

Milestone Report 1

Game Idea Pitch and Development Plan for a Twitch-based Puzzle-Action-Game

1 Game Description

1.1 Game Idea

Prepare cooking ingredients to serve up the desired orders. But that is easier said than done, because the Twitch-Chat might have something else in mind!

In this Twitch-based puzzle-action cooking game the twitch-streamer is trying to cook according to a recipe. He or she needs certain ingredients in pots and pans that are at the end of a field full of conveyor belts which transport the food components. The gameplay consists of controlling the conveyor belt tiles on the board so that the ingredients find their way to the desired destination. The player tries to complete as many dishes as possible in a limited amount of time to reach high scores.

The twist of this game is, however, that the twitch-chat has an influence by sending chat-messages to vote in polls. By voting, a twitch user can manipulate in which of the given positions the ingredients will spawn and also which ones will appear on the board. In addition to that, they can also vote on the tiles that the streamer gets access to.

1.2 Theme-based decisions

We took the given theme "Chaos and Order" and split it into its two aspects: One focus is on "order" as in "ordering food". Our game idea revolves around fulfilling the orders of customers by cooking food for them. But order can also mean "to bring structure into something" and this meaning was arguably even more important for our game idea decision process. The main premise is to order the conveyor belts so that the arising structures benefit the player and he or she can complete the given orders exactly as they were requested.

The other part of the project theme is responsible for our technical idea, i.e. integrating the twitch-chat into our game. The twitch-chat is the single most chaotic concept known to mankind so there is nothing more fitting than using this chaos to ensure unstructured and unsettled behaviour of our game. Using the natural creativity of humans we can ensure that a streamer will not find himself in a boring loop of ever-repeating gameplay. If the player finds a strategy that works well to deliver food as planned, the chat users can also adapt and find weak spots in the streamers strategy almost like an artificial intelligence that is improving and changing with its opponent, except that it is not artificial.

Besides that, other concepts were also designed with the idea in mind of bringing in more action and excitement: Making the game real-time instead of turn-based and adding a timer as the finishing condition ensures that the streamer is stressed at all times in

the game, without giving him time to breath which should lead to the feeling of chaotic gameplay rather than giving the player the time to make optimal decisions.

Finally, we also decided to punish the input of wrong ingredients into the cooking pot by failing the entire recipe. The idea behind this is that the streamer has no other option but to repeatedly destroy his own pathways which were created for previous food deliveries. With this cycle of trying to create, destroy and recreate paths through the board there is the requirement to bring order as well as chaos to the conveyor belt structure.

1.3 Gameplay

In this section, we want to give a more concise description of the actual gameplay. However, many aspects are subject to change as we will constantly evaluate whether the game feels chaotic enough while both the streamer as well as the Twitch-chat users still have enough impact with their own decisions.

A session starts with a randomly selected recipe and an ingredient list that are displayed at the bottom of the screen. Next to that is a pot, which symbolizes the goal where the streamer will try to lead the ingredients. Above the pot is a tile-based board [1] where each tile is already filled with a randomly shaped conveyor belt. These conveyor belts move ingredients that are moved on the according field. At the top of the board are spawning tiles where the different ingredients will spawn. On the right side of the board are the conveyor belt tiles that the player currently has available for placement. These can be dragged and dropped onto the board to replace existing tiles. Further on the right side of the field are two live polls [2] that are influenced by chat messages from Twitch-chat users. The first poll shows a combination of an ingredient and a number which points towards one of the spawn points as well as a timer that shows the remaining time until this particular poll closes. Once one closes the shown ingredient will spawn at the indicated position. The second poll shows different conveyor belt tiles and works similar to the first one. After a certain time, the shown conveyor belt tile will be placed into the UI on the right side of the board where the streamer has the currently available conveyor belt tiles.

Once the game has started more and more ingredients will spawn at the top of the board. However, not all of them will be necessary for the order that the player is trying to complete. Therefore, the streamer has to carefully adjust the conveyor belts by replacing them so that only the correct ingredients will end up in the pots. The others will either fall of the board if the conveyor belts are placed accordingly or remain on the board in "dead spots" where opposing conveyor belts keep them until one of them is changed. Eventually, the time will run out and the streamer will receive a score based on his completed recipes and the game can start again from zero.

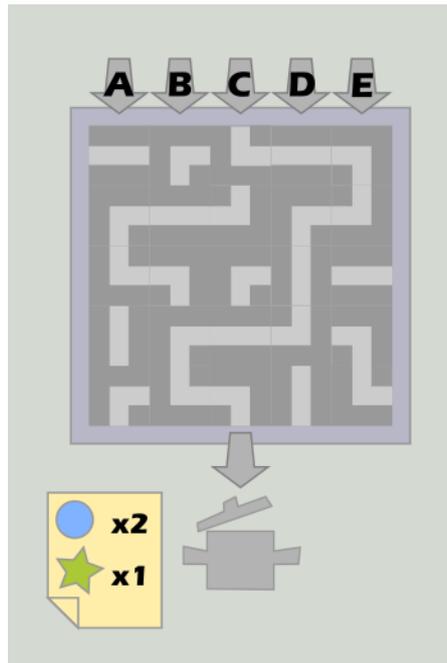


Figure 1: The board. The spawning points are above, marked with letters from A to E, the cooking pot - goal - is below the board. The recipe shows which ingredients have to be lead to the pot.

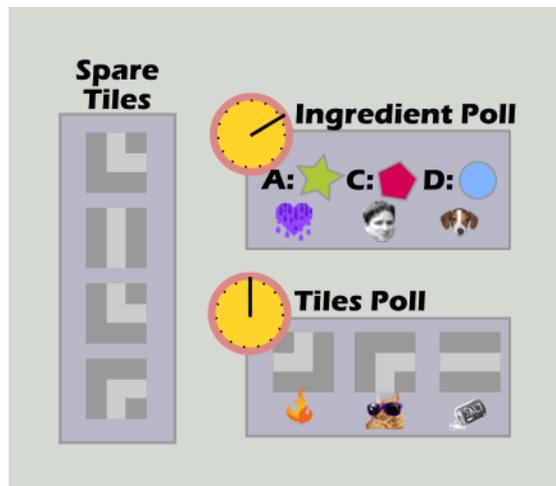


Figure 2: The polls. Above one for the ingredients, below one for the board tiles. The clocks are countdown timers that show how much time is left till the corresponding poll ends.

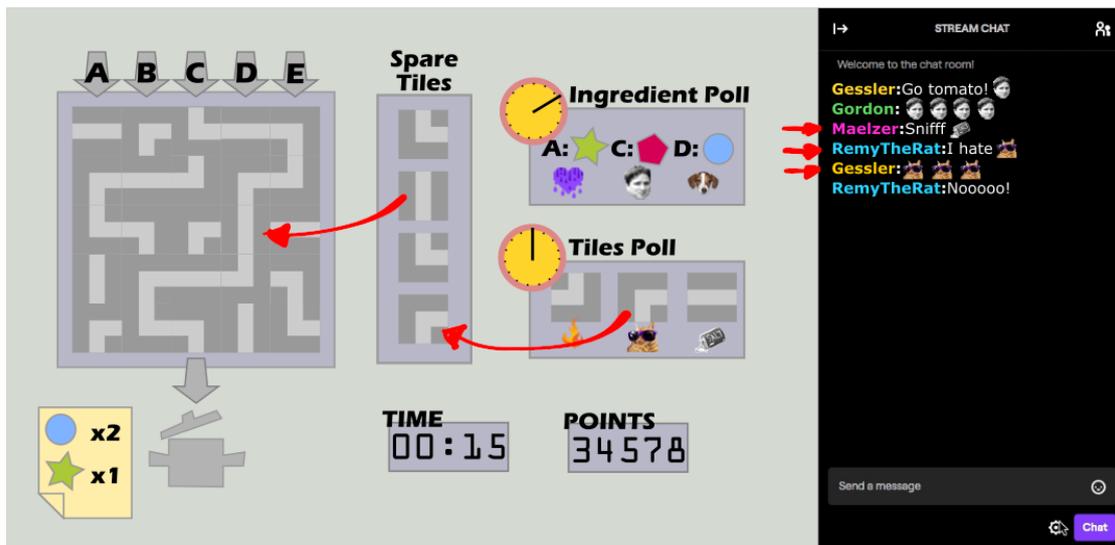


Figure 3: Whole game screen including Twitch chat (on the right). Stream viewers can influence the game and vote on tiles that will pop up in the Spare Tiles pool. These spare tiles can be then used by the player to build a conveyor belt that carry suitable ingredients to the pot.

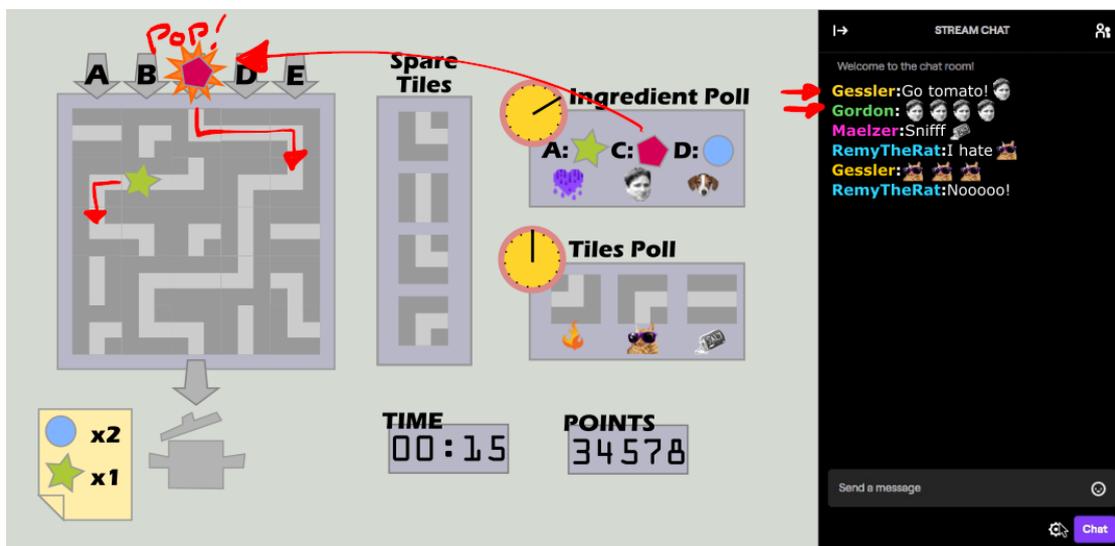


Figure 4: Whole game screen including Twitch chat (on the right). Stream viewers can influence the game and vote on ingredients that will spawn at defined spawnpoints. These ingredients will then ride along the built conveyor belts.



Figure 5: Core Idea: Completing food orders by ordering conveyer belts.
Technical Innovation: Integrating Twitch chat chaos via poll system.

2 Development Schedule

2.1 Layered Overview

Following the project overview document, the project's development process should be defined as a 5-layered step-by-step plan. In the following, all these 5 layers are defined according to their currently foreseeable functional requirements, starting with the minimum viable product.

2.1.1 Functional Minimum

We define the functional minimum as the technical core functionality all later development steps build upon. These are currently seen as, firstly, a rudimentary interconnection with the required Twitch APIs allowing basic inputs during a stream session from chat to be processed during the game's runtime, secondly, a basic grid-based representation of the puzzle-action-game with placeable tiles, and lastly, if the functional minimum already needs to be defined as a game, a very simple win-condition which can be added at this point.

2.1.2 Low Target

The low target is to be defined as a state where the game is fully playable with its core features, as stated in the previous sections, already implemented. These include the completely finished poll system executed via the Twitch-internal chat, the inclusion of several different basic conveyer-belt-tiles like, e.g., straight tracks, turns, blocking tiles, crossings, etc., and 3 to 5 different ingredients used in a single cooking method like 'boiling soup'. A scoring system is also required at this point.

2.1.3 Desirable Target

After achieving the low target, the desirable target includes features the game should have after all aspects our project must have are already put into place. This milestone primarily consists of a main menu, including graphics, sound, gameplay and twitch-based options, a highscore listing the players' scores, 2 to 3 cooking methods, 5 to 10 different ingredients and 1 to 3 conveyer-belt-tiles which render the gameplay more exciting (These are not fully discussed now, but could be, e.g., tiles which cause ingredients to be thrown away or which produce new ones from two or more inputs.). At this milestone, the inclusion of music and basic sounds are worthwhile too.

2.1.4 High Target

The primary high target should include an online leaderboard which lists the best players. Considering the gameplay, 3 to 5 cooking methods, 10 to 15 different ingredients and 5 to 10 bonus tiles producing and altering ingredients. At this point the addition of various graphical effects is also worthwhile to give the player a more immersive experience. More music and sounds (also for UI elements) are to be added and general improvements

need to be taken into consideration based on play experiences. However, these cannot be exactly pin-pointed at this point in time.

2.1.5 Extras

Extras could be, e.g. a two-player-mode, either co-op or versus, more twitch-chat mechanics like causing an earthquake when too many players spam a poll and eventually more visual effects if reasonable.

2.2 Development Timeline

The project's timeline follows a Waterfall-like approach. Development can be split into two major time intervals: The phase before the Alpha release during which the majority of the game's base functionality is implemented and the phase after the Alpha release during which we would like to improve our game based on playtesting results and our own experiences we hopefully will be able to collect during the course of the first phase. The entire timeline can also be seen on our wiki page of this year's Computer Games Laboratory.

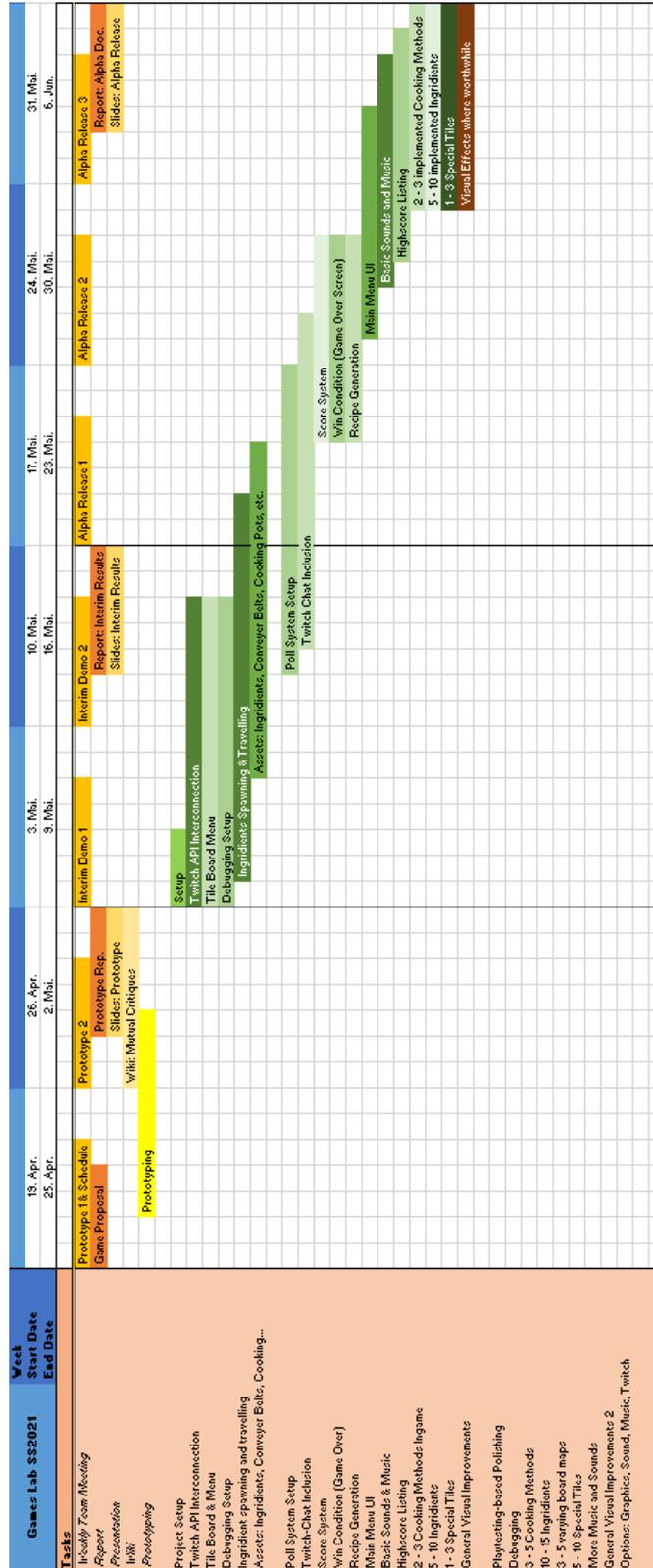


Figure 6: Waterfall Timeline until Alpha Release

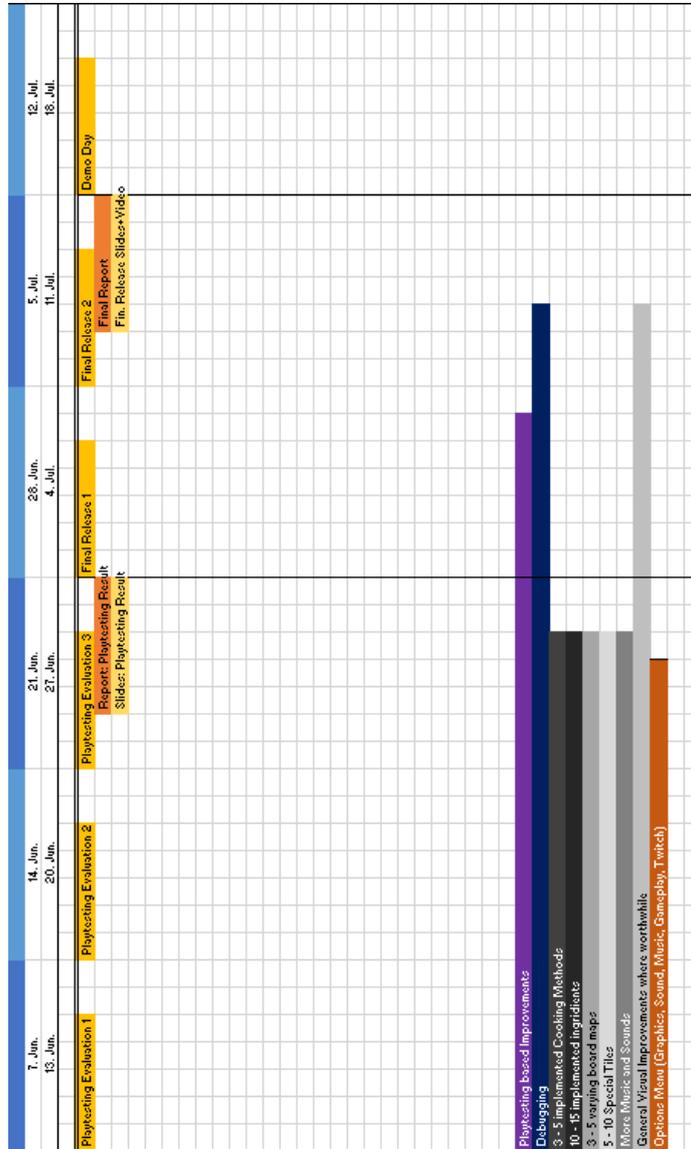


Figure 7: Waterfall Timeline after Alpha Release

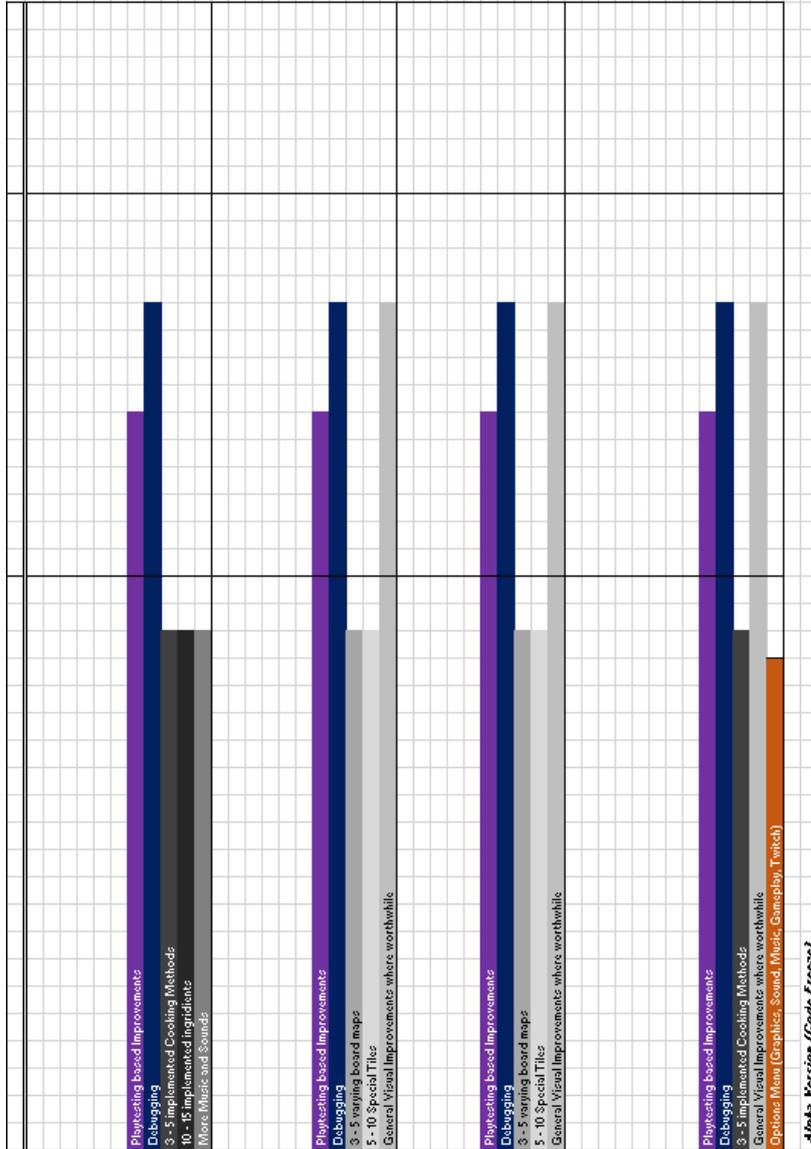


Figure 9: Task Assignments after Alpha Release

Milestone Report 2

Physical Prototype for a Twitch-based Puzzle-Action-Game

1 Prototype Setup

1.1 Timer

The game is intended to be played in real-time, meaning the player can manipulate the current play state at any time. As this is not quite easy to achieve with a physical prototype we use an iterative approach, one could say turn-based, to account for this problem. However, because we still want to display some kind of time flow, we decided to incorporate a physical timer which decreases by ten time units (e.g. seconds) when a turn is performed during gameplay.

1.2 Recipe Cards

The game will randomly generate recipes the player has to prepare. While the offered tiles and spawn placements of the ingredients can be selected by the Twitch Chat via polls, this does not account for recipes. To represent these orders the prototype includes cards with recipes featuring two to three ingredients which can be either a tomato, a potato, a cucumber, an onion, a cauliflower or a pumpkin. If these vegetables in combination really result in a tasty dish is currently not ensured but for our prototype containing common household vegetables it suffices for now.

1.3 Toy Money

Simple toy money is used to account for finished orders. If a basic recipe with two ingredients is completed, the player receives one currency unit as score (in this case 20 MonopolyTM DM). If a larger recipe with three ingredients is completed, the player receives two currency units (in this case 40 MonopolyTM DM) accordingly.

1.4 Twitch Chat

Twitch chat is emulated by randomly drawing ingredients, spawn positions and conveyor belt tiles out of three separate bags. In the actual game, these will be decided via chat-polls. Every time iteration we draw a new tile, and every two time iterations, we will draw a new ingredient and position.



Figure 1: Prototype parts resembling the game manager equivalent with score (toy money), timer (time stamps) and dish order generator (recipe cards)

1.5 The Board

The prototype of our board - the part of the game which can be influenced by the player - was designed to be large enough, so that real vegetables could be used. The stars are: tomatoes, potatoes, onions, pumpkin, cauliflower and cucumbers. After the presentation, every edible part of this setup will be converted to a delicious meal outside the game area and eaten. Conveyor belts are painted on both sides, one with a straight line, the other with a curve, which allows representation of every possible basic tile in our game. Spawn points and the goal are represented with kitchen utensils - plates and cooking pots respectively. In our simplified setup, the player is allowed to make only a single move and swap a chosen conveyor belt tile on the board with another spare tile in one iteration. In our final game the player will not have such limitations as everything will happen in real-time.

2 Experiences

The prototype was a helpful tool to bring our game closer to reality. By playing the prototype in real time we could experience the game from the player's point of view and quickly see the fun and challenges it will hopefully offer. Throughout the gameplay, we were often hit by unplanned and arbitrary choices made by the Twitch chat, which created a great sense of competition between the player and Twitch-Chat. Each time we could swap in a proper tile and find the right way, it felt like we had outsmarted the Twitch-chat, which was quite satisfying. At the same time, we could see from the other point of view, how amusing it must be to see the player struggling with the decisions they made. As the board started filling with more ingredients, we noticed that the difficulty also rapidly increased. This supports our aim to create a game where the player is

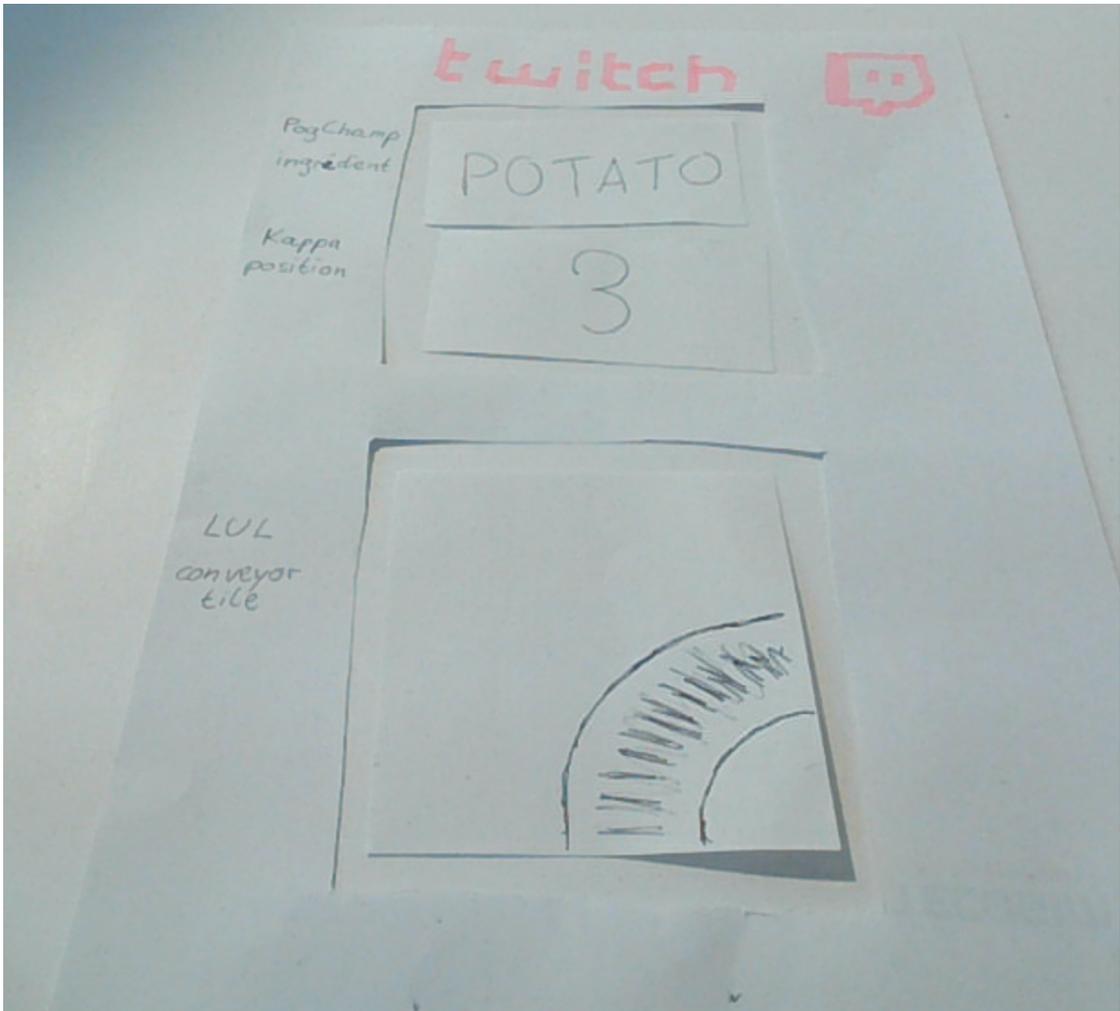


Figure 2: Paper twitch chat showing the poll results which were drawn randomly from bags.



Figure 3: Prototype of the 5x5 board (in front) including spare tiles set (on the rear), spawning points as plates (left) and the goal as cooking pot (right).

facing the continuously growing chaos. The more chaotic it was the more the sense of accomplishment upon completing a recipe. We felt that the game has a good balance between skill and difficulty creating high levels of engagement and cognitive flow.

One of the difficulties that were encountered during prototype testing was the fact that it is hard to replicate the feeling of haste we are going for in our game. The project is intended to be played with real-time interaction and constant time pressure with the player being required to finish incoming orders as quickly as possible. This is not so easy with a physical prototype where everything needs to be orderly executed to ensure that all rules are accounted for. Our prototype follows a strict iterative setup and there is no time aspect we can represent easily so this might cause the risk of the game appearing too easy, as there is a large enough thinking interval to e.g. swap tiles on the board and to come up with an optimal strategy.

Additionally, during our test play-through we ran into the problem that it would either take too long for vegetables to reach the desired destination or that too many ingredients would be on the board at the same time. This was resolved by decreasing the board to a 4x4-tile-matrix and allowing ingredient spawns only every two turns.

Moreover, during the first try with only one cooking pot and a single recipe, the simulated Twitch-chat immediately spawned a currently non-required vegetable. Thus, it was required to discuss, how to account for these cases so the player is able to apply a strategy to use these non-required ingredients and eventually hold them back for future food orders or throw them away by guiding them off the board.

In the end, what also caught our eye was the case when multiple ingredients on our board end up at the same position. In this case it was decided to apply a FIFO-strategy for presentation purposes with the iterative approach.

3 Revisions

The following revisions were decided on after finishing the test play-through of the prototype:

3.1 Multiple Recipes and Cooking Pots

To keep the game challenging and engaging and to add more strategic elements it was decided to not only offer a single dish order, but to instead offer multiple orders the player can decide to finish at a selected cooking pod on the board.

3.2 Adjusted spawn speeds

From the results of the prototype test it was decided to adjust the poll/spawning of ingredients in relation to boards tiles in a way, that new tiles are significantly quicker added to the tile bar than ingredients are spawned on the board. This needs to be accounted for in the polls for the Twitch Chat.

3.3 Time Limit

The time limit needs to be long enough to offer enough time to finish at least a certain amount of orders in average. The direct amount of given time could not be directly determined from the prototype since it was played in turns but it is an important thing to consider nonetheless.

Milestone Report 3

Interim Report for a Twitch-based Puzzle-Action-Game

1 Progress Overview

During the recent three weeks every required functional feature has been implemented to a basic level as stated in the low target from Milestone Report 1. The game now includes a board of conveyor-belt tiles, cooking pots to complete recipes in, a bar with randomly refilling tiles, a UI for current food orders, a poll system which already supports Twitch interconnection, a basic score system, ingredient spawning and travelling across the board and a console for debugging commands.

2 Implemented Features

2.1 Debugging Console

During the last milestone meeting and in the mutual critiques by our fellow peers a major problem many pointed towards was the testing and presentation of the gameplay without a large group representing the Twitch-Chat in the background. While we plan to randomize most of the processes people are allowed to vote for like the generation of tiles for testing purposes in the case of too few people being present during gameplay a basic console was additionally implemented which, amongst other things, allows developers to order conveyor-belt-tiles in order to make testing and presenting a lot easier. This console can later be used to set general hyper-parameters involving recipes, spawning of ingredients etc.

2.2 Game Board with Conveyor-Belt Tiles

The game's board which oversees the placed conveyor-belt-tiles is the core of the gameplay. A very easily extendable tile-hierarchy makes it possible to also add special tiles to the board which render the game far more exciting. Currently, only basic directional tiles are included. During the upcoming period for milestone 4 it is planned to add at least three special tiles to the game.

2.3 UI for Food Orders, Score, etc.

Most of the UI during gameplay is already functional: A very basic score system is in the game combined with a set of possible recipes each consisting of two or three ingredients. The game randomly places orders and the player can complete them to earn points which are then shown below 'Orders' (see figure 3). On the bottom-right, the required ingredients to finish a placed order are shown so the player always knows which combinations he or she needs to go for. Recipes are represented by icons showing the needed ingredients as a formula from top to bottom added up by plus-signs.



Figure 1: A debugging console was added to support development. It can be used to add tiles and later ingredients and food orders so testing various gameplay situations is simplified.

2.4 Cooking Pots

Cooking Pots are currently used to represent the process of cooking and combining ingredients. The player can see whether a pot already contains food or is still empty. This is additionally represented by small icons below the pot showing the ingredients which are currently inside (see figure 2 bottom). If at least one thing is inside a pot, a graphical effect is displayed which resembles a boiling soup or stew.

2.5 Polling System

The polling system and its connection to Twitch-chat is one of the core technical challenges in our project. Twitch chat input is parsed and users can vote on generated ingredients as well as tiles by writing emotes into the twitch chat. The polls use timers and in case of no votes or ties a random option will be selected. In future iterations we plan on adding a more sophisticated algorithm for the possible ingredients to prevent deadlock situation if the twitch chat is trying to sabotage the player too much.

2.6 Ingredients Movement

The second core part of the game, ingredients interaction with the environment, has already its basic elements. Ingredients are spawning on predefined spawning points, in accordance to results of the polls. They move along conveyor belts, are destroyed after falling over the edge of the board or crushed with new tile and update contents of cooking pots after reaching them.

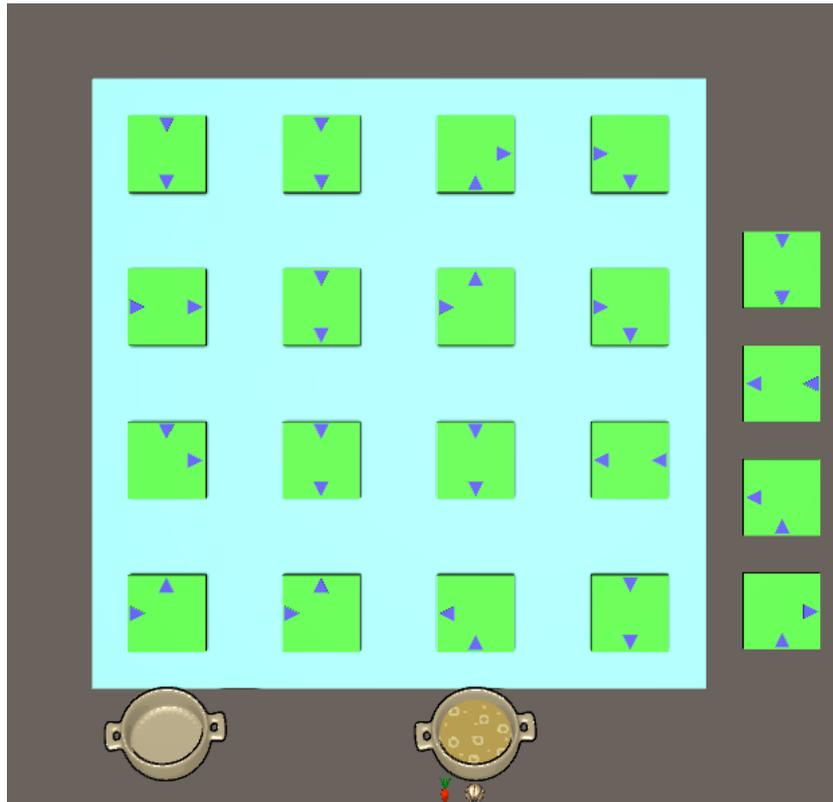


Figure 2: While not yet featuring models, the gameboard already contains required functionality and allows the addition of more complex tiles than the already present directional ones.



Figure 3: Food orders and current player score (currently 300 points)

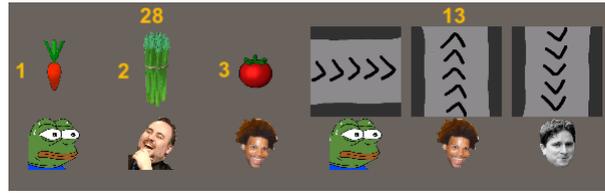


Figure 4: emote-based ingredient poll and tile poll

2.7 Assets

In order to keep the visuals consistent and simple, we've decided to create our own set of assets. Chosen style should be smooth, round and simple so that all, important models can be created in the given time and in order to amplify advantages of cell shading. Few textures are limited to emphasize some core features of certain ingredients, like for example stripes on an onion. At this point we have five, different files representing tomato, onion, carrot, chicken and asparagus.

2.8 Cel-Shader

To simplify the graphics and still appear consistent, a Cel-Shader was implemented (see figure 4). The game was decided to use OpenGL 3 as graphics API and the effect was therefore written in GLSL. It computes the Phong Lighting Model and then clamps color values into intervals giving objects the appearance of being drawn. On top of that, in a second render pass an outline is generated. Many popular games and even quite old ones use this technique to improve graphical appearance. While the shader now works well it was quite a hassle to implement because Unity mainly supports DirectX. The change of graphics API also caused issues and dark rendering viewports for some team members which unfortunately costed time to resolve.

3 Design Revisions

We ran into the problem, that replacing tiles below moving ingredients leads to immersion breaking teleporation, e.g. if an ingredient is moving from top to bottom and is currently near the bottom of the tile and now the tile gets replaced by a left to right tile we would need to teleport it onto the right side instead. Therefore, we decided that replacing tiles below ingredients now instead destroys the moving ingredient. This can be visualized by crushing the ingredient under the new tile and cannot lead to game-breaking scenarios unlike other considered solutions.

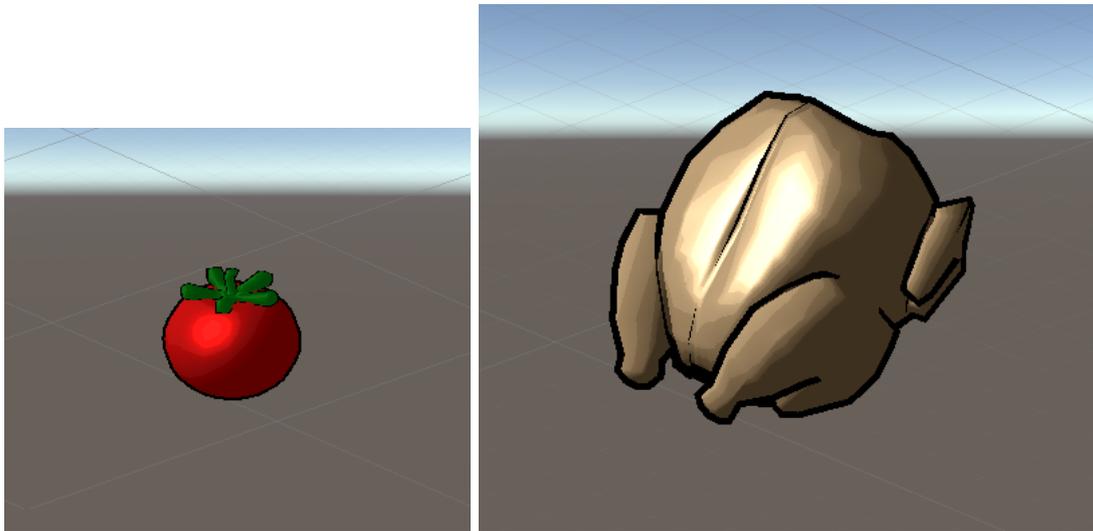


Figure 5: Cel shader as material of ingredient meshes. Assets appear to have some form of detail without the usage of bump-maps and albedo textures.

Milestone Report 4

Alpha Release of a Twitch-based Puzzle-Action-Game

1 Progress Overview of Alpha State

This section is a small recapitulation of the achieved features as outlined in the Game Pitch from Milestone Report 1 for the desirable target as it was defined at the beginning of the semester. Summing up the current alpha state:

Firstly, the game contains a User Interfaces with a Main Menu to adjust game settings and change the current user account of the Twitch Interconnection. A small Tutorial Popup was also added to simplify the introduction for new players. Menus were listed in the desired target and are now fully included.

Secondly, the game contains all required assets like models for conveyor-belt-tiles, food spawn points and ingredients which are used to cook a recipe. The majority of these models is shaded using the Cel-Shader introduced in the previous milestone. Graphically, it can be said that, with the inclusion of additional small effects like e.g. smoke particles for cooking pots and a boiling effect, the general look of the game is fully fleshed out.

Thirdly, at the moment there are 5 ingredient types with only a single cooking method and spawn points as the only special tile included in the game. Base tiles are either curves or straight tracks. Even though there already is an implementation for more special tiles it is a bit unfortunate that there are not more exciting board tiles to show during Alpha Release. Considering the 2 to 3 cooking methods: This turned out not so important, since the gameplay only would majorly change with the inclusion of new board tiles. So for now, cooking pots should suffice for finishing recipes.

Lastly, basic sounds and music are also included as stated in the desired target. A high score is not yet included.

2 Implemented Features

2.1 Main Menu, UI, Instructions

The Game includes multiple user interfaces required from our point of view for Alpha Release: These include a simple Main Menu (see Figure 2) with Options and Twitch-Settings, a Pause Menu and a small Tutorial Popup (see Figure 3) explaining the game's controls at the beginning. Additionally, a Game Over Screen is shown at the end of a session stating the scored points by the player. These are all fully functional.

2.2 Recipe Sheet

Considering the critics from a fellow peer during the previous milestone meeting the UI listing current recipes/food orders has been optically reworked. Now, each of the three

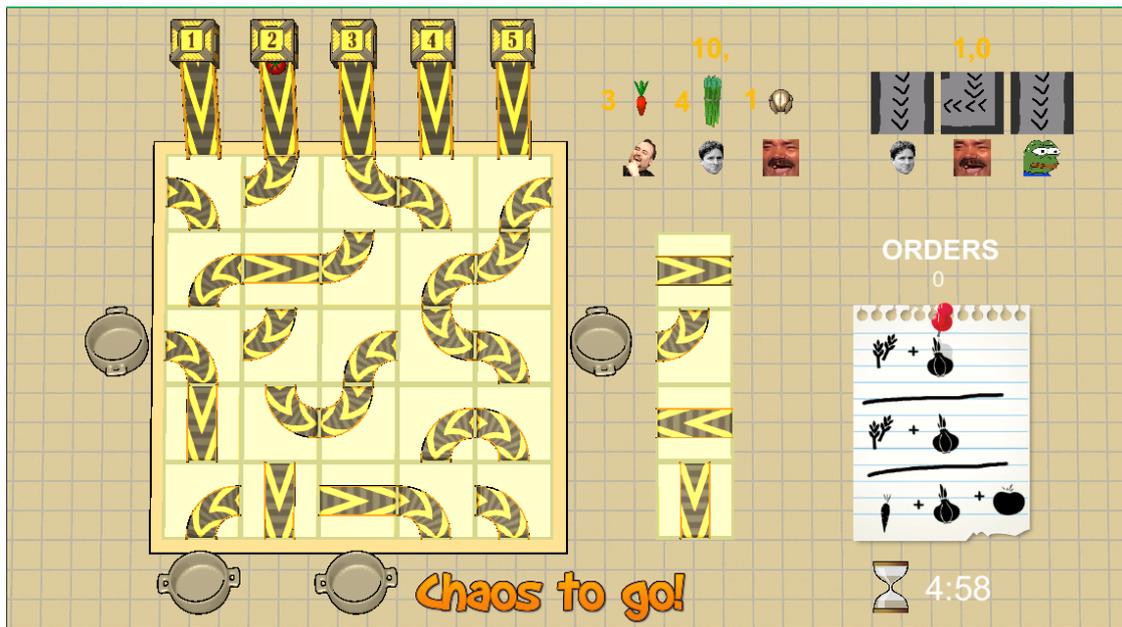


Figure 1: 'Chaos to Go!' with conveyor-belt-board on the left, UI for food orders, score and game time on the right and Twitch poll UI at the top

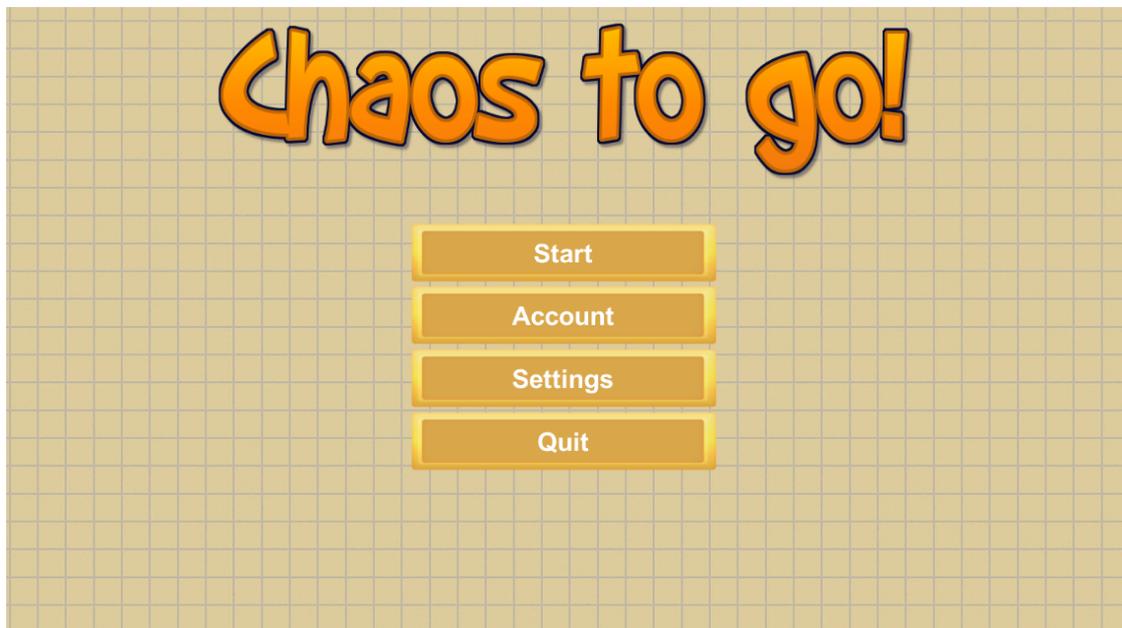


Figure 2: Title Screen for 'Chaos to Go!'. Very basic button layout.



Figure 3: A tutorial popup at the beginning explaining the controls (In German for Play-testing Purposes)

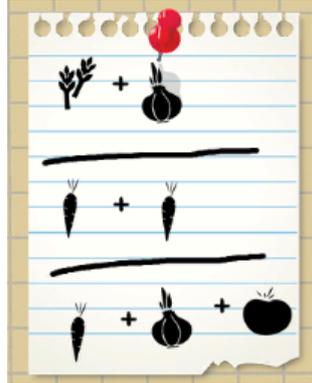


Figure 4: Current ordered recipes represented as a stylized shopping list



(a) Straight Tile



(b) Curved Tile



(c) Spawn Tile

Figure 5: Different animated assets for conveyor belts

recipes is shown strictly separated and horizontally listed as a sum of ingredients. Recipes can be defined in the Game Manager and are randomly selected (see Figure 4).

2.3 Animated Conveyor Belt Tiles

Basic, placeholder tiles with arrows indicating movement direction were replaced with final animated assets depicting conveyor belts. Movement visualization is achieved with proper UV mapping of the tiles, especially the curved ones, and texture scrolling. As we finally decided to spawn new ingredients on the border additional spawning tiles were created. These consist of a straight conveyor belt and an enumerated spawning box. Like in case of other assets the tiles are visualized with use of custom cell shader to achieve consistent look. In order to keep visuals clear, even with more complex shapes of tiles a highlight on hover was added to inform the player, where the dragged tile will be dropped.

2.4 Music and Sound

Background Music and sound effects were added on top to improve the player experience. The music choices were based on the idea of representing the atmosphere in a restaurant.



Figure 6: Audio Settings

The volume of both music and sound can be adjusted in the main menu settings. (See Figure 6)

2.5 Win Condition

The Win Condition is relatively simple: The player has to complete as many orders as possible within a set time interval in order to achieve a good score. Wasting ingredients causes a small penalty. Please remember that it is not okay to throw away food that is still good! Once the timer shown on the bottom right (see Figure 1) hits zero, the Game will stop and the player is shown the achieved score and asked to either return to title screen or restart another session.

2.6 Additional visual effects

Also considered as desirable are various small visual additions which render the game more playable. These include an effect for boiling soup, particles when ingredients are added to a pot or destroyed by crushing with new conveyor-belt tiles or when falling off the board and finally score labels spawned at destroyed ingredients or pots with completed recipes. Figure 5 gives a small overview of these additions.

3 Design Revisions

Various design revisions were made over the course of the previous three weeks:

3.1 Increased board size from 4x4 to 5x5

This change was made because a game board containing only 16 tiles was too easily manageable. Thus the size was increased to 5x5 and an additional sixth fixed row at the top was added for spawn points.



Figure 7: Left: Effect for filled pot with particles, right: Destroyed Chicken with penalty indicator (minus 20 points)

3.2 Changes to spawning

We removed all upwards facing tiles from the tile spawning pool, since there is no scenario in which the player would like to use such a tile. We improved the algorithm for ingredient spawning, so that there is a bias towards ingredients that are currently needed in the recipes. This makes the game experience feel more balanced especially if there is no twitch chat.

3.3 Tiles can be swapped with neighbors on the conveyor-belt-board

Often the player would run out of new board tiles. We decided to open new options by providing the possibility to swap tiles on the board as long as there are no ingredients on them. This has the side effect of decreasing the power of the Twitch-Chat. However, often the player is looking for a special tile anyways and the viewers still have the ability to decide, which new tiles to vote for. Additionally, the spawn selection of ingredients on the board is also done by the Twitch-Chat, thus giving enough possibility for interaction providing a lot of non-deterministic behavior nonetheless.

3.4 Increased amount of Cooking Pots from two to four

Reasoning behind such number of pots is quite simple: There are three different recipes and thus it is possible to work on all of them at the same time. Also, a fourth pot was added for some strategic micro-management, e.g. for storing spawned ingredients that are not yet needed and may become important later.

3.5 Cooking Pots do not empty automatically anymore

If a cooking pot is full, it needs to be emptied by clicking on it. The player either receives credit for a finished recipe or a penalty based on the amount of wasted ingredients. The idea behind this is to give the player the option to abort a current or wrong recipe to go for another receiving a small penalty.

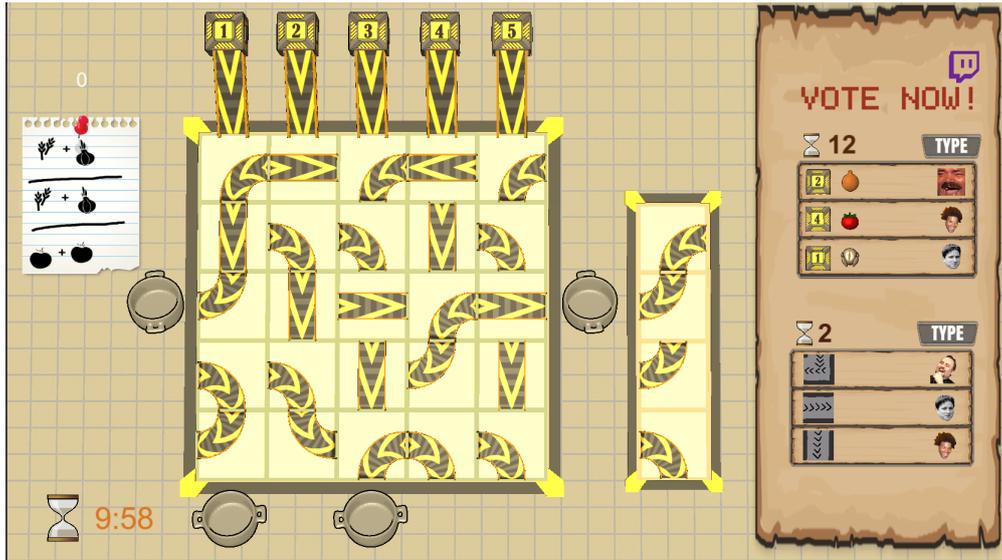


Figure 8: UI Design after Revision

3.6 UI Revision

To make the GUI more clear for player and Twitch viewer, the UI elements are newly arranged such that twitch related elements are located on the right side and player relevant elements on the left side of the screen. (See 8) This helps both parties to focus on their part.

3.7 Poll visualization

To make voting feel more impactful and giving the player as well as the viewers a better overview what is happening in game we added a visualization for the current poll vote standings.

Milestone Report 5

Play-testing of a Twitch-based Puzzle-Action-Game

1 Play-testing Setup

Since many game functions are highly dependant on Twitch as a platform but can also be played without it, it is equally important to test both the streaming aspects as well as the single-player experience the project provides. The goal was to find out, how both are received by the player and how they can be improved. Thus, a planned play-testing session with players each setting up a stream to test the experience with the streaming service, as well as a simple build distribution for single-player testing was initiated.

1.1 Testing without Twitch

Being able to play the game without the streaming platform always has been an important critic point by fellow peers. While a major focus lies on the Twitch interconnection it is unlikely for people to find themselves a follower base and set up a stream just to test the game's full experience. However, it is fully playable without the Twitch aspect nonetheless due to randomization. A build was offered to multiple persons to play how they felt like and they were then asked to fill out a form which also people who were present during the planned Twitch session had to answer.

1.2 Testing with Twitch

To test the experience including the game's polls via the streaming platform's chat a planned session with five players was set up. The testers were instructed to set up a Twitch Account and the recording program OBS Studio (<https://github.com/obsproject/obs-studio>) to open a streaming session. They were then asked to simply play while the remaining four players could interact via the streaming platform's chat. After one round of ten minutes the streamer was then swapped with another member of the group and the process repeated.

2 Observations during planned Twitch Session

2.1 Problems with Stream Setup

The general first observation that could be made before actually commencing the game-play was the general difficulty to set up a streaming session. Testers had to log into their account three times, that is one time on the internet platform directly, a second time to establish a streaming connection between OBS Studio and the platform and a third time to create the authentication token. This caused much frustration right at the beginning since the of 2-Factor-Authentication takes away some time even though it was tried to parallelize this process during testing.

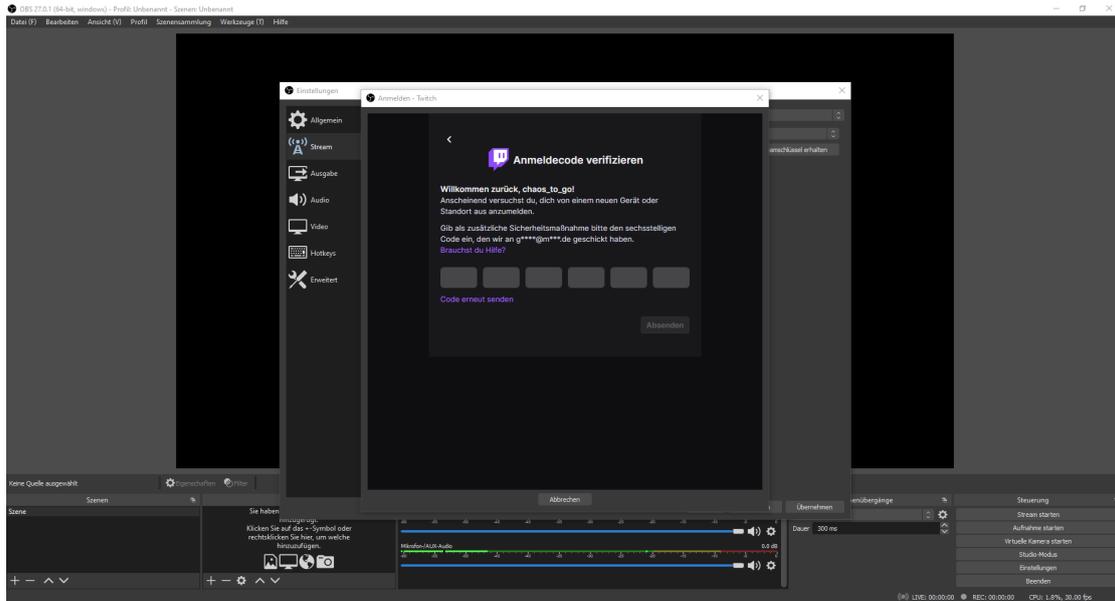


Figure 1: Due to required security mechanisms provided by Twitch, it can take quite some time for a new streamer to set up a running session. This can lead to frustration even before playing the game.

2.2 Missing Feedback for failed Connection

Another issue that could be observed right off the bat was the fact that there was not enough feedback when the set connection to the servers failed due to e.g. wrong credentials. The streamer has to first test out whether the poll system reacts to input by viewers which is not something we want to force to do. Moreover, for some players that were new to Twitch, the difference between "username" and "channel name" was not clear, so they unconsciously entered wrong credentials.

2.3 Visuals

Both on the game and Twitch side, there were some complains about visuals: For some players it was hard to distinguish direction of certain tiles, which they noticed only when multiple ingredients already stacked together. They also advised to use Twitch emojis that are available for everyone so that they are visible in the chat. However, overall the visuals have been evaluated as appealing.

2.4 Controls

The controls were praised for their simplicity. Only the left and right mouse buttons are used as well as the Escape-Key to pause the game. The entire game-play is mainly controlled by moving the mouse cursor which seemed very intuitive for the most. Players

appeared to never have the problem of not being able to execute an action due to bad control schemes. Rather, some did not know they could perform a specific action like swapping tiles on the board because they did not read the instructions given at the beginning of a run.

2.5 Game-play

One thing that confused some testers to a certain extent was that cooking pots needed to be cleared by clicking on them, which however did not cause too much of an issue during the playing session as they discovered it themselves and then accepted it as a given rule. As the players concentrated mostly on the game board itself, they almost never used new tiles provided by the Twitch chat and a had hard time to discover that they can smash traffic jams consisting of ingredients. When talking with players afterwards, some explained that they would prefer it when a single run lasted a bit shorter than ten minutes. Additionally, it appeared to be a problem, that many ingredients on the board would stack when players are still figuring out the basics. In general, they expressed some frustration when too many objects are present on the board as everything felt like it would be filling up with unneeded items.

3 Observations from Survey

After a playtesting session, the testers were invited to fill out a survey which gave us an overview about how the testers experienced the game and what impressions they got.

3.1 Playtesters

The people we invited were mostly our friends and colleagues. The majority labeled themselves as gamers and was fond of playing multiplayer games, but rather with friends. Favourite genres were action-adventure, strategy and role-playing games, but most testers already had experience with puzzle games. There were some dedicated streamers among them, but the testers were occasional stream viewers in general.

3.2 First impression

The most praised aspects of the game were interaction between participants and own progress, improving own skills during the session, overcoming challenges and scoring points. Unfortunately, most playtesters did not find the controls and visuals perfectly clear and needed considerable amounts of time to get the hang of the gameplay. Lack of experience with Twitch, unknown emojis, fast pacing at the beginning and thus intensified traffic and traffic jams on the conveyor belts significantly influenced the further gameplay and made it harder to score points. Even though some of the testers managed to get a decent final score.

Do you stream games or watch streams? How often?

10 Antworten

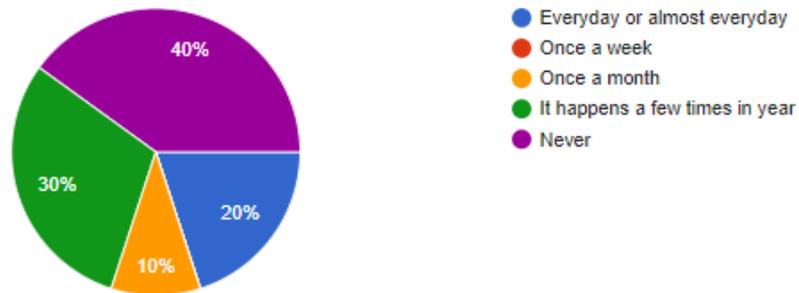


Figure 2: Graph showing how many of our Playtesters were familiar with streaming.

Gameplay: Was it clear to you what the game asked you to do?

10 Antworten



Controls: Were you able to execute all required actions using the controls?

10 Antworten



Figure 3: Graph showing that our controls and the game itself were not completely clear for majority of Testers.



Figure 4: Approximated position of Chaos to Go on the Play Matrix and the direction players wanted to move it towards.

3.3 Twitch influence

Tests were carried primarily online, but the testers, who played alone anticipated multiplayer to be more amusing. Those who experienced multiplayer wanted to stick with it. The viewers described themselves as rather malicious, but the players had an impression they were supported. It seems to us, that the viewers had enough empathy to help out, when the streamer was struggling against the controls. In overall Twitch chat users felt that they had influence on the gameplay but rather slight than significant.

3.4 Suggestions for improvement

Playtesters mostly wished for a clearer tutorial and more explanation on how the game works. They felt like some of the gameplay aspects were left out. Suggested was inclusion of additional information about how and when to finish the recipe, how to put the tile back, why they are getting negative points and what the Twitch chat influences exactly. Option to clear the board was desirable. It was also pointed out that some of the emotes used by the game are "paid" ones and so not available for every Twitch user. Use of basic emotes was suggested and maybe an option to add own emotes through settings.

3.5 Play Matrix

'Chaos to Go' was placed far in the direction of mental calculation and visibly towards skill. The testers would like to generally move the game a bit back towards physical dexterity and further in direction of skill. Proposed solutions for that would be some joker tiles and inclusion of difficulty levels.



Figure 5: Small icon to remind the player to set up a Twitch connection

4 Conclusion

Overall the game was received positively. The feedback contained opinions that it is an interesting idea and the game has a clear fun factor. Notwithstanding, there are numerous things to improve: We need to rethink and redesign our tutorial as it turned out to be not clear enough. Some information about the gameplay intended specifically for the viewers needs to be included. We have to improve the clarity not only through rules descriptions but likewise through visuals. Are the meals cooked correctly? Where will the next ingredient spawn? Is Twitch connected properly? Which emoji should I send? Does order of ingredients matter? Such questions are to be answered quickly, clearly and intuitively. An option to get rid of traffic jams and stacked mistakes e.g. through clearing the board without significant loss of points should also be implemented.

5 Resulted Improvements

5.1 Twitch Connection Label

To account for the issues considering the problem that players would not get feedback when they have not yet linked the game to Twitch, a small label (see Figure 2) was added below the Voting UI to indicate that no login data is present. If a streamer forgets to set up the connection to the streaming platform, this icon should remind that the game is still played offline.

5.2 Issues with Ingredient Movements

One tester encountered a bug in the movement pattern which we were unfortunately unable to reproduce. It would happen, when objects overshoot the destination area at the end of a conveyor-belt-tile and keep on moving. It is likely that this problem is caused by lagging or in very unfortunate cases where the distance threshold is too small in relation to the object's movement speed. Thus, for now, a failsafe was added which should generally prevent this behavior by adding an additional check which ensures that ingredients can never move to far away from their current tile on the board.

Milestone Report 6

Final Release of a Twitch-based Puzzle-Action-Game

1 Final Release - Summary

During the recent semester, our team was developing a Puzzle-Action-Game utilizing the Twitch streaming platform to include viewers into the gameplay while a streamer is playing for points. At the same time and for testing purposes, it is also possible to play the game without the streaming platform in a traditional single-player setting. This section is meant to give a small summary about all finished game features and improvements from Alpha Release (see Milestone Report 4).

1.1 Overview

'Chaos to Go' is a puzzle game with the inclusion of Twitch as a streaming platform allowing players to directly influence the game-play. The goal is to finish recipes by leading ingredients towards one of four cooking pots on a board full of conveyor-belt-tiles. This is achieved by either swapping tiles on the game-board or by placing new ones which are selected by the viewers of the streaming platform. Viewers can either support the streamer by providing needed tiles or they can sabotage by choosing unlucky spawn positions and ingredients. To balance this, a poll system with choices, the viewers can choose from by typing specific emotes into the chat, was set up.

1.2 More Visual Cues

During playtesting, many testers complained about the fact that some game mechanics, like swapping tiles or clearing recipes via clicking cooking pots, were not conveyed enough. Often, a player did not know that a certain action could be performed. An important addition against this problem are several new visual cues meant to give more feedback about what actions and moves are allowed at a given time. E.g., when an already placed tile on the board is selected, the game now highlights (see Figure 2) with which tiles the selected one can be swapped. This prevents, when a player tries to swap a tile with an occupied one, that a reaction is awaited.

Another problem was the fact that players did not know they also had to click on cooking pots to finish a recipe and receive points for it. While the pots still need to be cleared the same way as before to ensure a player can empty a pot at any given time, pots start to blink in green now when a recipe is complete (see Figure 3).

1.3 Improved Twitch Connection Feedback

During play-testing, there was the issue that the game did not produce enough feedback about whether a connection to the servers is successful. During Milestone 5, a small

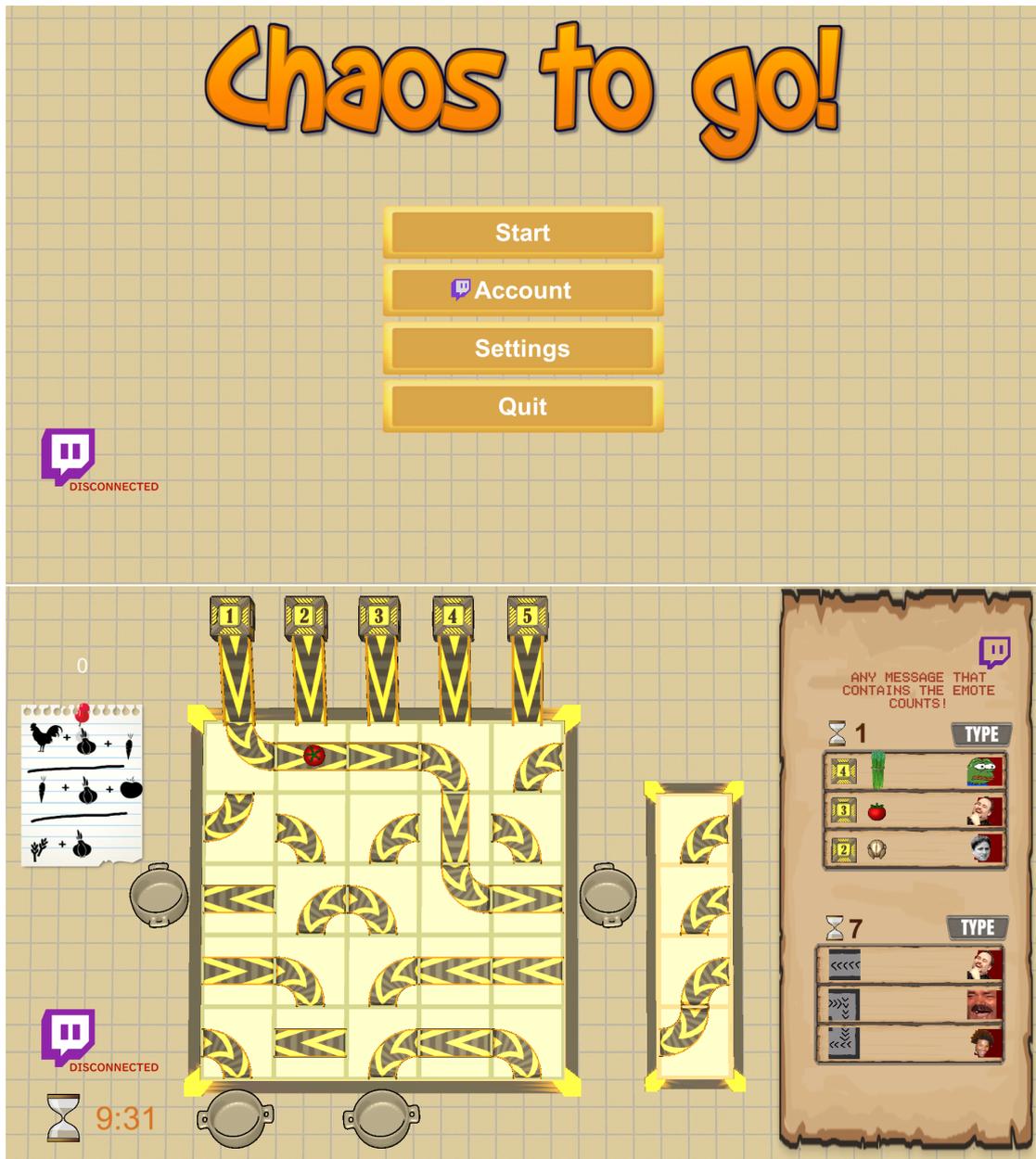


Figure 1: Screenshot of 'Chaos To Go' Main Menu and Main Scene.

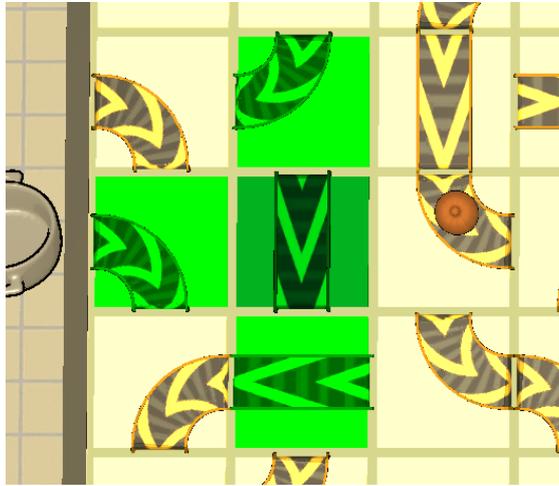


Figure 2: A tile can be swapped with neighboring, non-occupied tiles. This is now highlighted.

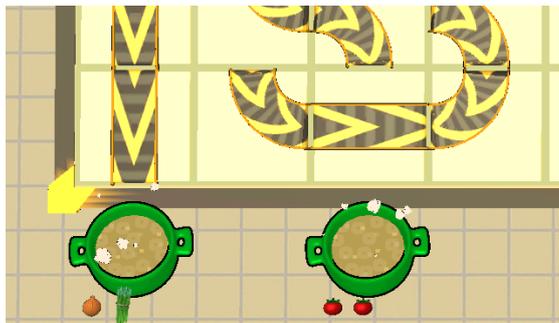


Figure 3: Pots still need to be clicked but blink now when recipe is correct.

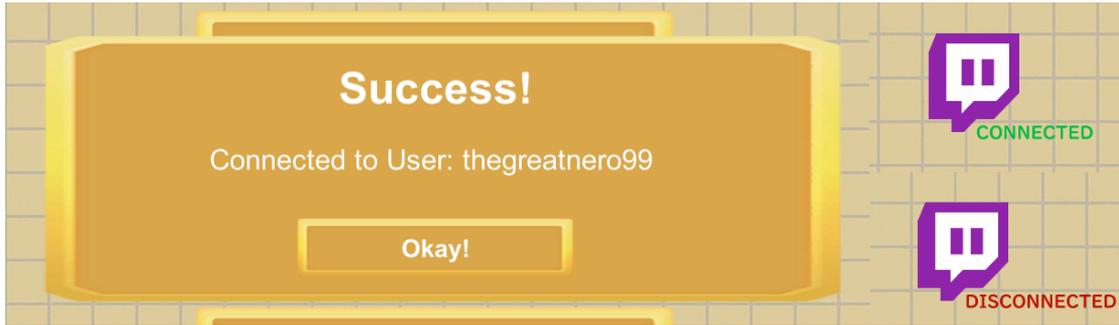


Figure 4: The indicator was improved and now keeps checking the connection.

indicator was added as a result of the play-testing sessions. This feature has been improved for final release and gives direct feedback, when a streamer set up the connection correctly (see Figure 4). An established connection is checked and shown to the player by a newly added icon.

1.4 Improved Tutorial for Players

The tutorial was extended with new images and texts (see Figure 5) to help new players understand the various mechanics. Even though the control set is very minimalistic with only left and right click and the escape key for pausing and exiting the game, testers were not content with the explanation of the various actions they could perform with these controls. The game appeared to be very difficult for newcomers. Our hope is that the newly added information will simplify it to a certain extent.

1.5 Improved Instructions for Viewers

During testing, we received feedback that viewers often did not understand how they could influence the gameplay and what they were supposed to do. While most of the people who gave feedback were not frequent users of the Twitch platform this is a major problem nonetheless. What makes this particularly difficult to solve is the fact that at any given time a new viewer could join a running stream session. To solve this problem a rotating set of instructions was included into the main scene (see Figure 1 and 5, up-right corner of the gameplay screenshots).

2 Development Experience

Considering the design, it can be said that the final release is still very similar to the paper prototype we presented as milestone 2. Almost all aspects about how the game is played, like the score, the timer, the voting system and the way the board is filled with conveyor-belt-tiles as straights and turns is still the same as it was planned during pitch and prototype phases. The only major change is that neighboring tiles are swappable

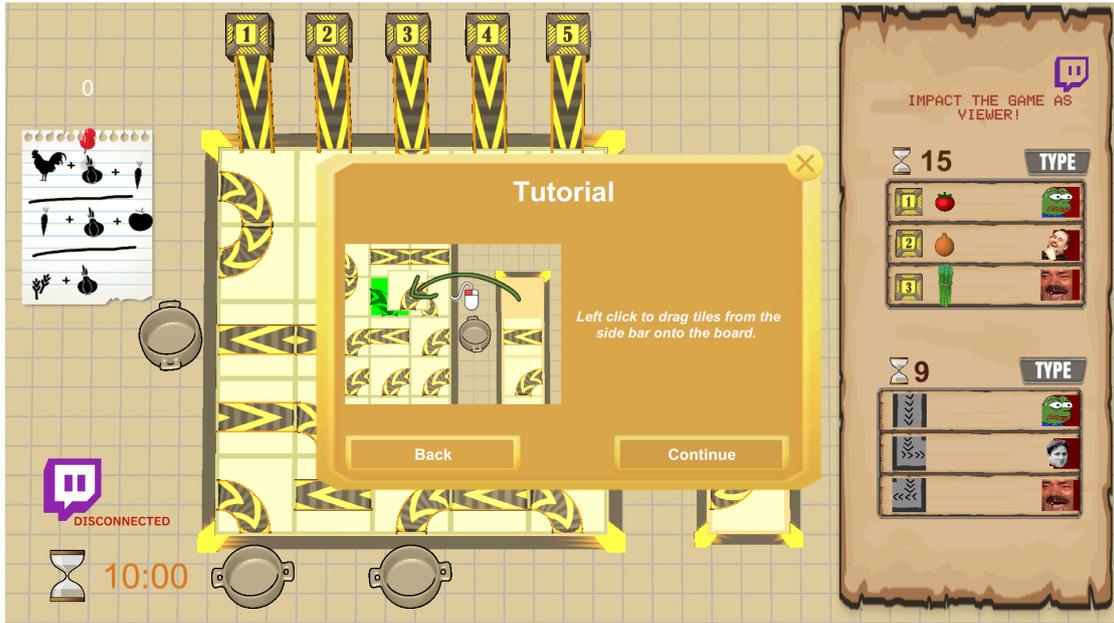


Figure 5: Tutorial pop-up at the start of a round.

as well, because the Twitch Chat would not generate enough new tiles to keep enough options open for the player.

2.1 Twitch Chat Inclusion

While it was definitely an interesting idea and development experience to include viewers of a live stream, it also came with its fair share of problems: Some of them were unfortunately not in our control. Those include the tedious set-up process for new streamers, a spam protection on the platform preventing the excessive repetition of the same message, a time delay between chat and the live stream and the fact that many of our testers just were not familiar with the Twitch platform in general.

Then there were issues we tried to account for, like giving viewers instructions so they know what they were supposed to do (see Subsection 1.5). Additionally, we prevented the viewers to fully take over the 'randomization' part by proposing ingredient spawns in a poll. This renders it impossible to completely stop the player from finishing recipes because mostly required ingredients are offered.

While all this was done to prevent the game from getting too chaotic and not handable for a player, it also meant we were effectively taking away power from the viewers. Right now, more ways people could influence the gameplay would be desirable.

All in all, it can be said that the balancing was one of the most challenging aspects as it turned out to be very difficult for us even though it had already been stated by fellow peers and their mutual critiques.

2.2 Task Scheduling

At the beginning of the course, we stuck to our planned schedule. On the one hand, there were some tasks which went faster than expected, like setting up the core managers for the Twitch platform, on the other hand things like creating the movement pattern for ingredients to move over conveyor-belt-tiles turned out to be a bit harder than first anticipated and was even refactored once. However, until Alpha Release it can be stated that we did follow the original schedule. Only then did we start to deviate from it a bit, because we spent most of the time addressing feedback collected during play-testing.

During this time we met more frequently each week and discussed which tasks are most important and needed to be done by who so every team member received a similar load. All in all, the schedule really helped us to get the project going.

2.3 General Remarks

The overall project structure was quite helpful in a sense that you always had a clear sub-goal you could work towards and we would not change it that way. It mostly helped us make progress. Even though our attitude towards the paper prototype was not fully positive at first because we needed to organize it fully online as a consequence of the current pandemic, it helped unleash our creativity a lot and in the end every team member knew towards which goal we were working.

3 Conclusion

To conclude, we are quite content with how the final release turned out to be and proud we tried to include viewers of a streaming platform into the gameplay as it is something we have not seen a lot of other games do. Of course, one can always improve a game by re-iterating and addressing more critiques by testers and normal players alike, however, for now, the current state should give a good impression of what we were going for.

In this final section, we try to answer the questions posed by the gamelab project structure document. Every team member was invited to write a sentence or two.

3.1 What was the biggest technical difficulty during the project?

The conveyor-belt-tiles and their respective movement patterns for ingredients were harder than anticipated. Also, we faced issues with the custom shaders written for OpenGL. The inclusion of the Twitch chat itself proved to be easier than anticipated. However, we had some technical difficulties with personalizing Twitch account details on runtime.

3.2 What was your impression of working with the theme?

The theme 'Chaos and Order' was really exciting. Playing with the word 'order' as in 'to order food' was quite funny. Overall the theme was much broader as we initially thought and allowed enough freedom for creativity.

3.3 Do you think the theme enhanced your game, or would you have been happier with total freedom?

Both things have their own pros and cons. It is hard to tell whether complete creative freedom is better or worse. One probably has to try both to come to a conclusion. However, working with an arbitrarily defined topic encourages to try out something new and throws out of the comfort zone, which could be considered advantageous.

3.4 What would you do differently in your next game project?

If another game using Twitch were to be made, we would strive for a more concrete plan about the viewer side of the project and how to include them more. Time discrepancy between streamer and viewers should also be taken into account, so the next idea would probably be slower or at least more lag-resistant.

3.5 What was your greatest success during the project?

How quickly we were able to create a playable game with the Twitch interconnection set in place when other teams still had no real gameplay to show. As well as, how good the overall idea and our gameplay was received by fellow students participating in first demo stream.

3.6 Are you happy with the final result of your project?

From our point of view, the project really reflects what we were going for. Some of us were also not familiar with streaming platforms at first, so it was exciting to create this form of 'Social Game'. The game could certainly benefit from some more playtesting-improvement iterations, but is already enjoyable and, as one of our Playtester said, "has a fun factor".

3.7 Do you consider the project a success?

We learned a lot about developing a game in general, how you structure its schedule and how to formalize ideas on early stages. So we would call it a success alone for this reason. Additionally, we are quite content with our final release.

3.8 To what extent did you meet your project plan and milestones (not at all, partly, mostly, always)?

We mostly reached our milestones. There was some overlap from time to time like with ingredient movement but never were we in a situation where something was not working at all putting the project's success in a real danger. We had to rethink some ideas and replace some tasks with others, but these decisions were made in favor of the final game and we would not call them deviating from our initial plan.

3.9 What improvements would you suggest for the course organization?

More frequent mutual critiques so you stay a bit more informed about the current state of the other teams. Also, some form of exchange between teams would be nice. However, this is probably hard, due to the current pandemic.

On the topic of the pandemic, hopefully such situation will not occur again, but if the course would be forced to be carried out in such form, it could be beneficial to adapt some parts of the project structure document - physical prototype, playtesting - to online teaching.

4 Special Thanks

We would like to thank this course's organizers to open us the possibility to try out this game concept as a practical course for our studies.