Play the game!
projectlegato.com/game
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GridBeat on Google Play!

Development Blog:
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Project Legato

Designing a Puzzle Game for Music Education

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Background and Objective

Often, educational video games (dubbed "edutainment") are focused more on their educational content more than the gameplay. Since these games are not fun, they fail at their goal to be an engaging new medium for education. Project Legato aims to combine the fun and rewarding nature of puzzle games with the pattern recognition inherent to making and learning about rhythm and percussion.

This game is intended for hobbyist music-makers that have minimal experience with writing music, especially parts for percussion. As a result, the game's design emphasizes visually representing music similar to the MIDI sequencers common in industrial music production software.

Fig 1. *Reaper, a commonly used piece of music production software by hobbyists, represents musical notes in a horizontal "sequence" as opposed to traditional sheet music.*

Method

I used the Unity game engine to implement the core logic of the video game, and the pixel art and animation tool Aseprite to create the art of the game. Along with separate weekly meetings with both my advisors, I also spent later parts of the semester conducting playtests to improve and iterate on the user experience of the game.

Design Problems

Initially, the game was designed around a 2-dimensional platforming game (like Super Mario Bros.), where the player helps the main character succeed by writing drum beats.

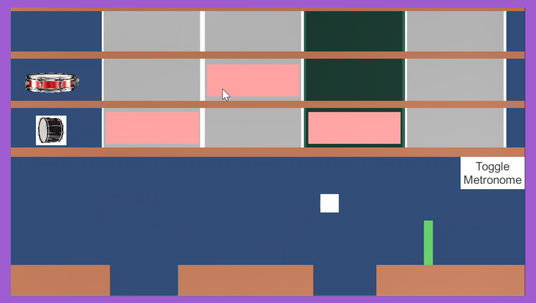

Fig 2. *The player, represented by the white square, inputs a "jump" to the bottom of the screen by adding a bass drum noise to be played on beats 1 & 3 of the grid on the top of the screen.*

However, this game proved to be not engaging or difficult at all - the player could very quickly solve puzzles without any additional thought (seeing a gap on the bottom half always indicated that a bass drum was needed, etc. Thus, the game was redesigned to instead be a number-based puzzle game.

The main benefit of this new design is that the game rewards learning without restricting the progress of players who are learning slower. Players who begin to recognize patterns and common elements of drum beats can apply their knowledge to new levels to begin solving the puzzles; however, players may still beat levels without applying any such knowledge - they can just play the game as a number-based puzzle game separated from the percussion.

Another goal with this new design is that all players can learn something out of every level in the game, as beating each level introduces them to a new drum beat.

Results

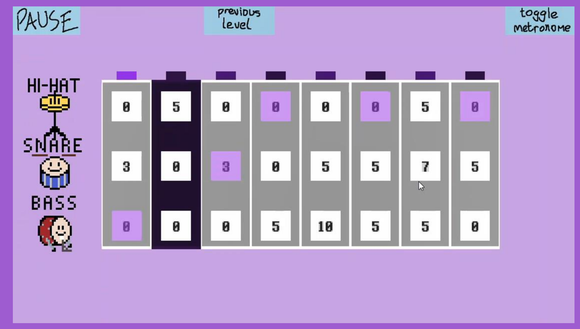

Fig 3*. A screenshot of GridBeat.*

The game resulting from work this semester, tentatively titled GridBeat, gives players a (seemingly) straightforward goal.

You are given a grid of numbers. Clicking on a number in the grid subtracts a certain value from the clicked number, and half of that value to adjacent numbers in the grid. What set of clicked numbers will turn all the numbers in the grid into **zero** (no more, no less)?

While the player solves the level, a metronome is constantly looping in the background of the game. Clicks they make correspond to the instrument on the row they clicked on playing on the beat corresponding to the column they clicked on. Thus, a solution to the level is also a drum beat that the player can hear.

GridBeat currently features over 10 levels that introduce the players to simple and advanced elements of rhythm and percussion, including:

- simple, compound, and complex meter
- polyrhythms
- the relationship between swung rhythm and triplets

Fig 4*. The "main characters" of GridBeat, the bass drum, snare drum, and hi-hat cymbal.*