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Experimental Methods in Computer Science

A large software house established in the market of computer games wants to study in depth the reward/frustration mechanisms involved in playing computer games, in order to optimize the games to increase the motivation of play. The idea is to study the brain activity in the moments when a player does a mistake or wins a game using a fRMI (*functional magnetic resonance imaging*), as the neurologists know that certain brain regions are associated to the feeling of frustration or pleasure (rewarding). By measuring the activity of such brain regions, it is possible identify the steps of a computer game that produce more frustration/rewarding in the player. In order to achieve that the player must be inside a fRMI machine while playing the game. Knowing that the space inside the fRMI is very tight and the environment is rather artificial, the company is afraid that the fact that the player is inside the fRMI may change the conditions and lead to erroneous results. For example, it may cause the player to do more mistakes and lose the game more often. For that reason, the company has decided to perform a preliminary experiment to verify whether the fact that the player is playing the game inside the fRMI machine affects the results or not.

The experiment consists of asking a group of players to play the game (only one game) in normal conditions (i.e., in a normal room) and count the number of mistakes done during 20 minutes playing the game. A total of 13 players have participated and the number or mistakes committed during the 20 minutes of playing are the following: 23, 24, 22, 39, 19, 26, 29, 32, 25, 21, 33, 36, 34.

Considering the difficulties of execution experiments inside the fRMI, the company only could execute the experiments inside the fRMI with 7 players. These players also played the same game during 20 minutes and the number of mistakes recorded is: 34, 30, 29, 41, 23, 43, 39.

1) Formalize the appropriate hypotheses, test the required assumptions and consider both parametric and non-parametric alternatives. Discuss the results obtained.