Half-Real

Video Games between Real Rules and Fictional Worlds

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camp. The problem is that it is hard to describe camping in unambiguous terms—players do not move all the time, so for how long is a player allowed to stay still? Furthermore, a player that walks into a room and is immediately killed may feel that camping was involved—even if the other player entered the room just a few seconds earlier.

Sportsmanship is not strictly a rule according to my previous definition since its ambiguity makes it subject to continued discussion and social regulation.

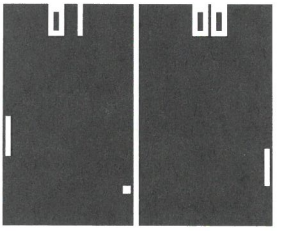
Generally, to play a game also requires competence in initiating or terminating game sessions and managing the interplay between the game and the context in which the game is played. This has been called *gaming* and *gaming rules*, and these are not rules as much as they are "rules for rules" in games (Hughes 1999, 195). This is a worthwhile study in its own right, but generally falls outside the scope of this book. Finally, many aspects of physical games are specified by preexisting systems such as the laws of physics, which are used as *objets trouvés* or *found objects*, appropriated for game purposes.

As such, the explicit game rules are not all there is to a game and games do not appear in a void. Games have an undetermined relationship to what is outside the game, and this is also part of the classic game model: the *negotiable consequences* of the game. Games often incorporate many things that are not specified in the rules.

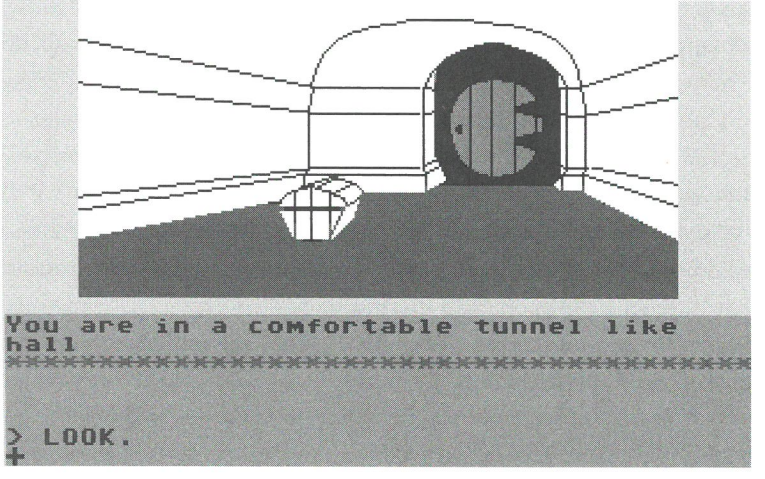
Rule Structures: Games of Emergence and Games of Progression

In the beginning of this chapter I discussed how games can present players with challenges. This can be done in several different ways, but the two most important ways are *games of progression* that directly set up each consecutive challenge in a game, and *games of emergence* that set up challenges indirectly because the rules of the game interact. To understand this, compare two old video games, the simple table-tennis game of *Pong* (figure 3.2) (Atari 1973) and the adventure game *The Hobbit* (figure 3.3) (Melbourne's House 1984), where the object of the game is to complete the travels of Bilbo as described in J. R. R. Tolkien's novel.

The Hobbit is a text-graphics hybrid adventure game where some of the world is represented in graphics and most is represented in text. The player interacts with the game exclusively through text input. To complete



| Figure 3.2 |
Pong (Atari 1973).



| Figure 3.3 |
The Hobbit (Melbourne House 1984).

the game, the player has to overcome a number of challenges such as getting a key from some trolls without being eaten, escaping from a goblin, sailing a river on a barrel, slaying a dragon using a helper, and finally getting back home again. On the surface of things, *The Hobbit* is the more complex game, having large amounts of graphics, dialogue, and a quite varied setting. *Pong*, on the other hand is as simple as can possibly be. Katie Salen and Eric Zimmerman have discussed how it can be difficult to understand why *Pong* became a popular game:

People love pong.
They do. But why?
Really. What's to love? There isn't much to the game; a pair of paddles moves to blunt white lines on either side of a black screen, a blocky excuse for a ball bounces between them, and if you miss the ball, your opponent scores a point. The first player to score fifteen points win. (Salen and Zimmerman 2004, 13)

They then list six reasons for playing *Pong*, the second one being the following: "*Every game is unique*. Because the ball can travel anywhere on the screen, Pong is an open-ended game with endless possibilities. Pong rewards dedicated play: it is easy to learn, but difficult to master" (Salen and Zimmerman 2004, 15). Therefore, *Pong* gives us a very rudimentary example of how a game with very simple rules can provide variation and replayability. *The Hobbit*, on the other hand, contains a wider range of possible actions that the player can perform (picking up things, talking to people, using objects to manipulate the world). Even so, the complete solution to *The Hobbit* fits on a sheet of paper (figure 3.4).

When actually playing the game, the player will at first fail to find the sequence of commands needed to complete the game. Having completed *The Hobbit*, he or she finds little reason to play the game again; the possibilities of the game are exhausted once it has been completed. This is not to cast a value judgment on the two games, but simply to point out the difference in the economy of their rules. A shorthand description of the rules of *Pong* is as follows:

Pong: Players control a bat each (at the left and right side of the screen) using a paddle. A ball is served by the computer; it bounces off two lines at the top and bottom of the screen and off the player bats. Players can direct the direction of the ball by hitting the ball with different parts of their bats. The ball accelerates until a player fails to block the ball with his or her bat, whereupon the other player scores a point. The first player to gain 15 points wins.[10]

Pong has very few rules, yet it provides the players with a large possibility space. A shorthand version of the rules of *The Hobbit* would follow the general structure of the walkthrough above, first describing where Bilbo starts, where the different players are, and what the conditions are for the solution of each task in the game. In fact, the rules of *The Hobbit* are quite

Hobbit Hole, a "comfortable tunnel like hall")

dawns)

R

D SWORD

ELROND
ND "HELLO"
ND "READ MAP"
nd gives you some lunch)

ND "GIVE ME MAP"

KEY

ld be by a crack in a wall, WAIT until it opens and you get
wn in the goblin dungeon!)

DOOR (keep doing it until it breaks, there is a CURIOUS KEY underneath.
the Key)
N "OPEN WINDOW"
N "PICK ME UP"
N "WEST"

blin appears)

N
ARD

S RIVER (you should see a boat)
ACROSS RIVER (may need to try more than once)

- SAY TO THORIN "CLIMB INTO BOAT"
- CLIMB OUT
- EAST
- SMASH WEB (until it breaks)
- NORTHEAST
- SMASH WEB
- NORTH
- WEAR RING
- EXAMINE DOOR
- WAIT (until the door opens)
- NORTHEAST
- SOUTH
- KILL BUTLER WITH SWORD
- GET RED KEY
- UNLOCK RED DOOR WITH RED KEY
- OPEN DOOR (if Thorin got captured earlier, he'll reappear now)
- OPEN BARREL
- OPEN TRAP DOOR
- GET BARREL
- THROW BARREL THROUGH TRAP DOOR
- SAY TO THORIN "JUMP ONTO BARREL"
- GET BARREL
- THROW BARREL THROUGH TRAP DOOR
- JUMP ONTO BARREL
- EAST
- PICK UP BARD
- WEST
- NORTH
- UP
- NORTH
- NORTHWEST
- NORTH
- WEST
- EAST
- NORTHWEST
- NORTH
- WAIT (keep waiting until sun shines on the rock and opens the SEC
- SAY TO THORIN "UNLOCK DOOR WITH CURIOUS KEY"
- DROP BARD
- EAST
- SAY TO THORIN "WEST"
- WEAR RING
- EAST
- GET TREASURE
- EAST
- WEST
- PICK UP BARD
- UP
- DROP BARD
- SAY TO BARD "GET STRONG ARROW FROM QUIVER"
- WAIT (until Smaug the Dragon shows up)
- SAY TO BARD "SHOOT THE DRAGON"
- SOUTH x 3
- DOWN
- SOUTH x 3
- WEAR RING
- WEST
- WAIT
- WAIT
- WEST
- WAIT
- WAIT
- WEST
- NORTH
- SOUTHWEST
- WEST x 4
- SOUTHWEST
- WEST
- OPEN CHEST
- PUT TREASURE IN CHEST

(You're back in your Hobbit Hole and rich, rich, rich. Congratulations!)
(Chesire 2001)

| Figure 3.4 |
Complete solution to *The Hobbit*.

similar to the preceding walkthrough. *The Hobbit* provides challenges via many rules, but even so, the possibility space of *The Hobbit* is quite small.

I have chosen these old examples to point to the dual origins of the video game. The history of video games can be seen as the product of two basic game structures, the *emergence* structure of *Pong* and the *progression* structure of adventure games. Though games of emergence are theoretically much more interesting, I emphasize that the distinction is purely descriptive. Chris Crawford has described a similar but not identical[11] normative distinction between information-rich and process-intensive games (1982, 46). Crawford argues that since the computer is a data-processing device, a game should take advantage of the computer's strengths by emphasizing processing over data storage.[12] The distinction is also present in Harvey Smith's call for systemic level design over special-case level design (2001), which will be discussed later.

Before I describe these two game types in more detail, I suggest the reader performs the *game guide test of emergence* on a number of games:

The game guide test of progression and emergence

Search for a guide to the game on the Internet. If the game guide is a walkthrough (describing step by step what to do), it is a game of progression. If the game guide is a strategy guide (describing rules of thumb for how to play), it is a game of emergence.

Many games can be found on a scale between emergence and progression, and their game guides are consequently a combination of step-by-step descriptions ("get the red key, walk north, and open the third door") and strategy guides ("in the large room, the best way of reaching the exit is to work your way around the side while keeping all enemies at a distance using the laser rifle"). There are two extremes of this scale and two primary ways of creating hybrids:

- *Pure progression games:* The traditional adventure game is the purest example of a progression game.
- *Pure emergence games:* The multiplayer board, card, action, or strategy games are the purest examples of emergence games.
- *Progression games with emergent components:* The single-player action game is usually a hybrid in that the player has to traverse a number of

areas each of which can be negotiated in a number of ways and are therefore emergence structures.

- *Emergence games with progression components:* Multiplayer role-playing games like *EverQuest* (Verant Interactive 1999) are hybrids where the overall game structure is emergent but contains a number of small *quests* where the player has to perform a sequence of events to complete the quest.[13]

Games of Progression

Progression is the historically newer structure that entered the computer game through the adventure genre. Most clear-cut progression games are adventure games. The first adventure game is the text-based *Adventure* (Crowther and Woods 1976). A typical start of *Adventure* looks like this (">" marks what the player types.)

Welcome to Adventure!

...

At End Of Road

You are standing at the end of a road before a small brick building. Around you is a forest. A small stream flows out of the building and down a gully.

>enter building

Inside Building

You are inside a building, a well house for a large spring.

There are some keys on the ground here.

There is tasty food here.

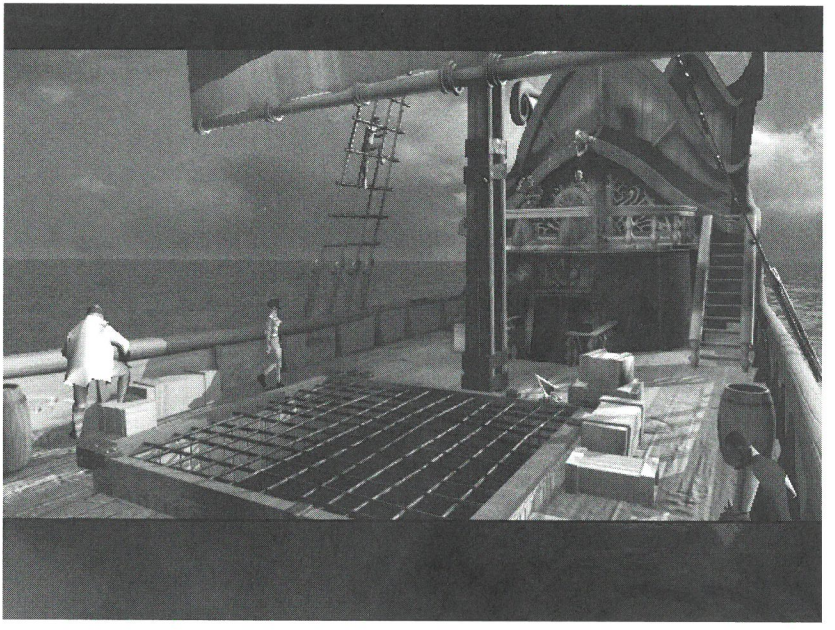
There is a shiny brass lamp nearby.

There is an empty bottle here.

>get lamp

Taken.

The traditional adventure game was based loosely on the fantasy genre inspired by Tolkien: a world of elves, trolls, dragons, caves, and treasures. During the 1980s, the genre changed from being text-based to being primarily graphical.[14] In *The Longest Journey* (Funcom 2000) the game protagonist, April Ryan, is on board a ship threatened by a storm. To save

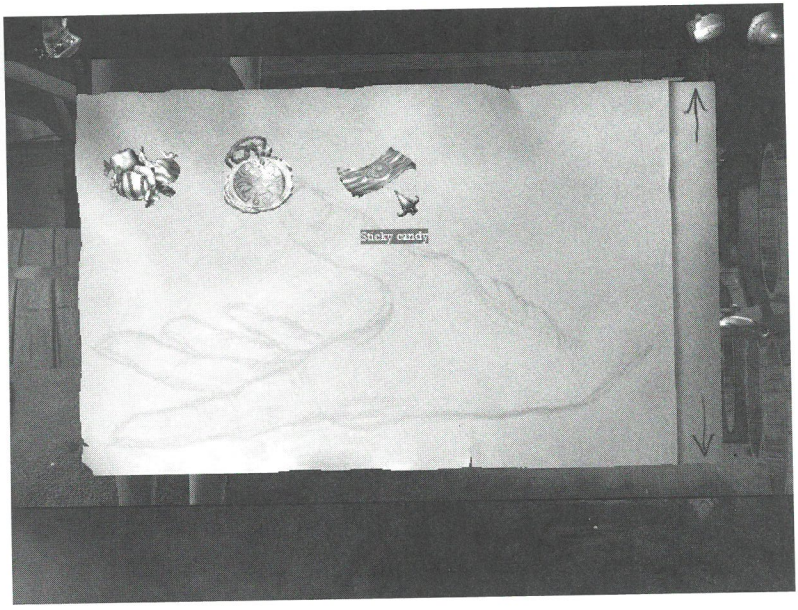


| Figure 3.5 |
The Longest Journey (Funcom 2000): Go to the cargo bay.

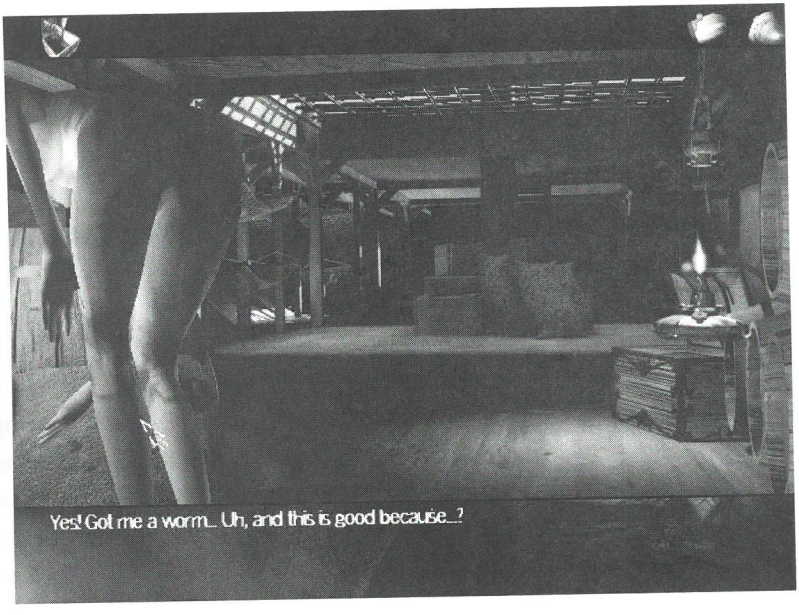
her, the player must perform a predefined sequence of events (figure 3.5–3.8). If the player does not perform the right actions, the game is over. It is characteristic of progression games that there are more ways to fail than to succeed (figure 3.9). The progression structure yields strong control to the game designer: Since the designer controls the sequence of events, this is also where we find the games with cinematic or storytelling ambitions.

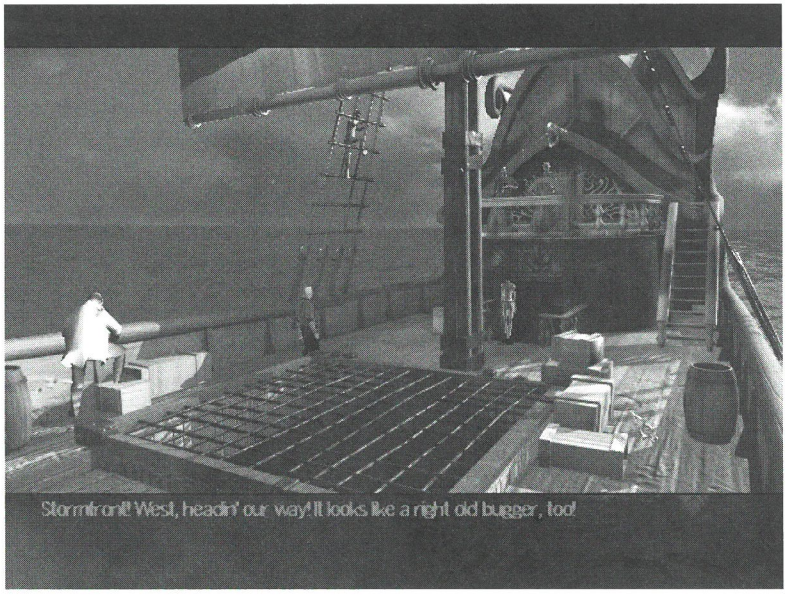
Games of Emergence

Emergence is the primordial game structure where a game is specified as a small number of rules that combine and yield a large game tree, that is, a large number of game variations that the players deal with by designing strategies. Emergence is found in card and board games, most action, and all strategy games. Almost all multiplayer games are games of emergence. Games of emergence exhibit a *basic asymmetry* between the relative simplicity of the game rules and the relative complexity of the actual playing

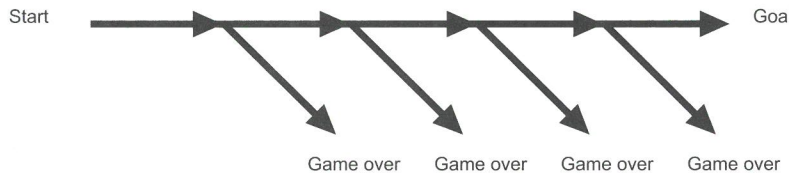


| Figure 3.6 |
Eat some candy, leaving a candy wrapper.





| Figure 3.8 |
A storm appears.



| Figure 3.9 |
Progression games: to complete the game, the player has to perform exactly the actions that the game designer planned or the game ends.

of the game. To give a non-electronic example, the rules of chess can be described on a sheet of paper, but a well stocked bookstore carries shelf after shelf of books on specific openings, gambits, endgames, and so on; there is more to playing such games than simply memorizing the rules. In a game of emergence, the game is therefore not as much a straight line as an open landscape of possibilities: In chess you win by checkmating your opponent—but there is a myriad of end positions in chess that

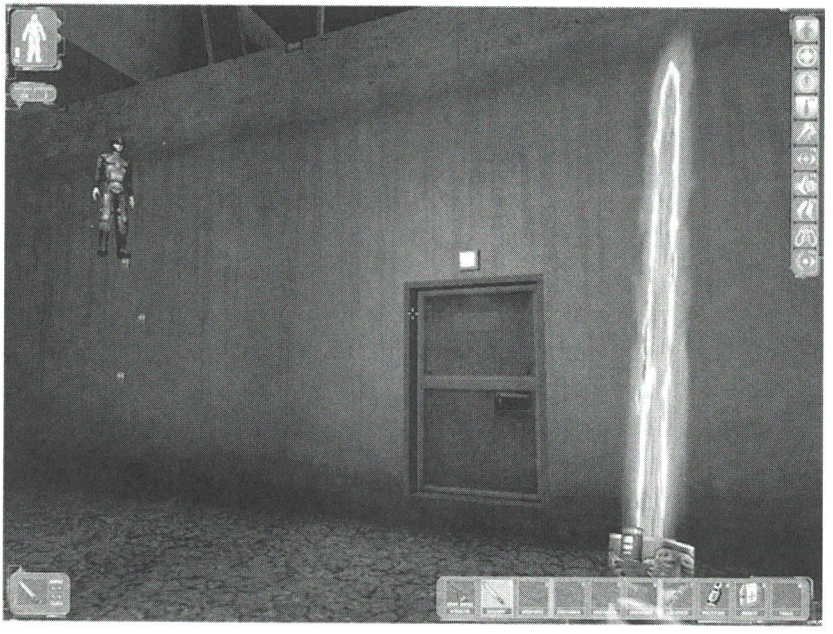
qualify as checkmate, and each of these positions can be reached in an immense number of different ways. A game of emergence has a broadly defined goal—there are many game states that qualify as the goal—and a large number of ways to reach these states.

A terminological caveat about *emergence:* The term is commonly used very loosely, and even scientific literature on emergence is often contradictory. My goal here is not to write a treatise on the general phenomenon of emergence, but to understand game rules. At a most basic level, the question is whether emergence is a feature of the game systems themselves or a feature of human cognition. There are good arguments for both positions, and I will therefore borrow from a number of different descriptions of emergence in order to distinguish between different types of emergence in games.

Emergence in games has recently received much attention under the heading of *emergent gameplay*. Emergent gameplay is usually taken to be situations where a game is played in a way that the game designer did not predict. The game designer Harvey Smith has argued extensively for *systemic level design;* game design that allows for emergent gameplay. He makes the distinction between *desirable* emergence, where the interaction between the different elements of the game leads to interesting gameplay, and *undesirable* emergence, where players find ways to exploit the rules in ways that make the game less enjoyable. The best-known example of the latter is the *proximity mine* problem in *Deus Ex* (Ion Storm 2000), illustrated in figure 3.10:

> Some clever players figured out that they could attach a proximity mine to the wall and hop up onto it (because it was physically solid and therefore became a small ledge, essentially). So then these players would attach a second mine a bit higher, hop up onto the prox[imity] mine, reach back and remove the first proximity mine, replace it higher on the wall, hop up one step higher, and then repeat, thus climbing any wall in the game, escaping our carefully predefined boundaries. (Smith 2001)

Smith's distinction corresponds closely to the distinction between emergence and progression games. Harvey Smith's aesthetic argument for systemic level design is that it allows for more *self-expression* on the



| Figure 3.10 |
Deus Ex (Ion Storm 2000): Climbing the wall using mines (from Smith 2001).

players' part; the players can solve problems the way they want to solve them rather than in the way the game designers planned. The *practical* argument is that it allows content to be created faster, which mirrors the basic asymmetry mentioned.

That rules and gameplay are asymmetrical, and that emergence games give the player freedom to play a game using different strategies, are in many ways flip sides of the same coin. This can be understood by way of what is broadly called "the sciences of complexity" (cf. Waldrop 1994), the study of systems (biological, economical, or otherwise) that exhibit an asymmetry between the simplicity of some basic rules and the complexity of the system. As Stephen Wolfram puts it: "Whenever you look at very complicated systems in physics or biology... you generally find that the basic components and the basic laws are quite simple; the complexity arises because you have a great many of these simple components interacting simultaneously. The complexity is actually in the organization—the

myriad of possible ways that the components of the system can interact" (qtd. in Waldrop 1994, 86).

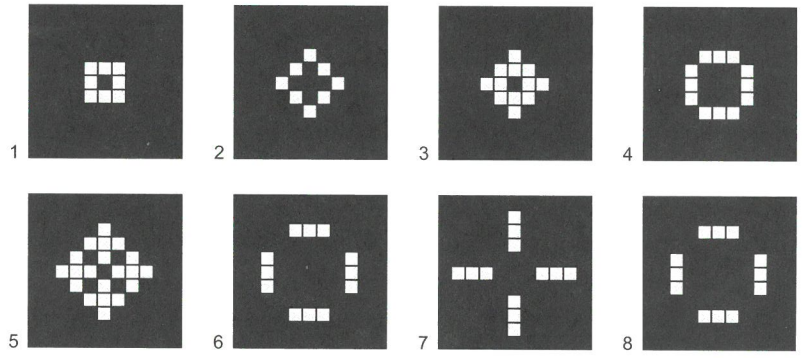
This corresponds quite well to the asymmetry between rules and gameplay in most games. What the sciences of complexity can provide is a framework for understanding how this happens. As for the term *emergence*, this is often taken to mean a higher-level pattern that is the result of interaction between many lower-level entities. Classical examples of emergence are life (life is molecules), consciousness (the result of interactions between brain cells), anthills (there is no central command in an anthill), bird flocks (there is no leader in a bird flock) (cf. Johnson 2001). As you read this, no cell in your brain is the one that is *really conscious;* your consciousness is an emergent property of the interactions between all your brain cells. In John Holland's description: "Emergence, in the sense used here, occurs only when the activities of the parts do *not* simply sum to give activity of the whole. For emergence, the whole is indeed more than the sum of its parts. To see this, let us look again at chess. We *cannot* get a representative picture of a game in progress by simply adding the values of the pieces on the board. The pieces interact to support one another and to control various parts of the board" (1998, 14).

A more concrete example of how something complex can arise from something simple is John Conway's *Game of Life* (Holland 1998, 136–142). Note that this is not a game, but an example of the emergent properties of some simple rules. Conway's *Game of Life* takes place on a grid of squares, each of which can be *on* (white) or *off* (black). The grid goes through a number of steps, in each of which the following rules are applied:

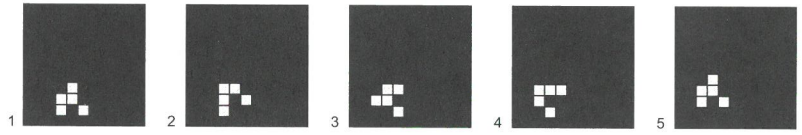
- If a square is on, it dies with less than two neighbors (from loneliness) or more than three neighbors (overcrowding).
- If a square is off, it is turned on if it has exactly three neighbors.

This may not sound very interesting, but it turns out to be a simple system that generates a large number of different patterns (figure 3.11).

▶ It is hard to do justice to the *Game of Life* on paper; an online version is available at http://www.half-real.net/gameoflife.



| Figure 3.11 |
Game of Life: eight steps of a pattern generated by simple rules. It eventually cycles between steps seven and eight.



| Figure 3.12 |
The glider: A pattern that moves across the grid in four steps.

All emergent systems are heavily *connected*. Their separate elements can all potentially influence each other in due time. The *Game of Life* has interesting properties because all its elements can interact with each other. Much effort has been dedicated to the study of the *Game of Life* and the more generalized field of *cellular automata* (for an example, see Wolfram 2002). One of the discoveries is that the *Game of Life* can support a number of regular patterns, the most famous of which is the *glider* (figure 3.12). The glider is a pattern that changes over the course of four steps, and finally reappears shifted one position on the grid (position five is identical to position one except it is shifted one position left and up). An animated version of the *Game of Life* shows the glider crawling (or gliding) across the computer screen. Patterns that are much more complex exist, such as the *glider gun*, a pattern that regularly creates new gliders.

What Emergence Can Teach Us about Games

There is some disagreement about whether emergence is a property of a system (Holland 1998, 5) or simply situations in which a game surprises its designer (Johnson 2001, 179–180; Rouse 2001, 124–125), but as we are interested in the human experience of playing games, we certainly can not afford to leave out the psychological aspects of games. The original question was how game rules provide challenges for players, and the ability of a game system to surprise players is important for games. We can distinguish between different variations of emergence in games: emergence as *variation*, as *patterns*, as *irreducibility*, and as *novelty* or surprise.

1. *Emergence as variation* is the variety of possible states and game sessions that a game's rules allow. *Pong* is an instance of *variation* coming from the interaction between some very simple rules. This is *not* emergence as surprise: It should be obvious that a large number of different games can be played by having simple rules describing, for example, the movement of a ball and some bats.

2. *Emergence as patterns:* These are patterns that players cannot immediately deduce from the rules of the game.

- All game strategies. (Since a strategy requires regularity to work, strategies require some kind of pattern in the gameplay of a game.)
- The team play required in *Counter-Strike* or the advantage of working in groups in *EverQuest*. (Specific higher-level patterns.)

3. *Emergence as irreducibility*. In his article "Guidelines for Developing Successful Games," game designer Bruce Shelley emphasizes the importance of play-testing in game development: "Prototyping is not only useful from a technology standpoint, but is also critical for testing gameplay. Designers are usually left guessing until their games can be played. There are always surprises when a game is first played, some good and some bad. Prototyping for gameplay testing is especially useful for strategy and other empty map games that do not depend on pre-planned or linear story lines" (2001).

It is striking to compare Shelley's guideline for game design to what Stephen Wolfram has written on the complexity of cellular automata: "This complexity implies limitations of principle on analyses which can be made of such systems.... The behaviour of the system can thus be

found effectively only by explicit simulation. No computational short cut is possible. The system must be considered 'computationally irreducible'" (1988). Most games are irreducible; there is no shortcut to actually playing the game. And the reason why Shelley puts less emphasis on play-testing for pre-planned or linear (progression) games is, of course, that they are not emergent games because their rules and game objects have very few potential ways of being combined.

If commercial games require play-testing to develop, where does this leave "folk" (non-commercial) games? Folk games are developed over long periods of time. Since most traditional games are strongly emergent, no one can predict from the rules how they will be played. Whenever changes are made to the rules of a folk game (by deliberate design or simply by misremembering), nobody can deduce whether this will lead to good game sessions is by playing the game. What happens then is that rule changes that lead to interesting game sessions survive by word of mouth, but the rule changes that lead to boring game sessions die out.

4. *Emergence as novelty or surprise:* This is in its simplest form when several rules or objects in a game are combined in a hitherto unseen way and surprise a human player or designer.

- In the game of *Quake III Arena*, this includes *rocket-jumping*, which is the tactic of jumping into the air, firing a rocket into the ground below, and flying on the shockwave of the blast. (This is a way of jumping further than you would otherwise be able.)
- Harvey Smith's example (2001) of proximity mine climbing in *Deus Ex* is also emergence as novelty.

Designing a game with many connections between different objects and rules certainly increases the likelihood that players will find unpredicted rule combinations.

Emergence and the Player

All emergent systems contain a high number of interactions between the different parts of the system. This observation provides a more precise way of differentiating between games of emergence and games of progression: In a game of emergence, a large percentage of the rules and objects in the game can potentially influence each other; in a game of progression,

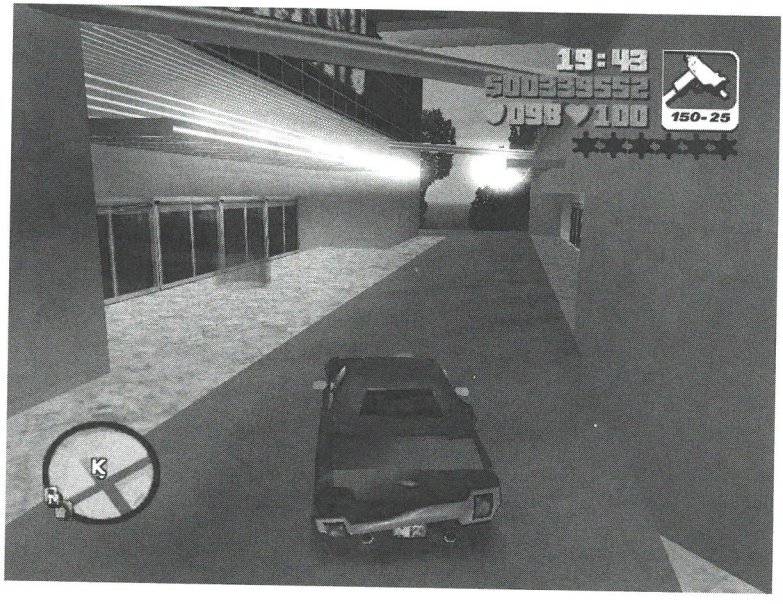
most rules and objects are localized. Strategy games are highly emergent and have a large degree of connectedness, since every move and unit can potentially matter to every other move and unit in the game. On the other hand, many games of exploration contain large areas that the player has to traverse, where the exact path the player follows is inconsequential—in a strategy game, the exact path of each piece always potentially matters to every other piece.

I mentioned the question of whether emergence is in the game itself or just in the mind of the player. Harvey Smith's examples (2001) describe situations where the game designer was *surprised* by what happened in the game, but he concludes that to promote emergent gameplay, games should be designed in a specific "systemic" way where the objects in the game can interact in many different ways. The experience of surprise occurs because the player and designer do not imagine the entire game tree and all possible game sessions. Emergence as novelty is therefore an interaction between the game system and human cognition. A game with many objects that interact according to well-defined rules can surprise a player in a way where the player can afterwards understand what *did* happen because the game proceeded according to clear rules.

Games between Emergence and Progression

Progression and emergence are the two extreme ways of creating games. In practice, most games fall somewhere between these poles.

To give a high-profile example, in *Grand Theft Auto III* the player is free to drive around the city and to take on the missions that various dubious characters offer. "Deal Steal" is a typical mission that takes place about one-third of the way through the game (figure 3.13–3.19). *Grand Theft Auto III* is structured in two different ways: In the big picture, the game is a linear sequence that the player has to complete, from being betrayed in the beginning of the game to finally getting revenge. There are a few optional missions and a few missions that can be completed in different order, but overall *Grand Theft Auto III* is a game of progression. Nonetheless, "Deal Steal" shows how the goals do not specify how they are to be achieved. It is up to the player to complete the mission in the way he or she wants. In diagram form, this is illustrated in figure 3.20. The advantage of structuring a game like this is that the player experiences a predefined story by completing the missions, *while* having freedom



| Figure 3.13 |
Grand Theft Auto III (Rockstar Games 2001). An indicator on the map (lower left corner) shows where to receive a mission.

to solve the tasks in different ways. Even though the player is in principle free to ignore the missions, most players will try to complete them *because they want to*, because it is more interesting to undertake the missions than not to. So even figure 3.20 does not quite express the flexibility of the game.

Gameplay: Rules in Action

While we can, in principle, list all the rules that govern any game and then proceed to draw the game tree of the game, this does not tell us how the game will be played. The term *gameplay* is commonly used to describe this dynamic aspect of a game. It is important to understand that the gameplay is not the rules themselves, the game tree, or the game's fiction, but the way the game is actually played. Richard Rouse's discussion of gameplay focuses primarily on gameplay as a property of the game: