

Power-Ups in Digital Games

The Rewarding Effect of Phantom Game Elements
on player experience

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Literature shows a lack of research into the effects of power-ups on subjective experiences and objective performance of players in games



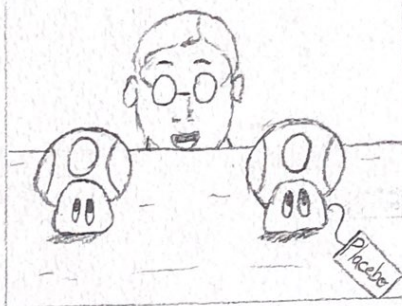
Some video games offer in-game rewards, in the form of items that give players extra abilities, called "power-ups".



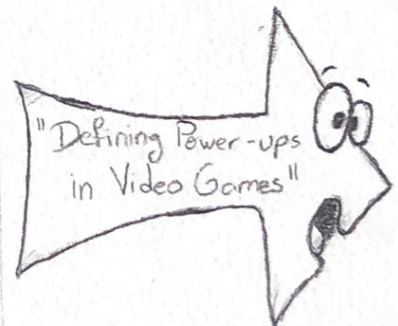
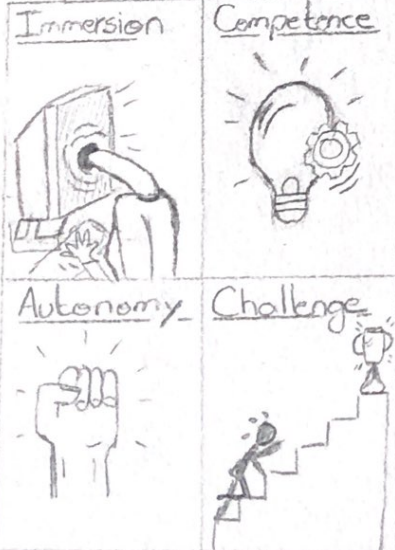
We conducted an experimental study using some of the most commonly found power-ups in video games. ...



... by augmenting a game with power-ups and comparing it to the same game without power-ups, and to a version with placebo power-ups.



MEASURES



It's a type of reward, directly linked to the gameplay, and allows the player to experience increased capabilities by giving their character additional powers.



Typically, the player can find power-ups pre-placed...



... or randomly spawned around the game world

Some are dropped by defeated enemies. Their effects usually last for a specified period of time



Video games offer different types of power-ups that modify different in-game parameters



For the purpose of this study, we focus only on "expendable and instant power-ups, which are defined as:

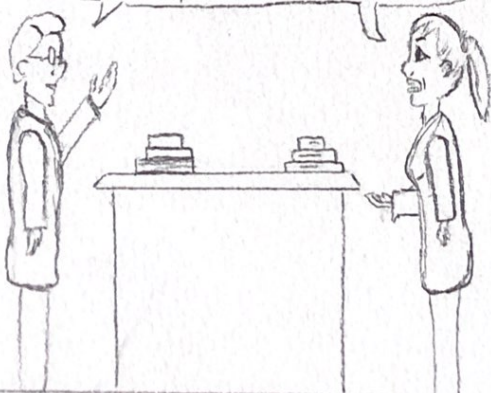


Power-ups that take an immediate effect once picked up



& cannot be stored for later

Literature says: Rewards can encourage players to invest time and effort into playing a game & have a positive effect on gaming experience



Let's get into the study design!





H1a: Power-ups increase a player's immersion

H1b: Power-ups lead to a higher sense of autonomy

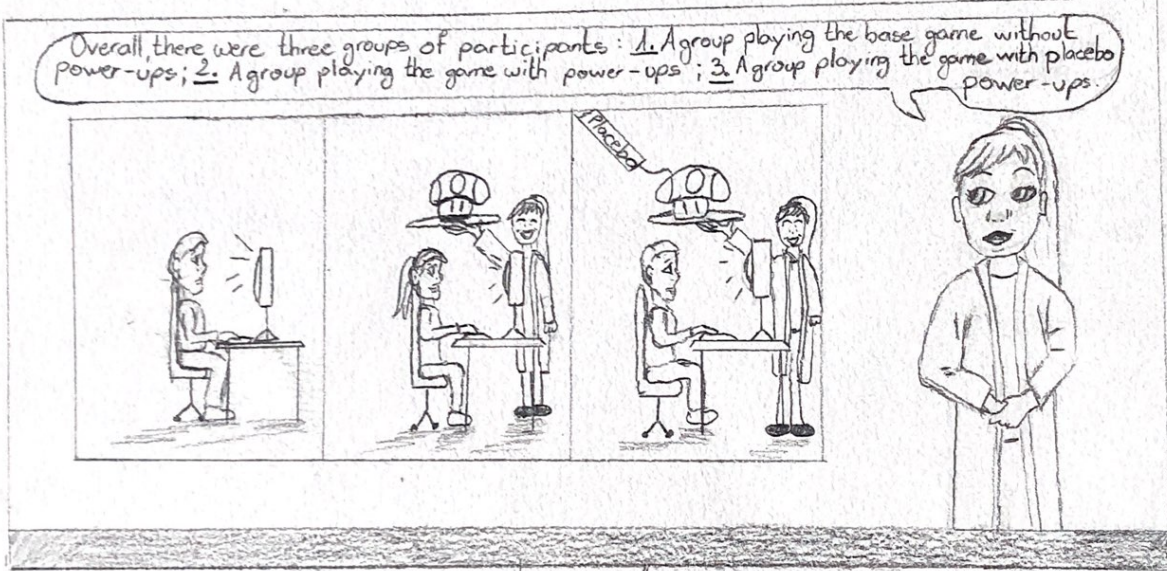
H1c: Power-ups lead to a higher sense of competence

H1d: Power-ups lower a player's perceived challenge.

H2: Power-ups improve player performance.

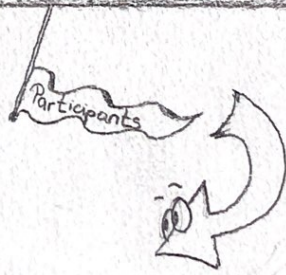
H3: Real power-ups provide a more immersive experience to the player than placebo power-ups

H4: Players perform better in a game with real power-ups than when playing with placebo power-ups.



Overall, there were three groups of participants: 1. A group playing the base game without power-ups; 2. A group playing the game with power-ups; 3. A group playing the game with placebo power-ups.

The dependent variables were player experience (immersion, competence, autonomy, challenge), and in-game scores as a measure of one's performance.



Opportunity sampling was used to recruit participants from a variety of different locations in the UK.

36 Participants took part in the study. (12 in each condition)

20

12

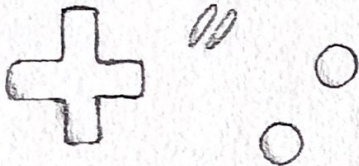
with the age range between 18 and 24 years ($M=20.52, SD=1.88$)



Participants were split equally across three groups based on their background and level of gaming experience.

Game

- * The game used for this study was a modified version of a survival shooter game, "Nightmares".
- * little boy in a nightgown who has to defend himself from zombie toys.
- * The objective of the game is to kill as many enemies as possible before they deal damage to the player.



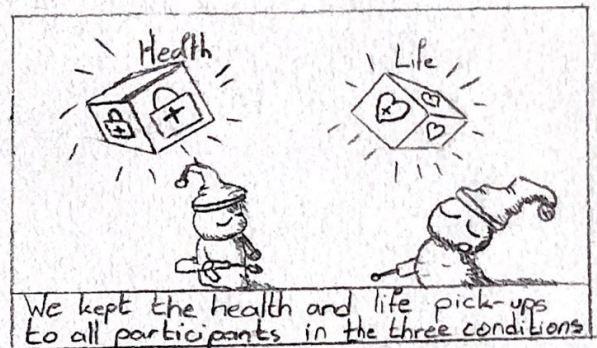
- ✓ none of the participants had had previous experience with the game
- ✓ game controls and rules were simple enough for participants with different expertise levels.
- ✓ chosen game allowed for a variety of different expertise levels.

Modifications

- game world was expanded
- 5 lives were introduced
♥♥♥♥♥
- Two expendable power-ups were created:

Health & extra life

However, they were not counted as a part of our manipulation

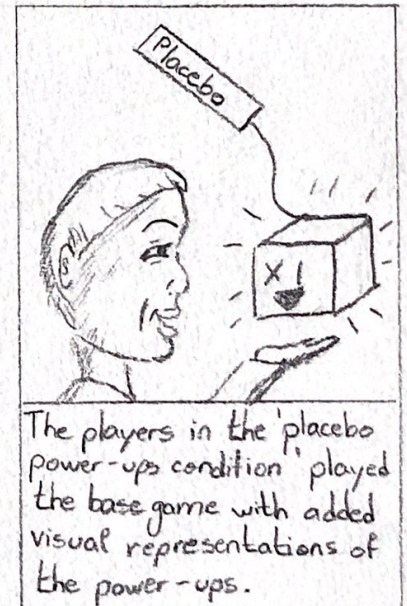


Three different temporary power-ups ...



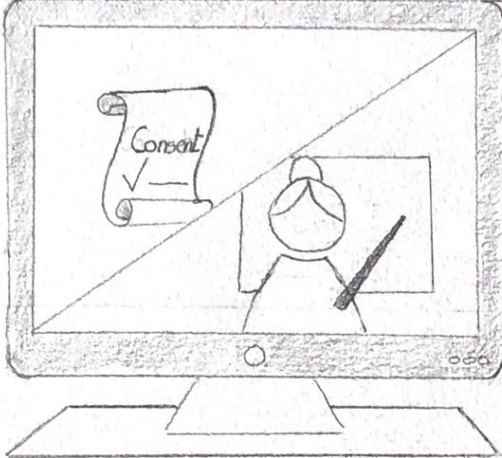
... each one lasted for 10 seconds before switching back

- Red = Shotgun style laser with a slower rate of fire that causes more damage
- Blue = Double bullets dealing double damage
- Green = Continuous, more powerful laser



Procedure

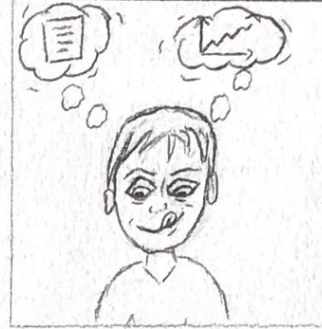
After digitally signing an informed consent, participants could start the game which first began with a tutorial.



After that, they completed the main part of the study: A 10-minutes gaming session



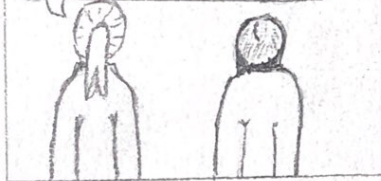
After completing the gaming session, each participant filled out an online survey and uploaded a file of their gaming performance data



We recorded in-game scores as a measurement of a player's objective performance.

We measured immersion using the Immersive Experience Questionnaire.

& competence and autonomy using the Player Experience of Need Satisfaction scales



The hypotheses were analyzed and either supported or not supported by the study.

Results



H1a ✓	H2 X
H1b ✓	H3 X
H1c X	H4 X
H1d X	

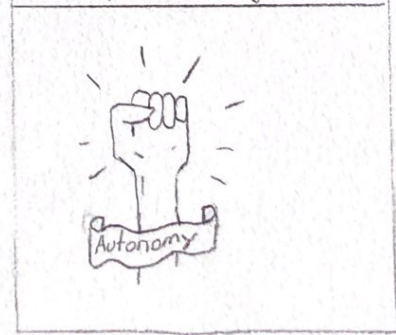
To sum up, we proposed four hypotheses linking player experiences and performances with power-ups, finding a positive effect on one's sense of immersion and autonomy.

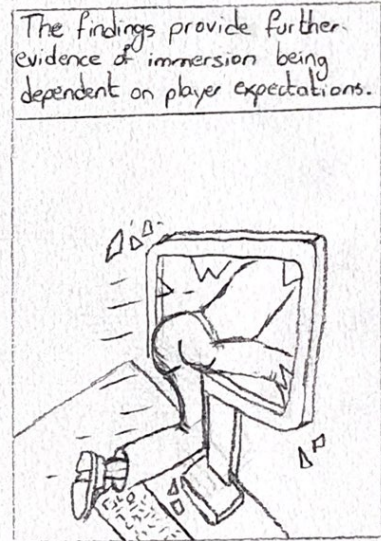
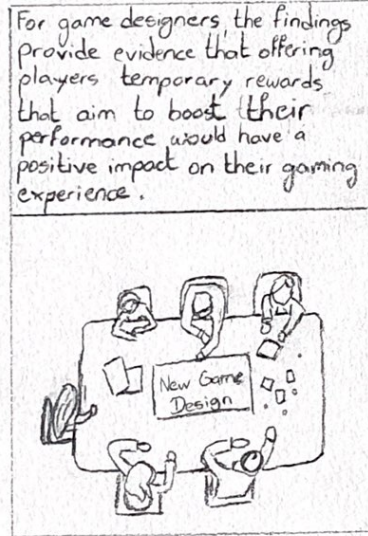
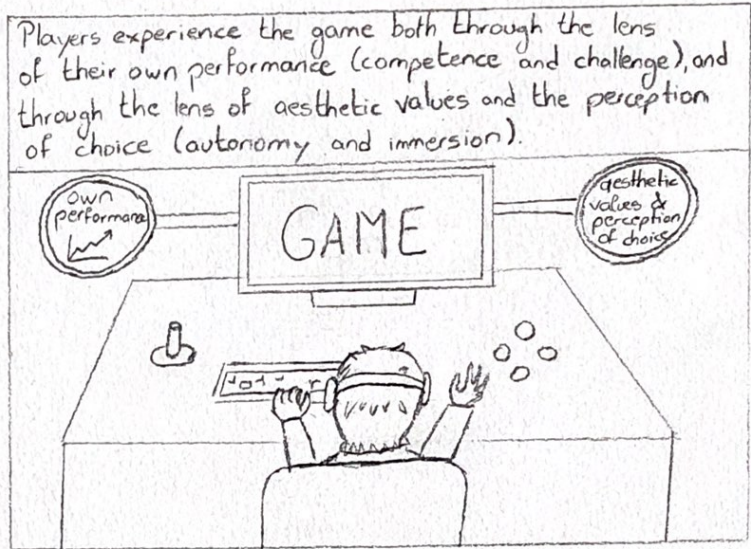
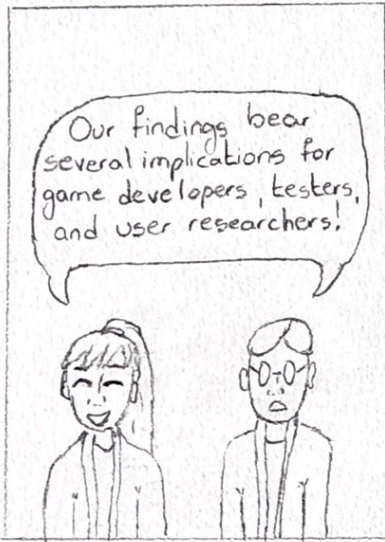


Interestingly, the increased feeling of immersion in the game as a result of playing with power-ups was observed in both groups of players who experienced real and placebo power-ups



Autonomy was positively influenced by the presence of power-ups, as giving the player the choice to pick up consumable items in the game provides him with more autonomy than offering no power-ups





Reference:

Denisova, A., & Cook, E. (2019, October). Power-ups in Digital Games: The Rewarding Effect of Phantom Game Elements on Player Experience. In Proceedings of the Annual Symposium on Computer-Human Interaction in Play (pp. 161-168).