

Game Optimization through Large-Scale Experimentation

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Music



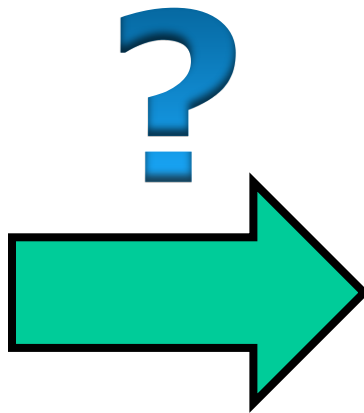
Art



Sound effects



Gameplay

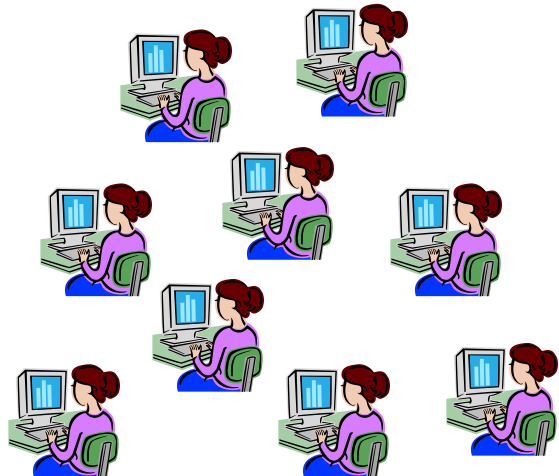
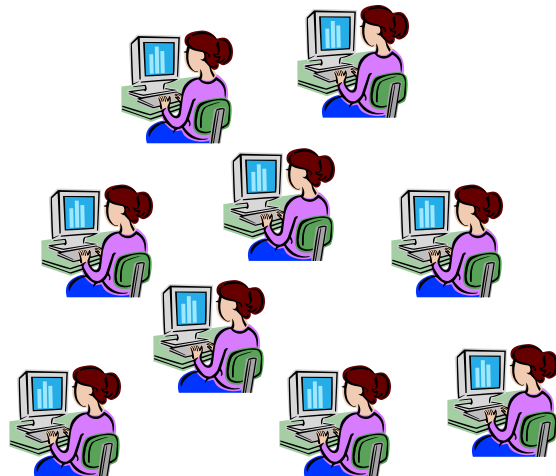


engagement
retention
revenue

A/B Testing



A/B Testing

**A****B**

Metrics

- Levels completed
- Time played
- Return rate

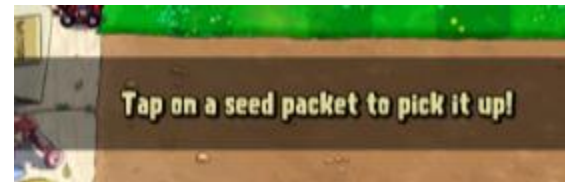
Aesthetics



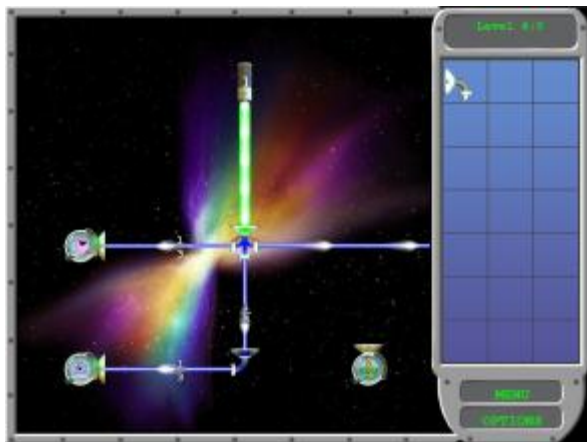
Secondary Objectives



Tutorials



Refraction



Hello Worlds



Foldit



Refraction





Rating: 3.8 / 5

400,000 plays

Hello Worlds!



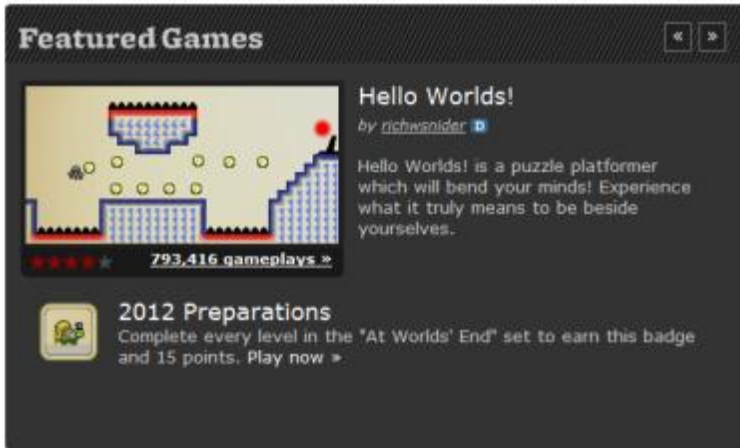


QUICK PICK:

[Protector IV](#)

by undefined

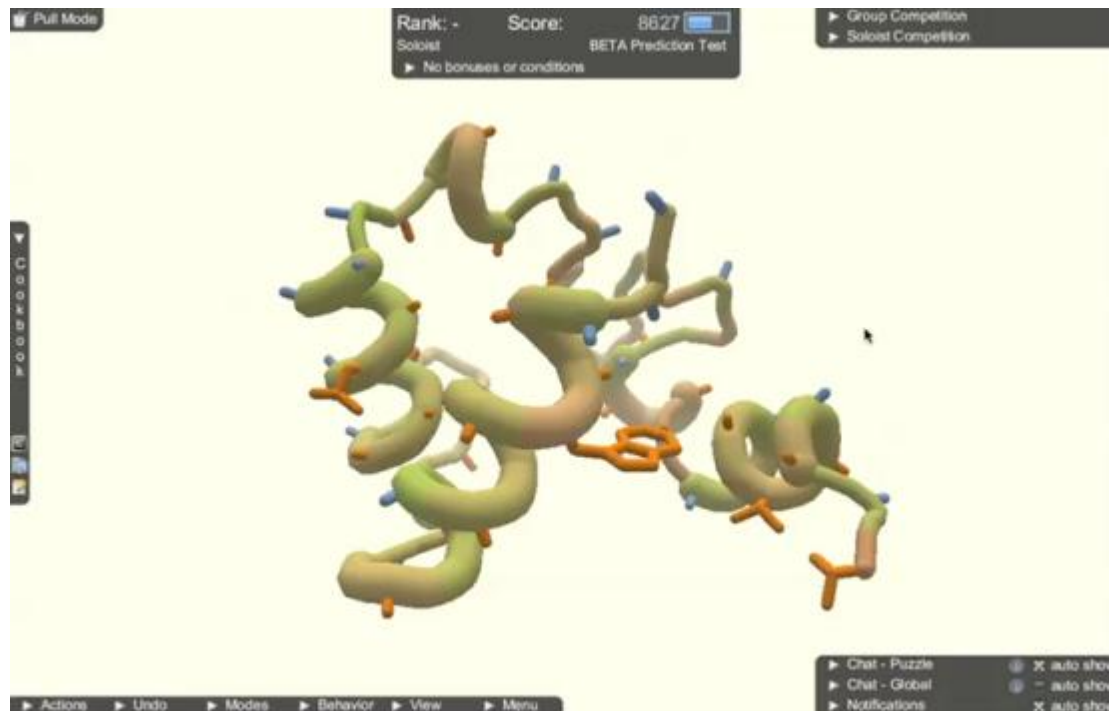
Adventure & RPG
★★★★☆
2,131,218 plays



Rating: 4.2 / 5

1,385,000 plays

Foldit





The screenshot shows the Foldit website interface. At the top, there is a green header with the "foldit" logo and the tagline "Solve Puzzles for Science". Below the header, there is a navigation bar with links: PUZZLES, GROUPS, PLAYERS, RECIPES, CONTESTS, BLOG, FEEDBACK, FORUM, WWW, TAG, ABOUT, and CREDITS. The main content area features a large image of a protein structure with a text box that says "Click to learn how you contribute to science by playing Foldit." Below this, there is a section titled "What's New" with a link to the "Latest Foldit paper named 'Article of the month' by Nature Structural & Molecular Biology". The right sidebar contains a "GET STARTED DOWNLOAD" section with links for Windows, Mac, and Linux. Below that is a "RECOMMEND FOLDIT" section with a "Send" button. At the bottom of the sidebar is a "USER LOGIN" section with fields for Username and Password, a "Log in" button, and links for "Create new account" and "Forgot your password?". There is also a "Connect with Facebook" button.

240,000 players

Player Tracking

- Flash cache / login name
- New players only

Statistical significance

95% confidence level ($p < 0.05$)

Experiment #1: Audio

Music



Sound Effects



Result:

Music and sound effects did not matter

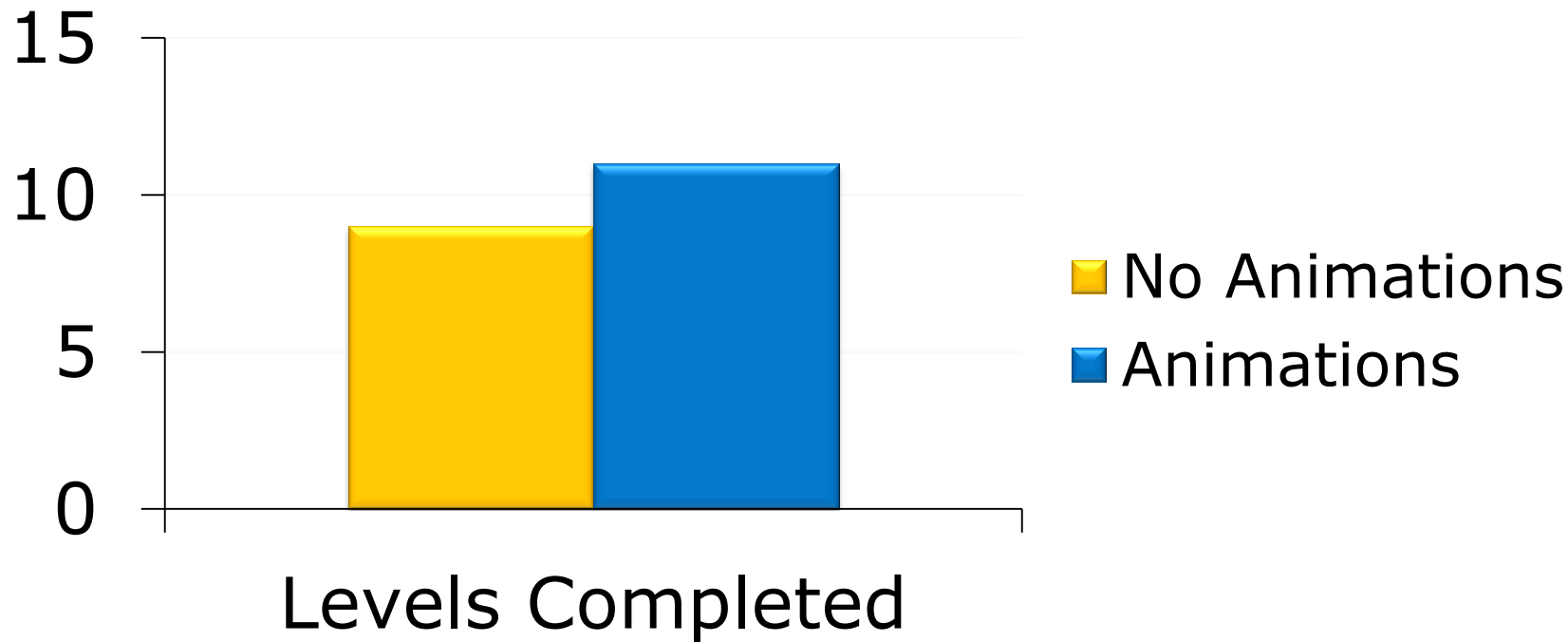
Experiment #2: Animations



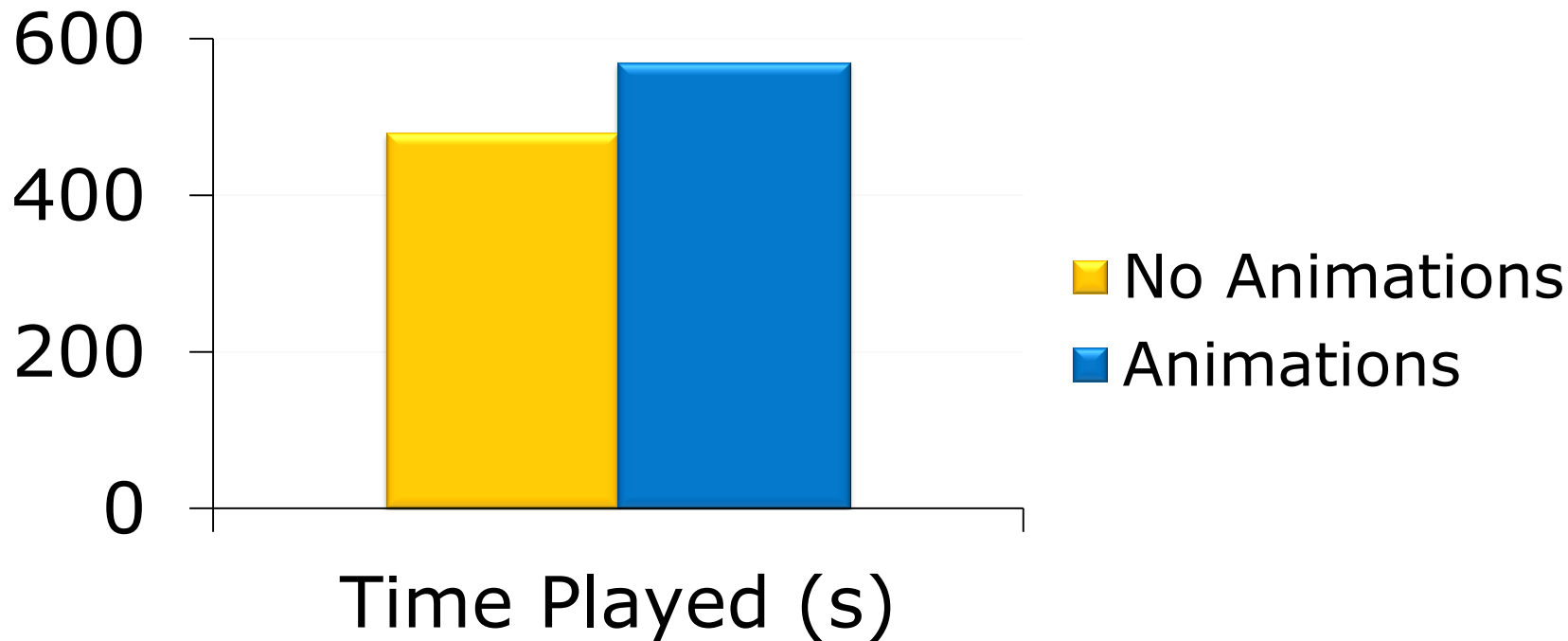
Result:

Animations improved engagement

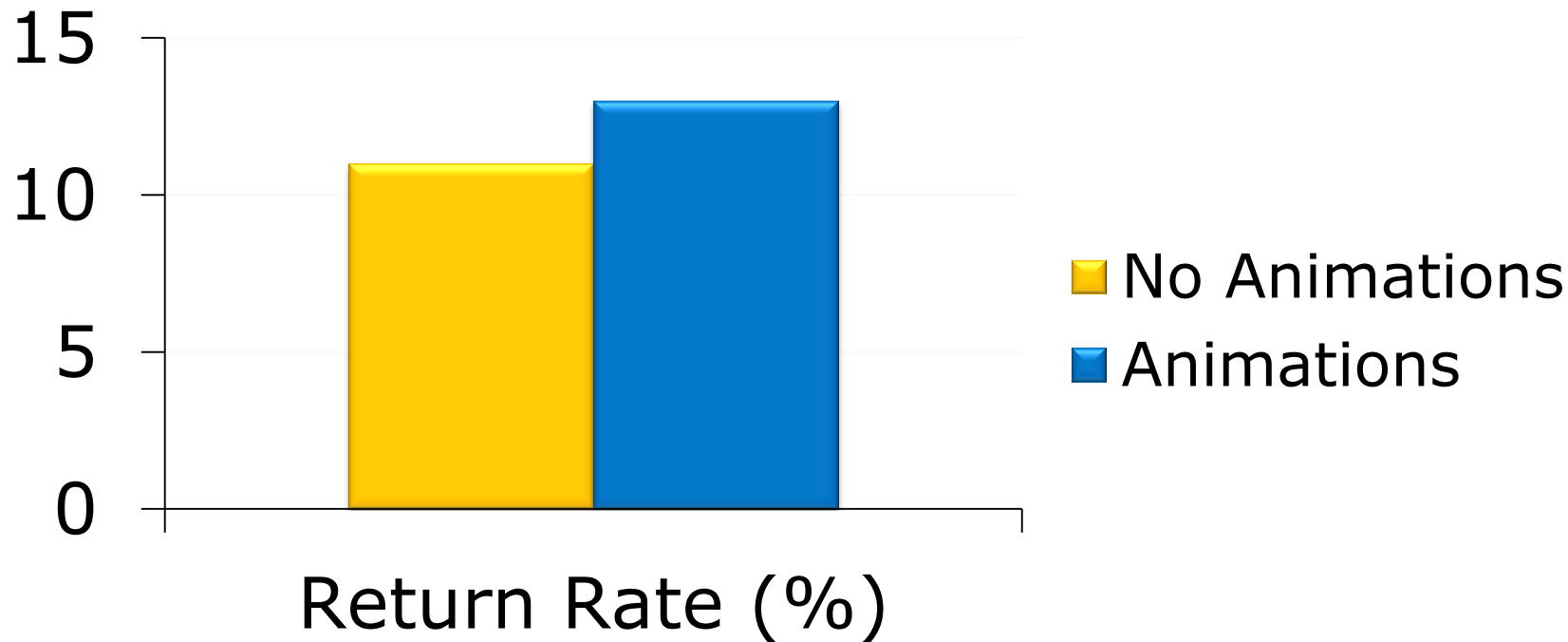
Refraction



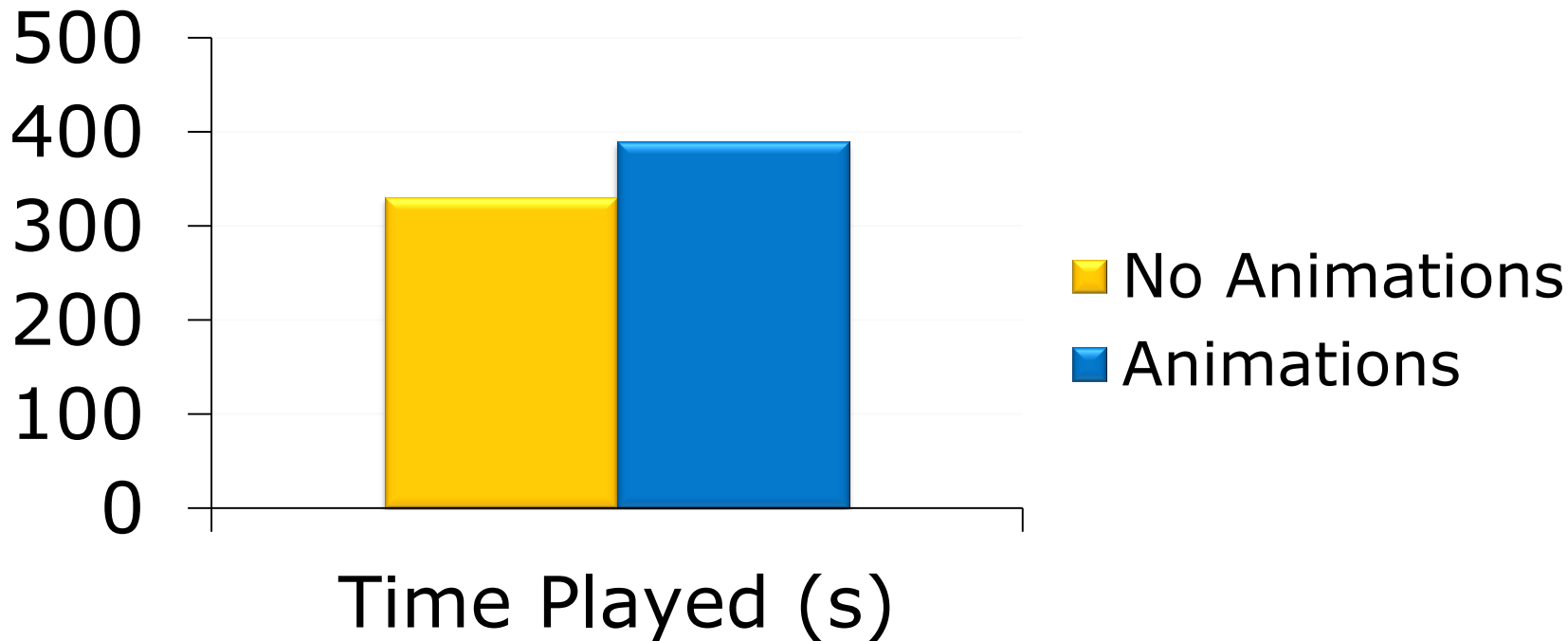
Refraction



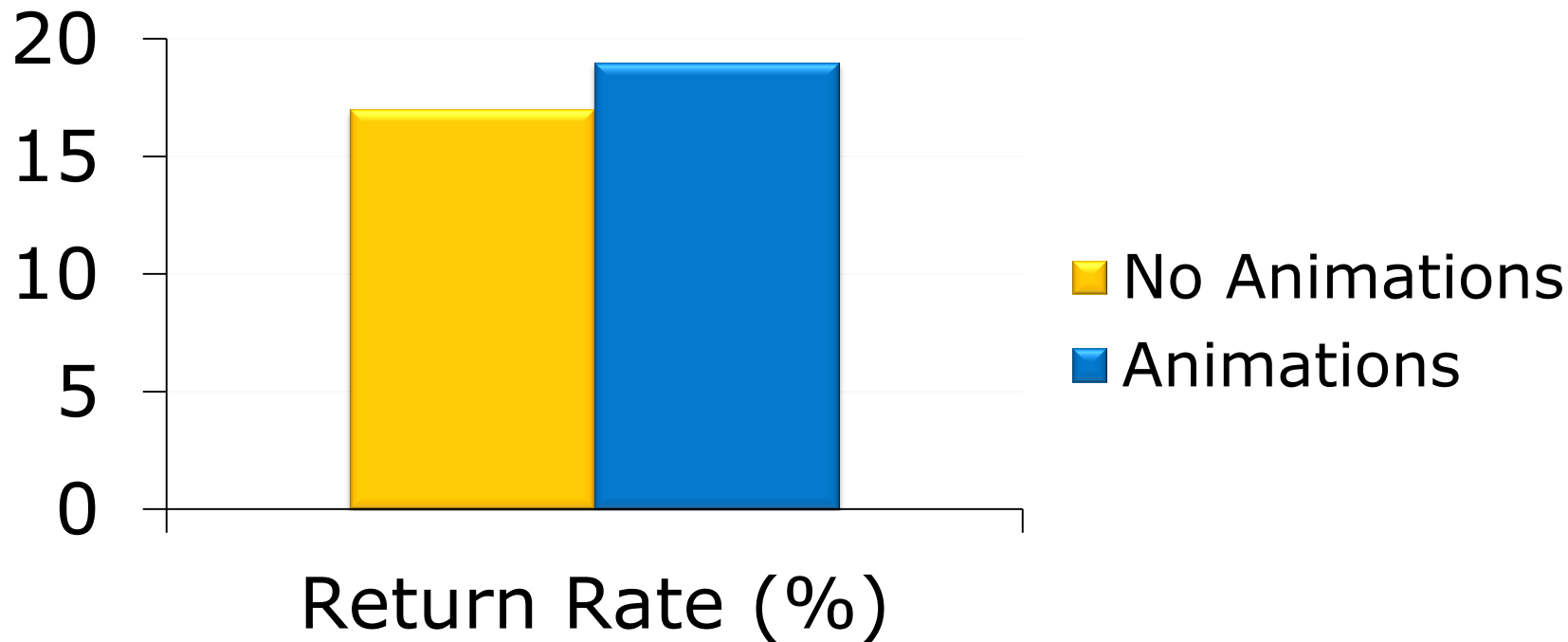
Refraction



Hello Worlds



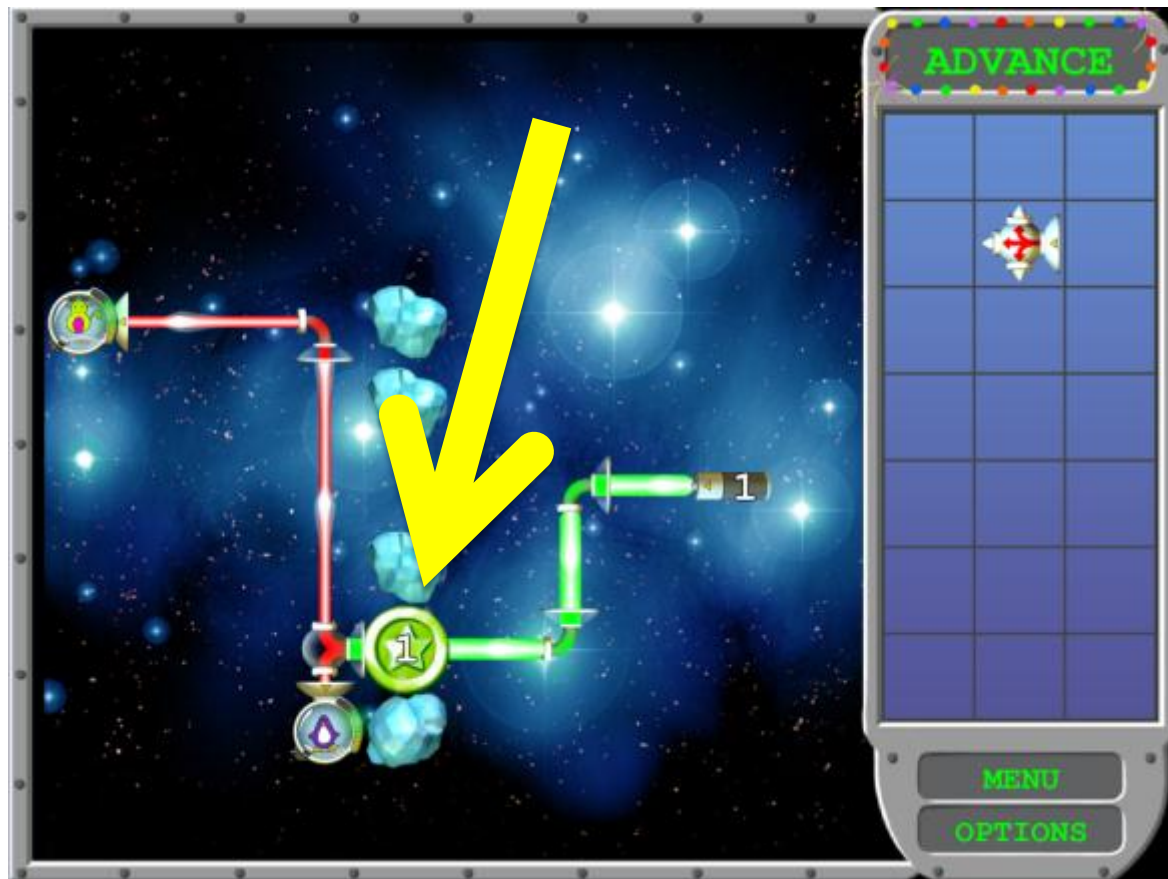
Hello Worlds

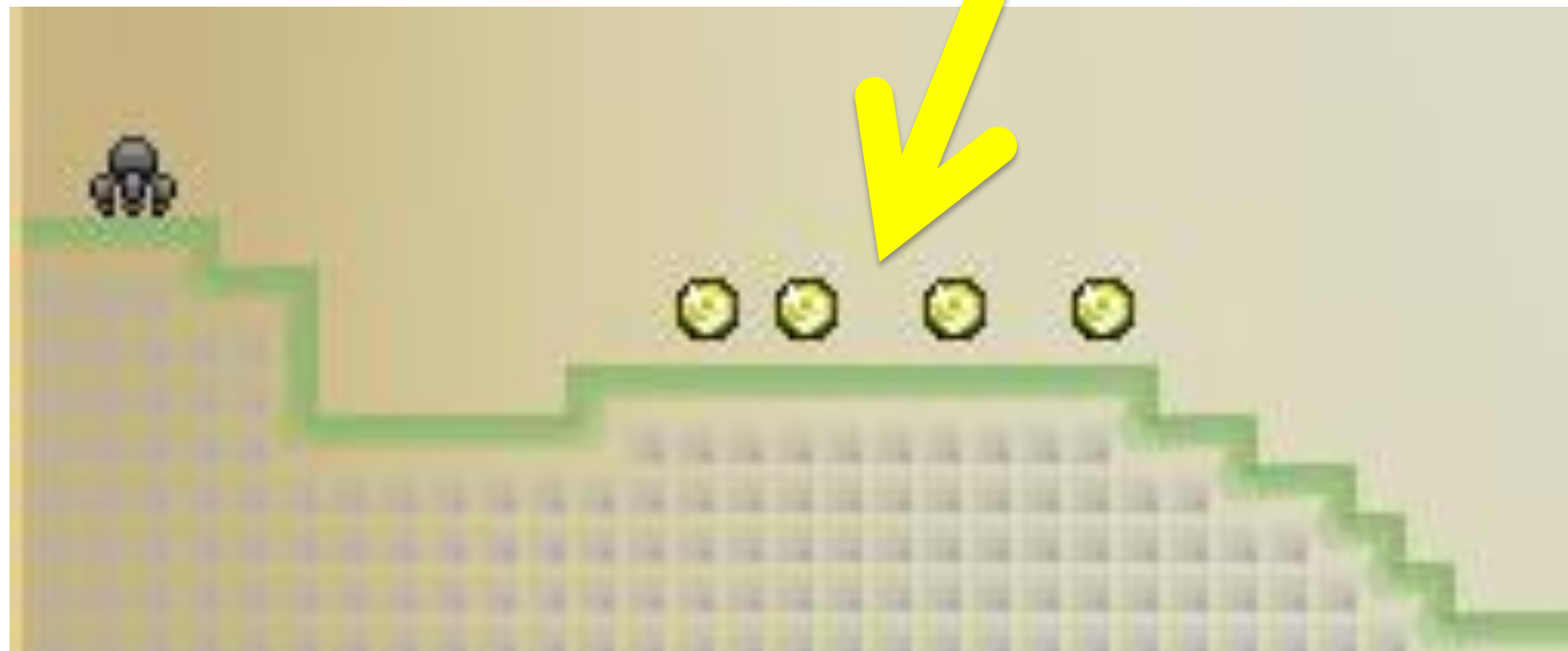


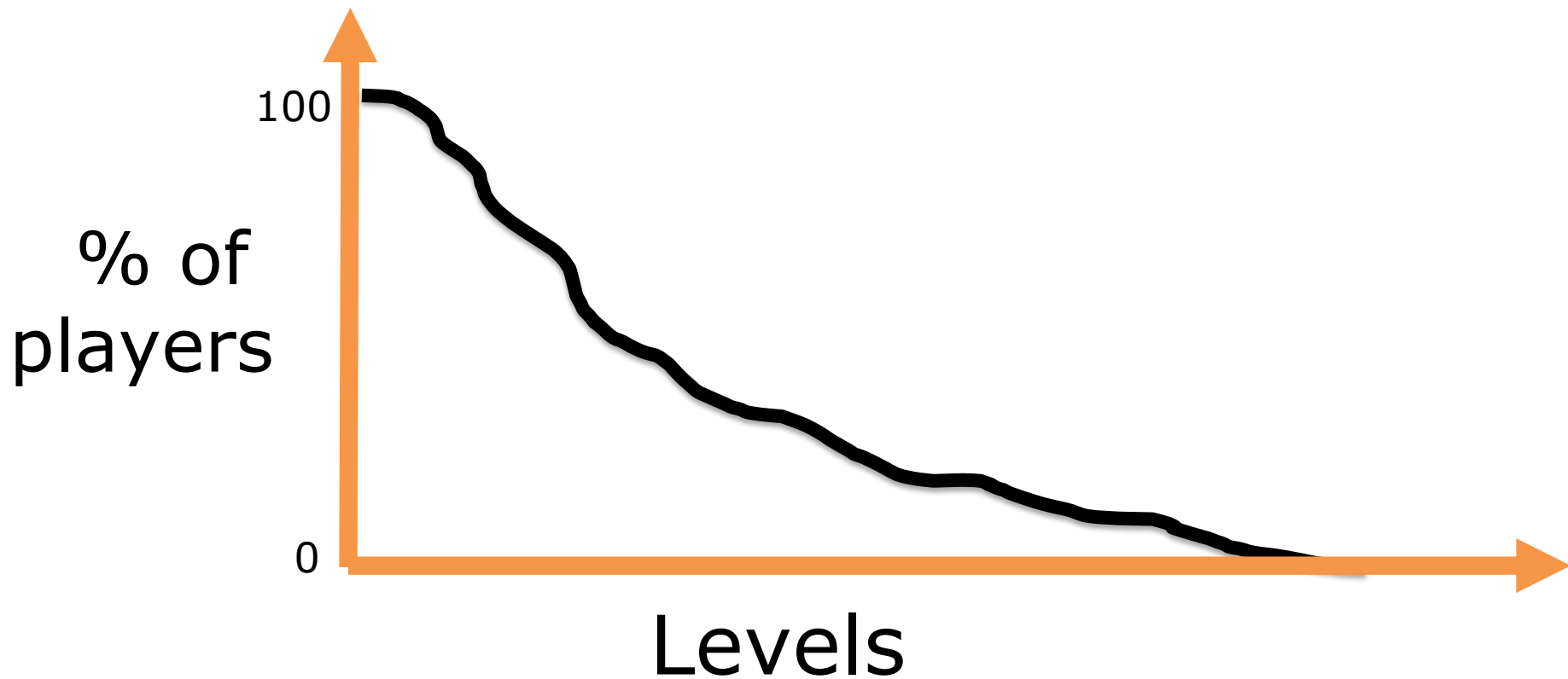
Experiment #3: Secondary Objectives



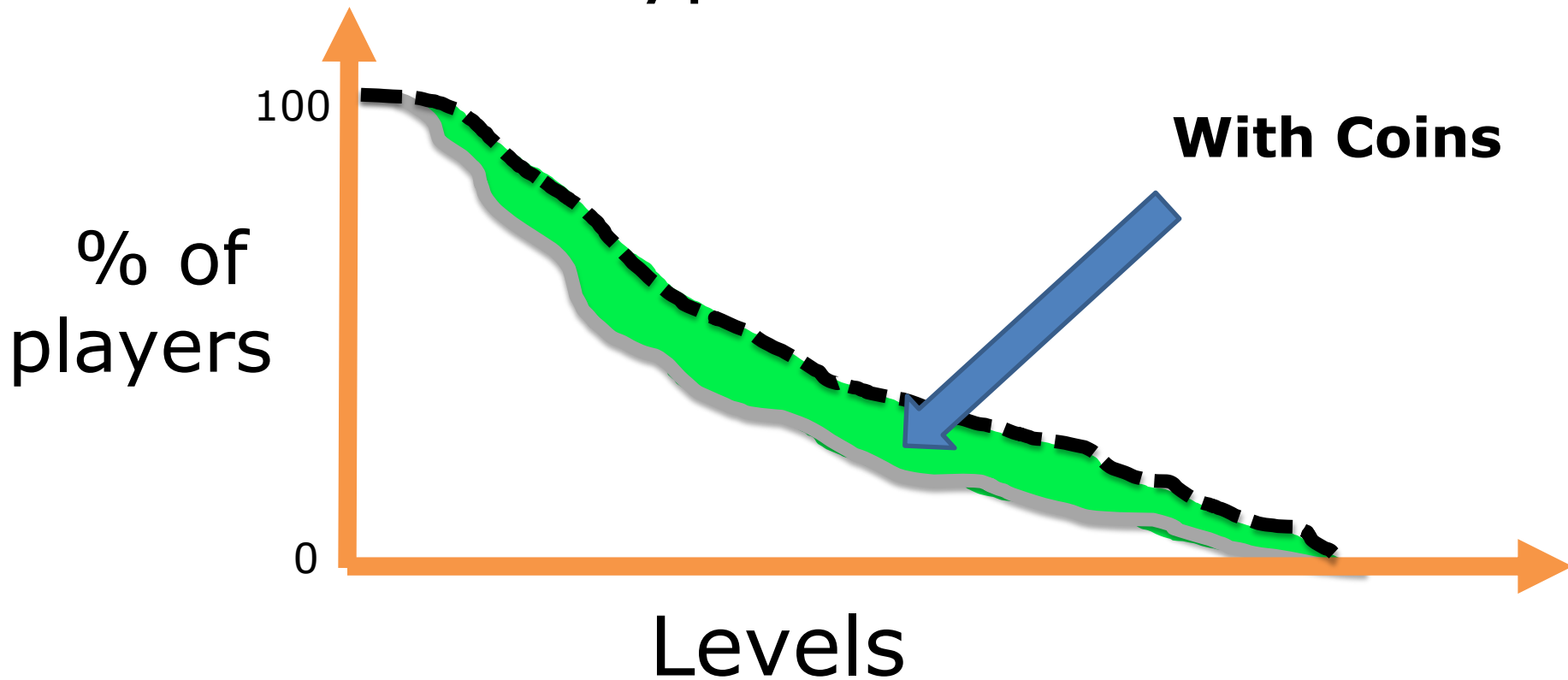
(Super Mario Bros., Nintendo 1985)



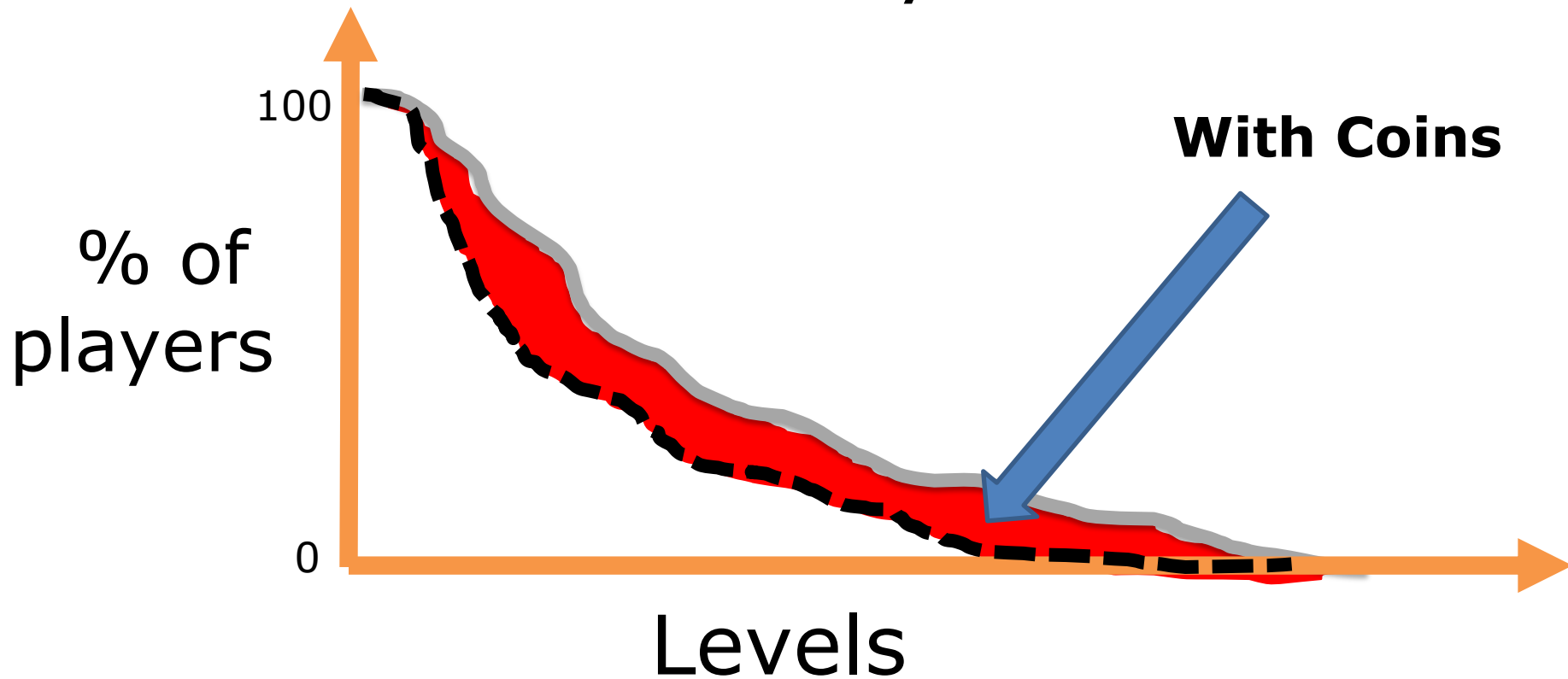


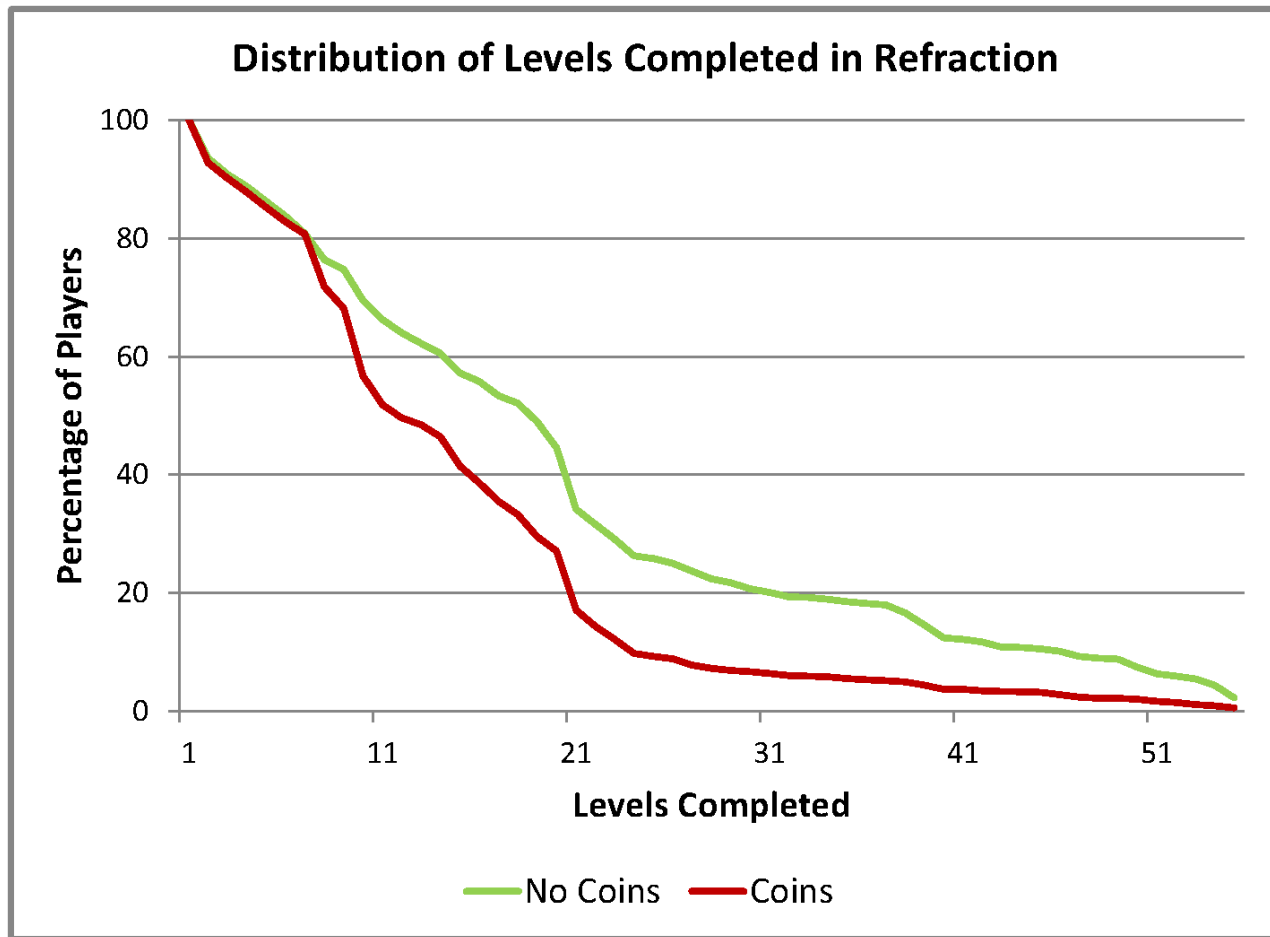


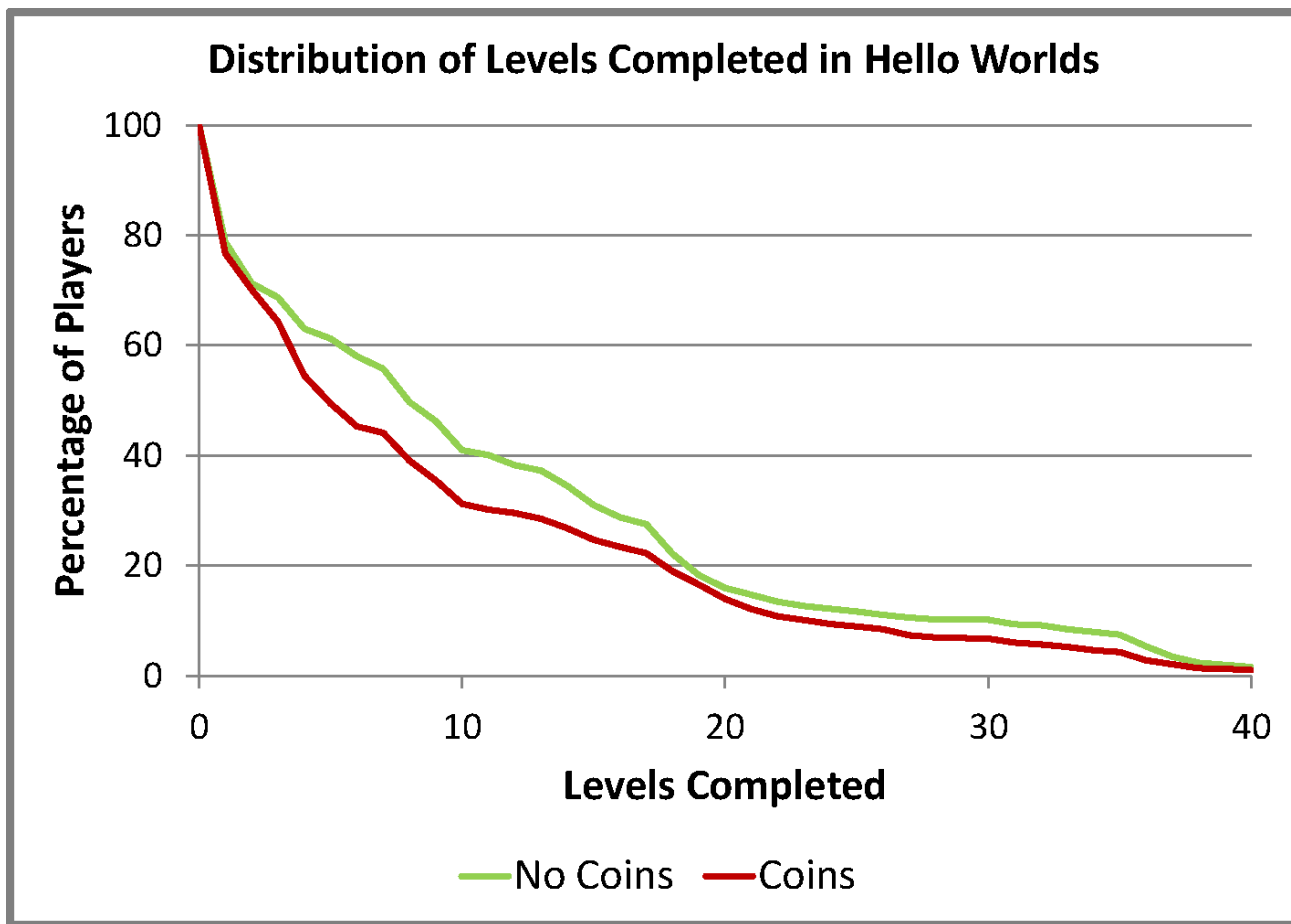
Hypothesis



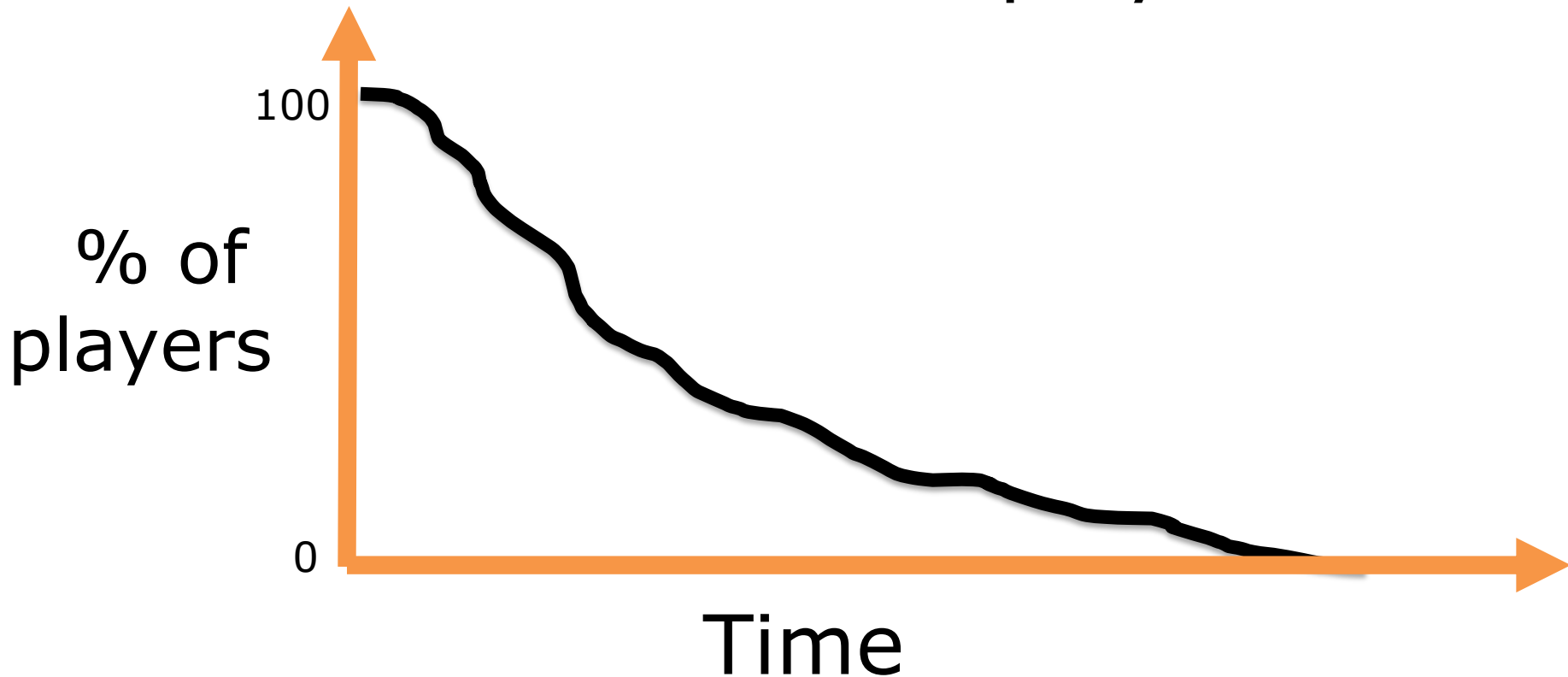
Reality



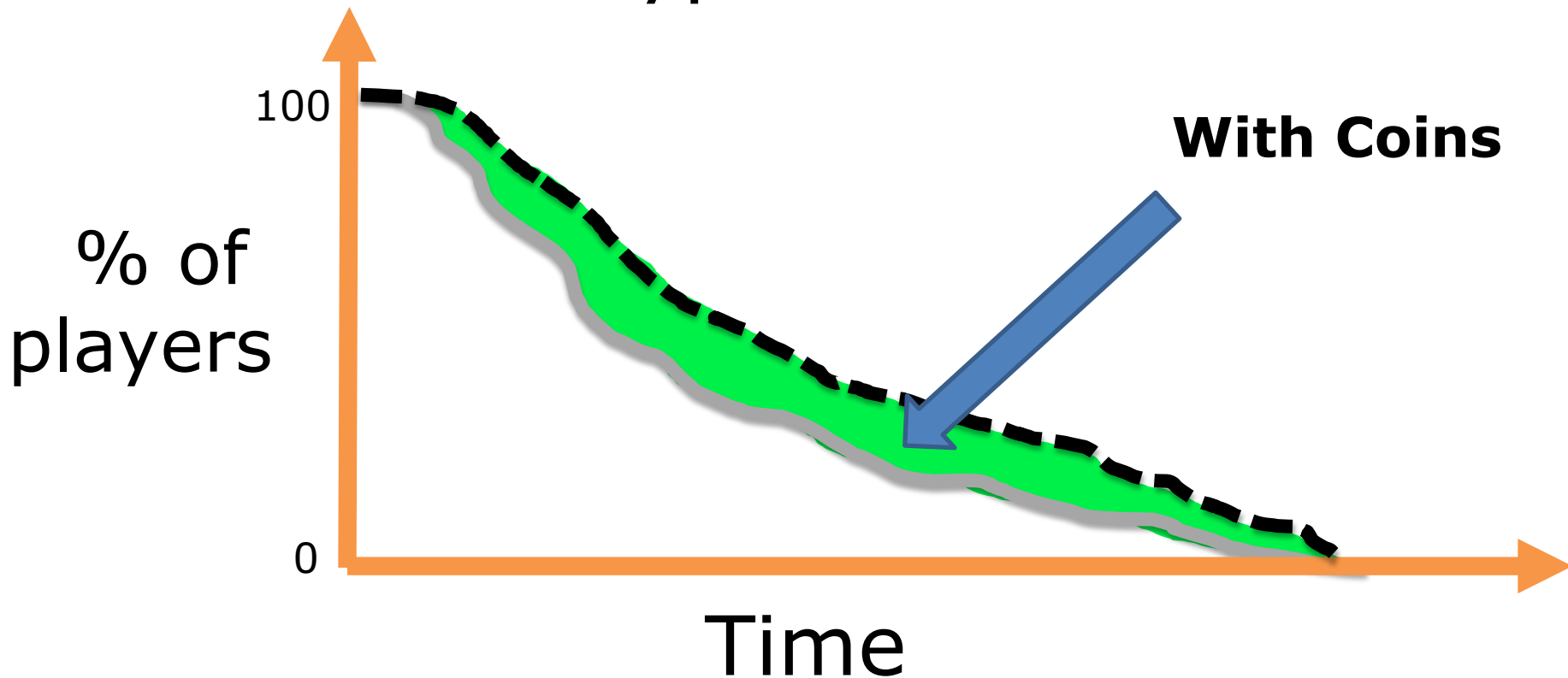




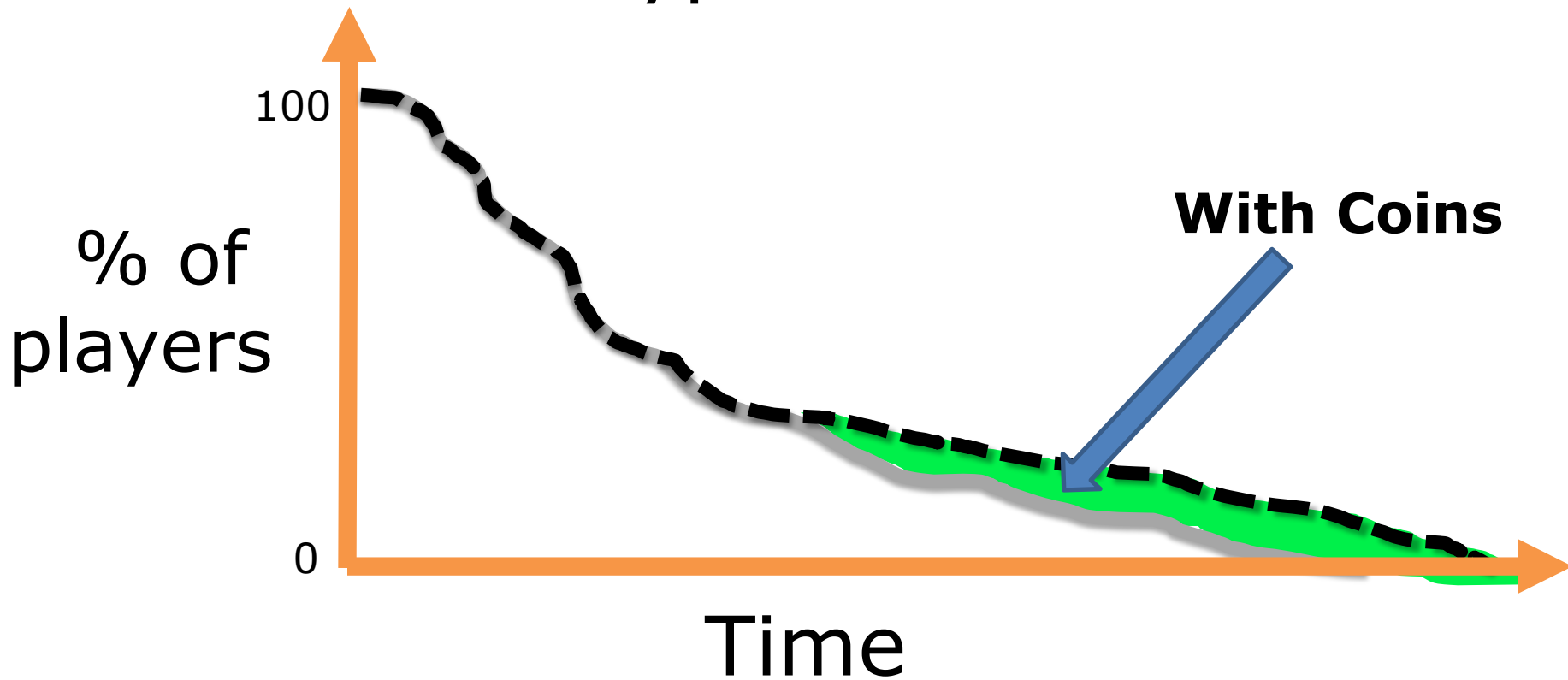
What about time played?



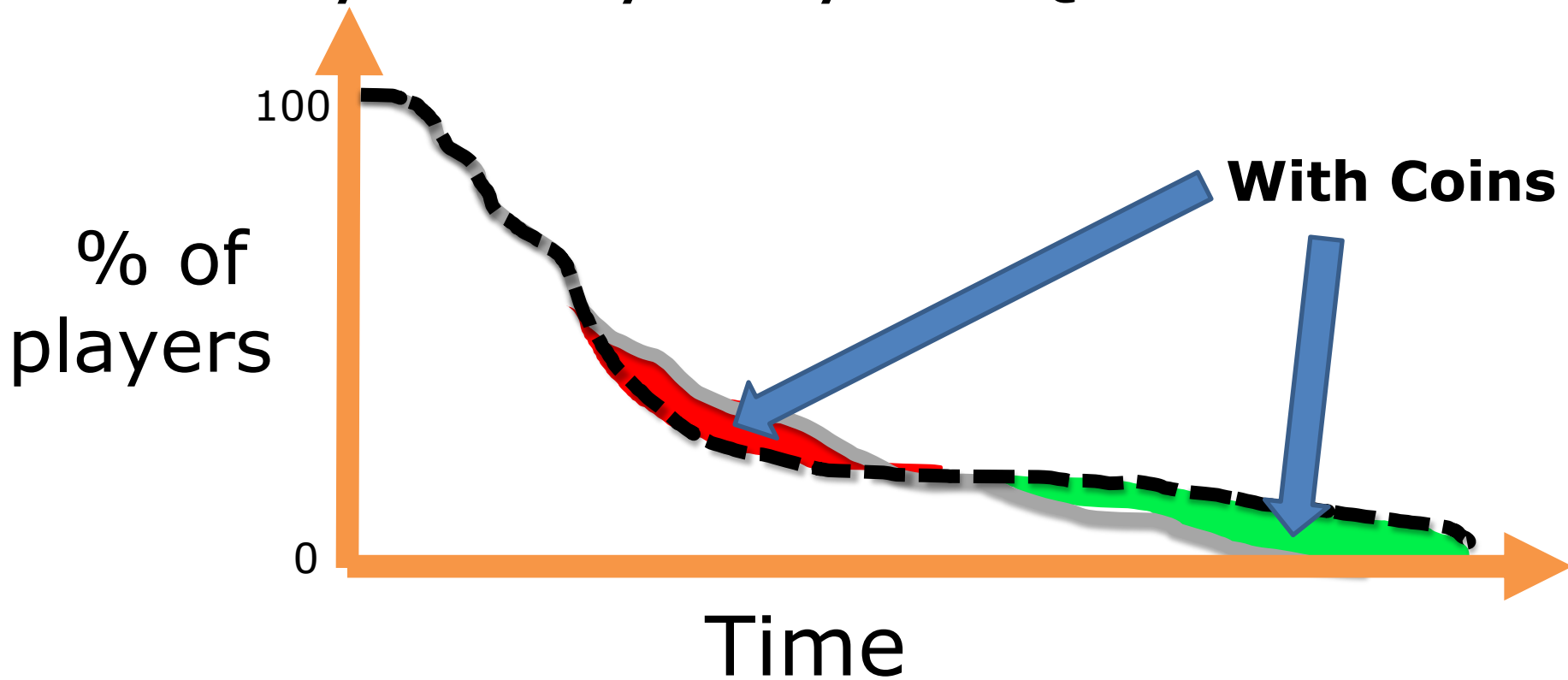
Hypothesis

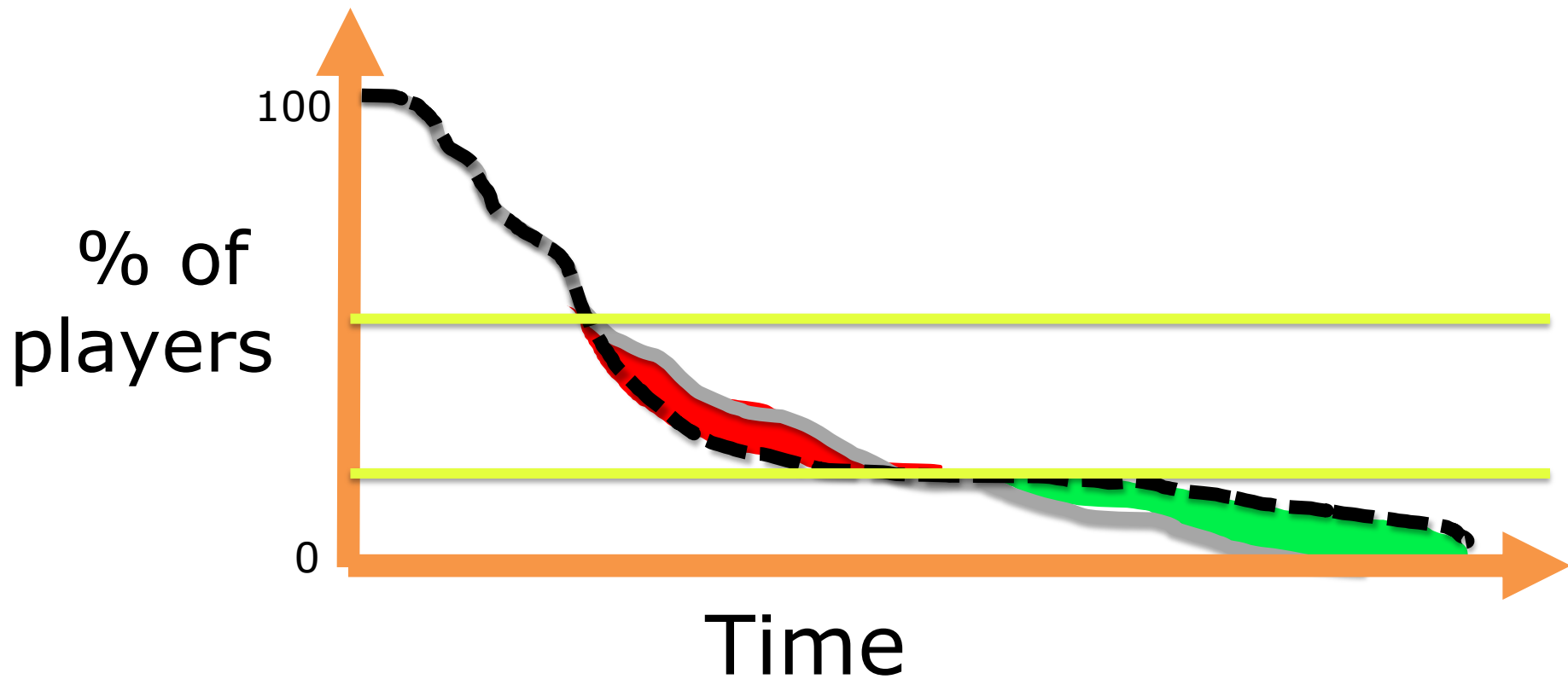


Hypothesis

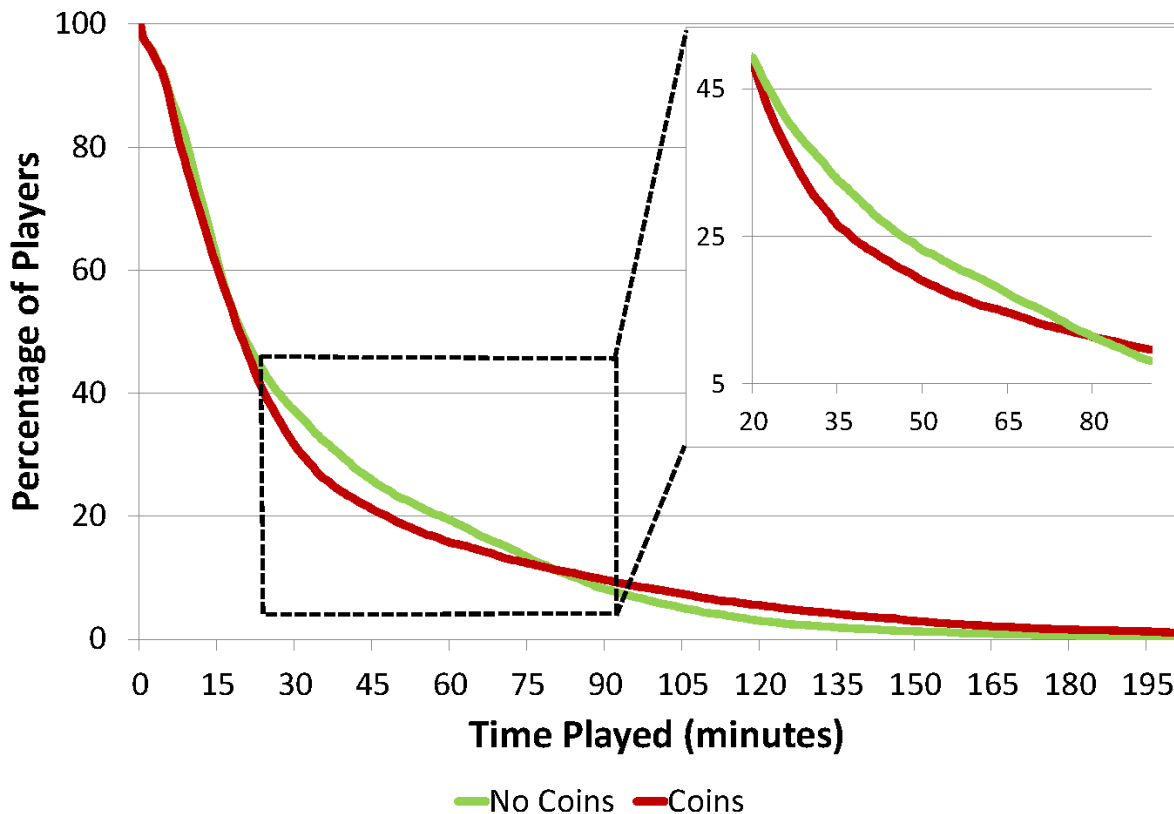


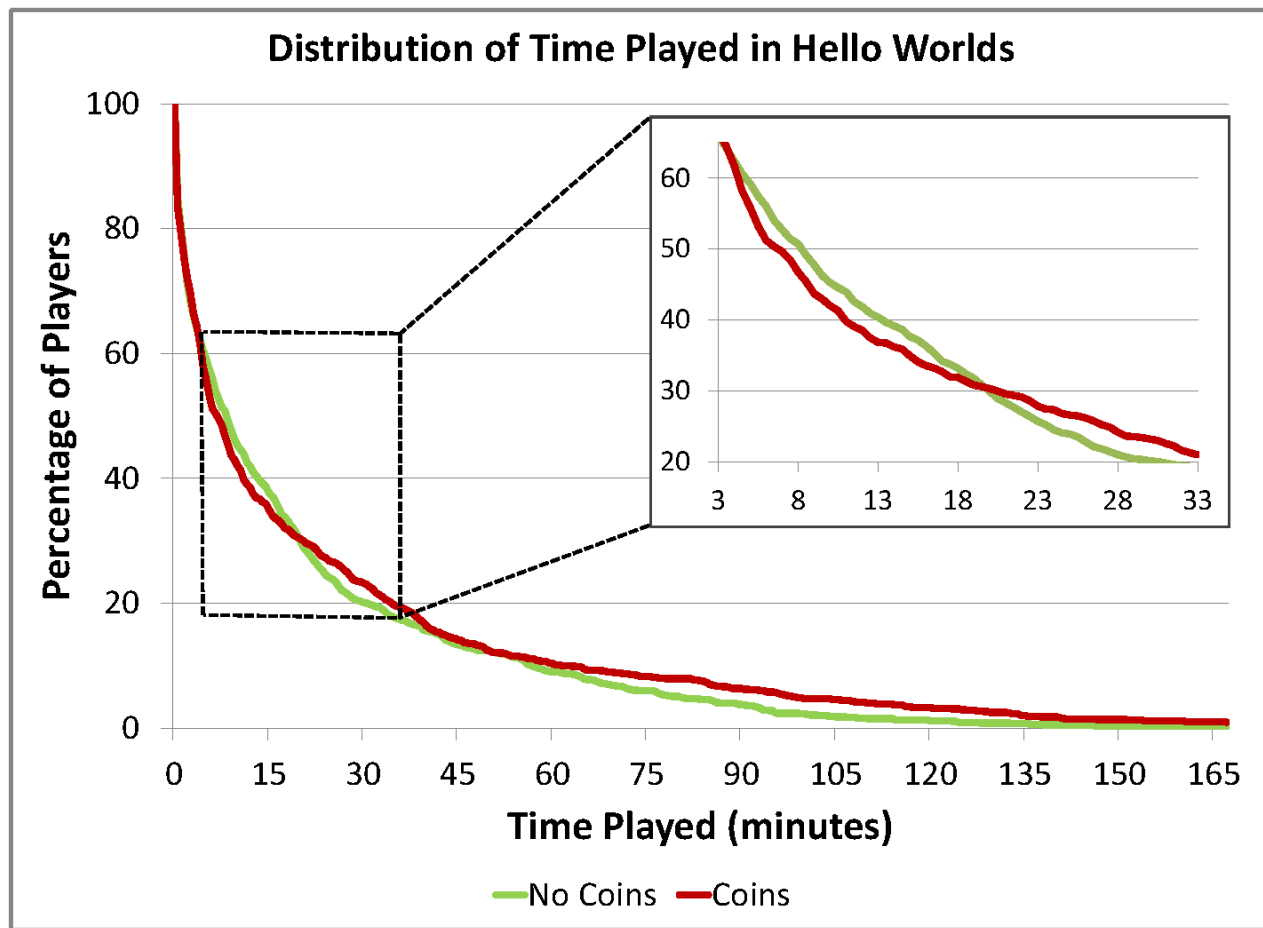
Reality: Many Players Quit Sooner





Distribution of Time Played in Refraction





Result:

secondary objectives **harmful** engagement

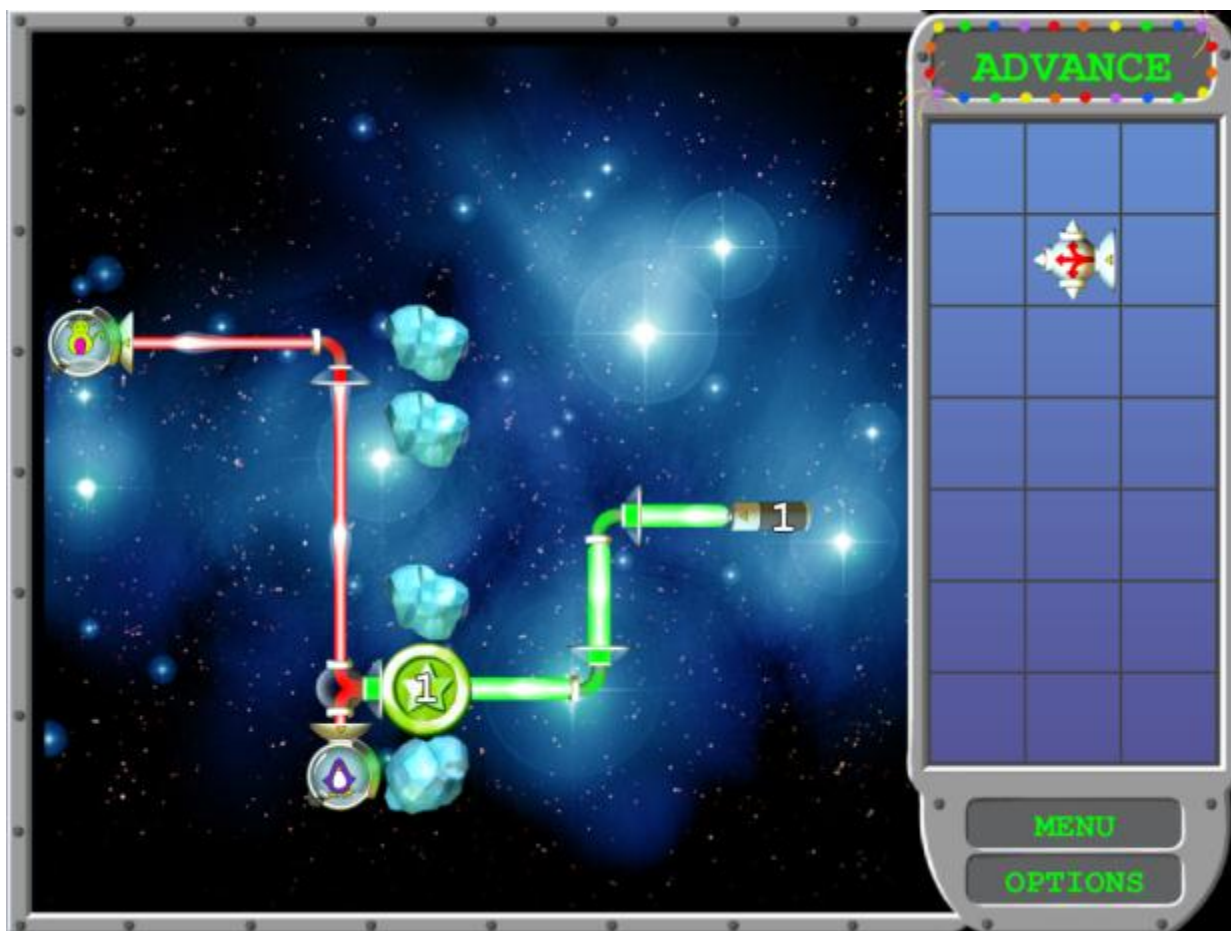


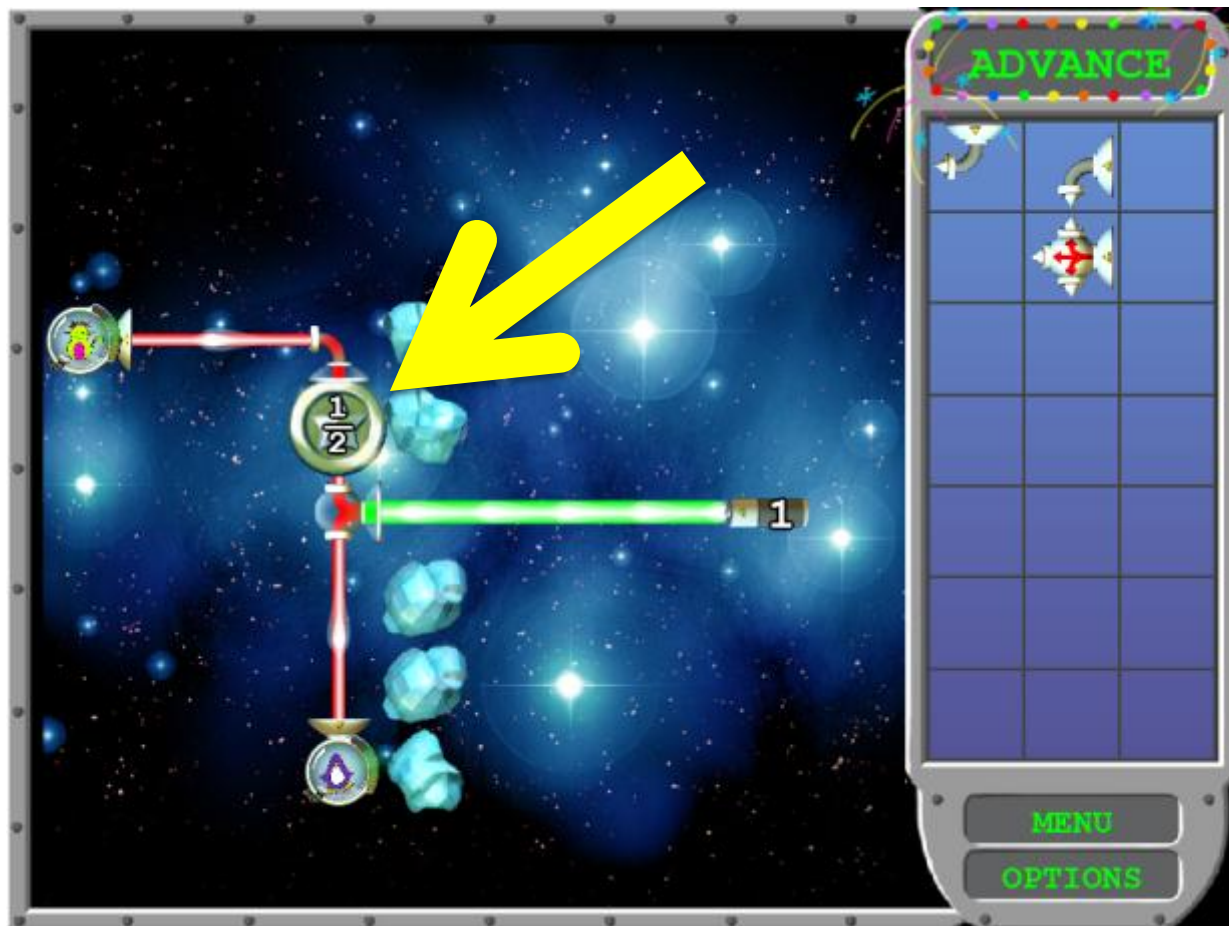
(Assassin's Creed, Ubisoft 2007)

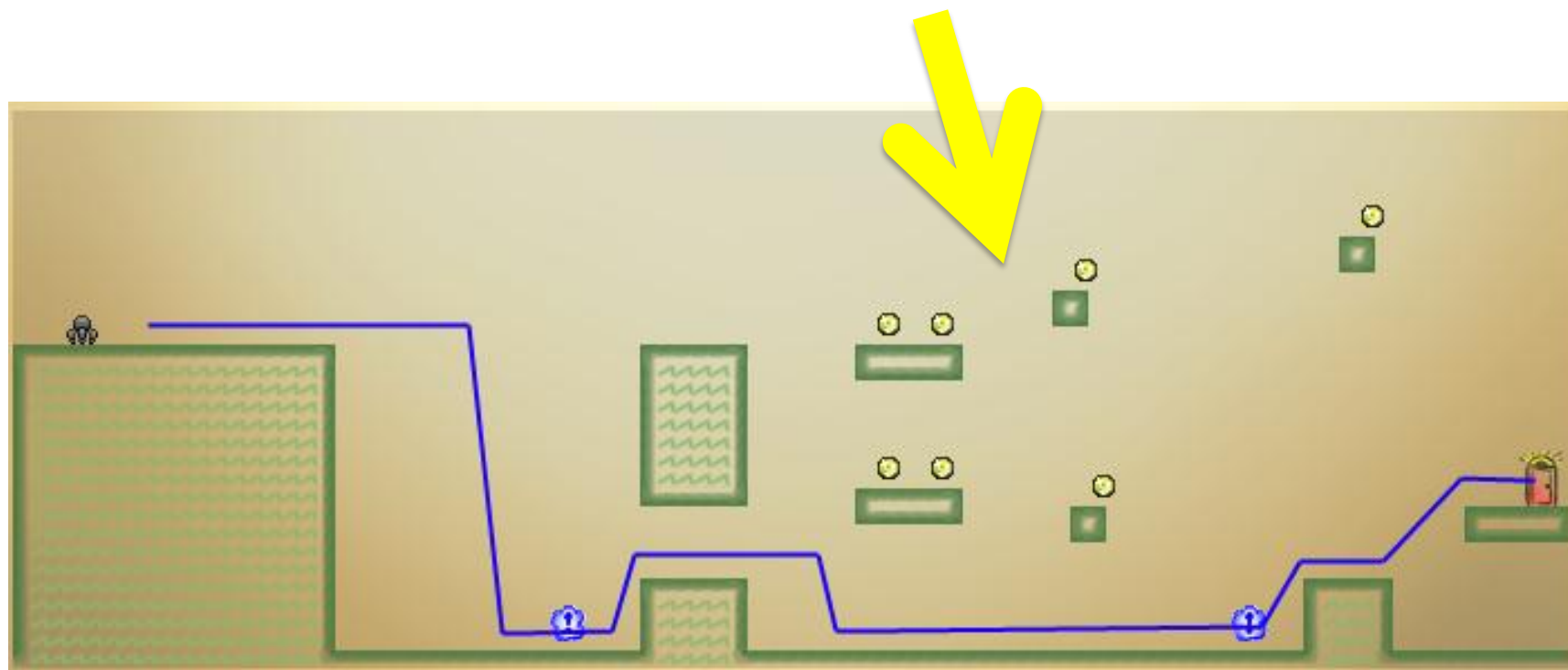
Maybe easier is better?

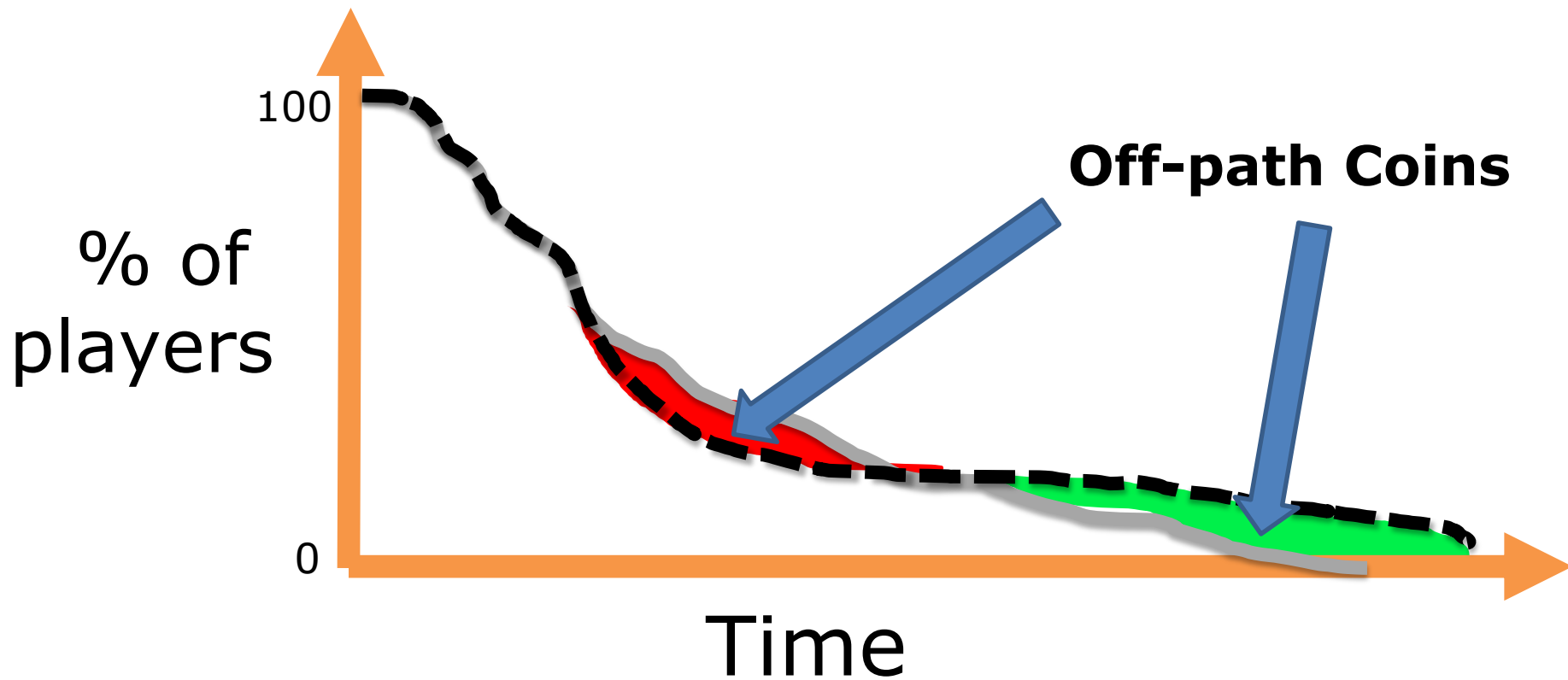


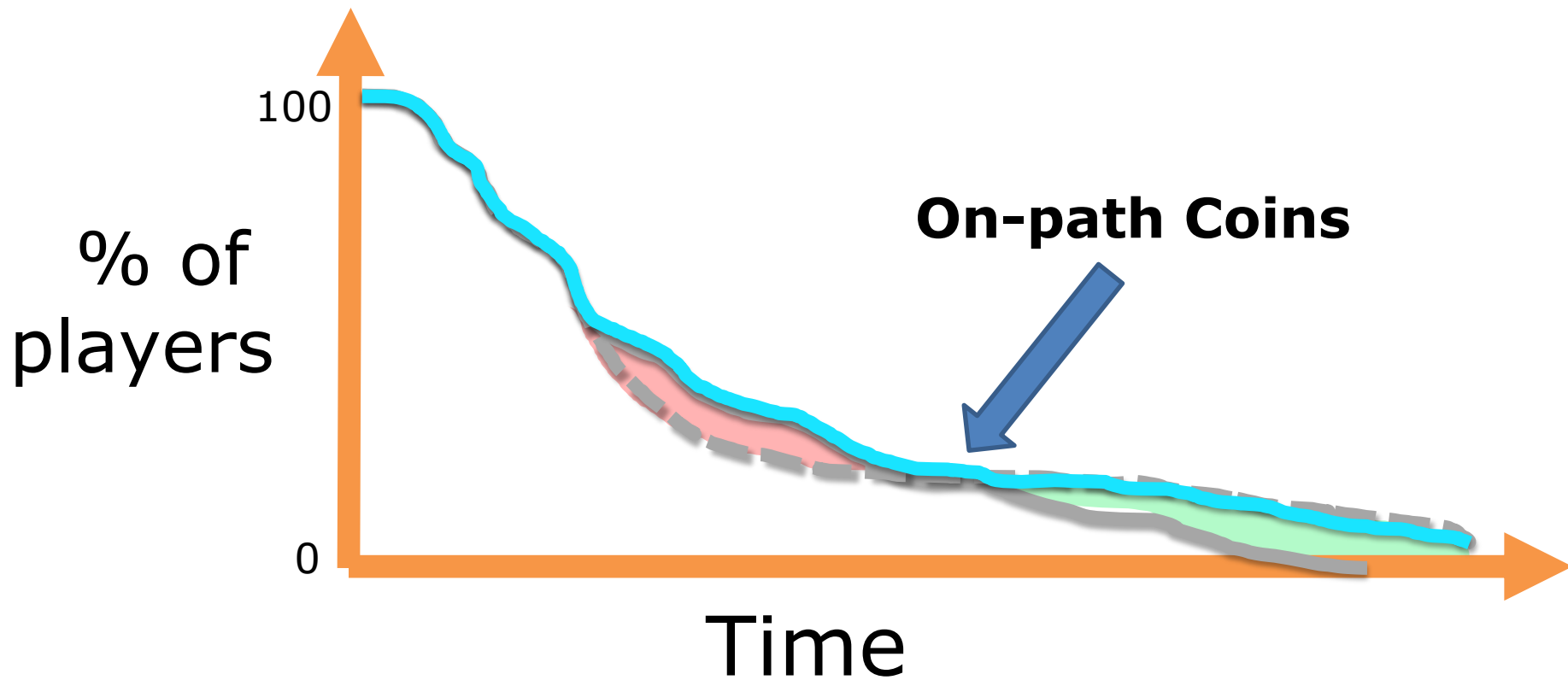
(Super Mario Bros., Nintendo 1985)



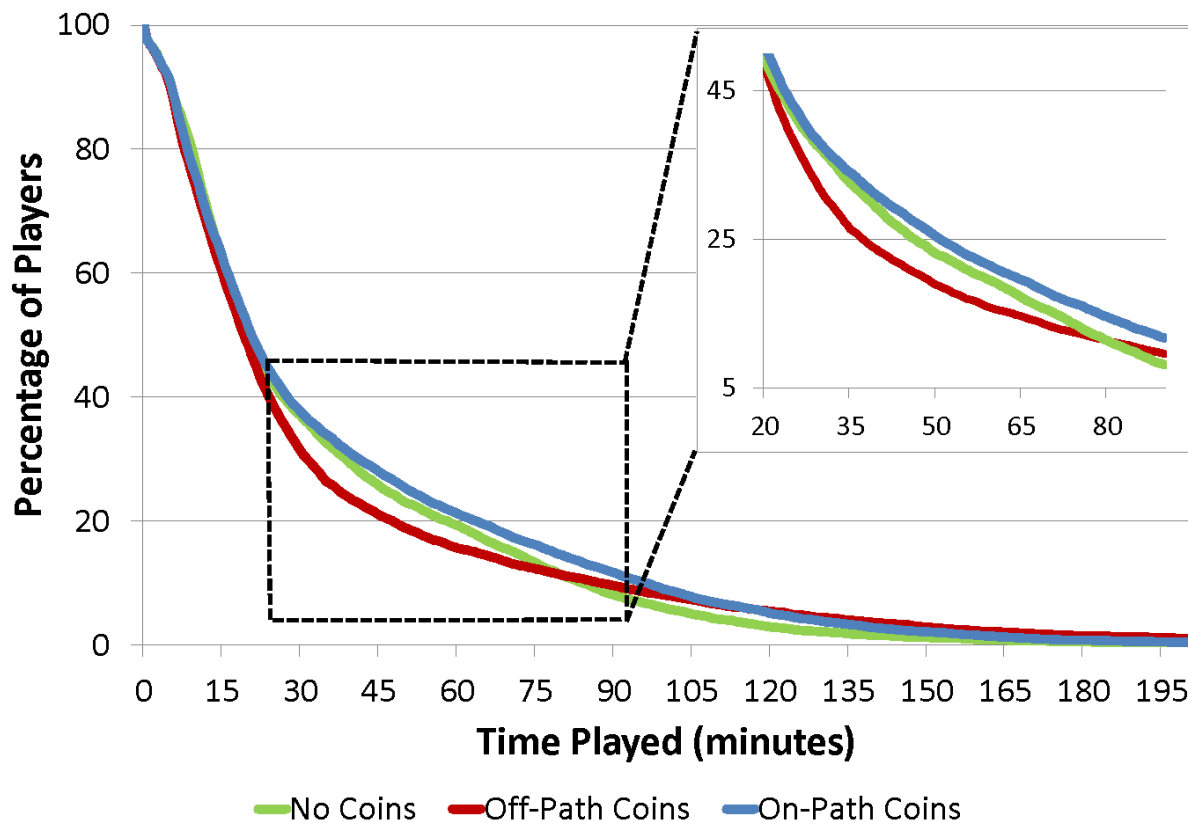


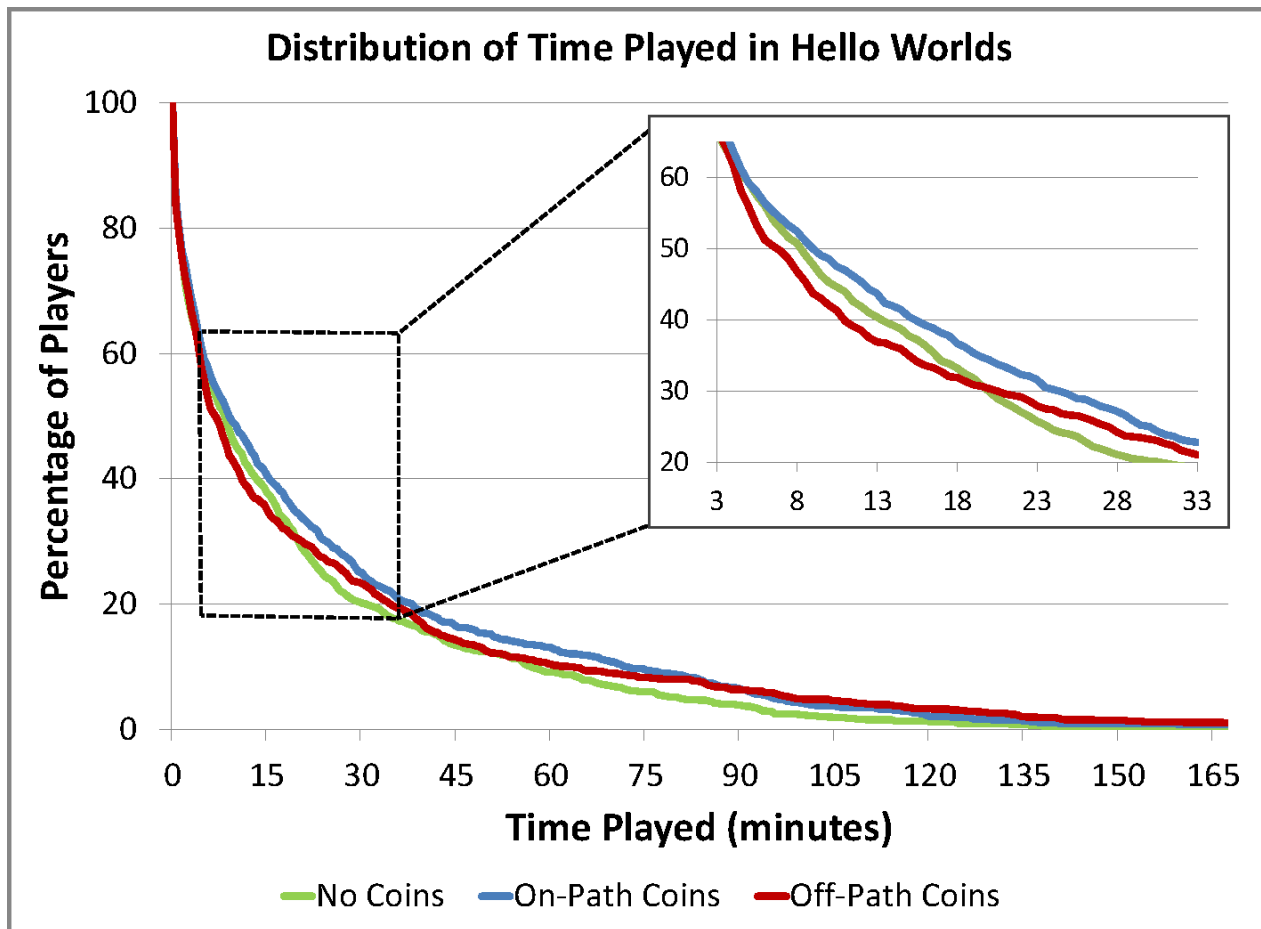






Distribution of Time Played in Refraction





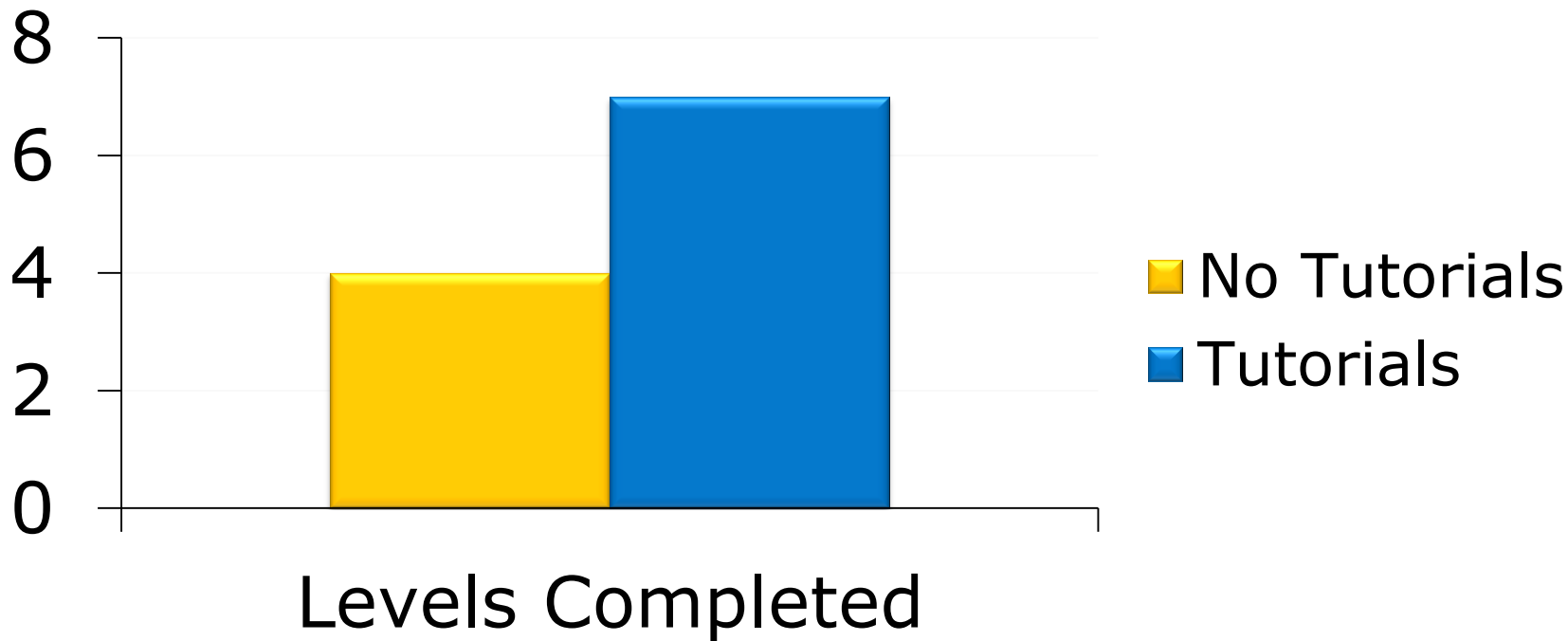
Result:

secondary objectives were good if they
supported the primary objectives

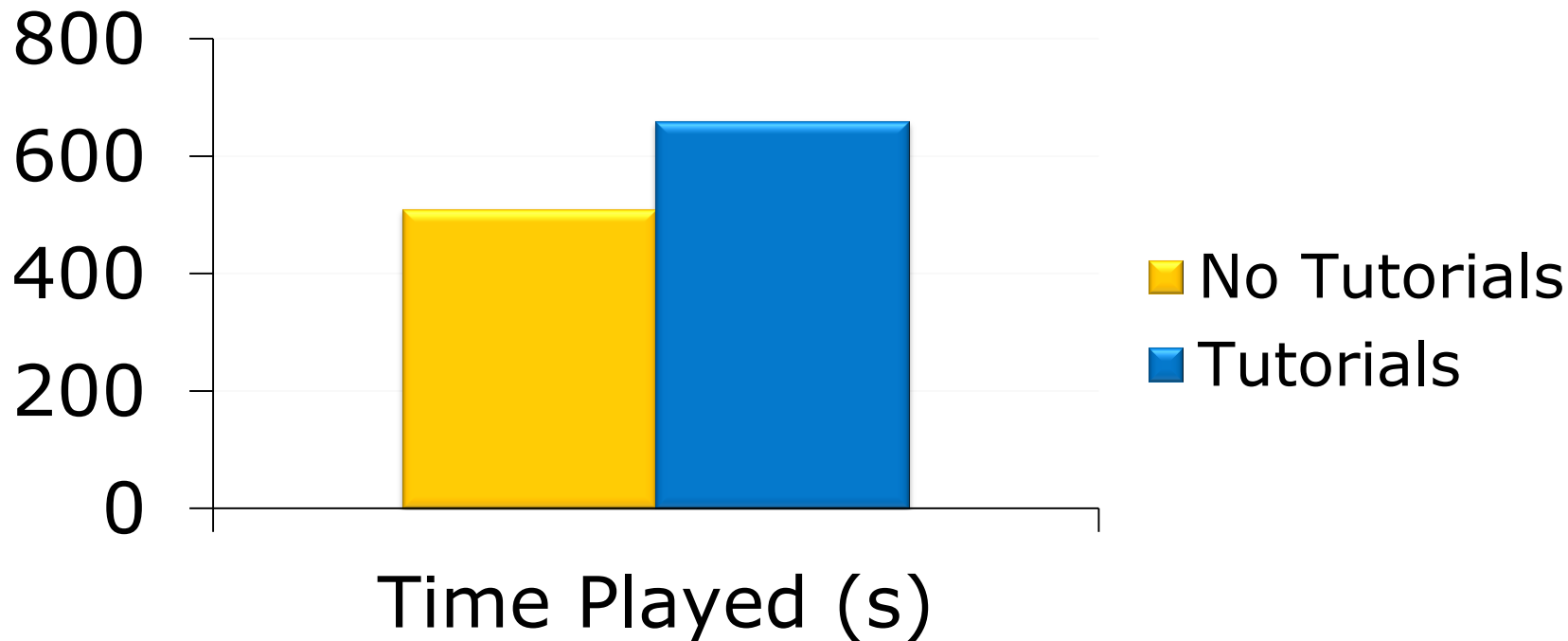
Experiment #4: Tutorials



Foldit



Foldit



Refraction and Hello Worlds:

no effect

Result:

text tutorials helped *only in
the most complex game*

Number of concepts



11



13

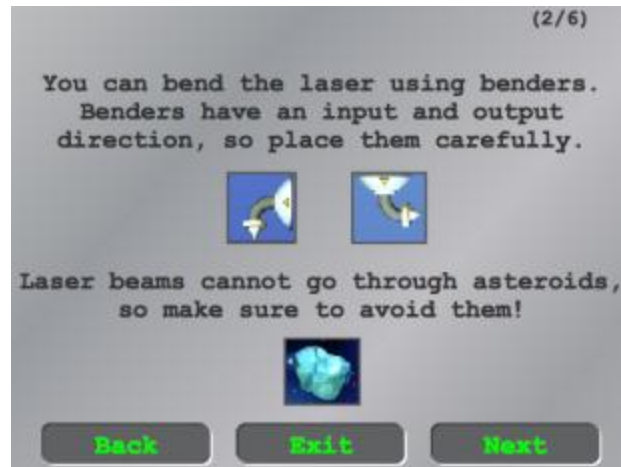


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Context-sensitivity



Context-sensitive

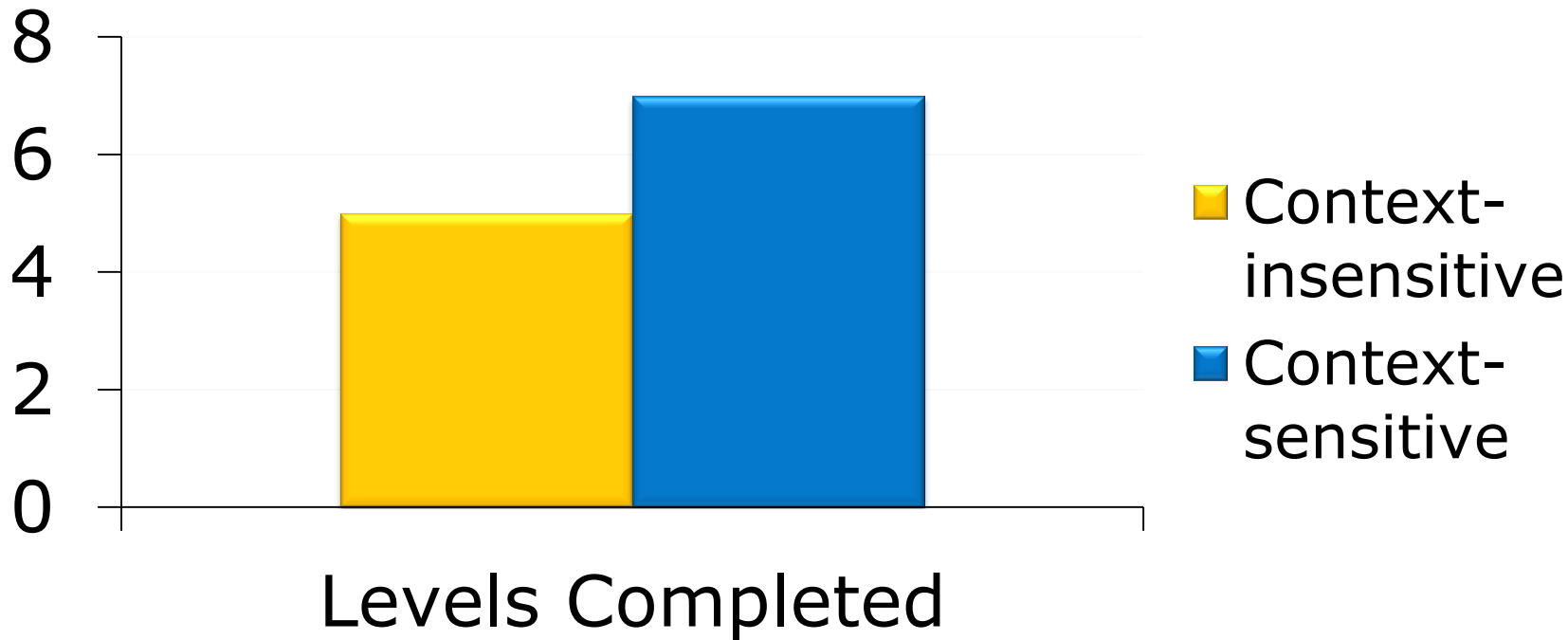


Context-insensitive

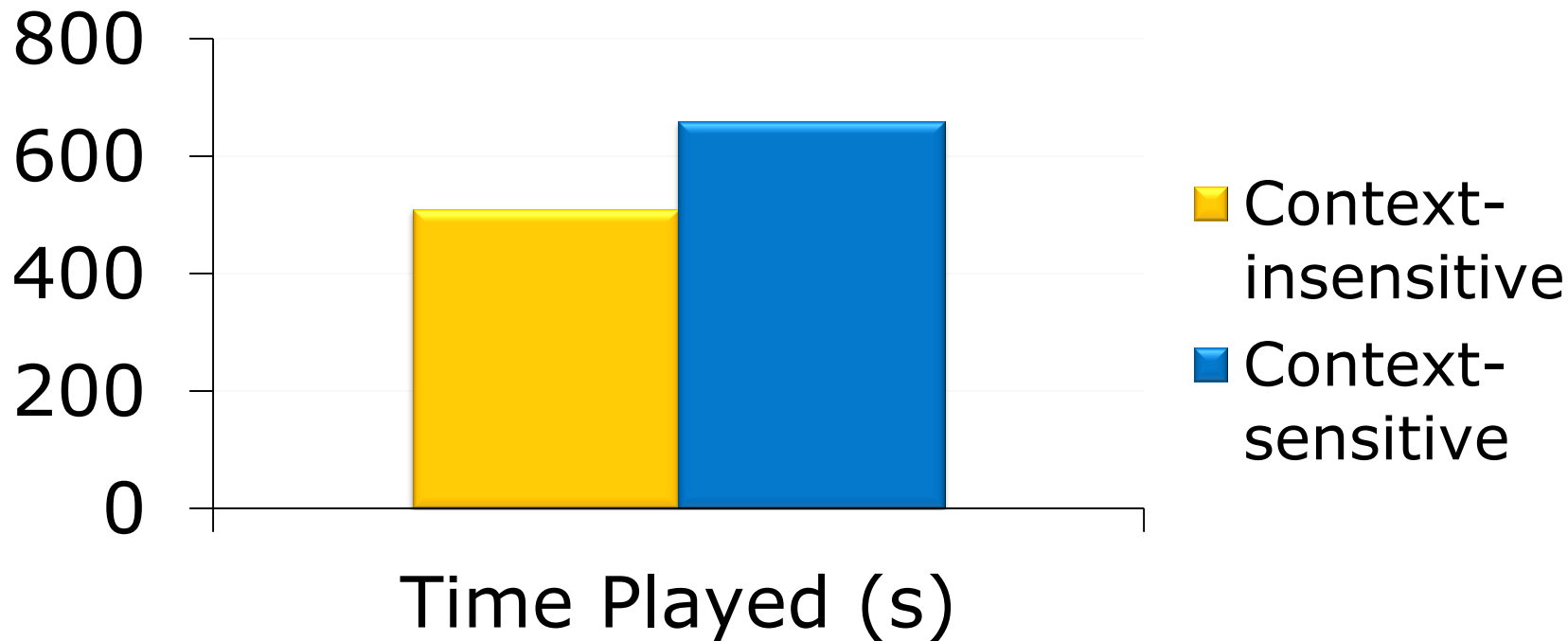
Result:

context-sensitive help was better
(if tutorials helped at all)

Foldit



Foldit



Let's gather more data

- Let us A/B test your games!

Coauthors

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Acknowledgements

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