# Gameplay Design Assignment 2: Game Analysis using Mechanics, Design Patterns, MDA, and Machinations

Andrej Erdelsky *Game Design and Technology*
*University of Gothenburg*
Gothenburg, Sweden
guserdelan@student.gu.se

Alexandre Monteiro *Game Design and Technology*
*University of Gothenburg*
Gothenburg, Sweden
gusmonalb@student.gu.se

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Figure 1: Catan and No Thanks! logos.

# 1 Introduction

## 1.1 The Concepts

In this section we'll introduce and define the concepts we'll be using during the paper for the games analysis.

### 1.1.1 Game Mechanics (Sicart)

There are many definitions of game mechanics, for the purpose of this paper we shall use Miguel Sicart's definition: game mechanics are "methods invoked by agents, designed for interaction with the game state" [1]. This mechanics will be actions and when referring to a Sicart game mechanic in text, we'll highlight it by underlining it.

### 1.1.2 Gameplay Patterns

Another concept we'll use is gameplay patterns, and the definition we will use is this one "a model to support the design, analysis, and comparison of games through the use of game design patterns, descriptions of reoccurring interaction relevant to game play." [2]. When referring to a gameplay pattern we'll highlight it by making it all caps.

### 1.1.3 MDA Framework

In this paper we'll also use the MDA (Mechanics, Dynamics and Aesthetics) framework, this framework breaks games into three components: rules, system, fun and establishes their design counter parts: Mechanics "describes the particular components of the game, at the level of data representation and algorithms." [3], Dynamics "describes the run-time behavior of the mechanics acting on player inputs and each others outputs over time." [3] and Aesthetics "describes the desirable emotional responses evoked in the player, when she interacts with the game system." [3]. When using the MDA framework, we'll highlight the text with superscript (M = Mechanics, D = Dynamic, A = Aesthetic).

### 1.1.4 Machinations

Machinations is a powerful design tool we'll use to model the games in order to produce wanted results. [4]

## 1.2 Defining Gameplay Patterns

In this section we'll define gameplay patterns that aren't included in the gameplay pattern wiki [5], that then we'll use throughout the paper.

### 1.2.1 Trading

Trading is a pattern in which players exchange resources with each other based on their needs and where they define the terms of the exchange themselves (for example, Jaipur, Catan).

### 1.2.2 Resource Management

Resource management is a pattern in which players manage their resources strategically by collecting, earning, spending or trading them to maximize their chance of victory (for example, Catan, Civilization).

### 1.2.3 Network Building

Network Building is a pattern in which players build interconnected structures in a strategic manner to optimize their resource management (for example, Factorio, Catan).

### 1.2.4 Point System

Point System is a pattern in which players collect points by performing various actions.

## 1.3 The Games

### 1.3.1 Catan [6]

Catan is a strategic MULTIPLAYER [7] TURN-BASED GAME [8] where players control characters that have the goal of creating settlements on an uninhabited island. Players engage in COLLECTING$^{M}$ [9] from RESOURCE LOCATIONS [10], TRADING$^{MD}$ or stealing$^{M}$ RENEWABLE RESOURCES [11] in order to build$^{M}$ roads and settlements, which can be upgraded$^{M}$ into cities by spending$^{M}$ them. The island is composed of semi-randomly placed hexagonal tiles representing the different SHARED REWARDS$^{MD}$ [12] they generate using RANDOMIZATION [13] based on the results of rolling dice$^{M}$, including resources like wood, ore, clay, wheat, and sheep. Players can also purchase$^{M}$ development cards in order to obtain various bonuses. The goal of the game is to be the first player to reach 10 points. Players can earn points when they build$^{M}$ settlements or cities by having the longest road or through the development cards (certain cards give points while others give resources that can then be turned into points).

NETWORK BUILDING$^{D}$ by smartly placing settlements and roads based on the islands resource allocation$^{D}$ is a crucial aspect to the game as it optimizes the RESOURCE MANAGEMENT$^{D}$ of players, directly influencing their ability to win. This makes every choice of the player have permanent consequences$^{D}$, making every decision important, sometimes even causing ANALYSIS PARALYSIS$^{A}$ [14]. Spending$^{M}$ resources correctly greatly benefits the player, as the inherit

POSITIVE FEEDBACK LOOP$^{D}$ [15] of the game creates a snowball effect, where players with the most resources gain even more resources.

Since players GAIN OWNERSHIP$^{D}$ [16] over different resources, the free trading$^{MD}$ mechanic of the game creates SOCIAL DILEMMAS$^{DA}$ [17] between players because of their need of other players resources while still being able to sabotage$^{D}$ each others plan by either stealing$^{M}$ resources or building$^{M}$ in a way that hinders the progress of others.

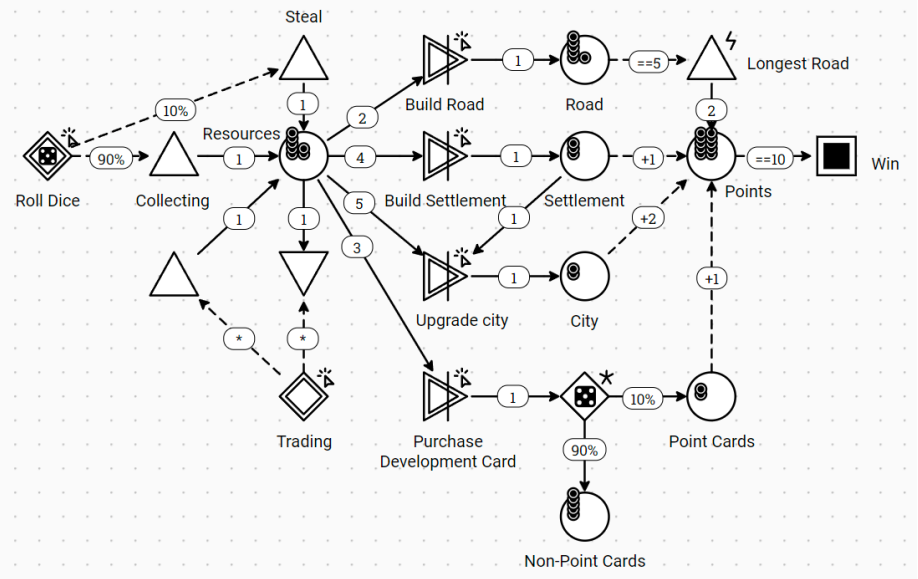


Figure 2: Catan Machinations Graph During a Game

### 1.3.2 No Thanks! [18]

No Thanks! is a MULTIPLAYER [7] and TURN BASED GAME [8] that has a DRAWING STACK$^{M}$ [19] from which players must draw$^{M}$ a CARD [20] (numbered from 3 to 35) each turn and choose to either take$^{M}$ it for themselves or place$^{M}$ a token on it and pass$^{M}$ it to the next player. Players don't know the CARD [20] they get when they draw$^{M}$ as the stack has RANDOMIZATION$^{M}$ [13].

Once a CARD has been taken$^{M}$, the player that takes$^{M}$ it GAINS OWNERSHIP$^{MD}$ [16] over the card and the tokens that had been placed$^{M}$ on it. If a player has COMPLETE RESOURCE DEPLETION$^{D}$ [21] of their tokens, they must take$^{M}$ the CARD [20]. The game ends when all CARDS [20] have been taken$^{M}$. The importance of deciding$^{D}$ when to take$^{M}$ or pass$^{M}$ a card can lead to players experiencing PARALYSIS ANALYSIS$^{A}$ [14] as they try to optimize$^{D}$ their RESOURCE MANAGEMENT$^{D}$.

At the end of the game, the players count$^{M}$ their points, and the player with

the least amount of points wins. The counting[M] of points works the following way: players sum the points of the CARDS [20] they have, then if they have tokens, they subtract a point from the overall score for each token they hold. Finally, if players have a SET [22] of consecutive CARDS [20], only the lowest CARD [20] of it counts[M] for the score.

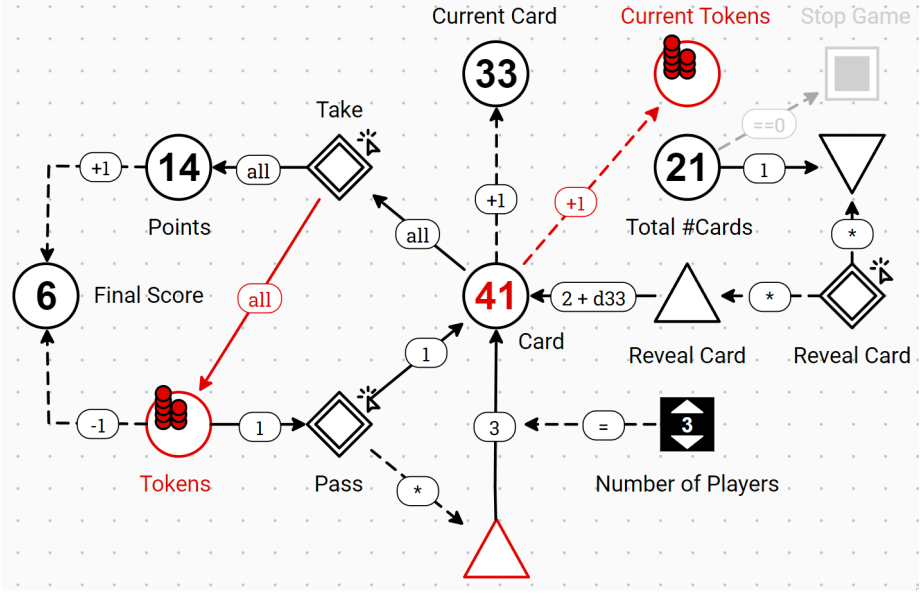


Figure 3: No Thanks! Machinations Graph During a Game

# 2 Game Analysis

## 2.1 What design structures are used to keep players engaged with the game, both regarding interest and regarding actively doing actions?

The design structures employed by Catan to make players perform actions, like we describe above, are the following: rolling dice[M], COLLECTING[M] [9], TRADING[MD] and stealing[M] resources that they can use to build[M] structures or purchase[M] development cards. As for engagement, Catan uses design structures like being TURN-BASED [8], RESOURCE MANAGEMENT[D], and RANDOMIZATION[M] [13], which keeps the player engaged as, let's say, they create a good NETWORK BUILDING [D] around the map, but each time that there's rolling dice[M], they'll receive resources at RANDOM[M] [13], which means they sometimes do not get the resource they were looking for, in which case they need to improvise and adapt their strategy. One common way they go about it is to engage in TRADING[MD], as they can try to obtain the resources they miss from other

players. This TRADING$^{MD}$ can lead to SOCIAL DILEMMAS$^{DA}$ [17] with other players, as they both try to optimize their own sides, increasing player engagement. Finally, stealing increases engagement, as the possibility of someone rolling$^{M}$ a 7 can significantly alter the state of the game.

The design structures employed by No Thanks! to make players perform actions, as described above, are: drawing$^{M}$ a CARD [20] from a stack; taking$^{M}$ the CARD [20]; passing$^{M}$ the CARD [20], which also includes placing$^{M}$ a token on it; and finally counting$^{M}$ the final score. Regarding engagement, it uses four main structures to engage players: being TURN-BASED [8], RESOURCE MANAGEMENT$^{D}$, PARALYSIS ANALYSIS$^{A}$ [14], created in a player as their actions have consequences that can directly affect the success of the player or the success of others. When a player gets a CARD [20] they must think about taking$^{M}$ it or not, if they pass$^{M}$ a lot, they'll eventually run out of tokens(this is a NEGATIVE FEEDBACK LOOP$^{D}$ [23] of the game, as it allows for others to catch on), and even when considering taking$^{M}$ a CARD [20] players must ponder the effects of it (for example, if a players gets a 12, it's not a super low or super high value, if they pass$^{M}$ it, this means that they'll pass$^{M}$ a 12 plus a token to the next person, which would be advantageous for said person, therefore the players must think to take$^{M}$ it or not, in order to prevent creating a better situation for other players). The other design structure employed by No Thanks! is the RANDOMIZATION$^{M}$ [13] generated by removing 9 CARDS [20] at the start; this makes the game unpredictable and discourages taking CARDS [20] over and over (to create SETS [22] of consecutive CARDS [20]).

Catan and No Thanks have some similarities in creating player engagement: both are TURN-BASED [8], meaning that players can think and strategize their next move while they wait for their turn; they both have RANDOMIZATION$^{M}$ [13], making both games more unpredictable (which leads to higher engagement as explained above); and they both have some sort of RESOURCE MANAGEMENT$^{D}$ that leads to players wanting to optimize their resources by various means. However, they also have differences, while Catan allows players to refresh their resources constantly in No Thanks! Players can run out of tokens if they pass$^{M}$ too much. Another difference is that TRADING$^{MD}$ being a possibility in Catan allows for things like SOCIAL DILEMMAS$^{DA}$ [17] between players (increasing engagement), while in No Thanks! players do not have this sort of interaction with each other.

## 2.2 What design structures are used to make the games typically end near the stated time (given players that know the rules)?

To answer this question, it is important to explain how the machinations graphs for both games work.

In figure 2, the resource flow and game actions of Catan can be seen, from left to right. The player starts by rolling dice$^{M}$, which creates random resources for the player, either by COLLECTING$^{M}$ them from the map or by stealing$^{M}$

them from the players (they need to roll a 7 to steal[M]). The player can also TRADE[MD] at this step, where they generally gain a resource by TRADING[MD] another. Based on the available resources of the player, they can either build a road, build[M] a settlement, upgrade[M] a settlement to a city, or purchase[M] development cards. All of these options contribute to the number of points they possess. Being the first to have five roads built[M] provides a one-time 2-point bonus; each settlement adds 1 point; each city awards 2 points; and development cards have a low chance of giving points as well. Possessing 10 points then finishes the game, and the player wins, considering other players didn't do it already. In this graph, it is then possible to see that the game eventually has to finish because every action that the player can take at any moment directly contributes to obtaining points; in other words, it moves the player closer to winning and therefore finishing the game. Catan also has an additional mechanic where, when the player has more than 7 resource cards in hand, they lose half of those cards, signifying that hoarding resources and not spending them is not a valid way of playing whatsoever.

In the game No Thanks!, every possible action of the player and the gameplay flow can be clearly seen in figure 3. The player reveals a CARD [20] from a pile of 24 CARDS [20] (33–9 CARDS [20] that are removed at the beginning), with the possible point values ranging from 3 to 35. They can then take that card or pass it along to other players, adding a token to it that is worth -1 point. If the card comes to the player, it has to have a number and an additional amount of tokens equal to the number of players. The graph is also showing the current score of the player, the current CARD [20] in play, and then the number of tokens on it. The end state of the game can be transparently seen in this figure (top-right), where the game ends when the total number of CARDS [20] is equal to zero, meaning there are no CARDS [20] left to play and the player with the least amount of points wins. Since there is a finite specific number of CARDS [20], and the fact that the player cannot pass on CARDS [20] forever (if the player has no tokens, he has to take the card), the game cannot go on forever and ends at approximately the same time every time it is played. Additionally, the 9 random CARDS [20] removed at the beginning make No Thanks! more interesting and different each playthrough.

When it comes to similarities, both Catan and No Thanks! use a POINT SYSTEM[M] to arrive at their end state. However, while No Thanks! cannot possibly go on forever because of its finite cards, if players do not build anything in Catan, the game can technically go on forever.

## 2.3 What design structures are used to make players interact with each other, or at least have a feeling that they have been playing a game together?

The appeal of Catan is largely founded on the social aspect of the game, in other words, being able to make TRADES[MD] and alliances with other players because of their ability to sabotage each other while playing. The fact that resources

are needed to take action in the game and that they are RANDOMLY [13] generated and shared by means of TRADING$^{MD}$ forces the players to interact with each other to properly achieve their goals. The action of stealing$^{M}$, along with the possibility of building$^{M}$ somewhere detrimental to the other players, adds even more social interactions and dynamics. All of these aspects of Catan make it a game inherently filled with social interactions and dilemmas.

In every turn of No Thanks!, all decisions made by the player are directly influenced by the CARDS [20] and choices of the other players and the number of their tokens. This fact makes No Thanks! inherently social because no player can make decisions in a vacuum if they plan on winning.

In conclusion, both games have similar reasons for players to interact with each other, mainly the fact that all decisions made by players can be influenced beneficially or sabotaged by the choices of other players.

## 2.4 What design structures exist to make players feel that they are achieving something while they are playing?

Catan utilizes building$^{M}$ structures; by placing a settlement or road down on the map and creating NETWORK BUILDING$^{D}$, players can visibly see progress taking place. Development cards are too often used for achievements (having the most knights leads to the biggest army achievement; having the longest consecutive road also grants one). Another design structure Catan uses to make players feel achievement is GAINING OWNERSHIP$^{D}$ [16] of certain RESOURCE LOCATIONS [10], thus potentially having control over the resource on the tile (creating a POSITIVE FEEDBACK LOOP$^{D}$ [15] of resources). Catan also has a POINT SYSTEM$^{M}$ that is run simultaneously as the game develops, helping players keep track of their progress.

No Thanks! utilizes CARDS [20] and tokens to make players experience progress, thus making them feel that they are achieving something. CARDS [20] will directly translate to points at the end of the game, making them a perfect counter for progress. Tokens help reduce points at the end of the game but are also used to pass$^{M}$ a CARD [20] during the game, both actions that relate with progression in No Thanks!

Both Catan and No Thanks! utilize a POINT SYSTEM$^{M}$ to determine the win condition as well as provide players with a way to measure their progress and achievements. Catan, however, uses the building$^{M}$ aspect of the game as well as development cards to make the players experience achievement, while No Thanks! sticks to the use of the tokens and CARDS [20] for that.

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