GAME DESIGN DOCUMENT

Stardust Stroopers

Test your sharpness in space

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Game Analysis

“Stardust Stroopers” is a thrilling video game wherein players are transported to the futuristic “SS Discovery” spacecraft, where the aliens of planet Alpha Sagittarius IV guide it. The goal of the game is to help them solve some tasks in the spacecraft and become familiar with objects and letters they discovered on Earth. Both goals can be achieved through a series of various minigames, which all include Stroop interferences involving different kinds of stimulus: hearing, size recognition, character pattern recognition, and color-shape recognition. Players will navigate these interferences, but the task may not be as easy as it seems.

Mission Statement

“Stardust Stroopers” is a mixture of puzzle games and an FPS one for PC platform and features various quests and gameplay modes. The game's main objective is to train players through different variations of the Stroop test with respect to the classical one. Players can choose any minigame they want and follow the aforementioned quests (e.g., correctly answering a question, shooting the proper object, recognizing a sound) to earn as many points as possible.

Target Audience, Game Objective, and Usage Scenarios

The game is mainly designed for children and pre-adolescents between the ages of 9 and 12, but it is not restricted to this age group and can be played by people of any age. It is particularly aimed at those with a diagnosis of ADHD, which justifies the choice of this particular age range: that choice stems from the observation in a meta-analysis by Schwartz and Verhaegen [1] of a decline in the percentage of adults previously diagnosed with ADHD as children, who still meet ADHD criteria, due to either related symptoms going in remission, or the patients learning to cope with them and letting them interfere less with the executive functions. On the other hand, the extension to other ages too depends on the fact that the auditory Stroop test implemented in one of the minigames takes inspiration from an exercise of a set of Stroop tests delivered to people aged between 18 and 69. [5]
"Stardust Stroopers" is intended for children to play independently, without the need for parental supervision. This is because the game does not present any parental control concerns and is solely for recreational purposes. This recreational purpose also allows for the possibility of the game being used in a school setting, where teachers can have students play the game as a means of screening and assessing their performance through the scores achieved in the minigames.

Gameplay

Overview of Gameplay

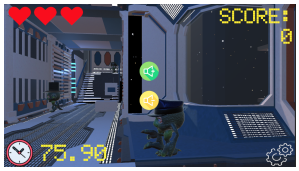
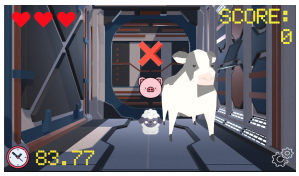
"Stardust Stroopers" features a single-player mode that is structured around a series of minigames. These minigames are distinguished by the type of stimuli they present, including visual stimuli such as size, letters, shape, and color, as well as auditory stimuli.
This structure allows for a more personalized approach to identifying potential deficits in cognitive inhibition in the player. [2]

Game Aesthetics & User Interface

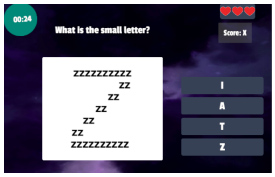
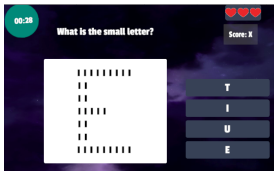
"Stardust Stroopers" is built using the Unity framework and features a main menu as the first scene that players encounter upon launching the game. The main menu presents two types of games for the player to select and start a minigame. It also includes a settings button with sliders for adjusting mouse click sound and background music, as well as an exit button for quitting the game. Each minigame has a "home" button that allows the player to return to the main menu.

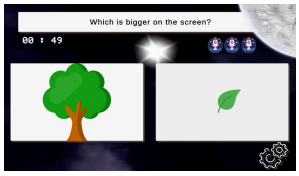
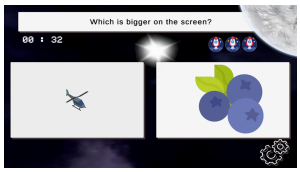
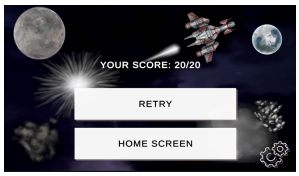
Figure 1: Main menu scene

Minigames Overview

Minigame	Player Experience and Level Design	Game Mechanics and Scheme
"Have I heard well?"  	This minigame features an auditory version of the Stroop test at three different levels: - Level 1: The player hears aliens reproducing a pre-recorded voice clip saying either the word "high" or "low" in a high or low pitch and must indicate the pitch of the voice, regardless of the word being spoken. - Level 2: The player hears five types of animals making calls that may or may not be their own and must identify the call being made, regardless of the appearance of the animal. - Level 3: The setup is the same as Level 2, but the player must identify the animal being shown, regardless of the call it makes. The player makes decisions by pressing buttons that appear on the screen. Level 1 features an auditory Stroop test that is based on one of the exercises described in reference [5]. Levels 2 and 3 present a different version of the same type of Stroop test, where sight and hearing serve as incongruent stimuli, respectively. Both versions of incongruent stimuli are included as there is no published research indicating	In this game, the player interacts with aliens and animals from a first-person perspective. They can move their character using the arrow keys or the W-A-S-D configuration[1] on the keyboard, and cursor to rotate the camera's view. When they are close to an alien or an animal, two or three buttons appear, one of which is the correct answer. In level 1 the green button represents "high pitch" and the yellow button represents "low pitch". In levels 2 and 3 each button represents an animal, except for the red cross, which indicates that none of the other answers are correct. The player has 2 minutes to find all aliens and animals and correctly identify the specific feature in the question. A maximum of three mistakes per level is allowed, after which the level ends with the score achieved so far.

[1] W = go forward, A = go left, S = go backward, D = go right.

	that one version produces a greater Stroop interference effect than the other.	
“See you, space explorer”   	In this minigame, the traditional Stroop test is adapted to present colored geometric shapes rather than words, while still maintaining the Stroop effect as described in reference [3]. The game has four stages, in each of which the player is required to shoot at all spawning targets that match either the shape or color of the target with their weapon projectiles. At the beginning of each stage, the player is informed which characteristics to match. The first two stages present neutral and congruent scenarios. One characteristic is fixed for both targets and projectiles. (in the first "match shape" stage, all targets are gray, and in the second "match color" stage, all targets are cubes). The remaining two stages present incongruent scenarios in which the other characteristic that has not been matched differs between the projectile and the corresponding target (i.e. in the match shape stage the cubic projectile is assigned a different color with respect to cubic targets whereas in the matching color if blue is assigned to the cube projectile then all the blue spawning targets are not cubes). This produces a stimulus that is incongruent with the task at hand.	The player is stationary and can move the first-person camera up and down 90° and left or right 60°. By using the Q and E keys the player can cycle through the projectile types forward and backward and can fire the gun by clicking the left mouse button. At the end of each stage, a summary screen appears displaying the score and completion time. The player can progress to the next level by pressing the space key on the keyboard.
“What is the correct letter?”   	This minigame tests the player's ability to recognize letters within a limited time frame. The objective is to alternate between recognizing the large letters that appear on the screen or the small letters that make up the large letters and then pressing the button corresponding to the correct answer. The minigame has two levels: congruent and incongruent. In the game, there is a picture where the large letter is represented with a global characteristic and the letter consists of smaller letters (local characteristics). In the first level, you have equal global and local features, while in the second level the global and local features are different. On the start page of the game, it is observed how many answers have been	The player can choose which level to start from and complete them or switch between mini-games. Throughout the game, they must pay attention to the task at hand (Identify Large or small letters) and answer as quickly and accurately as possible. After 3 incorrect answers, they are automatically returned to the home page and can choose to try again, return to the main menu or move on to the next game.

	correctly made by the user, and this is the data to check for the user's skill. While in the course of the game the user can observe the score he/she realizes the more correct answers he/she performs, the more points he/she accumulates. [6]	
“The Little Big Things”   	This minigame is based on the observations of Konke and Oliva [4], who demonstrated that real-world size is an inherent property of object representation, leading to the automatic association of objects like cars or planes with being large and objects like cherries or leaves with being small. The objective of the game is to challenge the player's automatic associations by asking them to identify the larger object on the screen, regardless of its real-world size. The sizes of the objects representing the two possible answers are assigned randomly, resulting in a mix of congruent and incongruent stimuli.	The player is presented with a series of twenty questions in random order. Each question has two possible answers representing real-life objects of different sizes. and the player must choose the object that is bigger on the screen as quickly and accurately as possible. If they run out of time or lose all three lives, the game is over and they can choose to try again or return to the home screen. While playing the game, the player has the option to adjust the background music and/or click sound by pressing the settings button in the bottom right corner. This will pause the timer, which will resume when the settings popup is closed.

Game Scoring Systems and Targets

The scoring system for each minigame is based on the task it presents and its gameplay mode.

- In the two puzzle games “What is the letter?” and “The Little Big Things” each correct answer earns one point;
- In the puzzle game “Have I heard well?” level 1 awards 10 points per correct answer due to the player having a 50% chance of guessing correctly; while levels 2 and 3 award 20 points per correct answer because the player must deal with a greater variety of sounds and the number of possible answers increases from two to three and are randomly generated (but with the condition that one of them is correct). Incorrect answers do not result in points being deducted in this game due to the limited number of mistakes allowed per level;
- In the FPS game “See you, space explorer” 10 points are awarded per correct answer, but negative points (-5 per the wrong answer) are also introduced, unlike in "Have I heard well?". This decision stems from the unlimited number of projectiles a player can shoot until the end of the game.

Scores are cumulative within the same minigame, such as between the levels of “Have I heard well?” and “See you, space explorer”, but they are not cumulative between different minigames.
The overall design of the scoring system for each minigame is characterized by the high frequency of rewards in terms of points for each correct answer as individuals with ADHD tend to prefer frequent and small rewards over large but delayed ones. [2]

GitHub Repository

The game’s code can be accessed in the following GitHub repository:
https://github.com/pietromarcogallo/UnityProject2022.git

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