this concept bears upon the simulated environment that serves as the foundation for both models. A helpful definition of simulation might begin with the following, from Gonzalo Frasca: "'to simulate is to model a (source) system through a different system which maintains to somebody some of the behaviors of the original system.' The key term here is 'behavior'" (223). Frasca's argument seeks to oppose simulation to representation, but I see no need to be so Manichean: simulation as defined here is surely a form of representation. A

simulation models—that is, represents—a system; the crucial point is that it does so in systemic terms. Its object of representation is not (or not directly) the particulars of a spatio-temporal environment but rather something more general and abstract behind those particulars; it specifies a set of laws or rules designed to reproduce the source system sufficiently well that certain behaviors of that system are also, in analogous form, produced by the simulation. Two things follow from such an understanding of simulation: firstly, simulation and narrative are categorically distinct modes of representation; secondly, a particular run through a simulation (that is, the interaction of its systemic laws, given certain initial conditions, for a certain period) does not in itself produce emergent narrative but instead emergent behavior. So Aylett's virtual Teletubbies, interacting with each other and with the user's input will (given the right conditions) produce emergent behavior that we as observers may be inclined to narrativize, just as we do in apprehending Conway's gliders. Similarly, the goal-oriented user in Galyean's interactive environment participates in the emergent behavior that system provides for, and that *experience* is one that the user may be inclined to narrativize. In neither case is the narrative itself emergent with respect to the simulation; it is a higher-level sense-making activity on the part of the user or observer, continuous with the kind of narrative sense making that informs our cognitive assimilation of life, experience, and the world around us. A user's interaction with a simulation is, in the first instance, behavior within the parameters of a system; it is no more inherently narrative than our behavior in negotiating everyday life.

Galyean in fact registers this distinction between narrative and behavior (he says "we all construct narratives out of our daily activities," not that our daily activities are narratives) without seeing that it drives a wedge between narrative and emergence. Aylett, though, would persist in the face of my objection, on the basis that in life, too, narrative may emerge from behavior. Her example, a football match, is chosen explicitly for its proximity, as a team game, to the case of interactive simulation and so doesn't really make the argument because it functions as a representational system itself (84); but the thrust of the argument is clear enough and is consolidated in later work from Aylett's research group, which more explicitly grounds emergent narrative in the behavior of characters and the user (as a "participant") within a virtual environment (Louchart and Aylett 26). At this point, the contested nature of the concept of narrative becomes apparent, because Aylett has good narratological authority for the claim that behavior, action itself, may be storied: just such an assumption runs through the whole history of the distinction between *fabula* and *syuzhet* (or story and discourse) in narrative theory, where much confusion arises from the idea that *fabula* can exist—can be conceived—prior to, or independent from, narrative representation.[4] This topic in narrative theory has generally been discussed in the context of fictional narrative, and so the misconception is typically formulated in relation to the idea of events in a fictional world, rather than the real world. The concept of a fictional world has been misleading for narrative theory because it has tended to stand as a proxy for the real world in relation to fictional narrative, whereas it corresponds much more accurately to the distinct representational mode of simulation used as a conceptual foil to narrative representation itself. For this reason it is helpful to consider simulation and fictional worlds together, and the best way to do so is to

cite Marie-Laure Ryan, possibly the narrative theorist who has engaged most extensively with digital media. Ryan, in the course of a discussion about the entrenched antagonism between ludologist and narrativist approaches to the study of computer games, suggests that the argument may be simply a disagreement about the scope of the term "narrative." She offers this clarification: "For a narratologist (or at least, for a narratologist of the cognitivist school), capturing a fictional world that evolves in time under the action of intelligent agents is all it takes for a semiotic artefact to fulfill the semantic conditions of narrativity" (*Avatars* 200). On this view, simulation is a form of representation (I agree), and therefore running the simulation—that is, playing the game, or interacting with the simulated environment—produces a represented spatio-temporal world, and doing so is a sufficient criterion for narrativity. A lot hinges upon how the word "narrativity" is interpreted here, but one common sense of the word, "the quality of being narrative" (Prince 387), is not applicable to simulated environments. (The other prevalent sense, in which narrativity refers to qualities that invite narrative interpretation, will be taken up below.) A simulation is a semiotic artefact, but that does not make it a narrative artefact, even where it involves the interaction of intelligent agents, as with Aylett's model. All that a simulation represents, by means of a set of governing rules, is the operation of the system it is modelling. The elements of that simulation may well be clothed in representational form—anthropomorphic agents, verisimilar environments—but these representations are secondary to the functioning of the simulation and serve to make *its* representational logic intelligible, not to model a source independent of that systemic representation. Playing *The Sims*, for example, you quickly discover that your knowledge of how real people behave is not a reliable interpretive paradigm: the behavior of a Sim has to be understood in relation to the system within which it behaves, a system which itself simulates only a very restrictive subset of real world processes, events, and behaviors. The events in a simulated environment are not in themselves products of representation but of action; they are not features of the simulation as a semiotic artefact (a representation of a system) but features of the simulation as a system in itself and of interactions constrained by the parameters of that system. They are actual events within an actual system, which also represents another system. Simulation and narrative, as modes of representation, are different in kind: a simulation represents a system, globally, while a narrative represents a discrete temporal sequence. Accordingly, to derive a fictional world from a narrative is to use the narrative as the basis for an exercise in mental simulation; it is a particular way of understanding narrative—in effect, the reverse of the cognitive process of understanding events within a simulated environment by narrativizing them. But the close interrelation between these cognitive orientations should not obscure the fact that action, whether within the domain of life or of a simulation, is not in itself narrative.

However, I do not intend this argument as a refutation of the idea of emergent narrative, because I think that idea is valuable. I do want to insist upon a concept of narrative as a semiotic activity, a sense-making process, rather than a product of other modes of representation or action. In these terms, narrative cannot be an inherent result of running a simulation or interacting with a simulated environment, but it *can* be a specific use of such simulation and such interaction—that is to say, a

semiotic use. We need to distinguish between two modes of interactivity: on the one hand, behavioral interactivity, in which the interactive system is a domain of action and can only generate emergent behavior (for example, the interaction between cells in Conway's automaton, where the system rules determine what each cell does with reference to the state of the system itself); on the other hand, semiotic interactivity, in which the interactive system is a domain of representation, and one of the possible effects is emergent narrative (for example, the interaction between players in a game of "Fortunately, Unfortunately," where the rules refer each turn to the represented situation created by the previous turn). A simulation is both a domain of action and a domain of representation; consequently, the nature of the emergent phenomena a simulation may produce is dependent upon the mode of interactivity that takes place within it. It is helpful at this point to recall the definition of emergence in terms of levels that I outlined above: emergence is the result of interactions within a complex system that produce phenomena at a level of organization above that of the system itself. A simulation conceived as a domain of action in terms of behavior allows for the possibility that behavioral interactions will produce higher-level behaviors: the programmed behavior set of a digital agent interacting with a simulated environment—or the interactions between such agents and a user engaged with the system as a participant (whether directly or via an avatar)—can produce the appearance of behavior irreducible to the terms of the behaviors actually programmed into the simulation. The integrity of this behavior is an emergent phenomenon; a description of it would attribute higher-level goals, motives, or intentionality to the agents concerned, whereas it is actually the net effect of multiple interactions at a lower level comprehended as a unit on another scale. Contrast this account of emergent behavior *within* the system of a simulation and the account required of a simulation that is conceived as a representational domain. In that case, the basis for interactivity is semiotic; it occurs between units of meaning rather than units of action. The elements of the simulation itself are understood in their representational capacity, the crucial feature of which is not merely that they stand for something else (elements of the system being simulated) but that they are taken as *designed* to do so; they are communicative acts. The representational elements of the simulation can therefore interact with representational interventions by the user, conceived now not as a behavioral participant but as a communicative dialogist; and the interaction between these communicative acts can produce the appearance of a higher-degree representational intentionality, irreducible to the level of the interactions themselves. This higher-level communicative agency, or collective representation, may be narrative in mode; it is an emergent phenomenon, arising out of the distributed communicative agency of representational interactions at the level of the simulation itself.

The difference I am attempting to articulate can be clarified, with respect to narrative, by invoking a useful distinction from David Herman between two senses of narrative cognition: narrative sense making, and making sense of narrative (12–14). I noted earlier in this essay that emergent behavior can be conceived as systemic behavior that becomes narratable at a higher level; it is conceptualized as such through an effort of narrative sense making. Emergent narrative, on the other hand, is a form of systemic representation that becomes interpretable at a higher level; it is understood

as an invitation to make sense of narrative. Or, more succinctly, emergent behavior is narratable; emergent narrative is legible.

So, to return to those virtual Teletubbies, the extent to which they can serve as a model for emergent narrative depends upon the way in which the simulation is conceived. The Teletubbies themselves interact with each other and with the user as participant, according to the dictates of their programmed behaviors, but this interaction is not semiotic; it is just action—what happens in a particular run of the simulation. To the extent that the bots' behavior is intelligible in terms that transcend the level of their programming, it is emergent behavior, but it is not emergent narrative, because it is not narrative. Louchart and Aylett explicitly adopt a character-based model of emergent narrative in preference to one oriented towards plot, but the emergent behavior of these virtual Teletubbies does not in itself establish them as characters properly speaking (that is to say, as representational artefacts); it only constitutes their integrity as agents.

From another perspective we could consider these same Teletubbies with reference to the programmer or designer of the simulation, in which case their programmed behaviors might be conceived to represent character traits, and a particular run of the simulation might be understood as a narrative use of the emergent behavior that results. The narrative itself is hardly emergent, though: the programmer's input is not interactive but prior, and to the extent that any user is still conceived as a participant in the action per se, the narrative dimension of that user's encounter is either that of an audience (for the effects of that preconceived deployment of representational elements defining the Teletubbies' behavior) or that of the producer of a posterior narrative account of the emergent behavior as such. In this case, then, the simulation is not used as a generator of emergent narrative but rather as a direct narrative medium, something like a constrained form of machinima.[5] The possibility of genuinely emergent narrative only arises when there is some interactivity between semiotic production and reception, between representation and its interpretation.

There is another way of using a simulation, however, which I can illustrate with the more familiar example of a session playing *The Sims*. In one approach to such a session, you might use the interface to pursue goals provided for by the game structure (a date, a promotion, a swimming pool), in terms of the simulation's system—that is, you may seek to accumulate "aspiration points" (in the language of *Sims 2*). The elements of the system are representational, but that quality is a feature of the system's intelligibility rather than of the user's interaction, which is simply action upon or within the virtual environment. You may formulate a narrative of your session, simultaneously or retrospectively, to yourself or someone else, making narrative sense of your own interventions or your Sims' behavior. In doing so you are making sense of events just as we make sense of events elsewhere in life; you are creating a narrative, not remediating an interactive narrative emerging from the session itself. Marie-Laure Ryan, working with a suggestive distinction between "narrative games" (emphasis upon game) and "playable stories" (emphasis upon story), locates *The Sims* in the latter category, in which "the purpose of the player is not to beat the game, but to observe the evolution of the storyworld" ("Narrative Games" 46). I would suggest that these two categories define different user *attitudes* towards games like *The Sims*

and also that approaching *The Sims* as a playable story involves a little more than Ryan's definition suggests. So I would substitute the word "simulation" for "storyworld" to make it clear that narrative is not inherent in the system, and although observing the evolution of the simulation may well prompt the user to construct a posterior narrative, this response is not interactive and does not seem to do full justice to the notion of a playable story. Another formulation offered by Ryan captures it better: "the pleasure of the game," she says, lies in "coaxing a good story out of the system" (47). This description implies the semiotic use of a simulation; such an approach to a *Sims* session would involve using the representational logic of the simulation and the directive influence of your own intervention to create a narrative. For instance, you may decide that a Sim is disaffected with his superficial lifestyle and is undergoing an emotional crisis. You articulate this narrative trajectory with the means at your disposal through the interface—so, he stops eating, neglects to pay his bills or tidy up, spends all day slumped on the sofa, etc. These are events you influence as a means of narrative representation; you are using the interface semiotically. And, of course, system elements you are not controlling may impinge upon this process. Another Sim calls at the house; you may respond by making your Sim behave badly in order to consolidate the downward trajectory of the narrative, or you may take the opportunity to represent a turning point in the story—his saving rediscovery of the value of human (or Sim) relationships. The narrative is thus an emergent phenomenon—a recursive product of the interaction between your own representational strategies and the input of the simulation engine itself. Note that this example is a relatively weak form of emergent narrative, in that it is heavily dependent upon the creativity of the user. *The Sims* does include some overt narrative prompts, such as the alien abduction scenario that Ryan mentions ("Narrative Games" 53), but these are not integral to the functioning of the simulation; they are more like the narrative "cut scenes" that provide the transitions between levels or advance the action in games like *Metal Gear Solid*, *Grand Theft Auto*, *The Legend of Zelda*, and many others. A fully interactive emergent narrative would require the simulation to provide integrated narrative cues that are specifically responsive to the user's input in a way not provided for by the *Sims* game engine.

To function effectively as the domain of representational interaction that emergent narrative requires, a simulation must generate behavior that is narratively legible. At this point it is useful to return to the concept of narrativity in its second sense: not as the quality of being narrative, but as the quality of inviting narrative interpretation. Note that there is an important difference between a representation that *invites* narrative interpretation and an event that is susceptible to narration. The latter applies to every temporal phenomenon, even those that are not in fact well explained by narrative representation (such as the recursive interactions within complex systems that produce emergence). To invite narrative interpretation means something more specific: such a form of behavior is necessarily communicative, since it implies an awareness of some narrative paradigm (some convention, genre, masterplot, or stereotype) that makes the representation narratively intelligible; and it assumes the mutuality of that awareness between the sender and receiver of the communicative act. In this sense narrativity is one possibility arising from the potential for all behavior to be (or

to be understood to be) communicative—a potential latent in the whole history of the implicit in speech act theory but most robustly developed by Dan Sperber and Deirdre Wilson through the concept of "ostension" (46–50). In the context of a simulation, narrativity depends upon the representational function of the systemic behavior and the fact that this behavior (to recall Frasca's definition) is maintained "to somebody."

The point can be clarified by reconsidering the non-digital example of dramatic improvisation, in order to articulate more carefully how it meets the key requisites for emergent narrative. Firstly, we have the layered structure of action and representation: the actors behave in certain ways within an actual environment (a stage, for example) in order to represent behavior in the roles they are playing within a represented environment. Secondly, we have recursive interaction: each actor's behavior responds to that of the other actors and is responded to in turn. Thirdly, the basis of this interaction is not at the level of the behavior itself but at the level of an underlying system that models the represented situation. Actors improvise on the basis of their shared understanding of how a given situation may develop. They use a script—not a playscript (or they wouldn't be improvising) but a script in the sense made familiar by Schank and Abelson's work in schema theory: a general template defining the possible, probable, or necessary sequential features of a given kind of event. For the purposes of an improvisation, the operative scripts define the parameters within which the current behavior of the actors is narratively legible. Reciprocally, the narrativity of that behavior is just the extent to which it invokes some operative or latently available script. The example of dramatic improvisation is closely related to the one that Louchart and Aylett propose as the best model for emergent narrative: role-play games (RPGs). This format, which may be a digital, table-top, or live action game, involves multiple players who interact within defined roles in the context of an evolving game scenario which is itself under the control of a Game Master (Louchart and Aylett 27–32). One crucial difference, however, is that, in Louchart and Aylett's account, the game itself is conceived as a domain of action, and the narrative of that action is only constructed retrospectively, when the players conduct a post-game debriefing (28). Under this description, the RPG narrative itself is not emergent, because the gameplay is not conducted in representational terms. It seems to me that the possibility of genuinely emergent narrative is available here but only if the players, like improvising actors, maintain the duality of performance: playing a role must be simultaneously action and communication—behavior as representation. This duality is analogous to, and enabled by, the duality that characterizes a simulation as both a system and a representation of a system. The same lesson is transferable to the quest for emergent narrative within digital media: unless interactivity is conceived as semiotic, rather than merely behavioral, the possibility of an emergent narrative does not even arise. On the other hand, once that principle is embraced, it opens up large and intriguing new possibilities for game design.

Dramatic improvisation is a good non-digital example of emergent narrative as a product of (semiotic) interaction between agents within a system (that is, actors within a scenario or set of available scripts). As such, it corresponds to the model of emergent narrative proposed by Aylett; but what about the alternative model pro-

posed by Galyean, in which the interaction is between an agent (the user or player) and the system itself? In a non-digital context, this model corresponds to the interaction between a narrative act and a systemic representational paradigm—but doesn't that interaction take place with any act of narrative creativity? Arguably, narrative imagination always involves a continuous negotiation between the discursive agency of the author and the necessary constraints of a system of representation within which that discursive act achieves narrative sense. To say so is simply to adopt a model of narrative like that conceived by Roland Barthes in *S/Z*, but to place the emphasis upon the author rather than the reader. It is, in effect, to consider authorship (or narrative production generally) as something analogous to reading (or narrative interpretation) rather than something antithetical to it—a view I've previously argued for elsewhere, although in somewhat different terms.[6] The particular systemic principles involved may take various forms, from the conventions of realism to those of a specific genre or to quite consciously non-realist kinds of narrative logic; and they may operate on different axes of signification, as Barthes's codes do. These various systemic paradigms, however, are themselves instances of a more abstract systemic principle governing all narrative articulation—the principle of the interactive relation between the particular and the general, as first formulated by Aristotle. The general logic of narrative, in other words, is not simply how the world is but a semiotic system itself; within any given communicative frame, that systemic logic is in a dynamic relationship with the particular narrative acts that both produce and depend upon it.

The relation between the particular and general in the production of narrative is reciprocal and recursive; these qualities are the hallmarks of emergence. And if emergence is inherent in the articulation of any given narrative, it must also be the case that the narrative logic providing the systemic context for a particular narrative act is not a fixed horizon of narrative legibility but is itself an evolved product of more fundamental semiotic systems. Can we usefully consider the development of narrative form in general as an emergent phenomenon? There are two levels at which I think such a perspective is a promising basis for future work. The first regards the emergence of the narrative mode within a specific medium and is a culturally and historically grounded domain of research. An instance of this kind of process would be the way the possibilities for emergent narrative itself are currently being developed in digital media; a more well-defined example would be the process by which film emerged as a predominantly narrative medium over the first twenty years of its history. Early cinema historians now recognise that this outcome was by no means a teleological development; nor was it inherent in the complex of initial conditions under which film production began. The difficulty, therefore, is how to give a credible account of the fact that narrative cinema did become dominant. Research in this area looks in two directions, then; it addresses both the emergence of narrative and the problem of narrating emergence.

The second level of inquiry would be to consider the emergence of narrative as a cognitive faculty in both phylogenetic and ontogenetic terms. It seems to me that there is something more specific to be said about the evolution of narrative cognition than that it is an emergent phenomenon just because the evolution of consciousness, cognition, and life in general are all instances of emergence. Narrative cognition as

an adaptive faculty is of interest precisely because of its incommensurability with the very processes that produced it. The individual's proficiency in narrative cognition must also be emergent from a personal history of sense making within the parameters of a social environment and a neurological heritage. This history must consist of recursive interactions between the narrative sense-making process and the individual's developing system of cognitive representation; and such an account seems to bear upon, among other things, some fundamental problems of self-knowledge. In both respects, the conjunction of narrative and emergence brings into focus the problematic tension between the two and holds out the promise that research on this topic can provide new insight into the nature and limits of narrative understanding. Narrative, after all, is our principal way of understanding our experience of reality by articulating patterns in time; if this cognitive strategy misleads us in relation to emergent phenomena, it may be something to do with the fact that narrative itself—as instance, as mode, and as cognitive faculty—is itself an emergent pattern in time.

ENDNOTES

1. The game of Life was invented in 1970 by John Conway, a mathematician then working at the University of Cambridge. There are numerous online accounts of the game; an accessible (and interactive) introduction is provided by Resnick and Silverman.
2. The first glider gun was discovered by Bill Gosper at MIT. The point about mixed metaphors also applies, of course, to the name "glider" itself in the context of a system represented by the metaphor of life; though in this case the term (coined by Richard Guy of Conway's Cambridge group in 1970) has a technical sense; it refers to the fact that the pattern is glide symmetric, i.e. it undergoes simultaneous reflection and translation. See Stephen Silver's *Life Lexicon.*
3. This account of emergence in terms of discontinuous levels of description derives ultimately from Ronald, Sipper, and Capcarrère (15).
4. For a critique of this and other confusions surrounding the *fabula-syuzhet* distinction, see chapter three of Walsh.
5. Machinima is a cinematic animation technique that uses a computer game engine to render 3D graphics in real time, typically (though not inherently) to narrative ends. There are several ways of doing so, and the degree of creative control possible varies with the method; clearly, this use of the Teletubbies program would be very limited indeed. See chapter 1 of Marino.
6. Chapter seven of *The Rhetoric of Fictionality* uses the conceit of the novelist as medium to articulate just this idea of narrative creativity as a quasi-interactive process, and to that extent it provides for a view of all narratives as emergent (Walsh 130–47).

WORKS CITED

Abbott, H. Porter. "Narrative and Emergent Behavior." *Poetics Today* 29.2 (2008): 227–44.

———."Unnarratable Knowledge: the Difficulty of Understanding Evolution by Natural Selection." In *Narrative Theory and the Cognitive Sciences*, edited by David Herman, 143–62. Stanford, CA:

Center for the Study of Language and Information, 2003.

Anderson, Philip W. "More is Different: Broken Symmetry and the Nature of the Hierarchical Structure of Science." *Science* 177 (1972): 393–96.

Aristotle. *Metaphysics: Books 7 and 8*. Translated by David Bostock. Oxford: Clarendon Press, 1994.

Aylett, Ruth. "Narrative in Virtual Environments: Towards Emergent Narrative." In *Narrative Intelligence: Papers from the 1999 AAAI Fall Symposium, Technical report FS-99-01*, 83–86. Menlo Park: AAAI Press, 1999.

Barthes, Roland. *S/Z*. 1973. Translated by Richard Miller. Oxford: Blackwell, 1990.

Frasca, Gonzalo. "Simulation versus Narrative: Introduction to Ludology." In *The Video Game Theory Reader*, edited by Mark J. P. Wolf and Bernard Perron, 221–35. New York: Routledge, 2003.

Galyean, Tinsley. "Narrative Guidance of Interactivity." PhD Dissertation. MIT, 1995.

Herman, David. "Introduction." In *Narrative Theory and the Cognitive Sciences*, edited by David Herman, 1–30. Stanford, CA: Center for the Study of Language and Information, 2003.

Holland, John. *Hidden Order: How Adaptation Builds Complexity*. Reading, MA: Addison-Wesley, 1995.

Johnson, Steven. *Emergence: The Connected Lives of Ants, Brains, Cities, and Software*. London: Allen Lane, 2001.

Louchart, Sandy and Ruth Aylett. "The Emergent Narrative Theoretical Investigation." *Sandy Louchart (Bsc, Msc, PhD)*. http://www.macs.hw.ac.uk/~sandy/Publications.html; www.macs.hw.ac.uk/~sandy/Publications/LouchartAylettFinal.pdf (accessed September 1, 2010).

Marino, Paul. *3D Game-Based Filmmaking: The Art of Machinima*. Scottsdale, AZ: Paraglyph Press, 2004.

Prince, Gerald. "Narrativity." In *The Routledge Encyclopedia of Narrative Theory*, edited by David Herman, Manfred Jahn, and Marie-Laure Ryan, 387–88. London: Routledge, 2005.

Resnick, Mitchel and Brian Silverman. *Exploring Emergence*, February 4, 1996. http://llk.media.mit.edu/projects/emergence/contents.html (accessed September 15, 2009).

Ronald, E. M. A., M. Sipper, and M. S. Capcarrère. "Testing for Emergence in Artificial Life." In *Advances in Artificial Life: 5th European Conference*, edited by D. Floreano, J. D. Nicoud, and F. Mondada, 13–20. *LNCS* 1674. Berlin: Springer-Verlag, 1999.

Ryan, Marie-Laure. *Avatars of Story*. Minneapolis: Univ. of Minnesota Press, 2006.

———. "From Narrative Games to Playable Stories: Toward a Poetics of Interactive Narrative." *Storyworlds* 1 (2009): 43–59.

Schank, Roger and Robert Abelson. *Scripts, Plans, Goals, and Understanding*. Hillsdale, NJ: Erlbaum, 1977.

Silver, Stephen. *Life Lexicon*, February 28, 2006. http://www.argentum.freeserve.co.uk/lex_home.htm (accessed September 23, 2009).

Sperber, Dan and Deirdre Wilson. *Relevance: Communication and Cognition*. 2nd ed. Oxford: Blackwell, 1995.

Walsh, Richard. *The Rhetoric of Fictionality: Narrative Theory and the Idea of Fiction*. Columbus: Ohio State Univ. Press, 2007.