

Strategy Games

- Reference:

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on Game Design, Chapter 10

Introduction

- The origin of strategy games is rooted in their close cousins, board games.
- Computer strategy games have diversified into two main forms:
 - classical turn-based strategy games
 - real-time strategy games
- Real-time strategy games arrived on the scene after turn-based strategy games.

Themes

Conquest (e.g., Age of Kings). Engage in conflict with one or more foes.

Exploration (e.g., Sid Meier's Colonization). Explore a new world.

Trade (e.g., the Tycoon series of games).

- More often than not, a strategy game blends these three activities.
- The extent to which any particular activity is dominant over the other determines the overall flavor of the game.
- However, the three activities are usually mutually interdependent.

Conquest: StarCraft

- StarCraft uses conquest as its primary mechanism.
- Exploration and trade do feature in the game, but only as an enabler for the player to conquer more effectively.
- The player must explore the area to be conquered and set up resource-processing plants to allow resources to be traded for weapons and units.

Exploration:

Sid Meier's Colonization

- Sid Meier's Colonization is primarily about exploration.
- The basic goal of the player is to explore the new world.
- Secondary aims are to settle colonies and subsequently defend those colonies from attacks by the displaced natives and the other colonizing nationalities.
- The three primary activities of conquest, exploration, and trade are quite evenly distributed
- However, the enabler for conquest and trade is exploration.
- You can't trade or conquer before you've explored who to conquer or trade with.

Trade: Monopoly Tycoon

- Monopoly Tycoon focuses on trade as the game's main activities.
- Players are required to trade to increase their value, while simultaneously preventing their opponents from increasing their value.
- Exploration is not really used in Monopoly, but it could be argued that the competitive nature of the game implies that conquest is a small part of it: You can win only by defeating your opponents.

Conquest

- Essence of conflict is a contest between two or more opponents.
- To achieve game balance, these conflict relationships can be resolved with the use of an SPS (Scissors-Paper-Stone) mechanism.
- Example from The Ancient Art of War:
 - knights beat barbarians
 - barbarians beat archers
 - archers beat knights
- Observe that there is no completely dominant unit.
- SPS is simple and can guarantee a fair relationship between all the conflicting entities.

Conquest

- Consider the following scenario:

Red	Blue
A	H
A	H
A	H
A	H
A	H
A	H

- The red player has a squad of archers.
- The blue player has a squad of horsemen.
- The horsemen can ride down the archers en masse before they can cause too much damage.
- Archers are less effective at close range.
- As long as the blue player can get through the initial barrage of arrows, he is assured victory
- As horsemen tend to beat archers, we would expect the blue player to win.

Conquest

- Consider the following scenario:

Red	Blue
P	H
P	H
P	H
P	H
P	H
P	H

- The red player has a squad of peasants.
- The blue player has a squad of horsemen.
- Peasants are soundly beaten by the horsemen, who can deal out damage far more efficiently than the peasants.
- Blue wins.

Conquest

- Consider the following scenario:

	Red	Blue
		H
	P	H
A	P	H
A	P	H
	P	H
		H

- The red player uses 2 archers and 4 peasants.
- Red places his peasants in a row facing the horsemen, and his archers remain at a safe distance behind the peasants.
- Blue player has a squad of horsemen.
- To reach the archers, the blue player's horseman must first defeat the peasants.
- While they are doing so, the archers are free to rain arrows on the horsemen, causing much more damage than the archers from the previous encounter.
- The delay caused by the peasants allows the archers to pick off the horsemen.
- Red wins.
- This is an example of compound SPS effects.

Conquest

- Consider the following scenario:

	Red	Blue
		H
	A	H
P	A	H
P	A	H
	A	H
		H

- The red player has switched the positions of the archers and peasants.
- The compound effect is wasted here.
- Blue wins.

Conflict

- Conflict does not necessarily have to involve physical combat.
- Civilization III uses diplomacy as another method of introducing conflict to the game.
- Response of the enemy leaders to your diplomacy overtures depends in large part on whether you have the force to back up your tough words.
- Diplomacy isn't all about trash-talk and “who-has-the-biggest-missile” contests — it also allows for the formation of diplomatic alliances and missions of peace.
- Diplomacy gives the player an extra degree of freedom, and this allows for the creation of more devious and interesting game plans than would be possible otherwise.
- Diplomacy, in this case, is a catch-all term to also include actions such as espionage and spying.

Exploration

- Games that focus on exploration often use the conquest activity in almost equal parts.
- XCOM: Enemy Unknown depicted the secretive invasion of Earth by aliens.
- Players were aware of the map of the Earth, but the location of hidden alien bases and UFO landing sites was a mystery until the player sent out a squad of XCOM soldiers to investigate the site.

Physical Exploration

- Investigating alien bases and landing sites requires physical exploration — the entire area is shrouded in darkness, revealed only when the player's soldiers gain line of sight on an area.
- This approach to implementing exploration is used in most strategy games (known as “the fog of war”).
- The physical exploration of the area reveals aliens scouting the area, who do not hesitate to fire on the soldiers using their superior weaponry.

Non-physical Exploration

- If the soldiers defeat the aliens at a site cleanly enough to be able to recover some of their advanced technology, the second form of exploration comes into effect.
- The XCOM squad takes the technology back to the base, and the player can assign researchers to unlock the secrets of the alien technology.
- When they have discovered how the alien technology functions, the XCOM experts can duplicate it, giving the player a better chance against the stronger aliens with even better technology.
- In this case, we have exploration of nonphysical frontiers — in this case, the frontiers of science.
- Exploration of the frontiers of science is also called the “tech-tree”.

Tech-Tree

- A tech-tree allows you to explore the frontiers of science.
- A tech-tree serves other purposes in the game as well: it serves as a means of limiting and rationing the spread of technology.
- This can be used to pace the game effectively so that the progression from (for example) stone age to iron age to machine age can be managed in a somewhat realistic fashion.

Tech-Tree

- A tech tree can be misused.
- In most RTS games, the single-player campaigns limit which technology upgrades are available on a certain level.
- This is a rather heavy-handed way of ensuring that the campaign balance is maintained and that the difficulty level progresses smoothly.
- This approach prevents the more experienced player from blitzing the earlier levels by upgrading his units to a greater level than the (usually scripted) computer opposition.
- The problem with this approach is that the implementation of an artificial upgrade barrier really jars the suspension of disbelief.
- The player ends up wondering why she could not upgrade her units to the next level, especially when it was possible to do so on the previous level.

Tech-Tree

- There are methods available to alleviate this problem:
 1. The first method is to maintain consistency. When a player has gained the knowledge of an upgrade, then that knowledge should never be taken away temporarily.
 2. The second method by which the designer can justify preventing access to certain units is to provide an excuse. For example, the pre-mission blurb could state, “Advanced cybermarines are not available in this environment, due to the risk of increased power consumption of their enhanced exoskeleton armor causing a chain reaction in the methanogenic gas atmosphere”.
 3. The third method (and probably the best one) is to not disallow any previously accessible upgrades. Instead, vary the costs of the units that you want to prevent the use of on a level-by-level basis. For example, if the advanced cybermarine requires a larger quantity of a certain resource, then make that resource extremely scarce. As another method, if you want to disallow flying units, then arm the computer opponent with extremely effective anti-aircraft weaponry.

Trade

- Usually in RTS, trade is handled simply: Resources such as gold or oil are mined using worker units and are directly exchanged for more units. In this way, an extremely simplistic wartime economy is set up.
- Economics of a strategy game do not need to be realistic — they must be merely consistent with the world in which it is based.
- For example, to be completely realistic, the troops in Warcraft would require supply lines to maintain them. However, this is not feasible because it would add unnecessary complexity to the game.
- Instead, resources are decentralized and can be used from anywhere on the map: Food produced on farms is magically eaten by units, even if they are on the other side of the world.
- This decentralization of resources can cause certain balance problems in games if they are not carefully handled.
- For example, in Age of Empires, it is possible to send a lone peasant into an inaccessible area and build a structure, such as a barracks. Assuming that it is not spotted, this structure can immediately start producing troops right on the enemy doorstep, with no regard for supply lines or resource distribution.
- A possible solution (which has been at least partially implemented in one RTS to date) is to use influence maps to indicate the areas to which resources are distributed.

Trade: Supply Lines

- Slower-paced strategy games allow the player to focus a lot more on trade and other aspects of resource distribution.
- For example, consider this scenario:
 - Town B has access to a forest — it has a road (supply line) leading directly to the forest, providing a ready source of lumber.
 - This allows Town B to build wood-based units, such as catapults.
 - Town A is linked to Town B via a road.
 - This means that there is the same production capabilities as Town B. Anything that is available to Town A is also available to Town B and vice versa.
 - Town C is a newly built town. No roads have been built to Town C, so it will not have access to the resources of Towns A and B until a linking road is built.
- This is the approach taken by Civilization III.

Trade: Supply Lines

- Civilization III's approach is still not an entirely accurate solution — materials are assumed to travel instantaneously along the roads.
- Not only do supply lines make gameplay that much more involving — it's not just a case of cranking out units and killing the world — but they also add a dimension to the range of possible attacks that a player can perform on an enemy.
- If you want to sack an enemy city, it makes sense to cut off the supply lines to the rest of the enemy empire (by destroying the road), thus preventing the soon-to-be attacked city from building the more advanced units to defend itself.
- In Civilization III, destroying the road also serves another purpose: It slows down the passage of reinforcement units from other cities and thus increases the chances of a successful siege.

Setting

- If the same underlying gameplay is dressed up with a different setting, it can feel like a totally different game.
- The choice of setting is highly dependent on your target market.
- Thus far, the three most common settings for strategy games have been:
 - historical
 - sci-fi
 - contemporary (particularly in the case of business-based strategy games).

Interaction Model

- Generally, the player is given a godlike view of the game world, indirectly controlling the units under his command.
- The true interaction model, in this instance, is related to the scale of the world:
 - how many units does the player indirectly control?
 - is it a small squad, or is it a large army?
- The feel of a small squad is much more personal and intimate than a large army.
- The personalities of the units can be explored more, and the player tends to care more about the individual fates of his units.
- Also, with smaller groups, individual character progression (in terms of improvements in skill and ability) can be dealt with more thoroughly.

Interaction Model

- For larger-scale games, it would be hard for the player to keep track of every single unit in the army.
- Some games do attempt to do so:
 - Civilization III: dramatically simplify unit progression so that it can be fairly easily understood
 - Warcraft III: nominate certain units as Hero units; these units are easily distinguished from normal units and are effective like a squad within an army; the player can easily focus his attention on the small number of heroes relative to the total number of units in his army
- Yet another interaction model that is prevalent in strategy games is the abstraction model.
- In this form, there is no representation of the player — or the player's forces — in the game world.
- Instead, the player deals with the data and statistics both directly and indirectly.
- This last model is more often seen with business-based strategy games such as RollerCoaster Tycoon.
- In this game, the player has no avatar. She deals directly with the game world and can see the results of her actions both by examining the visual representation of her theme park and by reading the statistics and reports provided

Perspective

- Almost without exception, up until about 2000, primary perspectives used for strategy games were either 2D top-down, or more recently, 3D isometric views, usually tile-based.
- With the advent of powerful 3D graphics cards, a few strategy games appeared in full 3D, but usually these were gimmicks.
- Mostly, the user of 3D is limited to isometric — the 3D hardware is used just to give it a little extra flair.
- Even with the most powerful graphics card, the most important part of a strategy game is the ability for the player to get the big picture.
- The player cannot strategize effectively if he is forced to focus on the view from one avatar's perspective — as in Activision's Battlezone.
- That's why real-life generals stand in little tents pushing toy soldiers around on 2D maps.

User Interface

- The user interface for a strategy game can make or break it.
- The difficulty is that often the game must seamlessly present the player with different scales of information.
- This is a difficult task to achieve without breaking the flow of the game.
- Most games present the data in windows, much in the same manner as a windowed operating system.
- Although no designer wants her game to look like just another business or productivity application, do try to ensure that, within reason, the user interface behaves as the player would expect.
- Make buttons clear, concise, and recognizable.
- If possible, provide context-sensitive commands — that is, commands that appear only when appropriate.

User Interface

- Consider providing separate levels of commands — a beginners mode and an advanced mode — so that the player can issue commands with a finer grain as she becomes more experienced.
- Also, ensure that commands are well separated by area of functionality.
- SimCity 4 does a fantastic job with the user interface:
 - all of the commands are separated by functionality into an intuitive nested sequence of menus
 - at the top level, the player can choose between mayor mode and god mode
 - mayor mode provides standard commands (segregated into functional areas, such as roads, power, water, civic buildings, and land zoning) that pertain to the building of the city
 - God mode provides another unrelated set of commands that allow the player to unleash all sorts of fantastical and supernatural events upon her unsuspecting sims
- (Technically, SimCity 4 is a construction and management simulation, but for the purposes of our discussion here, the interface shares a lot in common with strategy games and is valid for this example.)

Designing Opponents

- Designing opponents in strategy games is a subject of much research and investigation.
- Various approaches have been tried, including:
 - hierarchical Finite State Machines (hFSMs)
 - neural nets
 - genetic algorithms
- The problem with the latter two is that it is difficult to guarantee a consistent result, and it is even more difficult to diagnose why a particular result occurred.
- The system that has had the most success so far is the goal-oriented hFSM system.
- With this approach, the AI chooses a top-level goal, such as “Take and hold this hill” or “Increase customer satisfaction,” and delegates the tasks required to achieve the overall goal to subordinate hFSMs, which further delegate down to the individual unit level.

Strategy Game Worksheet

When beginning the design of a strategy game, consider the following questions:

1. Is the game turn-based or real-time?
2. Is the game world 2D (as in checkers), 2.5D (as in Starcraft), or fully 3D (as in Populous: The Beginning)?
3. Which of the classic themes (conquest, exploration, trade) will the game include?
4. Some games, like Go, are about control of territory rather than destruction of units per se. If this is true of your game, how is territory seized and how is it retained (or retaken)? What methods are used to indicate to the player who owns a particular region?
5. If the game involves units in combat, what are the units and what are their key characteristics (strength, speed, range, reloading time) and limitations? Is there a scissors-paper-stone model to balance them? If not, what discourages the player from always choosing the most effective unit?
6. Is the player given a fixed number of units at the beginning, as with most strategy board games like chess, or is there a production mechanism? If there is a production mechanism, what are the production times and costs of each unit, and what (if anything) is consumed by production? If something is consumed by production, where does it come from in the first place?

7. Real-time strategy games are prone to certain dominant strategies: the “tank rush” of Command & Conquer and the race for resources in two-player Dungeon Keeper. In both cases, these blunt approaches tend to overwhelm more subtle strategic details. Can you devise means of predicting and avoiding them?
8. Does the game include a technology tree? If so, what is it and what causes the player to move along it (time, expenditure, collection of points, and so on)? What does it add to the player’s experience of the game?
9. Does the game include maintenance of supply lines? What happens if supply lines are broken?
10. What is the game’s setting? If the units are unfamiliar to the player, what visual cues or other clues will you use to indicate the difference between them?
11. Is the game a large-scale one, with thousands of units, or a small-scale one with tens of units? How will this affect the player’s perception of them? What user interface features will be needed to manage them?
12. How much can the player see? Will the game offer perfect information like chess, an exploration feature in which the landscape is unknown until explored, or a “fog of war” feature in which regions unobserved by a unit cannot be seen?
13. Given the rules of the game, what goals should the AI work toward, and how should it choose the actions to achieve those goals?