LAPLAND UNIVERSITY OF APPLIED SCIENCES

Implemention Project

Software Required Specialities

1301794 – Mert Ertugrul Musul

TABLE OF CONTENTS

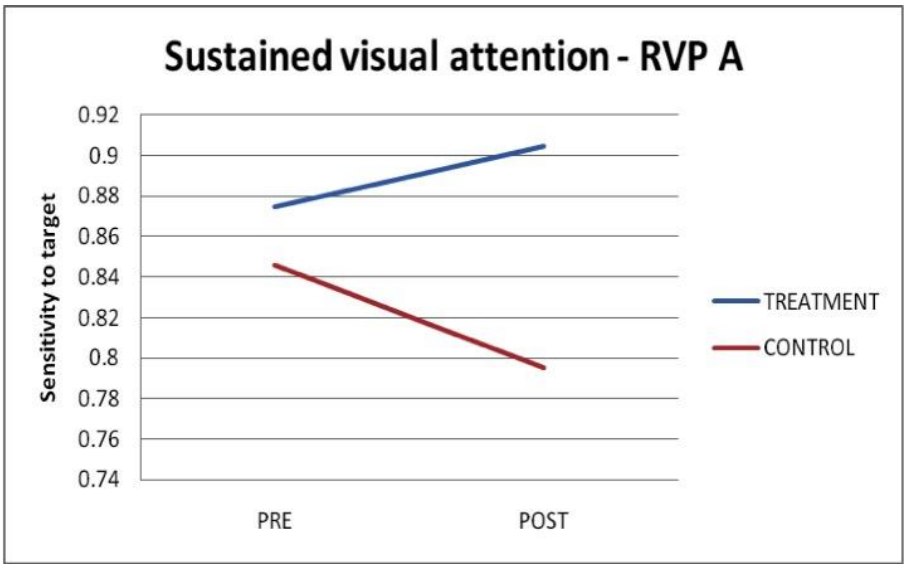
THE PROJECT: CRAZYMIND

Crazymind game project's main idea is being simple and elegance. Idea is challenging the brain mixing the pointing direction and moving direction under a limited time based on score system. Player supposed to be focused on the game to get high score.

Moreover, Crazymind game project doesn't offer only to have a nice time and also improving players' skills on focusing and fast deciding.

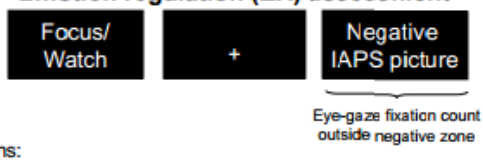
This kind of brain training games are helpful for every age of people. According to researchers,

Dr. Maurice Finn, a clinical psychologist and researcher at the University of New South Wales in Sydney, Australia found that brain training improved visual attention performance on the Cambridge Automated Neuropsychological Test Battery (CANTAB) in patients with Mild Cognitive Impairment (MCI). (Brain Impairment, 2011)



An other study about adaptive and interactive video games may serve as a useful medium to provide executive functions training, as they can be challenging and engaging.(Training Executive Functions, 2010)

Emotion regulation (ER) assessment



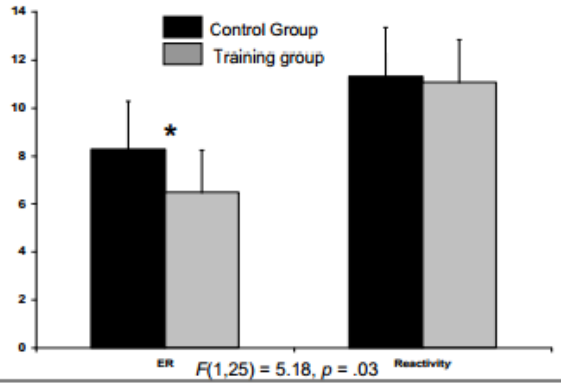
Task instructions:
-Focus (ER): *Reduce* how *negative you feel* by focusing on less negative parts of the picture.
- Watch (Reactivity): *Watch* the picture *naturally*.

Hypotheses 1: Time 2 training effects on ER

1.1. Time 2 ER: Training group will show improved ER as assessed by the number of eye-gaze fixations outside the negative zone of the negative IAPS picture in the Focus (ER) condition.

1.2. Time 2 Reactivity: No differences in number of eye-gaze fixations outside the negative zone of the negative IAPS picture in the Watch (Reactivity) condition.

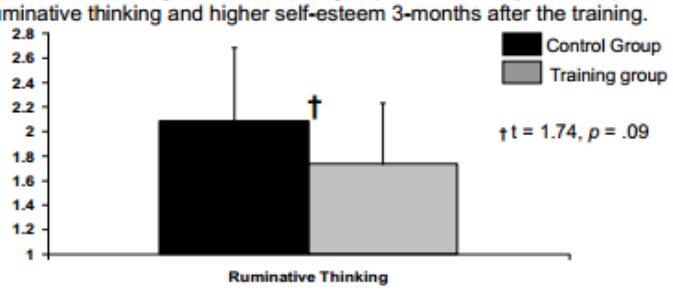
Eye-gaze fixation count inside negative zone

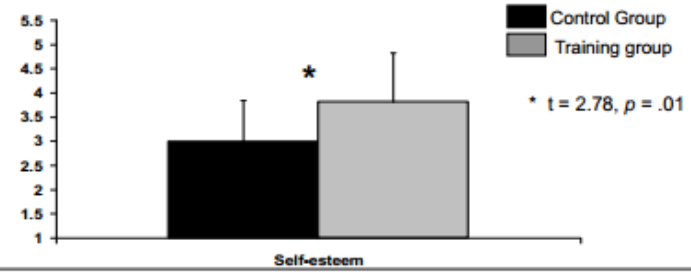


$F(1,25) = 5.18$, $p = .03$

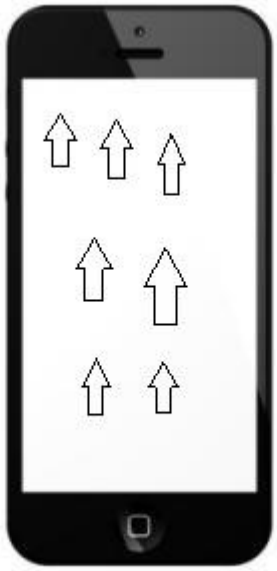
Hypotheses 2: Time 3 training effects on affective functioning

2.1. Time 3 affective functioning: Training group will experience better affective functioning than the control group as indexed by lower depressive ruminative thinking and higher self-esteem 3-months after the training.





This is an example of gameplay on a mobile device



Up arrows moving right

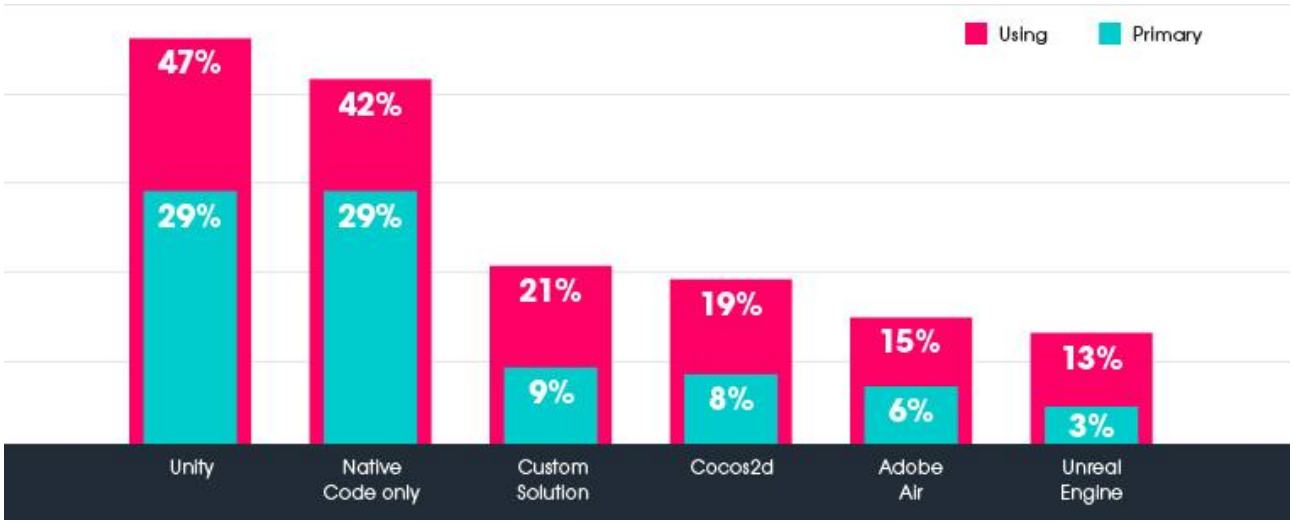
Player must swipe through the direction arrow points.

Player can play anytime he wishes and make daily brain training.

USED SOFTWARES

UNITY3D GAME ENGINE

Unity 3D is a complete game engine which is developed by Unity Technologies. Not only for making video games, also it is possible to develop different kinds of visual arts for instance interactive web pages. Unity 3D has become one of the most popular game engine so far. Unity 3D has 3.3 million registered members now 12/2015 and 47% of market share. Unity has famous customers using all over the world such as Coca-Cola, NASA, LEGO, Disney, Microsoft and Warner Bros. (Unity 3D 2015a.)

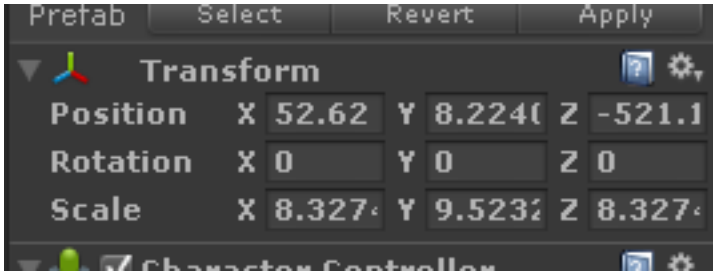


Picture 3: Unity Market Research (Unity3D, 2015b)

Game engine's new version has published in November 2015. It's faster and comes with a new system for developing user interfaces*. More, this system is open-source* for developers.

Unity 3D game engine include NVIDIA PhysX -3D- physics motors. Physics motor is able to draw possible 2D and 3D models. Physical models may have Rigidbody- , Joint-, Ragdoll-, Soft Bodies- and Cloth models. Rigidbody is used to add real physical properties to the chosen object such as mass, force etc. Soft Bodies- component helps to move soft objects in the environment in a realistic way. Joint- component help to add an object to another object to move together for example chain models and possible to add crash power when objects separate each other. Cloth-component is used for clothes on the game character which is physic rules applied on.

In Unity 3D, each game object has Transform component which includes Rotation, Scaling and Position in the game world.



Picture 4: Unity3D Transform View

In Unity 3D, it is possible to add different kind of collider components which detects the collision between objects. Collider types are shown in the table 1. Among the all colliders, the most effective is Mesh Collider, because it covers the all over surface of object. Of course good quality brings the high cost, which means Mesh Collider has more calculation than other collider types. Wheel Collider is planned for wheel models in driving situations.

Colliders
Box Collider
Capsule
Collider
Sphere Collider
Mesh Collider
Wheel Collider

Table 1: Unity3D Collider Types (Unity3D, 2015c)

Also it is possible to add Physic Material- component which helps to adjust properties such as bouncing, air friction, surface friction. Another useful property is Constant Force-component; it is commonly used for bullet a script which adds velocity after shot.

Whenever a game object wanted to be shown in the game world, then user must add Mesh Filter-component. Mesh Filter is the component which saves game objects' information. Also Mesh Renderer comes with Mesh Filter which draws the chosen material to object.

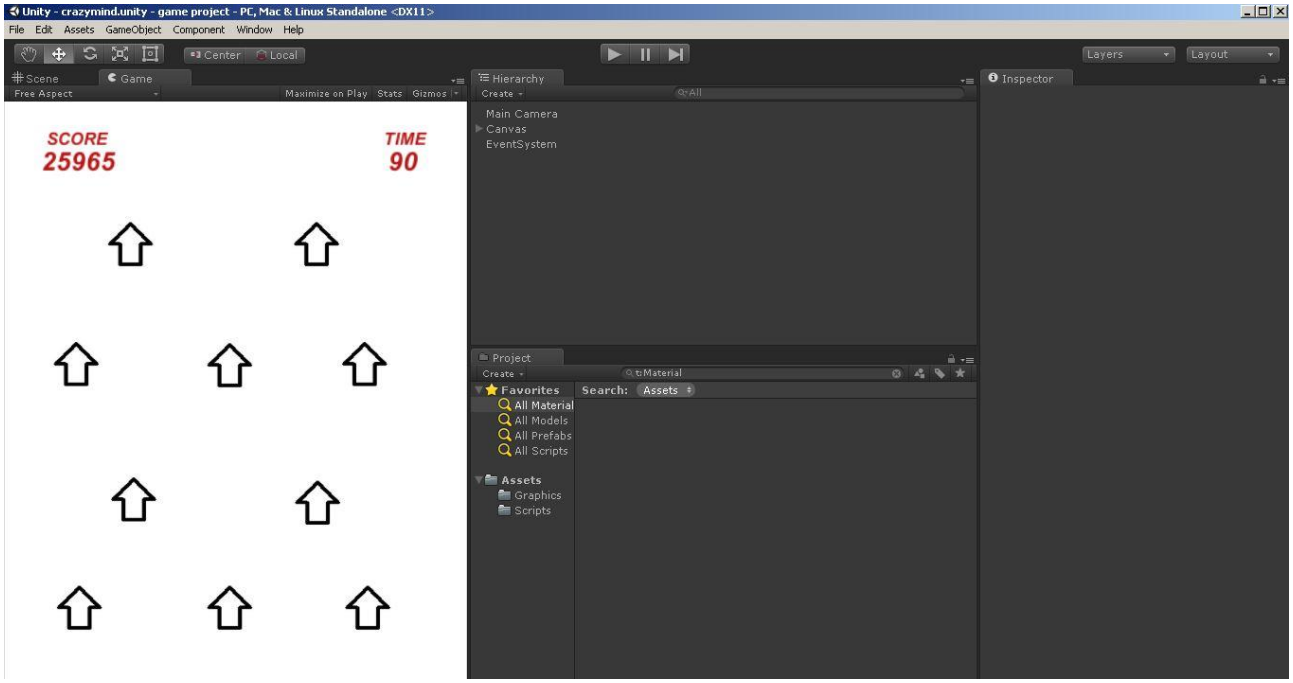
Scene system is like a field in the game world. All objects information saved into game scene. By using scenes, it is easy to separate game in levels such as Main Menu scene, Scoreboard scene etc.

Picture 6: Unity Tool Menu

Unity 3D is not only developing PC games but also possible to develop for web browser and game consoles. In computer environment, the developed products are suitable for Windows, Linux and Mac operating systems. In mobile devices, built games are suitable for iOS, Android, Windows Phone 8 and Blackberry operating systems. Developing video games for consoles such as PlayStation 3, Xbox 360 and Wii U, is only possible for companies which are the official developers accepted by Unity.

EDITOR

Unity 3D's editor view can be separated to 5 different parts: Hierarchy, Project Browser, Inspector, Scene and Game. Hierarchy lists all game objects in the scene. Project Browser shows all files in the project folder. Inspector shows all properties related with chosen object. It is another easy way to assign objects, sounds and textures directly into a script via Inspector without writing codes. Virtual environment is seen in the Scene screen and in the Game screen; it is the active camera view in other meaning game play screen.

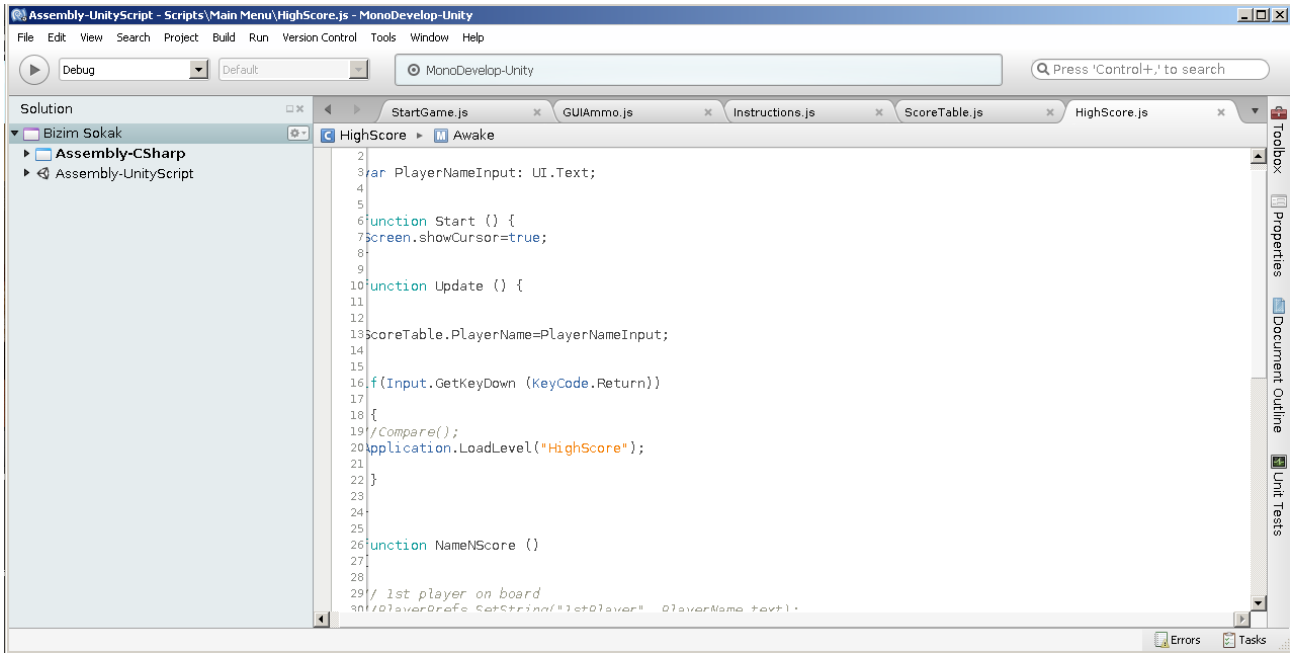


Picture 7: Unity Editor View

Game engine let the user change the position of the objects in the editor. Editor is planned to work Drag-Drop style, which makes it easier to add an object to a script or an object transferring to Scene screen.

SOFTWARE ENVIRONMENT

Unity 3D supports C#, Javascript- ja Boo programming language. Game engine works open source .NET based Mono Editor. Unity3D install package includes MonoDevelop-editor, and also possible to use other editors.

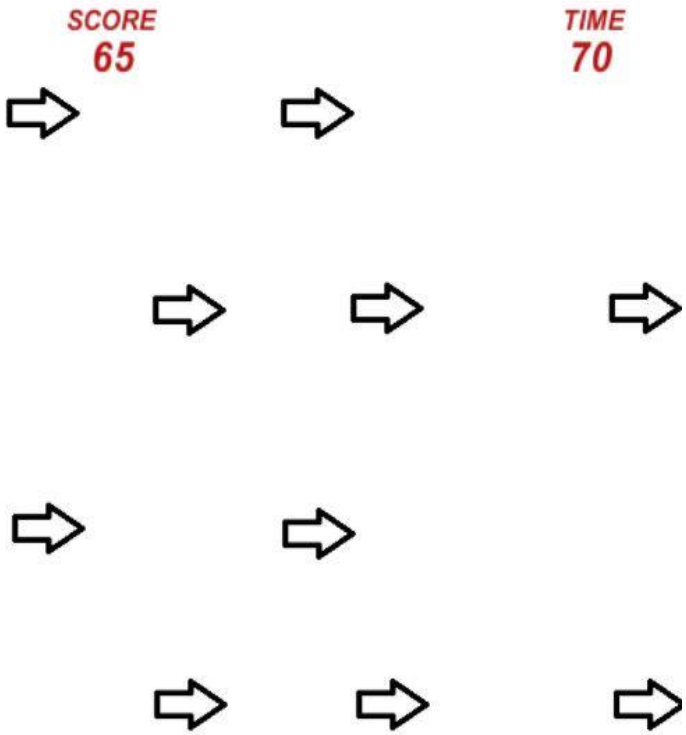


Picture 8: MonoDevelop Editor View

Mono Develop automatically adds Start function and Update function. Start function runs once when script is active. Update function runs on each frame.

DEVELOPING PROJECT

GAME SYSTEM



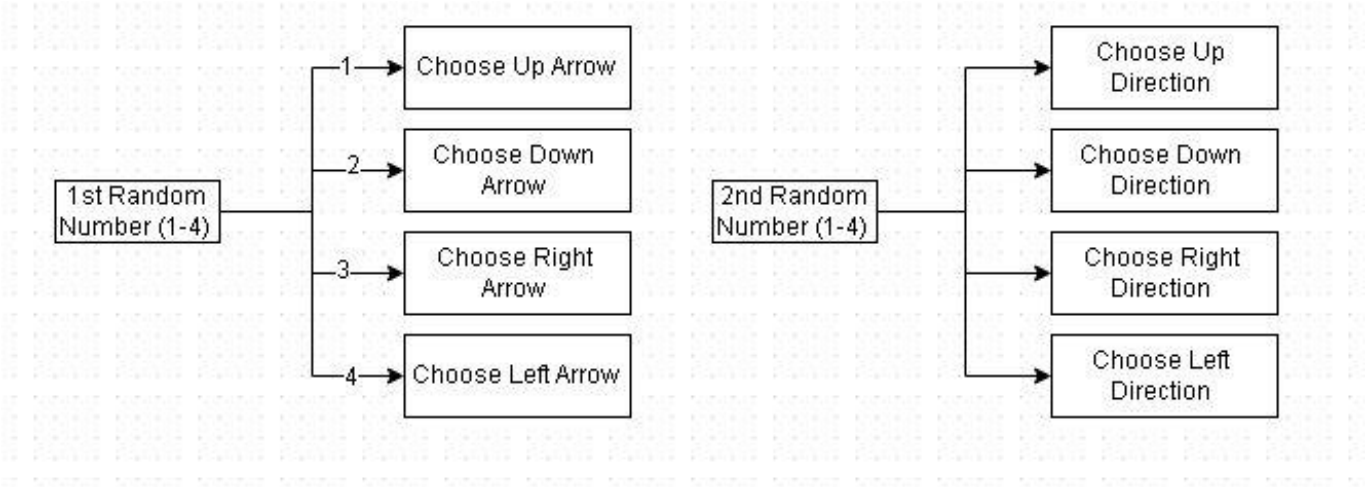
Picture 9: Game play screenshot

Arrows are moving to left but point right direction. So the player should press right arrow to get points.

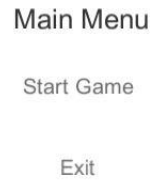
```
function Update () {

dice1=GameSystem.random_dice1;           // getting values from GameSystem.js
dice2=GameSystem.random_dice2;

if(Again)
{
Points=0;               // Scores gets 0 when player wants to play again
Speed=1;
}


if (!GameSystem.IsGameEnd)                  // If game doesnt end,,
{

Choose();
Select();
Move();
Player();
InsideFrame();

Score.Score=Points;
}
}
```

Example Code 1

Game system choose arrows randomly. Randoming two integers, one for directions of moving, and other is for arrows' pointing direction which is explained in the workflow.



MAIN MENU



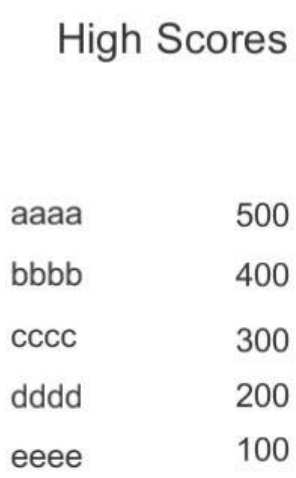
Picture 10: Main Menu

In the project, it is preferred to have very basic menu without any colours, only on white background. It is a very simple game, not to destroy the theme of being “basic”, that is one of the main reason.

```
3 var Click: UI.Button;
4
5 function LevelStart()
6
7 {
8
9
10 Application.LoadLevel("crazymind");
11
12
13 }
14
15 function Quit()
16 {
17 Application.Quit();
18 }
```

Example Code 2

SCOREBOARD



Picture 11: Scoreboard

Scoreboard menu also designed with the same mentality, “the basic theme”.

```
if (Score.Score > PlayerPrefs.GetInt("1stScore"))
{
IsChanged=true;
PlayerPrefs.SetInt("5thScore", PlayerPrefs.GetInt("4thScore"));
PlayerPrefs.SetString("5thPlayer", PlayerPrefs.GetString("4thPlayer"));

PlayerPrefs.SetInt("4thScore", PlayerPrefs.GetInt("3thScore"));
PlayerPrefs.SetString("4thPlayer", PlayerPrefs.GetString("3thPlayer"));

PlayerPrefs.SetInt("3rdScore", PlayerPrefs.GetInt("2ndScore"));
PlayerPrefs.SetString("3rdPlayer", PlayerPrefs.GetString("2ndPlayer"));

PlayerPrefs.SetInt("2ndScore", PlayerPrefs.GetInt("1stScore"));
PlayerPrefs.SetString("2ndPlayer", PlayerPrefs.GetString("1stPlayer"));

PlayerPrefs.SetInt("1stScore", Score.Score);
PlayerPrefs.SetString("1stPlayer", PlayerName.text);

Player1st.text=PlayerName.text;


}
```

Example Code 3

SOURCES

Brain Impairment,
http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=8495377

Executive Functions Training,

http://www.lumosity.com/pdf/Gyurak-et-al-2010-DEFD-training-emotions.pdf