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Exercises - Ch. 3-5

3. Mechanics

1. State spaces and action spaces - Backgammon
   To describe the state of the game, you need to describe where each of the players' pieces are. Pieces may be on the points of the board, in the middle of the board, or cleared off the board. To change the game state, a player will roll the dice and is then presented with several options of how to move their pieces on the board, in two steps. The number of available options greatly depends on the numbers rolled and where the pieces are currently situated. This creates uncertainty and suspense in the game, as one's options for moving forward in the game are constantly in flux.

2. Control mechanics - Katamari Damacy
   Katamari Damacy predominantly makes use of analog, directional inputs using the joysticks. Moving the joysticks in different combinations of directions translates into various game actions. For example, moving both joysticks forward, backwards, left, or right moves the katamari in the corresponding direction. While moving is the same velocity, the player can also dash by quickly alternating the left and right joysticks (forward/backward). Turning is also possible: moving just the left or right joystick forward lets the player turn, while having the joysticks in opposite directions (forward/backward) allows the player to make a quick turn.
   While digital buttons are not utilized for movement, pressing both joysticks lets the player do a 180 degree jump. L1 and R1 are used to look around the game world from various perspectives.

3. Progression mechanics - Pokemon Yellow
   The player knows how well they are doing in the game by being aware of their pokemons' stats and keeping track of their gym battle badges. As the player improves, their pokemon become stronger, leveling up and evolving. As their pokemon are more powerful, they are able to catch stronger wild pokemon. Players can see their progress in how strong, evolved, and rare their pokemon are. By having strong pokemon, and learning from experience from battles, players will improve over time and perform better in gym battles, and can thus also see their progress by seeing how many badges they have. These progression mechanics are successful in keeping players engaged in the

game because they want to continue to improve their pokemon and earn gym badges. It is rewarding to start from the simplest pokemon and no badges and progressing up towards legendary pokemon and battling the Elite Four.

4. Uncertainty mechanics - Backgammon
   The two main sources of uncertainty in the come from the dice and the other player. Dice rolls determine the moves that are available to you. From turn to turn your options are changing. Meanwhile, what your opponent is planning is unknown to you – you may be able to make guesses about what their next move will be (based on their own dice roll) but you can never be certain.

5. Resource management - Pokemon Diamond
   Units include pokemon and trainers. Stats to differentiate pokemon are most salient. Stats include HP, levels, type, attack speed, defense, nature, special attack, and special defense. Pokemon of different HP, levels, attack, and defense will differ in overall strength across various categories of combat. The pokemon's type, nature, and special attack and defense differentiate special categories of the pokemon's abilities. Strategy in pokemon battles involves choosing pokemon of types that will work to your advantage. You can improve your pokemons' stats by feeding them various supplements such as calcium, zinc, and candy that improve their stats.

6. Implicit and explicit mechanics - 地獄・Hell
   When you first play Hell, you are told only instructed you can move with the arrow keys. The game progresses through various stages and types of gameplay, and the player has to learn over time how to move through the game. Some new controls are explicitly told, such as pressing certain keys. However, without experimenting, the player would get nowhere in the game. For instance, one implicity mechanic is stacking chickens. The player observes the game world and makes a guess at what they need to accomplish. To do so, they must experiment with explicitly known controls, and stumble upon implicit mechanics. Later in the game, by interacting with other characters and objects, the player discovers how to unlock new interactions with their environment. They also discover the applications of those new mechanics that will help them make more progress. If these mechanics were revealed from the very beginning, the game would not be nearly as interesting. Most of the fun in the game stems from discovering new mechanics throughout the experience. The various stages of the game's story are very unexpected, and revealing all of the implicit mechanics explicitly and early on would ruin the suspense and surprise.

4. Systems

1. Game systems
   While mechanics can be seen as the smallest unit of game actions or interactions, it can be too tedious to describe every mechanic in isolation. Mechanics certainly do not operate in a vacuum, in fact, oftentimes groups of mechanics are very closely linked. Instead, it may be more meaningful to talk about certain groups of closely interacting mechanics, and this would be a system. While a mechanic cannot be broken down into any smaller unit, systems can be decomposed into various mechanics. For example, there could be a crafting system made up of mechanics that: allow characters to collect resources and items from their environment, go somewhere to combine resources and items to create new items, then use or sell those items, and

2. System layering - Runescape
   Inventory: Has a limited capacity but allows players to carry their own items and consume/use/equip them (this includes a player-owned item bank account).
   Combat: Players may battle against each other in certain settings, or against enemy monsters.
   Questing: Players may interact with NPCs to get quests, which provide rewards upon completion.
   Crafting: Players may use items from their inventory to craft things to use or sell, gaining experience for various crafting skills.
   Gathering: Players may gather resources to use for crafting or to sell to other players to craft with through various means, such as mining ores or fishing.
   Economy: Players may exchange equipment, resources, or various items useful for quests. This economy is a free market, determined by supply and demand.

   Inventory, Gathering, and Crafting and closely related. Acquiring items means items need to be stored in the inventory, and crafting requires taking items from the inventory to create new ones.

3. Chains and loops - Animal Crossing
   Catching beetles and then to selling them to Tom Nook in order to get Bells to pay mortgage is an example of a resource loop. The resource loops in this game are usually profitable, and they mostly do not cost anything to gather the resources (e.g. only need a net for bug catching, fishing rod for fish, nothing to shake trees for fruit, etc.). These profitable loops cannot lead to runaway resource creation, as there is a limited amount of inventory space that you can manage your gathered resources with. Once it's full, you have to expend these resources for a flat amount of Bells, and while the cost of mortgage

increases, this cost stays the same. While the resources to gather is infinite, it is not "runaway" due to these limitations.

4. Grinding - Pokemon Yellow
   You need to win lots of battles to level up and evolve pokemon, and this can become extremely tedious and repetitive. In particular, grinding for level 100 can be not fun, as for many pokemon you stop having the ability to evolve and learn new moves by the time it reaches around level 60. The final stretch to level 100 is long and monotonous as you continue to battle the same trainers that give you the best experience points over and over again.

5. Feedback loops - Farmville
   The strong positive feedback loop in this game consists of the concept that the price you pay for the means to grow crops or nurture livestock will always be lower than the amount you make by selling them. Each time you harvest what you currently have, you have more money to buy more resources, or resources that will produce more money for you, and the cycle continues in a somewhat exponential way. If this were to be negative feedback loop, the game could introduce things to keep this exponential growth in check, such as the introduction of an increasingly competitive market or bad harvest/weather conditions to make your prices or harvest drop, thus making your profit not continuously growing. This is definitely possible, and would just involve changing the game to make these things happen enough to control profit growth.

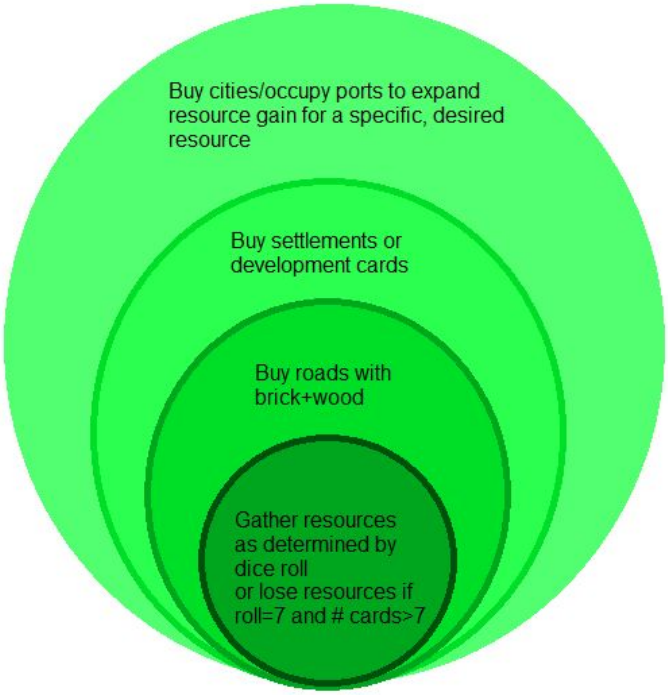
6. Positive feedback - StarCraft
   This game has resource production in the form of natural minerals and gas being collected by your workers. This forms a positive feedback loop, since gathering these allow you to create more workers to increase the resource gathering rate, as well as a military and new bases to expand your resource gathering reach. The conflict and resolution phases progress with this positive feedback loop, as your military and buildings grow at an increasing rate as you get more workers and access more resources. So, both players (or the AI) need to ride this positive feedback loop at an equal or higher pace than their opponent in order to compete properly in each phase of conflict, or else they will lose.

7. Randomness and feedback - Poker
   In poker, since players should usually start with the same number of chips (in a competitive setting), there is typically no detrimental effect on the early game. Therefore, the randomness affects each player equally. However, this randomness is integrated in a way that players' abilities can still make a large impact, since their

decisions and understanding of other players' decisions can lead to them being able to take larger risks involving randomness than their opponents, if their players cannot afford such risks as easily. Players' strategy and skill still has a significant effect on their success.

5. Gameplay

1. Gameplay loops - Catan



The smallest loop is the gathering/losing resources loop, and every single turn begins with a dice roll. This dice roll can give people resources if their settlement/city is on the corresponding place on the board, or give the roller resources if they roll a 7 and they move the robber to steal one of somebody else's resources. A 7 can also cause players to lose resources if they have more than 7 cards. The core loop would probably be the "buy settlements or development cards loop," as most players will spend most of their time in that loop. While the smallest loop is actually the most exciting (with the uncertainty of dice rolls and tension from trading resources), this core loop is central to progression, as it allows you to increase your resource gathering rate, increase your Victory Points, as well as potentially disrupt other players' progress. This can exist without the presence of the larger loop.

2. Loops and systems

   (Systems - mechanics)
   Economy - gathering and losing resources, trading resources with one another
   Building - exchanging resources to build roads/settlements/cities
   Dice rolls - rolling the dice
   Moving the Robber - rolling the dice, moving the robber, taking resources
   Development Cards - buying and using development cards

   (Loops - systems)
   Gather/lose resources - dice rolls, economy, moving the robber
   Buy roads - economy, building
   Buy settlements/development cards - economy, building, development cards
   Buy cities/occupy ports - economy, building

   Different mechanics and shared by systems, and different systems are shared by loops - everything is closely intertwined to make up the gameplay experience.

3. Flow - Katamari Damacy

   Katamari Damacy is my favorite game and I often find myself getting lost in the star-building levels. I become engrossed in the katamari version of earth, rolling up objects as efficiently as I can to create a new star. The timed levels are often 10 minutes long, and though this typically would seem like a long timed level to me, these 10 minutes often fly by very quickly. In my experience, the high level of detail in the game world and the time pressure to reach increasingly challenging katamari size goals helps players zone in on the game. There is a lot of pressure to focus on the star-building task.

   There is a very clear goal for each star-building level: get the katamari to a certain size within a certain time. There seems to be a good balance between the player's skill and the perceived challenges of the level - especially after practicing with earlier star-building levels, the player feels increasingly confident about their skills to clear these levels. Though levels do ramp up in difficulty over time, so does player experience. There is very clear and immediate feedback - on the screen there is always a graphic depicting the size of the katamari, how much progress you have made between the start and goal sizes, as well as how much time is left in the level.

4. Fun of learning

   Smaller loops are harder to learn - StarCraft

As worker/military size grows, it becomes increasingly difficult to manage these units (moving them around the map or in battle) since the camera is small compared to the size of the playing area. The smaller loop would be unit movement, which is harder to learn how to do well than the larger loops of upgrading units and building with a limited number of options, which can be understood relatively easily. Learning this smaller loop increases enjoyment of the game, as it allows you to become better at expanding your base or battling others, which is key to progression and winning. It's also fun in of itself to feel yourself become faster at moving around in the game.

Larger loops are harder to learn - Civilization V
The smaller loops consist of producing units or making unit movement decisions. The larger loops are harder, as they require a much more complicated look at the game than simply spending time/resources on production and expansion. The larger loops could be considered as making a significant (but costly) production to work toward one of the several conditions for victory. This could involve completely blocking one of your major cities' production in order to build a very important building to work toward a cultural victory. It's arguably more difficult than the smaller loops, as it is a riskier play that more game knowledge, and learned knowledge of what your opponents are currently doing, can improve. The enjoyment of the game certainly increases the better you get at this strategizing. It is rewarding to feel your knowledge of the game as a whole develop, and you are better able to strategize against harder opponents and AI, and react better to their decisions, allowing you to pull off these riskier large-scale decisions.

5. <u>Extrinsic rewards - Amazing Katamari Damacy</u>
   In Amazing Katamari Damacy, you can roll up certain items in the game world that can be used to unlock rockets. These rockets are only available after certain time intervals (e.g. 3 or 8 hours after activation), and once they are ready to be launched, the player receives coins and rubies. In addition, there are daily challenges that can be met in exchange for coin and/or ruby rewards. Challenges include rolling up a certain number of objects or reaching a certain cumulative diameter within 24 hours. These scheduled extrinsic rewards encourage players to continue to play, day after day. However, the amount of work they have to put in increases as they achieve more and more. For instance, as daily challenges are accomplished, the requirements for the daily challenges also increase (e.g. the player has to roll up more and more items, or katamaris with bigger and bigger diameters). In exchange, the daily rewards also increase, rewarding the player as they improve and progress through the game.

6. <u>Gamification - Memrise</u>

Memrise is an app that people can use to learn new things, particularly languages. By completing learning and review exercises on a daily basis, they can gain a streak, points, and level up their avatar. Memrise aims to help users learn new languages by utilizing spaced repetition; as a result, daily use is crucial. This gamification is helpful because it motivates players to come back to the app regularly, thus they can reap the full benefits of using the app. Simply going through flashcards and quizzes everyday can become repetitive and boring but having the points and levels system can help users see the progress they are making in a fun and concrete way. Users can keep track of how well they are doing on their review for learning new words and will want to keep using Memrise to continue leveling up their avatar. I think the app is very successful in giving the user feedback on their progress - there is constant, concrete feedback - and relatively successful at motivating players to participate more - there is little scaling in the rewards for making progress.