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Computer Game Semiotics

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I discuss symbols within the computer game and how those symbols are transformed during play. I develop a method of critically analyzing computer game structures utilizing a modified version of the semiotic square of Greimas. This analysis has goals somewhat similar to those of Propp (as applied to the study of folktales) and Levi-Strauss (as applied to the study of myth); however, this analysis also addresses recursive and deconstructive elements within computer game play—elements that tend to undermine the more definitive conclusions of structuralism.

During study of computer game play, I have become increasingly concerned with relationships among the works of Vladimir Propp (1928/1968), Claude Levi-Strauss (1976), and Jacques Derrida (1967/1976, 1967/1978). In simplest terms, these concerns focus on the fundamental issues of formalism, structuralism, and deconstructionism that distinguish these critical approaches from one another and simultaneously—almost paradoxically—draw them together within the field of mass communications.

If we are to believe the results of bibliometrics (Beniger, 1988, 1990; Paisley, 1984; Reeves & Borgman, 1983; Rice, Borgman, & Reeves, 1988), mass communications as an academic discipline has proliferated over the last few decades despite the "lack of a theoretical core" (Beniger, 1990, p. 698). The most fundamental and defining issues of communications as a discipline have been revealed, according to these analyses, only recently through the roundabout "convergence of several disciplines on the subject matter of communications" (Beniger, 1990, p. 713). What are these disciplines? They are those that I have come (in a much different, more roundabout way) to believe are more important to the analysis of computer game texts—"French structuralism or poststructuralism, hermeneutics or phenomenology, deconstruction or even semiotics" (Beniger, 1988, p. 213).

If this is true, then I feel justified in abandoning the variable analysis of mainstream mass communications research in favor of the participant-observation methods of cultural anthropology (Myers, 1987a), the controversial empiricism of Q-methodology (Myers, 1990c), and similar jaunts of play. Although the study of computer games seems at first glance trivial, it is significant

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that the serious consideration of topics and issues labeled frivolous and peripheral within the field of mass communications has led to many of the same conclusions as analyses of that field from much broader perspectives.

Goals and Limits

During previous investigations of computer-game player behaviors and preferences (Myers, 1984, 1990a), I have observed the importance of computer game text (form and structure) in affecting and qualifying the computer-game playing experience. There are obvious patterns in computer game design and play that appear, at times, equally attributable to characteristics of the computer medium and characteristics of the human mind. The computer game is composed of Boolean operators combined into logical and finite, yet extremely complex, sequences. High-level sequences of this sort tend to evoke dramatic relationships during play and, therefore, to appear patterned after interpretative processes within the human mind.

Realizing this, it is tempting to try to identify, as others have done (McLaughlin, 1990), physical structures within the brain that correspond to the creative experience of reading texts and playing games. The equally tempting alternative is to try to reproduce the functional equivalent of human interpretive processes outside the brain through artificial intelligence routines and other such mechanical procedures (Gardner, 1987; Posner, 1989). Yet, although both neurobiological and cognitive science approaches are enlightening, this analysis does not refer to them. The argument here is restricted to the symbolic (as opposed to the physical) structures of computer game play.[1]

Mine is ultimately a strategy of describing play with text by describing textual ''playings.'' This strategy is most effective where the infinitive is given precedence over the noun. Unfortunately, such a strategy is difficult to follow in a largely noun-based language. For instance, I do not want to deal with isolated elements of the computer game text but rather with their relationships. Even then, my true topic is more properly these elements' ''relationshipping'' or, somewhat less exactly, their *relating*.[2]

Methodology

The task of identifying common elements within computer games appears relatively straightforward, but, even after begging the important question of proper units of analysis, there are numerous pitfalls. Propp's *Morphology of the Folktale* (1928/1968) was one of the first to demonstrate the methods and values of detailed structural analysis. In 1960, Levi-Strauss published a structuralist critique of Propp's formalism, which was followed in 1966 by Propp's rejoinder. Derrida was later to undermine both approaches in *Of Grammatology* (1967/1976) and *Writing and Difference* (1967/1978). It is useful here to summarize briefly the relevant positions of these three theorists.

Propp reduced the Russian wondertale to a sequence of abstract events, resulting in a formulaic sequence. As expressed in *Morphology of the Folktale*:

> A tale may be termed any development proceeding from villainy (A) or a lack (a), through intermediary functions to a marriage (W*), or to other

> functions employed as a denouement. Terminal functions are at times a reward (F), a gain or in general the liquidation of misfortune (K), an escape from pursuit (Rs), etc. (Propp, 1928/1968, p. 92)

This analysis eventually led Propp to the conclusion that . . .

> To the variable scheme
>
> $$ABC\uparrow DEFG \frac{HJIK\downarrow\ Pr\text{-}Rs^{\circ}L}{LMJNK\downarrow Pr\text{-}Rs} Q\ Ex\ TUW\ *$$
>
> are subject all tales of our material. (Propp, 1928/1968, p. 105)

Levi-Strauss regretted that this analysis "lacks . . . context" (1976, p. 131), which, from his point of view, deprived Propp's abstract forms of their most crucial and informing characteristics. In his critique of *Morphology*, Levi-Strauss carefully distinguished form from structure: "Form is defined by opposition to content, an entity in its own right, but structure has no distinct content: it is content itself, and the logical organization in which it is arrested is conceived as property of the real" (Levi-Strauss, 1976, p. 115).

According to Propp (1984, p. 68), the argument between him and Levi-Strauss was that between an "empiricist and a philosopher." Yet, while Propp took refuge in his data—the folktale text—he did not necessarily seek to isolate interpretation from interpreter. Indeed, although Propp steadfastly supported the validity of examining the elements of the folktale out of their social and political contexts, he was also later to admit "morphology is sterile if it is not bound directly or indirectly to data from ethnology" (Propp, 1984, p. 71).

At the basis of the differences between Propp and Levi-Strauss—and between formalism and structuralism—is the more synthetic perspective of the latter. Many of Propp's analytical elements of the folktale were combined and collapsed in subsequent structural analyses. These later analyses conceived variations in form or content as transformations of some more fundamental core structure. For instance, one result of Levi-Strauss' ethnological approach was to replace the rigid chronological sequences of Propp's folktale formulas with the more atemporal structures of myth.

> Instead of Propp's chronological scheme . . . another scheme should be adopted, which would present a structural model defined as the group of transformations of a small number of elements. This scheme would appear as a matrix with two or three dimensions or more:

w	-x	1/y	1-z	. . .
-w	1/x	1-y	z	. . .
1/w	1-x	y	-z	. . .
1-w	x	-y	1/z	. . .

> and where the system of operation would be closer to Boolean algebra. (Levi-Strauss, 1976, p. 137)

Thus, in the Levi-Strauss analysis, the number of textual elements (w, x, y) is less significant and defining than the constant pattern of their transformations (w, −w, 1/w, 1−w).

In opposition to Propp, Levi-Strauss defined textual elements without regard to their position in time (or syntagmatic aspects) and solely in terms of their relationships with each other. As a result, the Levi-Strauss matrix—wherein the omission of any single element (or element relationship) might have a ripple effect over the entire structure—is much more tightly integrated than Propp's formulas and requires a more holistic perspective (both inside and outside the text) during interpretation.

Matrix analysis of this sort is intriguing[3] but also, as others have commented (Schliefer & Velie, 1987), puzzling because Levi-Strauss offers no subsequent empirical elaborations concerning the application of this matrix to textual studies. Yet, upon learning of this model only after I had spent considerable time observing and cataloging computer game structures, I was immediately attracted to it by the similarities between it and computer game structures. These similarities are both logical/mechanical (mutual dependencies on Boolean algebra) and conceptual/symbolic (mutual dependencies on relationships as defining structural characteristics).

Subsequently, Greimas streamlined Levi-Strauss' and Propp's analyses in a series of works beginning with *Structural Semantics* (1966/1983). This volume attempted to establish a "descriptive metalanguage" for the "sciences of signification" (Greimas, 1966/1983, p. 161) through the study of patterns of binary relations among elements of meaning (or "semes"). Greimas later expressed his results inside a semiotic square—"the visual representation of the logical articulation of any semantic category" (Greimas & Courtes, 1979/1982, p. 308). (See Figure 1.)

> The semiotic square is a logical mapping out of structural possibilities: for any content which can be understood as itself analyzable into binary opposition (S vs. non-S), the square, repeated and superposed, will exhaust the logical structural relations between its minimal elements. (Schliefer, 1983, pp. xxxii-xxxiii)[4]

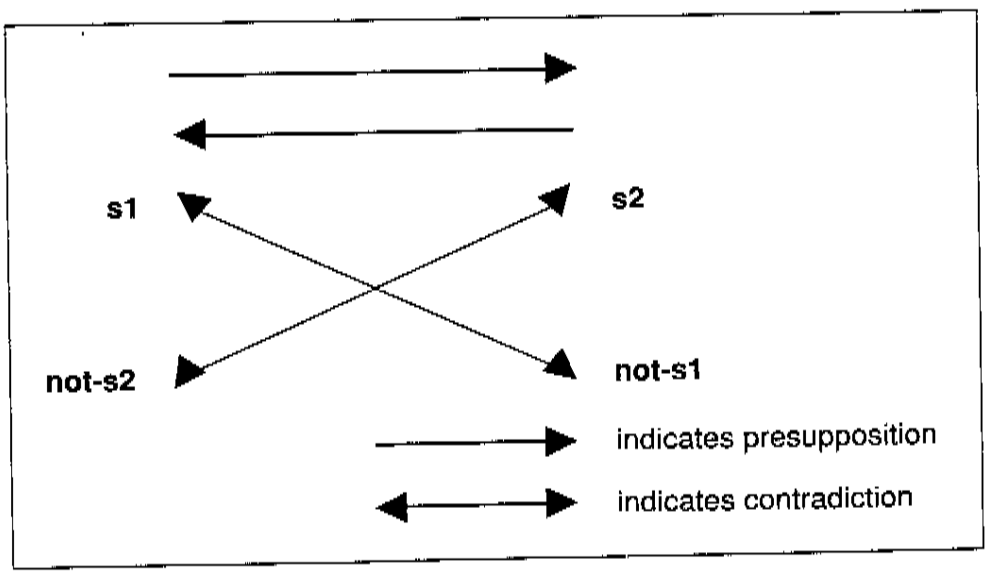

Figure 1 — Greimas' (1987, p. 66) semiotic square: the elementary structure of signification.

Structural analysis of this sort, though appealing aesthetically, is frequently ambiguous in application and not entirely proof against deconstruction. One of Jacques Derrida's first widely publicized ventures into U.S. academia was at a 1966 lecture at Johns Hopkins University entitled "Structure, Sign, and Play." Both in that lecture and thereafter, Derrida (1967/1976, 1967/1978) attempted to undermine the structuralism of Levi-Strauss and others with reference to its logocentrism.

Logocentrism approaches are, in Derrida's terms, biased toward finding a center within a fundamentally noncentered text. Whereas structuralism, like formalism, ultimately seeks "a formula of algebraic power and simplicity" (Norris, 1982, p. 37), deconstructionism prefers to investigate those moments when a text "transgress[es] the laws it appears to set up for itself" (Selden, 1985, p. 87).

The conflict between deconstructionism and structuralism is similar to that between playing games and attempting to discuss that experience in a formulaic way. Though I have been overwhelmed by evidence of recurring patterns in computer game play and text (Myers, 1984, 1987a, 1990b), I have been often frustrated in my attempt to fully explicate those patterns within the context of the ephemeral relationship between player and plaything. In fact, it begins to seem as though that relationship—playing—requires a special sort of explication, one that somehow finds its most important meanings in its most inexplicable aspects (cf. the two interpretations of interpretation in Derrida, 1967/1978, p. 292ff).

In order to demonstrate further this conflict—and perhaps this frustration as well—I would like to apply the Greimas logico-semantic (semiotic square) model to three representative computer games. It is this particular structural model, with the important addition of recursive relationships, that I have found most promising in explicating the symbolic structuring and restructuring of objects and events during computer game play.

Analysis

Chosen for analysis are three games that received the Overall Computer Game of the Year award during 1988, 1989, and 1990 from the popular publication *Computer Gaming World* (see Myers, 1990b, for a brief description of *CGW*). These games are best-sellers within the computer game marketplace, are innovative and complex in their designs, and represent the efforts of three entirely different designers or design teams (both British and American).

The Games

Simcity, designed by Will Wright, was unable to find a willing publisher until almost 3 years after its completion. Ostensibly, the game puts the player in the role of city architect and manager. Successful game play results in a well run, cost-efficient city. This game was named Overall Game of the Year by *CGW* in 1988.

Populous was created by Bulldog, a British software company, and was introduced to the U.S. marketplace in 1989. *Populous* players—cast in the role of divine being—alter the environment of their game world to suit the needs of their population. They then use that population and their environment-altering powers (earthquakes, floods) to conquer a rival population. *Populous* won the *CGW* Overall Game of the Year award in 1989.

Railroad Tycoon requires the player to build a railroad empire through corporate financing, surveying and laying of track, and operating and dispatching trains. The designer of *Railroad Tycoon*, Sid Meier, has had previous commercial successes with the well-known computer games *F-19 Stealth Fighter* and *Pirates*. *Railroad Tycoon* was named Overall Game of the Year by *CGW* in 1990.

Game Sequences

All three of these games are classified as strategy games by *CGW*—"games that emphasize strategic planning and problem-solving" (see Myers, 1990b)—and share many structural similarities. Propp reduced hundreds of Russian folktales to a relatively simple linear sequence of events. Is that possible here? Yes, each game proceeds in a linear fashion, of sorts, though *Populous* is different from the other two games in this respect.

The linear progression in *Populous* is bounded (that is, there is a definite end to the game). The sequence of player actions in *Populous* is roughly this:

1. Power (manna) transforms the player's game world. (Power → Transformation)
2. Transformations increase the player's population. (Transformation → Population)
3. Population increases the player's power. (Population → Power)

Thus, this sequence

Power → Transformation → Population → Power

might proceed indefinitely. But, in order to play the game successfully, the player must enact this sequence well and quickly enough to accomplish a singular goal: to destroy an enemy population controlled by the computer. Once either enemy or friendly population is destroyed, the game recycles and presents the player with another, slightly altered game environment in which play begins anew—with the same set of boundaries and goals.

The sequence of events is similar, but without such rigid designer-determined boundaries and goals, in *Simcity* and *Railroad Tycoon*. There are enemies (rival railroad builders) in *Railroad Tycoon*, but the destruction of these enemies (by buying their stock or driving their railroads into bankruptcy) does not end the game. *Simcity* has no obvious computer rival for the game player to compete against, yet both it and *Railroad Tycoon* move through time in a manner similar to *Populous*, with the accumulation of power replaced by the accumulation of money.

In *Railroad Tycoon*, the player uses money to transform the game world (cut down forests, lay railroad track). These actions have secondary effects (growth of cities, creation of industries) and enable the game player to charge for the transportation of passengers and cargo. These charges turn into profits, which provide funds for further transformations of the game world. Thus, there is this sequence:

Money → Transformation → Passengers → Money

In *Simcity*, the player uses money to transform the game world (cut down forests, create residential areas). These actions have secondary effects (growth of population, increased traffic) and enable the game player to tax city residents. These taxes turn into revenues, which provide for further transformations. Thus, there is again this sequence:

Money → Transformation → Population → Money

In all three instances, there is an important difference between these computer game sequences and the generic sequence Propp used to explain Russian folktales. The computer game sequences are *recursive*. That is, where Propp's sequence is linear, the computer game sequences are circular. And this circle does not always end where it begins; therefore, the computer game sequence is best visualized as a spiral of mounting complexity.

Where does this spiral end? *Populous* designers force an ending to this recursive sequence by imposing a single goal for the accumulation of power: the destruction of a rival power. There is no similar imposition on the game play of *Railroad Tycoon* and *Simcity*. The game sequences in these two games end only in game defeat (loss of money or bankruptcy). If the player is not defeated, game play simply does not end. Larger and larger railroad empires are established; greater and more far-flung cities are created, bound only by the physical characteristics (disk space and memory size) of the machines on which the games are played.

What is the goal of play in these endlessly spiraling sequences? Propp's formalism fails us in this regard. Transformations take place, recursively, on several different levels during computer game play. Arranging events chronologically does not clearly indicate the degree to which previous events are reflected and affected by subsequent events. In order to understand the playfulness of recursive sequences, it is necessary to examine computer game play dimensionally as well as sequentially. And that requires the examination of structure as well as sequence. Therefore, advancing our analysis requires moving beyond Propp's formalism and considering the structural critiques of Levi-Strauss and Greimas.

Game Structures

Within each of Propp's event categories (such as A, the category for villainy) there are many paradigmatic variations (i.e., A_{1-19}). And the structural relationships of these variations to each other are ultimately more significant to computer game analysis than the sequential (or syntagmatic) relationships Propp established among his broader categories of events.

Within the three computer games, there are obvious structural similarities of this atemporal (or paradigmatic) sort. For instance, in *Railroad Tycoon* and *Populous*, game opponents are computer-driven analogs of the game player. Though *Simcity* has no such game-player analog installed as enemy, the same obstacles facing the *Populous* player (earthquakes, floods) intervene during the building of *Simcity*'s simulated cities. Thus, in all three cases, there are imbedded elements of conflict. These elements of conflict normally have the same power/money as the game player at the beginning of the game and are intended to be equal to the game player in every respect but one: the individual application of strategy.[5]

Recognizing these similarities, we can begin to express the conflict between player and game structurally and see along what dimensions it takes place. If we designate those elements of the game opposing the game player's actions as game opponents, there then exists a contrary relationship (Gremias, 1987, p. 49) between game players and game opponents, forming one half of Greimas' semiotic square. The latter half we may derive from the former—and from the Levi-Strauss matrix analysis. (See Figure 2.)

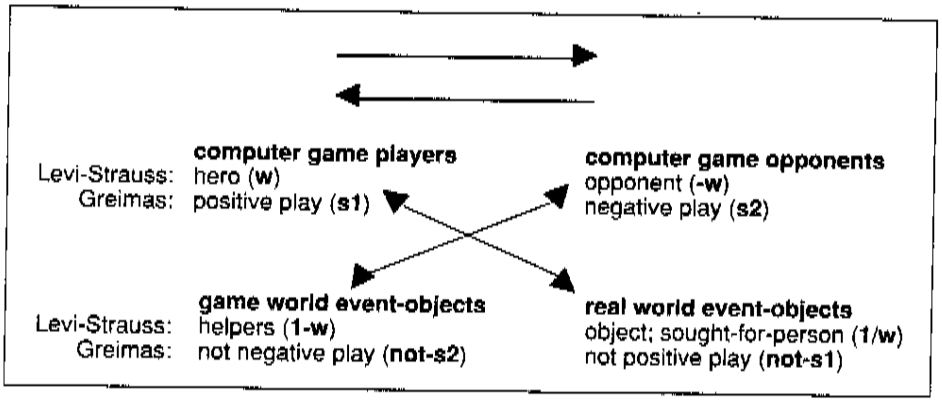

Figure 2 — Greimas' semiotic square: adapted to explain computer game play.

Left-side entries in Figure 2 are logically contrary to their right-side counterparts, and all diagonally opposed entries are logically contradictory (Greimas, 1987, p. 49). Greimas called this diagram "an appropriate model by which to account for the first articulations of meaning within a *semantic microuniverse*" (1987, p. 66).[6] Difficulties in articulating the semantic microuniverse of the computer game immediately ensue.

Contrariety is defined as "a relationship of reciprocal presupposition . . . where the presence of one [term] presupposes that of the other, and, conversely, where the absence of one presupposes that of the other" (Greimas & Courtes, 1979/1982, p. 61). We normally think of these relationships as between opposites, but opposites do not always exist in the clear-cut binary relationship that the semiotic square seemed to assume.[7] In *Railroad Tycoon*, for instance, there are *three* opponents to the game player, and each represents a slightly different sort of opposite to the game player—and to each other.

Contradiction is defined as "the cognitive act of negation" and also assumes a strictly binary relationship in which "the presence of one term presupposes the absence of the other, and vice versa" (Greimas & Courtes, 1979/1982, pp. 60-61). This relationship is very similar to that between figure and ground in which the ground provides the necessary contrast (background) for a figure to exist. Indeed,this particular interpretation of contradiction is supported by Greimas' indicating that contrary terms (s1 and s2) are subsets of their opposite, negated forms (not-s1 and not-s2).[8]

Negation, in this sense, establishes a particular context (figure and ground; s1 and not-s1); opposition creates an alternative context (s2 and not-s2). Relationships of opposition (contrariety: s1 and s2) are therefore of a more advanced level, necessarily leading to consideration of conversions (or equivalences) between different *contexts* (or, speaking geometrically, *dimensions*; or, speaking anthropologically, *cultures*) of meaning.

Basing the computer game, a "semantic microuniverse," on a process of moving from figure to ground and back again (context shifting) is particularly appealing because this process, like the chronological sequences observed earlier, is recursive. That is, context shifting is a process that constructs and deconstructs itself. Neither figure nor ground can be firmly fixed during play.

Thus, in *Railroad Tycoon*, the player is, at the beginning of the game, pitted against three computer-run opponents. However, at some point in the game, one or more of these opponents might be used as a helper (to block the invasion of a more formidable opponent) or as an extension of the player (by absorbing the opponent's railroad company into his or her own). Because of the interrelated characteristics of the semiotic square model, any such change in any one of the square's elements causes changes in all its other elements as well.

For instance, even when the player manages to seize control of *all* opponents in *Railroad Tycoon*—seemingly eliminating the game's source of conflict—the game does not end. By either transforming opponent to helper or by extending player structure into opponent structure, the contexts (game world and real world) are transformed and extended. And so the relationshipping, the playing, goes on.

Referring back to Figure 2, the game player who has seized control of all *Railroad Tycoon* opponents (s2)—a player who has previously been playing opposite individual game elements—now plays opposite the game as a whole. The original helper (not-s2) is transformed from game context to game *design* context, and so forth, in a spiral of increasing complexity wherein the original figures (s1 and s2) get increasingly closer to their ultimate grounds (not-s1 and not-s2).

Thus, we could create a more formal abstraction of Figure 2 (see Figure 3). At this point, as we begin to concentrate on the gradual movement (or transformation) of the self into the real world and the not-self into the play world that occurs during computer game play, we begin to lose touch with the atemporal permanence of structuralism and slide toward an increasingly deconstructionist interpretation of the play process.[9] For where is the center of the structure in Figure 3? The sought after object—the real-world ground that would encompass all possible figures—is in the lower right-hand quadrant: "objectiving." But this goal can never be achieved. It is a goal erected by the very process that negates its achievement: the process of "subjectiving," or playing.

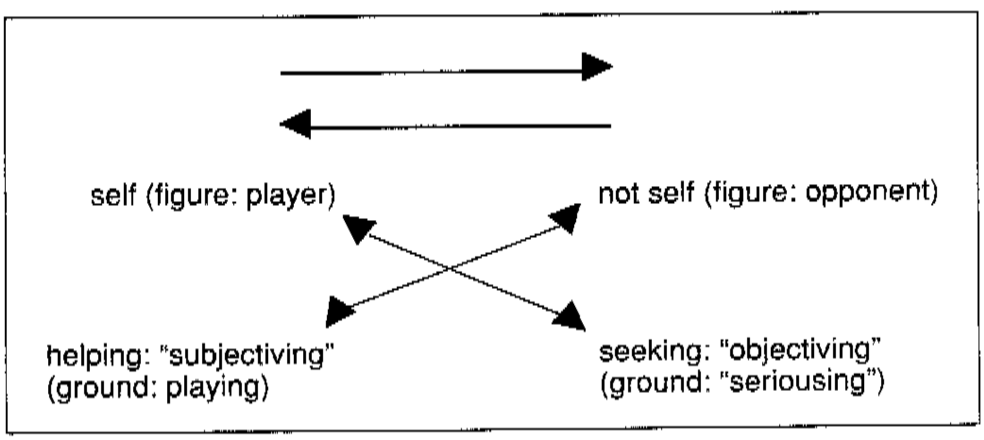

Figure 3 — Greimas' semiotic square: adapted to explain play.

> The concept of a centered structure is in fact the concept of a play based on a fundamental ground, a play constituted on the basis of a fundamental immobility and reassuring certitude, which itself is beyond the reach of play. (Derrida, 1967/1978, p. 279)

The spiral does not end because it cannot end—not without destroying the playing. Play is, in fact, never a spiral, always a spiraling.

Final Comments

It is important to note that the three games examined here, whose sequences and structures are dominated by recursive context shifting, are very popular games. They are described in many reviews as particularly addictive games that completely absorb a player's interest. From personal experience and interviews with other players, I can say it is *very* common to play these games for 8 or more hours without pause, usually through the entire first night after purchase.

However, they are also real-time games; that is, things happen in these games regardless of whether the player is attentive to the game world or not. Only *Populous*, in fact, demands player action. Either *Railroad Tycoon* or *Simcity* may be allowed to run forward without player intervention. Railroads would extend, cities would grow, and players, we assume, would merely watch. But that never happens—at least not during those first sleepless nights.

The compelling structure of these games is as clearly real time (sequential) as dream time (nonsequential). It is difficult to say if either of these two aspects of game structure are dominant; they may not even be different. Certainly, however, it is the acting that is more defining than the action, the structuring that is more fundamental than the structure.

It can also be said that these computer games (and the compelling components of most others) are pervaded by structures of recursive context shifting. Indeed, play seems to function in this respect as a scaling mechanism, wherein microlevels of disbelief and its willing suspension somehow manage to bootstrap themselves into macrolevel realities. It is this spiraling process that makes the computer game so addictive: replacing the physical context of reality with its symbolic representations ("objectiving") and then infinitely progressing those computer game symbols (including game player) toward an unachievable limit.

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Notes

[1]I would like to differentiate my approach from those that assign no particular intrinsic qualities of value or distinction to the text. The analogy here—based on logico-semantic models (Greimas, 1966/1983)—is that the computer game serves as a lens by and through which computer game play is focused and made manifest.

[2]Difficulties of this sort seem to occur regularly in the analysis of play, which inevitably takes both high and low ground furthest from the point of attack. But then, this realization is a source of both frustration and energy because it seems to indicate that the essence of play is indeed somewhere roundabout.

[3]Equally intriguing are parallels between the movement from structuralism to deconstructionism in literature and from S-matrix to quantum theory in physics: "Physicists have been seeking a unified field theory that . . . could integrate quantum physics and theories of astrophysics. The approach to language in structuralism and post-structuralism was likewise intended . . . to be a unified field theory . . . through a general theory to which the name semiotics has been attached" (Berman, 1988, p. 291). See also Bohm (1982).

[4]Still another way of understanding the semiotic square is given in Schliefer (1983, p. xxxiii): "Nancy Armstrong has recently explained this scheme in this way: 'Once any unit of meaning (s1) is conceived, we automatically conceive of the absence of that meaning (not-s1), as well as an opposing system of meaning (s2) that correspondingly implies its own absence (not-s2).' "

[5]Once again, for emphasis: These elements of conflict result from the paradigmatic transformation of game player to game opponent (and/or vice versa).

[6]His use of the concept "semantic microuniverse" is intended to indicate the impact of culture and ethnolinguistic communities on the articulation and expression of meaning during syntagmatic discourse. Thus, though the semantic square seems to lie at the base of meaning-making, meaningful discourse (and its analysis) must also consider the cultural dimensions of discourse and what Greimas described as "privileged articulations, favor[ing] one microuniverse at the expense of another (wine culture in France, use of spring water in Turkey)" (Greimas, 1987, p. 66).

[7]This questioning of the universal validity of binary relationships is indeed the basis of deconstructionist attacks against structuralism. "Any attempt to undo a particular concept is to become caught up in the terms which the concept depends on. For example, if we try to undo the centering concept of 'consciousness' by asserting the disruptive counterforce [opposite] of the 'unconscious,' we are in danger of introducing a new centre, because we cannot choose but enter the conceptual system (conscious/unconscious) we are trying to dislodge" (Selden, 1985, pp. 84-85). See also Berman, 1988, p. 211ff; Derrida, 1967/1978, p. 283ff.

[8]More specifically, Greimas used subset notation to explain the relationship between the contraries (s1 and s2) and their subcontraries (not-s2 and not-s1) inside the semiotic square: "not-s1 $\supset$ s2; not-s2 $\supset$ s1" (1979, p. 308). However, his use of the term *figure* is quite different from my own (cf. Greimas & Courtes, 1979/1982, p. 120), which more nearly corresponds to the analysis in Seldon (1985, p. 106).

[9]Though widely quoted recently, Derrida and deconstructionist approaches are not singular in their questioning of structures and structuralism. For other intriguing comments on the topic of recursive context shifting, see Koestler (1979) and his notion of holarchy.