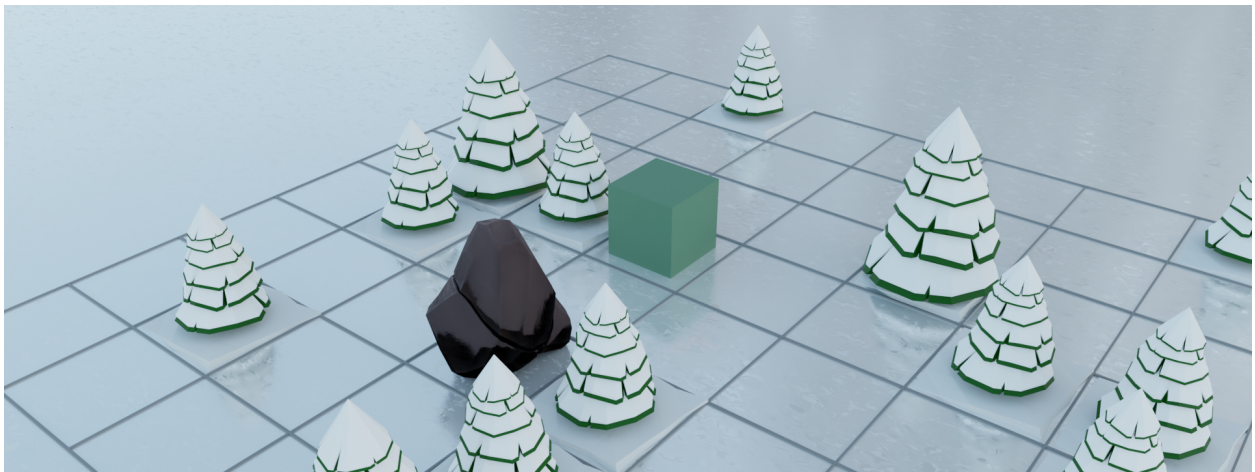


Playtesting: qubi

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1 Playtesting approach

1.1 Qubi playtesting version

To prepare the game to get into a shape where it can be played by our playtesters, it was time to make some changes to introduce new players to the game and improve the general usability of it. We did not have any kind of user interface or way of telling the player how to play the game, which we addressed in this first step of the playtesting phase.

1.1.1 Changes to the renderer

For the playtesting we did not want to interfere with the tester while they are playing. But since the game introduces mechanics on the fly that require the player to learn new keybindings, we wanted to implement image overlays that fade in to visually show the player images of the keys they need to press to discover new game mechanics.

As a start we looked at Dear ImGui to render any kind of user interface. It is an implementation of an immediate mode graphical user interface. It outputs draw calls to draw the requested UI. To use it, we created a second rendering pipeline and render pass for the UI and every frame let ImGui record the draw calls into command buffers to draw the UI.

When doing this we observed a performance penalty of around 20% for the second render pass (from around 11.000 fps to around 9.000 fps on our machines). We also experimented with instead rendering the UI in a second subpass in the main render pass, and marking the main render pass as a subpass dependency for the UI subpass. We could however not see any performance improvement and reverted the changes, as rendering two separate render passes led to simpler code.

We also used RenderDoc to take a look at the shaders and draw calls that ImGui generated for our simple image overlay. We noticed that ImGui only generates the shaders and draw calls that are needed to render the requested UI, so the shader only consisted of sampling the image. We decided, that was enough for our intended purposes and left it like that. Because even if we decided to render the overlay completely ourselves, we would probably not see any performance benefit over using ImGui.

1.1.2 Main Menu

The main menu was created as an in-game level itself. Therefore players move the cube on the tiles (slippery and dry) to reach a finish. As of writing this report, the main menu consists of two finishes, one tile that specifically starts the game with the first level and one tile that quits the game. These tiles were specifically equipped with corresponding textures. The idea was to offer a way for players to experiment with the basic controls before they actually started playing the first level.

As can be observed in Figure 1, this level can be extended with additional menu functions such as an options menu or a way to continue a previous session.

1.1.3 Level structure

In this version of qubi that we used to playtesting we featured a total of twelve different levels which we arranged in the following three sections: The first three levels only featured slippery tiles, obstacle tiles and a finish. We figured with the initial prompt of the movement instruction, this number of levels would be sufficient to convey a basic understanding for the core mechanics. For the next six levels we added green dry tiles on which the cube would flip. Finishes also require a specific side of the cube to

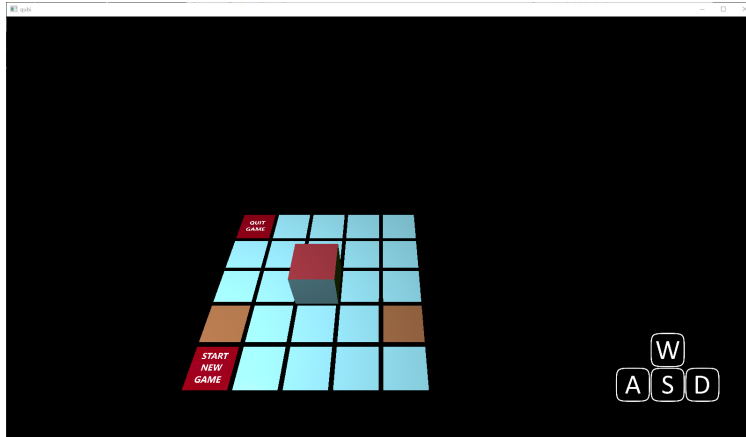


Figure 1: The player here can move the cube the start the first level or quit the game

be on top/bottom. We did not add instructions here. The focus of the remaining three levels was the unfolding mechanic. For that we added one prompt to show which keys need to be pressed to unfold the cube. Should the player make a mistake we further added a prompt to undo actions. We expected players to have the hardest time with these levels but also the most enjoyable time with all the different options.

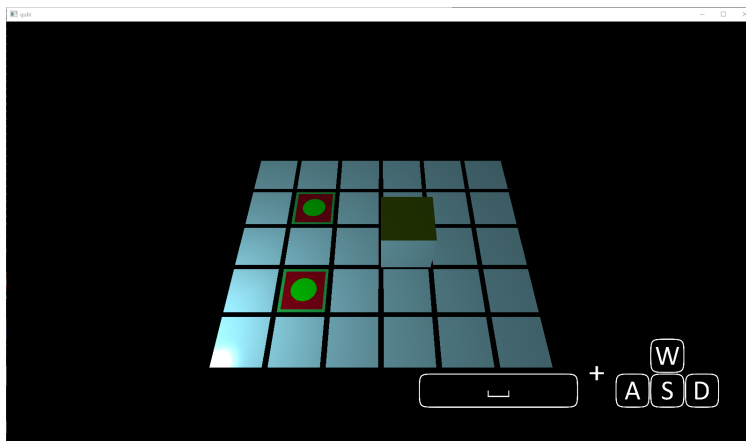


Figure 2: The figure shows the first level with the unfolding mechanic. Once the player is on the green dry tile, an instruction pops up.

As a main philosophy we wanted to keep instructions at a minimum. We believe that figuring out these mechanics is part of the enjoyment of qubi. The playtest would determine if the amount of instructions we featured are enough or if they are too vague. In addition the representation of the different tile types is tested as well. We want to see if players understand the meanings of the different tile types as they play.

1.2 Procedure

After welcoming the testers we made sure to remind them that we were testing the game, not their skill. We also requested for the testers to speak out loud when playing qubi while we remained quiet. All of

the 12 levels are rather short. This is why we let the testers play through all 12 levels until they finished without interrupting them. As the testers were playing the game, we made sure to note our observations regarding their understanding/confusion of the game mechanics. These observations helped us get more insight into possible target audiences. With the completion of the last level, we then discussed aspects of qubi with the testers in one on one conversations.

1.3 Questions

Starting off we asked testers for their first impression of qubi as well as how much that first impression changed. To get a better understanding of the testers' knowledge of qubi, we further asked them to describe the objective of the game as well as the gameplay mechanics. Following that were technical questions as to how testers felt about the controls and the minimalistic instructions that were featured. We then had them locate qubi on the play matrix and asked them if and where they would move the game.

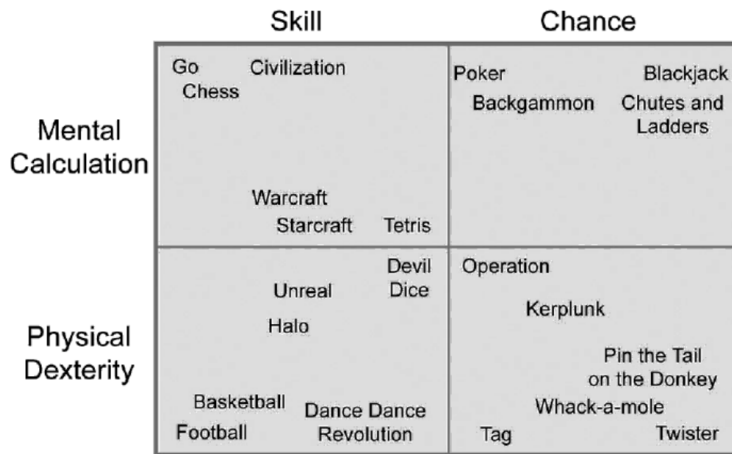


Figure 3: On the play matrix a game can be characterized by its reliance on skill or chance as well as mental calculation or physical dexterity.

Afterwards testers told us about their view on the positive and negative aspects of qubi including their take on the music choice. Finally they made suggestions regarding changes and/or additions to the game.

2 Playtesting results

2.1 Play Matrix

The following play matrix displays how the participants of our playtesting session classified qubi. As we expected qubi was placed across the top left quadrant that is representing skill and mental calculation. Most of the participants placed it close to the top left corner next to chess and Go. This makes sense for us as all moves in qubi are deterministic so there is no chance involved and it also matches the vision of the game we had set out to create.

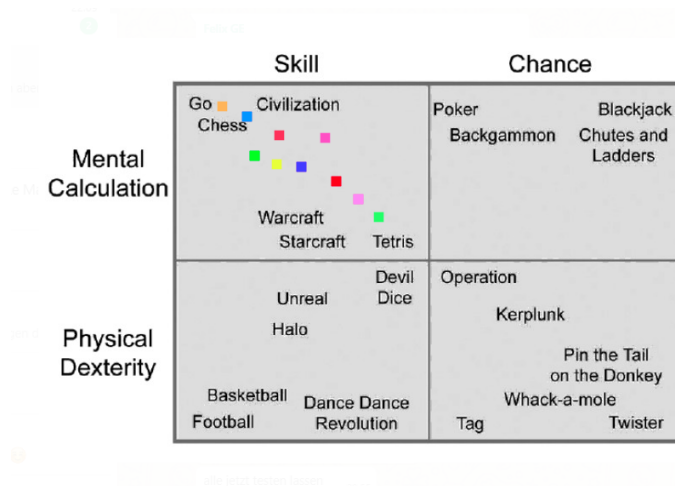


Figure 4: Classification of qubi in the play matrix from the playtesting participants

2.2 Questionnaire results

In the following section we will go over each question that we answered in our questionnaire and go over the results that we gathered from our playtesting group. For the test session of qubi we gathered a group of 16 playtesters. The majority of our playtesters had a very high experience playing video games, although a small subset only had rudimentary knowledge of gaming.

2.2.1 What is the objective of the game?

All of the participants were able to describe the objective in simple terms leading us to believe that the goal was communicated intuitively by the differently colored tiles without the need for any additional input.

2.2.2 What were your first impressions of the game?

Most testers noted the minimalistic design first and for some it even created an expectation of the type of game that was about to follow. For a few players it even came as a surprise that the cube was able to slide on the ice tiles and they expected a different kind of puzzle game.

2.2.3 How would you rate the controls of the game?

The controls were considered to be intuitive by the majority of our playtester and were commended for being simple. This was probably due to a high number of experienced gamers that are very used to WASD based movement. Even though the controls were intuitive a few of the participants suggested to also implement control of the cube by using the arrow keys as it is fitting for these types of games.

2.2.4 Were the instructions clear enough?

The instructions were one of the most critiqued elements during the playtest. About half of the testers thought that the instructions about the exact end goal for each level were not communicated well enough. Additionally to this group some thought that the instructions for the mechanics were understandable but that the visual clarity of the finish tiles could be improved. There also was a smaller subset of our

playtesters that enjoyed the explorative aspect of learning the game mechanics with a minimum of instructions provided. They mostly argued that figuring out what the goal was for a new level felt to them as part of the game and induced an intrinsic reward for finishing each level.

2.2.5 How would rate the difficulty of the puzzles?

The difficulty of the puzzles was judged to be good by the majority of the playtesters. The slight increase in difficulty was also noticed and was perceived as suitable. Most of the players considered the level introducing the unfolding mechanic, undo button and two finish tiles as the most difficult but argued that it was mainly due to lack of instruction. The difficulty for them was realizing how the new mechanics work exactly which was also observed as they managed to solve the following unfold level much quicker.

2.2.6 Different type of players

In terms of playing style three different types of players were observed:

1. Players that used trial and error right from the start, which was decently effective as the number of possible moves and level size/complexity is not at the stage that we have envisioned
2. Strategic players that were observing the complete level first and already planning out a route. Some of these type of players suffered from an analysis paralysis in the levels that introduced new mechanics such as the unfolding and two finish tiles. The prompt for the unfolding of the cube was only shown after moving the cube to a tile on which it could be unfolded. Players who wanted to plan out their moves beforehand did not reach the tile for the instruction and thus thought the level to be impossible to solve.
3. The third type of player that we observed were a mix between the trial and error and strategic. These players first tried to navigate the cube through the level until there was an obstacle presented to them that they could not solve directly. After that they switched to an analytical/strategic mode and solved the levels in that manner.

Interestingly none of the player types had a significant advantage in how fast they solved all of the playtest levels.

2.2.7 In which situation would you play the game?

Many of the playtesters argued that qubi is perfect as a quick puzzle game while traveling long and short distances because the atmosphere is calming and the concept is simple. They also mentioned for this reason that porting qubi to a mobile platform would greatly benefit the game.

2.2.8 What was the best aspect of the game for you?

The aspect that was considered the best for many of the testers was the unfold mechanic of the cube. Many argued that this gameplay element added a significant amount of creative depth to the already interesting puzzles and was something that they had not seen in any other games. Other parts of the game that were positively received was the fact that it was a spatial puzzle game, something that is not very common to see even for experienced gamers. Some players also mentioned that it was very fun to learn about the game and its mechanics was intrinsically fun for them.

2.2.9 What was the worst aspect of the game for you?

Most of the testers considered the lack of clear direction and instruction the worst aspect of the game, especially in the level that introduced three new mechanics.

2.2.10 How would you rate the visuals of the game?

Many thought that the simplistic visually helped them in their understanding of the puzzles but criticized the bland colors and lack of textures of the tiles. Another point of critique for a few of the testers was the already mentioned lack of clarity of the finish tiles. It was difficult for most of the testers to deduce what the color combination on the finish tiles tried to convey to the players.

2.2.11 How fitting was the music in your opinion?

The music was rated generally well by the majority of participants although it was argued to be too loud. Some players also mentioned that the general style of music captured the cozy feeling very well and that it increased their focus on the puzzles while the music shifted to the background. On the other hand it was also mentioned by a few tester that the main music loop was becoming a little bit too repetitive after around 20 min - 30 min of play time.

2.2.12 What would you change about the game and do you have any other suggestions?

For this question we wanted some free feedback and suggestions from the playtesters. The suggestions were relatively similar and we have compiled them into the following list:

- Add more mechanics that also incorporate the 3rd dimension or intermediary finished tiles
- Increase the number of levels and the complexity/length of the levels
- Including achievements for finishing certain levels or finishing them with a limited amount of moves.
- Unlockable map skins
- A limit of how many moves are needed per level including a counter to make it feel more like a puzzle game
- Particle effects when moving the cube
- Better visual clarity for the finish tiles
- Embedding a demo video of the game in the main menu/pause screen to motivate player

2.2.13 Notes

We also compiled some notes that we took during the observation of our playtesters into the following list:

- Some people tried to use the mouse in the main menu to “click start game”
- Undo button was used by some players as a restart button and the purpose was generally not 100% clear
- Some were afraid to let the cube fall off the unbounded side of the level
- Unfold was by some only used to turn cube which made some levels trivial


- It was not understood intuitively why they could not unfold on ice, and only realized after trial and error
- Color change due to misplaced light confused a player to misjudged the color need for the finish tile
- The need to keep the space bar pressed while unfolding was not communicated directly enough and not intuitive for the majority of the testers

3 Conclusion of the playtest

Even though all of the participants could identify the objective of the game correctly, it was very often the case, that the testers could not distinguish between different kinds of finishes. This includes both the difference between slippery and dry tiles, as well as the difference between differently colored finishes, where the cube has to have a certain orientation for the finish to activate. For the final release we will work on making the different finishes easier to distinguish. We are also thinking about using not colors but different symbols to distinguish between the different types of finishes, and also make it really clear to which side of the cube they correspond.

The reason why we think most people struggled with the unfolding level – even though the solution only consists of few moves – is that we introduce too many aspects in this single level. They include the unfolding, the presence of multiple finish tiles whose win conditions all have to be satisfied at once and thirdly the undo functionality that can be necessary in this level, as the players can reach a state where they cannot finish the level anymore. To mitigate the difficulty we will introduce these mechanics in separate levels, so not all concepts have to be acquired in one single level, which we believe overwhelmed the testers.

Also we noticed that many players did not understand the undo functionality as we only showed the keybind and no written instructions. Until now we just teleport the players back to the position they were before. It seems however, some players did not understand this intuitively and we believe this is because there is no visual feedback for the player to notice that we are setting their position to the previous one. There are some options we believe we have here.

1. When introducing the player to the keybind for the undo, we could also add a text next to the keybind that describes what it does. This violates our philosophy to not communicate with the players with language, but might be the easiest way to solve this problem.
2. Another way could be, showing the player what is happening during an undo action with the help of an image overlay. For example we could show a symbol like  for a short amount of time when the player pressed the undo button.
3. Finally, the best results would probably be achieved when the movement animation would be played backwards to the position the cube was before. While we believe this would lead to the most intuitive learning of the undo functionality, it is also the technically most challenging version to implement, as a single move can consist of many animations which itself consist of parenting, movement and unparenting actions, which would all need to be played backwards in reverse order.