

Designing Good Games

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Uses: no specific version of Game Maker

Level: Beginner

When Atari produced its first game console in the seventies it was not very popular. This changed drastically when the game *Space Invader* was created and bundled with the console. Within a short period of time Atari sold a huge number of consoles. The same thing happened when *Pacman* was produced. And for the Nintendo Game Boy *Tetris* was the absolute winner. Why are these games so special that they mean the difference between success and failure of the devices they were created for?



Figure 1. PacMan and all of its clones are still very popular games.

The same applies in PC games. Some games become extremely popular making their creators instant millionaires, while other games, that look almost the same, become miserable failures. And then there is also a large collection of games that you never see because they were cancelled halfway the production and their creators went bankrupt. What makes a game a winner and what leads to failure? This is a very difficult question to answer. It involves many different aspects. In this tutorial we will delve into some of these aspects in the hope it will help

you to create better games. Many elements of this tutorial were based on a paper by Creg Costikyan¹.

What is a Game?

Before talking about good games we should decide what a game is in the first place. There is a surprising amount of discussion about this issue and there are many different definitions. It is easier to say what is not a game. This

A movie is not a game

This is rather obvious, but why? What elements of games are missing in movies? The main difference is that there is no active participation of the viewer in a movie. The viewer does not control the movie and cannot make decisions that influence the outcome of the movie. The same is true for stories and plays in a theater. Also the final outcome of the movie is fixed (even though the viewer might not know it). This is a crucial aspect of movies and plays. People in general don't like plays in which the outcome is not predetermined. In games the opposite is true. People do not like it when the outcome of a game is fixed. They want influence on that outcome. They want to be in control.

A toy is not a game

You play *with* a toy but you do not play *with* a game. You play the game. With a toy there are no predefined goals although during play you tend to set such goals yourself. A number of computer games actually are close to being toys. For example, in *SimCity* or *The Sims* there are no clearly defined goals. You can build your own city or family and most likely set your own goals (like creating the biggest city) but there is not really a notion of winning the game. One could add this (e.g. you could add that the game is won when your city has reached a particular population) but this can be frustrating because it is not a natural ending. This being said, there is nothing wrong with creating a nice interactive computer toy.



¹ Creg Costikyan, *I have no words & I must design*, Interactive Fantasy #2, 1994. See also <http://www.costik.com/nowords.html>.

Figure 2. Is SimCity a game?

A drawing program is not a game

A drawing program is fun to play with and encourages creativity, but again it has no clear set goals. The user defines the goals and it is the user who decides whether the goals are reached.

A puzzle is not a game

This is a more difficult one. Clearly many games contain puzzle elements. But a puzzle is static, while a game is dynamic and changes in the course of playing it. A satisfying game can be played over and over again and there are different strategies that lead to success.

So what is a (computer) game then? Here is a possible definition:

A computer game is a software program in which one or more players make decisions through the control of game objects and resources, in pursuit of a goal.

Note that the definition does not talk about graphics, or sound effect, or in-game movies. Such aspects obviously do play a role in making nice, appealing games, but they are not the essential aspects of games. Let us look at the different ingredients of the definition in some more detail.

A computer game is a software program

This makes it rather different from for example board games or sport games. It takes away some of the fun of games. There are no pieces to move around and there is no physical satisfaction (although some recent games, like *Dance Dance Revolution* or the games for the new Nintendo *Wii* console involve physical exercise). Also the social aspects are less prominent, although online multiplayer games add a new form of social interaction. But we get quite a bit in return. A software program can much better react to and adapt to the players. Most computer games have a real-time element that is not present in board games. The game continues even when the players do nothing. This can lead to enhanced excitement and a better feeling of presence in the game world. Also computer games can adapt to the players making it satisfying for largely different players, both beginners and advanced. The possibility of having computer-controlled opponents adds many new challenges. Computer games can also be more complex because the game itself can help the players understand the different aspects and teach the player how to play. Finally, computer games can create a more immersive environment by adding wonderful graphics, music and cut-scenes.

A computer game involves players

This is rather obvious. A game is not something to watch. You should be involved in a game. Don't underestimate the importance of the player. Beginning game designers often forget that you make the game not for yourself but for the people that are going to play it. So you always have to think about who they are. A game for children should be rather different than a game for adults. And a game for hard-core gamers should be rather different from a game for less experienced players. You need to pick the correct audience. Bad games are often written for the wrong audience. For example, a very experience flight simulator freak wants to be able to

control every aspect of the plane and wants things to be as realistic as possible. For a player that just wants a bit of quick flying fun this is frustrating and boring and such a player will most likely never get the plane to take off, let alone to get it to land.

Playing a game is about making decisions

The player makes decisions that influence the rest of the game. In fast paced action games such decision typically involve in which direction to move and which weapon to choose for shooting. In complicated strategy games the decisions involve where to build your settlements, which units to train, when and where to attack, etcetera. Of course decisions should have an effect. Surprisingly, in many games the effect of decisions is only marginal. For example, often it does not really matter which weapon to use. This often leads to frustration. Carefully balancing decisions and their effects is crucial for satisfying game play.

Playing a game is about control

The player should feel in control of the game. Not the other way round. Uninterruptible sequences in which the control is taken out of the hands of the player still occur in many games and often lead to frustration. The more freedom there is for the player, the better. There is though a catch here. A game is also about surprises and dramatic effects. Such effects can be created much better if the player is not in control. For example, in a movie, when the main character approaches a door you can let the music rise. The viewer knows that something is going to happen. Together with zooming in on the door, this can create a great dramatic effect. But if the same happen in a game and at the last instance the player decides not to open the door, most of the effect is gone and even becomes absurd. Careful balance of freedom of control and dramatic effect is difficult. (There is another less valid reason for not allowing too much control. More freedom and control for the player makes it more work to create the game.) Whenever you need to constrain the user, try to do this in a natural way. For example, in *Riven* the player moves between different parts of the game world. By letting the user use some kind of train system it is natural that this motion goes automatic and cannot be controlled by the player.

Game objects and resources

In a game you normally control certain game objects, like the main character, units, a car, etc. In some games you can control just one object while in other games, for example strategy games, you can control many different objects. Besides the game objects that the player controls, there are normally many other objects that are controlled by the computer. The game objects the player controls play a certain role in the game. This is an important property. In other programs you also control certain objects, like buttons, but these do not play a role in the program. They are only meant to give certain commands to the program. Besides controlling game objects you must often also manage certain resources. This is most evident in strategy games and simulation games in which you must manage the amount of food, wood, stone, gold, etc. But also in many other games there are resources to manage, like ammunition for your weapons, a shield that can be used a limited amount of time, etc. Careful planning of resources and their use can add

many nice aspects to the game play. The game designer must balance the availability of resource with their need, to achieve interesting game play.

A game needs a goal

This is a crucial ingredient in a game. People want to win a game and, hence, there must be a goal to reach. For long games there should also be sub-goals, like finishing a particular level, defeating a certain monster, or acquiring a new spell. Reaching a goal or sub-goal should result in a reward. Such a reward can consist of a score or some nice movie, but it is better if the reward is actually part of the game play itself, for example a new weapon, some additional useful information, etc. We will talk more about goals and rewards in a moment.

What is a Good Game?

So now we know what a computer game is. But it does not say much about when a game is good. Think about the following computer game:

You have to rescue the princess who is held in a fortress. On the screen you are shown two roads, one leading to a fortress and the other leading to a cave. You have to decide which road to take. You choose the road to the fortress? Congratulations. You rescued the princess and won the game. You choose the other road? Bad luck. You are eaten by the cave monster and die.

If you verify it, this game has all the ingredients described above. There is a player, there is a decision to make, the player controls what is happening, there are game objects (the prince, the cave monster, etc.) and there is a clear goal. But it is obviously a rather boring game. There is no challenge. The game is too easy. So clearly we have to do a better job to make an interesting game.

Reaching Goals

An important part of a game is that there is a goal and the game challenges the player to try and achieve this goal. Actually, there are often many different sub-goals. Goals come in all sorts and shapes. A goal can be to try and shoot an enemy plane, or to finish a level by collecting all diamonds, or to reach the highest score or to finish the game. Clearly some of these goals are short-term goals while others are long-term goals that can only be reached by playing the game for weeks. A good game is filled with these goals and the player should be rewarded when he reaches one of the goals. Rewards give an important additional motivation to try and reach the goals.

Goals should not be too easy to achieve. There must be a challenge. And when the game progresses the goals should become harder to reach and the player has to become better at the game to achieve them. This learning curve is very important. In the beginning the player needs to understand the controls and the mechanisms in the game. This is best done by letting him achieve some simple goals. Later on, the player understands the game better and will be ready for bigger challenges.

Obviously, when goals are hard to achieve, there is a big chance of failure. You have to be careful with failure though. It can easily put the player off, making him stop playing. And that is definitely not what you want to happen. To avoid this it is crucial that, in the case of failure, the player always has the feeling he made a mistake that he could have avoided. It should not be the game's fault that the player lost, but his own. It is one of the aspects that distinguish games like *PacMan* and *Tetris* from other games. You always have the feeling you did something stupid. You can be pretty angry with yourself when it goes wrong and you are determined to avoid this mistake the next time. This feeling keeps you playing the game. On the other hand, consider a maze game in which from time to time at a random spot a flash of lightning occurs, killing you if you happen to be in the neighborhood. In such a game you, as a player, did nothing wrong. You just had bad luck to be at the wrong spot. This is very frustrating. You are not angry with yourself but with the game. And you probably soon stop playing it. Don't think that commercial games are perfect in this matter. Quite some games for example produce enemies at random locations and random moments in time. If you have bad luck they appear at the wrong moment right next to you and kill you.

You should learn from this that you have to be careful with "luck" in your games. Whether the player can achieve a goal should not depend on good or bad luck. Bad luck is of course very frustrating for a player but also good luck does not give the player satisfaction. Imagine that you can be lucky and find a super bomb just before facing the main enemy. Having the super bomb make the fight very simple while not having it makes it a major challenge. With the super bomb the player will not have the feeling he conquered the enemy himself. It would have been much better if the super bomb was always there but the player had to make a difficult move to get it, for example, jumping over a dangerous pit. Now the player has an interesting decision: performing the dangerous jump to make the fight easy, or not risking the fall and fighting the enemy with lesser weapons.

Decisions

As we saw in the last example, creating an interesting decision enhances the game play considerably. In general, decisions are a crucial ingredient of games. The more interesting the decisions, the more interesting the game is. There can be very simple low-level decisions or very high-level strategic decisions.

Let us look at the well-known *PacMan* game. It is packed with decisions. The most important decision that you constantly have to take is which direction to move in. Are you trying to stay as far as possible away from the monsters or are you going after the dots, even if the monsters stay close-by? And will you go to a corner, where you might be caught or will you stay in the center where you can move in more directions but can also be attacked from multiple sides? A second type of decisions lies with the pills you can eat to chase the monsters. When are you going to use them? Do you leave them to the end and only use them to get to the final dots or do you use them early on to clear most of the maze? And if you eat them, are you going to hunt

for the monsters to get extra points or are you going to use the safe time to eat more dots and try to finish the level? And finally there is the bonus item that appears from time to time. You can try to get it for extra points, but you will run the risk of being eaten by a monster.

When there are many decisions to make, like in *PacMan*, the player will make mistakes. In *PacMan* these mistakes are not immediately fatal, but it will require you to work harder to finish the level or to get the highest score. This is important because everybody makes mistakes and you should not be punished too much for such mistakes. In the same way as a reward should be related to the achievement you made, a punishment should be related to the seriousness of your mistake. If the player loses the game, this should be the result of a grave mistake or a series of smaller ones. In such a case the player will definitely feel that he himself is to blame for the loss, and will continue playing to try to do better.

Balance

In a good game different game aspects are balanced. For example, the player should have the weapons with which he can fight the enemies. The weapons should not be too strong. That would make the game too easy. And they should not be too weak because then the player can only survive if he has a lot of luck, and remember what we said about luck before. Balance is difficult to achieve. And players are very clever in finding out where the game is unbalanced and exploit this unbalance, thereby often ruining the fun of the game.

There are three different aspects of balance: balance between players, balance between the player and the game play, and balance between different features in the game. We will discuss each of these below.

Balance between players

If you create a two-player game, you better make sure that the best player normally wins, and not the most lucky one. Imagine a strategy game in which two players compete with each other. As in most strategy games they have to build up a city and for this they need wood. Now imagine there is just one forest in the world and one player starts very close to this forest and the other is far away from it. This gives the first player an advantage that will most likely win him the game. So the game is highly unbalanced.

A game of chess on the other hand is highly balanced. Each player has the same pieces and can make the same move. The only problem is that one player can start and this is actually an advantage in chess. But this is balanced out because in a match each player can start the same number of times.

Chess is a symmetric game. Symmetric games are well balanced. But symmetry is also a bit boring. Imagine that in the strategy game I mentioned the world looks completely symmetrical and each player plays the same race with the same units. That would make the game less appealing. Still it is used rather often. For example, the multiplayer maps in *Red Alert II* are very symmetrical. The real game design challenge is to make a non-symmetrical game that is still rather balanced.

One way of achieving this is to use fake asymmetry. Let me demonstrate this with an example. In our strategy game we let the first player start behind a mountain range while the second player has his city behind a river. The first player we give the ability to create boats while the second player has equipment to drill tunnels. This looks very asymmetric but the tunnels can be used to pass the mountain range and in a similar way the boats can pass the river. So balance is restored again. Many strategy games use some type of fake asymmetry. Races might look rather different but in the end the possibilities are very similar.

Balance between the player and the game play

The game play is there to help the player, not to fight the player. As was said before, the player should lose because he made a mistake, not because he for example forgot the key combination to fire the canon. Careful design of the interaction (the use of the keyboard, mouse, joystick, etc.) is important to avoid this type of problems.

Also you need to strike a good balance between what the player must do and what the game does for him. For example, in most games the player does not need to continuously push buttons to make a game character walk. The game does this automatically for him. But the player must press a button to make the character shoot. In many strategy games, soldiers automatically start attacking enemies that come in close range rather than requesting the player to constantly check on all the units. But the player must decide when to start an invasion into foreign territory. But also well-known games make the wrong decisions here. For example, they force the player to constantly bring food to the troops or they force you to manually withdraw wounded soldiers from the battle. For example, one of the things many people complained about in *Black and White* was that when your people were praying you had to bring them food all the time.

Let us consider another example. In the early adventure games one of the major challenges was to find out where you should click on the picture to get certain things done. For example, to open a door you had to find the secret button to press. Only after pressing on all the 100 stones in the wall you found the one that opened the door. This adds no fun to the game. In modern adventure games the mouse cursor changes whenever you move it over a place where you can click and often a message appears indicating what there is to click on. Good visual cues are also given, for example by giving one of the stone a slightly different color. This will improve the game play a lot. The player still has to come up with the idea that there might be a secret button but once he has that idea it is easy to find the place.

The bottom line is that the player should spend his time and energy on the important aspects, and the game program should do the rest. The game should try to understand what the player wants and take action accordingly, rather than the other way round.

The balance between game features

A game contains many different features: different weapons, different enemies, different units, different roads, all sorts of resources that can be use, and so on. These features result in

decisions for the player: which weapon to use for what enemy, which road to take, how to use the resources, and so on. This makes the game interesting. But you better make sure there are some real decisions here. For example, when your game features four types of weapons, but one is superior to the others, the player will never use the other three weapons once he finds the best one. So there is no decision left anymore. To keep the decisions interesting you should balance the good aspects of the features with the bad ones. For example, the powerful weapon can fire only one shot per second, or the ammunition is more expensive, or it cannot be used in a cave, or one opponent is more sensitive to a particular weapon than another. Use your creativity.

You have to balance the powers of the player with the power of the computer-controlled opponents. When new opponents appear during the game, you should give the player new powers to fight them. But be careful that you don't fall in a well-known trap in which you simply increase the firepower of the player while the opponents get equally stronger. This does not lead to more interesting game play. There is not much difference in driving with a slow car against slow opponents or with a fast car against fast opponents (unless, of course, steering the fast car is more difficult). A key issue here is that the player should improve during the game, not the character he plays (or the car he drives). This is not to say that the character of car should not improve. But the improved character should reflect the improvements in the player.

Don't forget that a player must learn to play the game. That is, the game should start easy with easy decisions for the player to make. When the game progresses and the player becomes better at it, he should get more and more complicated decisions to make. This can be achieved by introducing new features gradually during the game. The features should match the players' abilities. Make sure that there are still new features appearing far into the game. Too many games show all the features in the first few levels after which the game becomes just more of the same. Good games come up with surprises, all the way till the end.

Rewards

You need to reward a player when he achieves a goal. A reward can take the form of a particular score, some nice graphical or musical feature, or items that can be used in the game, like better weapons, power-ups, spells, or knowledge about the game world. The last type of reward is definitely the most rewarding to the player and whenever possible you should try to create this type of rewards. The effect can be permanent or temporary. Temporary rewards are typically given when a player achieves minor goals. It makes the playing easier for a while. Examples of this type of reward are some extra ammunition, or temporary invisibility to opponents. Permanent rewards are given when bigger goals are achieved. For example, you get a new weapon or spell or car. This will change the game play from that moment on, hopefully extending the range of decisions the player can make.

Giving the player the right type of rewards is actually an issue that is harder than you might think. People are picky about their rewards. If the rewards are too small they will not work hard to achieve them. If they are too large they get greedy and want even bigger rewards. It is a well-

known psychological phenomenon that players start expecting rewards and if you somewhere during the game you decide that a particular reward is no longer available they get angry. Let us consider an example of this. If in the first level of the game you give the player a bit of extra health for each opponent he kills, the player starts expecting this. If you decide in the second level that the player should now be more experienced and you stop giving this reward the player tends to be upset and might stop playing the game. It would be better to gradually increase the maximal player health and the damage opponents do, such that the increase in health is not significant anymore. The player still gets his reward but it has less influence on the game play.

You also need to decide whether rewards are predictable or more random. For example, in your game you might give a bonus item for each 50 collected coins. Alternatively, with every coin you collect you have a $1/50^{\text{th}}$ chance of getting the bonus. Even though mathematically equal, the effect of these two choices on the player is completely different. In the first situation, in the beginning the player is not very interested in collecting coins. It will take way too long before it will result in a bonus. This will make the game play less intense so there should be other aspects that keep the player interested, like exploring the environment. But when the number of collected coins approaches the 50 the game plays starts becoming very intense and the player will work very hard in collecting opponents, even those at difficult spots. So there is a high variation in intensity, which is appealing to certain types of players. When the award is randomly there is always an interest in trying to collect coins because it might lead to a reward. So the average intensity of the game will be higher. But there will be no peaks in intensity, which can lead to a more dull game.

Make sure the player notices the rewards he gets and starts understanding why he gets them. If the player does not know the relation between his actions and the rewards he gets this will be frustrating and will lead to less focused game play. So clearly indicate when points are scored or power-ups are obtained. For example, use some sound effect or some graphical effect.

Flow

A game gives challenges to the player and the player develops abilities to conquer these challenges. Challenges can take the form of monsters to beat, obstacles to avoid, puzzles to solve, bases to attack, and systems to master, for example a plane. The abilities a player must develop depend on the game and can for example be reaction speed, strategic thinking, or knowledge. A game is only fun to play when the challenges are in balance with the abilities of the player. While the game progresses the abilities of the player improve and, hence, the challenges should become more difficult. It is the task of the game designer to keep challenges and abilities in balance. This situation is called the *Flow*. When challenges are too hard the player gets frustrated, when they are too easy the player gets bored. There actually is a band in which the game is still fun to play. If you get to the top of the flow you reach a state that is sometimes referred to as *pleasurable frustration*. It is good to let your game from time to time get to this top and then give some easier challenges again. This helps the player to improve his abilities. So the difficulty should zigzag through the flow.

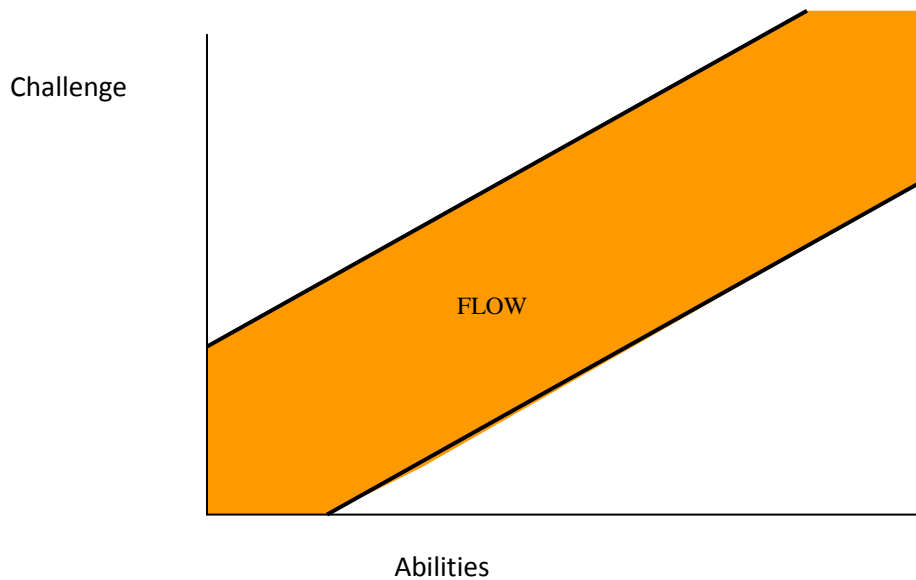


Figure 3. Keeping the Flow.

Keeping a game in the flow is difficult because it depends on the player. The easiest way is to give the player the opportunity to choose a level but this is not very effective, unless there is a big reward in playing on a more difficult level and it is easy to change level during the game. A second option is to let the player skip certain challenges and do alternative ones, better suited to his abilities. But most players tend to take the easier route, even if it leads to boredom. So the best way is to adapt the challenges to the player. Monitor the players behavior (for example how much damage he takes) and adapt the number or (better) quality of the opponents to this. Make sure that the player always progresses but let the reward depend on his qualities.

Presence and Immersion

You might have wondered why we did not talk about graphics yet, or about sound and music. Many people consider them crucial ingredients of a game. New commercial games try to achieve great new graphical effects and hire famous musicians to create the music. So isn't this important? Well, yes and no. If you look at the games available on devices like the *Nintendo Game Boy Advanced* or mobile phones, they have rather poor graphics and the sound is also limited. Still they are great fun to play and many people are addicted to them. On the other hand, some of the best three-dimensional games create a special atmosphere using the right type of music and stunning graphics effects like dripping water, smoke, and flickering torch lights.

The key issue here is *immersion*. Game play is largely enhanced if the player feels immersed in the game; if he feels that he is present in the game world and that his decisions and actions really matter; and if he becomes emotionally attached to the main characters in the game and really wants to help them. Important ingredients to achieve this immersion are the story in and behind the game, the surroundings in which the game takes place, the way the main characters in the game look and behave, the music, and the special effects.

The story

There is a lot of discussion about whether a game needs a story. Popular games, like *PacMan* or *Tetris* do not have a real story (although the designers still gave them some sort of story). And in many first person shooting games, the story is almost always the same: rescue the world from some kind of evil. Most people never read the story and it seems not to influence the way they experience the game. (You are not trying to save the world; you are simply killing the monsters that attack you.) On the other hand, for adventure games the story is crucial. It forms the basis for the puzzles you need to solve, and the story actually helps you solve the puzzles; they often only make sense when being part of the story. Also other games can benefit from a good story; again because they give a meaning to the actions you are performing and deepen the satisfaction when reaching your goals. It leads to *Meaningful Play*. This can be achieved by making sure that the different tasks or levels in the game form a logical sequence and by putting cut-scenes or movies in between them to enhance this storyline. Designing a good storyline with movies, etc. is probably beyond the skills of most beginning game designers, but it is good practice to at least put some logic in the game you are creating and such logic normally comes from a story.

The game world

A game takes place in some world. This world can be presented in exact three-dimensional realistic detail but also in a more abstract or cartoon-like two-dimensional way. Some games just use text and some static images to represent their game world. Designing an interesting game world is an important part of game design. And picking the right type of representation is important too. For a first-person shooter a well-detailed three-dimensional game world with lights, shadows, and special features like mist and water is crucial to give the player the feeling of presence. He has to see what a real fighter would see, otherwise the game becomes artificial. For a flight simulator the world should also look as realistic as possible. For an adventure game a realistic three-dimensional world is not so important. Here it is the story that creates the feeling of presence and this can also be accompanied by simple two-dimensional images. In puzzle games and many arcade games the game world is rather abstract and often two-dimensional. For example, in a scrolling shooter planes don't fly in natural ways nor do the bullets behave natural. And power-ups might float in the air. This is all perfectly acceptable for the player when the game world is rather abstract but would be out of place when the game world would look realistic. So it is really important to adapt the game world to the type of game you are creating.



Figure 4. A flight simulator should be realistic, while a scrolling shooter can be more abstract.

A realistic three-dimensional world can also hamper game play. For example, many strategy games use a form of overhead view of the game world in which you view it under a 45 degree angle (a *isometric* view). This makes it easy to track your units and to quickly see what is happening. You can easily scroll over the world to steer your units in doing the right things. Trying to do the same in a full three-dimensional world is a lot harder. You quickly lose your orientation, and have difficulty in keeping track of what is happening in the world. Moving around is more difficult. Again you must adapt the representation of the game world to the game play that is required.

The main characters

Many games have one or more main characters that the player controls or meets. Like in a movie it is important that the player becomes emotionally attached to these characters. He can hate them and try to kill them or like them and try to help them. So characters and their behavior need to be designed carefully. How again depends on the type of game. For example, in a first-person shooter the player himself is the character. He should fully identify himself with the character. In such a case it is advisable not to give the character a strong personality. This makes it more difficult to identify yourself with him. Or at least give the player the possibility to choose between different characters to pick one that suits him. For third-person games and adventures a strong personality is often important. If done right, the character can get some kind of hero status, like Lara Croft from *Tomb Raider*.

Music

Music and background sounds can play a very important role in immersing the player in the game. Even very soft background sounds can have a dramatic effect in games. For example, dripping water in a cave gives a creepy sound. Rolling thunder can raise the players fear, etc. Background sounds can also provide clues to the player about what is going on. For example you can hear footsteps in the distance or a door that is slammed shut. Modern games use positional sound such that the player also knows where things are happening. Picking the right kind of music for your games is as important as picking the right kind of graphics. A cartoon style game should have cartoon style music. Creepy games should have creepy music, and funny games should have funny music. Better have no music than the wrong kind of music. Modern games

nowadays use adaptive music that changes with the action that is happening. This can further increase the dramatic effect but is definitely beyond the possibilities for beginning game designers.

Special effects

Like in movies, special effects can have an important effect on the player. Some great explosions or sound effects can temporarily highly enhance the game experience. But be careful. The effect soon wears off. After 10 of such explosions you won't even notice them anymore. And they might even become annoying if they hamper the game play, e.g. by slowing down the refresh rate, or distracting the player. For example, some puzzle games have beautiful color changing or animated background. Soon these become very annoying and you really want to switch them off. So don't spend too much time and effort on special effects. Better concentrate on good game play.

Game Genres

Games come in many different types. Over the years a number of different genres have been created. If you are very creative you can try to make a game that is completely new, but if you want to be on the safe side you better pick a particular genre and make a game that fits in this genre. The following are some of the most important game genres:

Arcade games

Here reaction speed is the most important aspect of the game. Typical examples are scrolling shooters, maze games like *Pacman*, breakout type of games, various platform games, etc. These games are relatively easy to make and normally 2-dimensional graphics is good enough for them. These are definitely the type of games you should first start creating. A particular type of arcade games is the pinball game. These are a bit harder to create because you need natural ball movement.

Puzzle games

Here clever thinking is the most important aspect. Many maze games are actually more based on puzzle solving rather than on reaction speed. Other examples include board games and sliding puzzles. These games are also normally 2-dimensional and are relatively easy to create, unless the game has to be played against a computer opponent in which case it might be difficult to program the way the computer plays the game. (Think about trying to program the computer to play chess.)

Role playing games (RPG)

Here you steer a character through a dangerous world. Typical examples are *Diablo* and *Baldur's Gate*, *Oblivion*, and *Fable*. The most important part of such a game is the development of the character you control. The character must learn new skills, become more powerful, and find additional and better weapons. At the same moment the opponents become more powerful as well. Sometimes there is also a strong storyline and the player must discover what is going on in

the world. RPG games are often isometric or fully 3D, but this is not crucial. You can also create 2-dimensional RPG games. RPG games are harder to make because you must create the mechanism of character development. Also the games normally need to be large because otherwise they are soon finished. Good level design is crucial.

Strategy games

These can be either real-time (RTS) or turn-based. Here the player normally only indirectly controls the character in the game but he does set out the strategies that the characters need to follow. Examples include *Age of Empires*, *Caesar*, *Command and Conquer*, etc. Strategy games often use an isometric view. They take a lot of time to create because they require many different game objects, like characters and buildings, that all need their own animated images and specific behavior. Moreover, they require some careful artificial intelligence for the computer opponent.

Management games

Here you must build up an empire. In these games the player manages for example a city, factory, railroad company, park, etc. Examples are *SimCity*, *Theme Park*, *Railroad Tycoon* and in some sense also games like *The Sims*. Views are often isometric for a good overview. Managing resources is a crucial ingredient. These games are difficult to make because there must be an underlying system that simulates the world, for example the behavior of the visitors of your theme park. Many GOD games can be considered as a combination of management and strategy games.

Adventure games

Here the storyline is rather crucial. Adventure games can be 2-dimensional or 3-dimensional. They typically use the well-known point-and-click interface. The difficulty in creating an adventure game does not lie in the actions but in creating an interesting, funny, and surprising story line and in creating the corresponding artwork. You really need to be an artist for this.

First-person shooters

These can be seen as the 3-dimensional version of the old arcade games. Here the emphasis is on fast-paced action and reaction speed, not on cleverness and puzzle solving. Famous examples are obviously the *Doom* and *Quake* series but huge numbers have been created. First person shooters need a 3-dimensional world to create the feeling of presence.

Third-person shooters

Here the player directly controls a game character through a hostile world. A clear example is *Tomb Raider*. The main difference with role playing games is that there is not much emphasis on character development. It is more a matter of fast action and discovering the game world. Many third-person shooters also have a storyline and borrow aspects from adventure games. Third-person shooters do not need to be 3-dimensional (think for example of the early *GTA* games) and can be created with relative ease.

Sport games

Here an existing sport, like soccer or baseball is simulated. Many such games exist and they are very popular. Creating a convincing and fun-to-play sport game is though a big challenge. It might work better if you give it a cartoon flavor because then the action does not need to be realistic.

Racing games

These are in some sense a special type of sport game. Because there are so many of them they deserve a category of their own. Some racing games, like for example many Formula-1 games, try to model the driving of a car as realistic as possible. Other games are more arcade style and make racing very easy. Racing games can be 2-dimensional or 3-dimensional. One of the major challenges when making a racing game is to create convincing racing behavior of the computer controlled opponents.

Simulators

For example flight simulators. Such games try to realistically simulate some mechanism, like a plane. They are popular because people like to understand how such systems work and like to be able to control them. Creating simulators is rather difficult because you must implement the internal working of the system you are simulating, e.g. the flying of a plane.

Clearly we did not cover all types of games in this list but it at least gives you some indication of the various genres.

You can of course produce a game that has aspects of different genres, but you should be careful with this. The player picks a game from a particular genre because he likes that genre. For example, assume that you, as a designer, decided to create an adventure game with some added action. Somewhere in the game the main character has to move to a different city and for this he has to steal a car. Chased by the police the player has to race to the next city, avoiding being caught. This may sound like fun, but be careful. A player that chooses an adventure game likes the story aspect, the fact that he has to solve complicated puzzles, and the fact that he can take his time and is not hurried. The racing part suddenly requires him to play a completely different type of game in which reaction speed counts much more than clever thinking. Probably this is not his type of game and he might be unable to finish the race and will stop playing the game. Similar problems occur for example when combining strategy games with first person shooting action. So best pick your genre and stick to it for the whole game.

Learn from Other People

This tutorial should have given you a rough idea of the things that matter when trying to create a good computer game. But in the end the best way to learn is to do it yourself and to critically look at your results.

Another piece of advice is to learn from other people's mistakes. Whenever you plan to make a particular type of game, look at similar games. Play them and see what they did right and what

they did wrong. It is amazing to see how often people repeat mistakes made by others before them.

There is a lot of information on game design available on the web and in this tutorial a lot of information was taken from these sources. You are strongly encouraged to read some of the articles experienced game designers have written. See for example the websites of Gamasutra (<http://www.gamasutra.com/>) or the Game Developers Network (<http://www.gamedev.net/>). Also many books have been written about game design although unfortunately many are rather poor.

And of course you are recommended to regularly visit our *YoYo Games* website:

<http://www.yoyogames.com/>

Here you can get help and information about how to create games, you can discuss game design issues in the forum, and you can publish your games to have them played and reviewed by others.

Further Reading

For further reading on designing games and how to create them using *Game Maker* you are recommended to buy our book:

Jacob Habgood and Mark Overmars, *The Game Maker's Apprentice: Game Development for Beginners*, Apress, 2006, ISBN 1-59059-615-3.