
Developing a 3D Collect-to-Score Game in Unity 3D to Implement Research in Cognitive Science through Foraging

ASPIRES

Accelerated STEM Pathways through Internships,
Research, Engagement, and Support



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Outline

- Project Goal
- Background
- Materials
- Procedure and Game Description
- Results
- Challenges and Conclusion
- Future Works
- Acknowledgements
- References

Project Goal

- Objective

- To create a 3D video game that can give the researcher maximum experimental controls over foraging conditions

- Significance

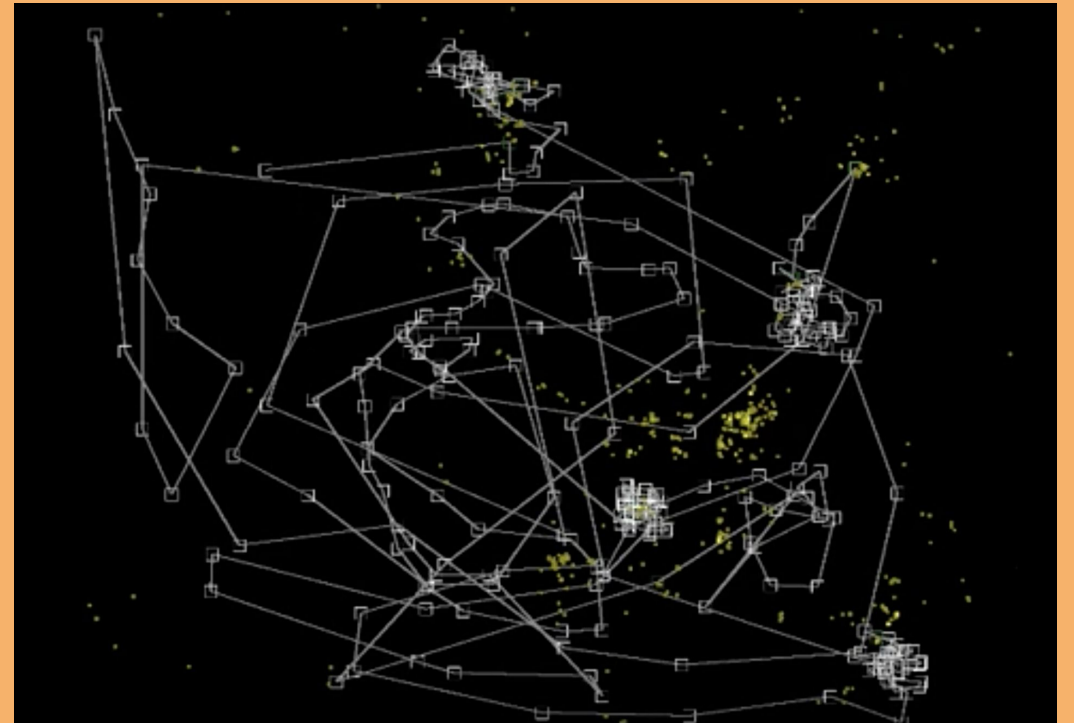
- To conduct research and manipulate variables with ease
- 'Virtual' Reality
 - realistic and natural feel

Background

- Foraging
 - Common function of Cognition
 - Type of search process
 - Agents moving through a finite space and unknown locations
 - Means to reduce movement, conserve energy, save time, and minimize risk
- Cognitive Science
 - Spatial memory - recording information around the subject

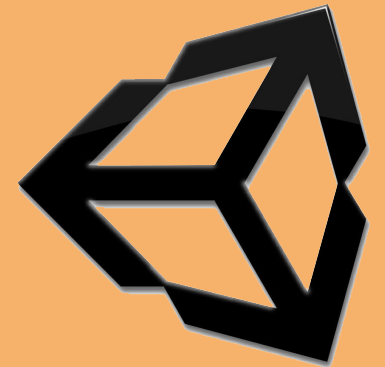
Background (cont.)

- Video Gaming
 - Used on entertainment and research
 - VR - therapy
 - Engaging and easy
- Prior Foraging research
 - Existing 2D game
 - Objective is hidden
 - Data extracted creates trajectory path of user
 - Albatrosses Lévy Flight



Materials

- **Hardware and Software used**
 - Apple Macbook Pro 15”
 - 3.1 GHz Intel Core i7 Processor
 - 16GB 2133MHz LPDDR3 Memory
 - Graphics:
 - Radeon Pro 560 4096MB
 - Intel HD Graphics 630 1536MB
 - Unity 3D Game Engine - Free to Students
 - Cross-platform
 - 2D or 3D
 - ASSET Store / API Scripts
 - MonoDevelop - C# / Java



Procedure and the Game

- C# Scripting
- 'Prefabs' used
 - 3D models
 - Code snippets
- Used API Scripting



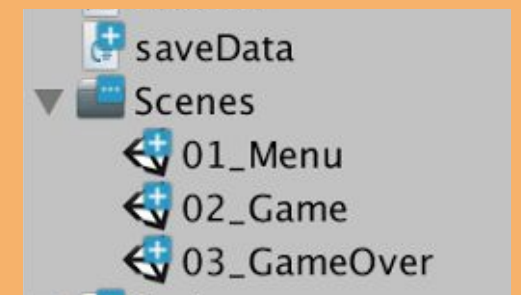
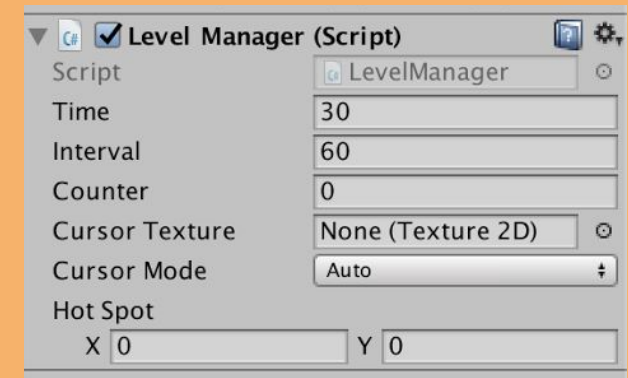
- **Game Description**
 - 3D first person POV
 - Mouse / Keyboard
 - User will 'forage' around open space
 - Scattered Coins
 - Collect
 - Time limit
 - Saved data
 - Score, Time, X & Z loc

Results

- Running and functioning game
- Key game features:
 - Pick Up
 - Time Left
 - Score Data Extraction
- Platform compatibility
 - OS, Windows, Linux
- Varying conditions
- User-friendly software
- Naturally embodied



```
New data created.
X: 0 , Z: 0 and SCORE: 0
X: 0 , Z: 0 and SCORE: 0
X: 0 , Z: 0 and SCORE: 0
X: 0 , Z: 0 and SCORE: 0
X: 0 , Z: 0 and SCORE: 0
X: 0 , Z: 0 and SCORE: 0
X: 0 , Z: 0 and SCORE: 0
X: 0 , Z: 0 and SCORE: 0
X: 0 , Z: 0 and SCORE: 0
X: 0 , Z: 0 and SCORE: 0
X: 2.314923 , Z: 3.142247 and SCORE: 0
X: 0.2880655 , Z: 9.474877 and SCORE: 2
X: -3.466182 , Z: 15.00721 and SCORE: 3
X: 0.6253322 , Z: 20.09797 and SCORE: 3
X: -3.242023 , Z: 25.2895 and SCORE: 3
X: -8.373399 , Z: 30.25332 and SCORE: 3
X: -13.50121 , Z: 35.21475 and SCORE: 3
X: -18.74337 , Z: 40.05268 and SCORE: 3
X: -24.07986 , Z: 44.57796 and SCORE: 3
X: -29.52228 , Z: 49.19193 and SCORE: 3
X: -34.97338 , Z: 53.78819 and SCORE: 3
X: -40.54946 , Z: 58.18506 and SCORE: 3
X: -45.79715 , Z: 62.20937 and SCORE: 3
X: -50.8189 , Z: 66.92801 and SCORE: 4
X: -57.61535 , Z: 67.99981 and SCORE: 4
X: -63.00245 , Z: 72.66759 and SCORE: 5
X: -67.4502 , Z: 72.66751 and SCORE: 6
X: -67.04994 , Z: 65.61111 and SCORE: 6
X: -63.94429 , Z: 59.64872 and SCORE: 7
```



Challenges and Conclusion

- **Challenges**

- Time constraint
- Unity program's database
 - API, 3D models, color, camera, and effects

- **Conclusion**

- Game is playable
 - Experimental and Entertainment values
- Familiarity with software is KEY
- Game has room for improvement

Future Works

- VR and Joystick compatibility
- Experimental improvements:
 - Camera angles
 - Coin spawn: clustered or at random

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- Dr. Amelito Enriquez
- Dr. Christopher Kello

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Questions?