

Training Crowd Workers to Avoid Cognitive Bias using a Web Game

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Abstract

Microtasks has become increasingly popular, due to providing easy access to a crowd of people to perform remote work. However, many crowd workers face some cognitive bias, which ultimately deteriorate the work quality produced. This article reports the development of a web mini game, which can be deployed as a microtask, for the training of users to avoid common cognitive bias found in crowdsourcing settings.

Keywords

Web Game; Microtasks; Cognitive Bias.

Introduction

Cognitive bias refers to the mental processes of individuals that consistently generate representations that deviate systematically from reality [1]. In relation to workers' self-assessment confidence, the Dunning-Kruger effect characterizes a cognitive bias wherein individuals with lower abilities possess an overly optimistic outlook that does not align with the actual assessment of their own abilities [2]. This cognitive bias also leads individuals to make mistakes without realizing them. Conversely, individuals with high abilities can also exhibit a cognitive bias by undervaluing their own skills. Previous studies have investigated the impact of the Dunning-Kruger effect on participants in crowdsourcing, particularly regarding their self-assessment of confidence levels in task performance. Regarding the design of tasks in microwork scenarios, a body of research has explored the influence of cognitive bias on changes in the layout of microtasks [3]. The objective of this research is to examine the prevalence of cognitive bias among crowd workers, specifically in the context of document relevance assessment tasks. Some of the cognitive biases studied include:

- Anchoring: This bias occurs when individuals excessively focus on a particular piece of information, often the first one they encounter, while disregarding additional contradictory evidence [4].
- Bandwagon Effect: This bias describes the phenomenon where the presentation of a group's existing results can influence an individual to conform to the behavior of the group [5].

With the increasing volume of information generated for the Web, it is essential to ensure proper adaptation for each individual user. By developing JavaScript-based mini-games, it becomes possible to teach users how to avoid cognitive biases that may occur. Although there are various types of biases, only Anchoring and the Bandwagon Effect were addressed in the mini-game developed to provide users with training in dealing with these cognitive biases in a web scenario, which can be used subsequently in a crowdsourcing setting.

Development of the Mini-game for the Inference of the Verbal-Visual Dimension

It is a mini-game developed to reduce cognitive bias, meaning its primary objective is to teach users how to avoid cognitive biases that may occur, thereby stimulating various types of thinking and cognitive skills. The "SUPER BIAS" is a 2D platform game that has been developed based on an open-source code available on GitHub¹. It draws inspiration from Nintendo's game "SUPER MARIO" while incorporating modifications and adaptations permitted by the license of the original code. These modifications are made to implement the Bandwagon Effect and Anchoring. The following requirements for the creation of this game were defined.

The game being playable in a web browser

The "SUPER BIAS" mini-game is designed to be accessible to a wide audience by leveraging the ubiquitous nature of web browsers. This ensures that players can engage with the game effortlessly, regardless of their device or operating system.

The game allowing the player to move and interact with the game environment

In the "SUPER BIAS" game, players are empowered with control over a dynamic character or avatar. They can navigate the vibrant and immersive game environment through a range of movement abilities, such as walking, running, jumping, and perhaps even additional interactive actions,

¹ <https://github.com/VarunBanka/super-mario-run-using-javascript>

like grabbing objects or activating switches. This interactivity promotes engagement, agency, and a sense of presence within the game world.

The game featuring enemies or obstacles that the player must avoid or overcome

To challenge the players and stimulate strategic thinking, the "SUPER BIAS" game incorporates a variety of adversaries, obstacles, or environmental hazards throughout the levels. These challenges may include agile enemies that pursue the player, treacherous platforms, hidden traps, or puzzles that require problem-solving skills. By navigating these obstacles, players must employ their cognitive abilities to make quick decisions, adapt their strategies, and successfully overcome the presented challenges.

The game having a scoring mechanism

To incentivize players and provide a tangible measure of progress, the "SUPER BIAS" game implements a comprehensive scoring system. The scoring mechanism assigns points based on various factors, including the completion of objectives, defeating enemies, collecting power-ups, or achieving specific milestones. This scoring system serves as both a metric of performance and a motivator for players to strive for higher scores, fostering a sense of accomplishment and healthy competition.

The game displaying the score to the player

In the "SUPER BIAS" game, the player's score is prominently displayed on the screen during gameplay. This real-time score display allows players to monitor their progress, track their performance, and assess the effectiveness of their strategies. Additionally, visual and auditory cues may accompany score updates to provide immediate feedback and reinforce the players' engagement and satisfaction.

The game having an user-friendly interface

In the "SUPER BIAS" game, special attention is given to the user interface (UI) design, aiming for an intuitive and user-friendly experience. The interface elements, such as menus, buttons, and control prompts, are thoughtfully arranged and visually appealing. Clear and concise instructions are provided to guide players through the gameplay mechanics, ensuring that they can quickly grasp the controls and objectives without confusion. The UI also incorporates intuitive visual cues and feedback, such as color-coded indicators or sound effects, to enhance the overall usability and immersion.

The anchoring effect was applied by creating two characters with different fake statistics data, that leads the user to erroneously choose the strongest character (see Figure 1). In other words, the objective is to observe whether the player's

behavior is influenced by the statistical data or "anchor," which, in this case, is false because both characters have the same level of performance.

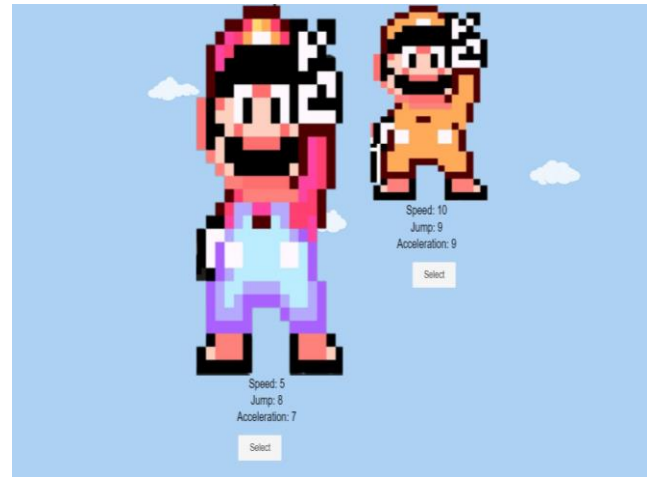


Figure 1 - Anchoring effect in the scene to choose the player character.

On the other hand, the bandwagon effect is depicted in the top left corner of the start screen of each level in "SUPER BIAS." In Figure 3, information is presented to study the player's behavior towards this particular information. The information states, "70% of players who won used the aerial platforms." The objective is to observe whether the player tends to believe this statement without critically evaluating whether utilizing the aerial platforms is indeed the best option (see Figure 2).

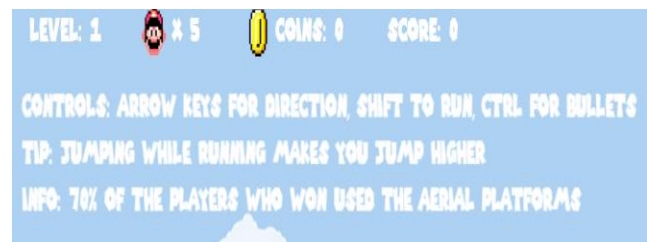


Figure 2 - Bandwagon effect in the instructions provided to the player.

Final Remarks

The work carried out has the potential to reduce cognitive bias as it stimulates various types of thinking and cognitive skills by teaching the player not to believe everything they see and not to adopt or believe in something simply because many others do so. To assess how different types of biases have affected the player's experience, usability tests will be conducted in future work.

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