

Equipe MIM

Axe « Interactivité pour Lire et Jouer »

Perception de la difficulté des Jeux Vidéo



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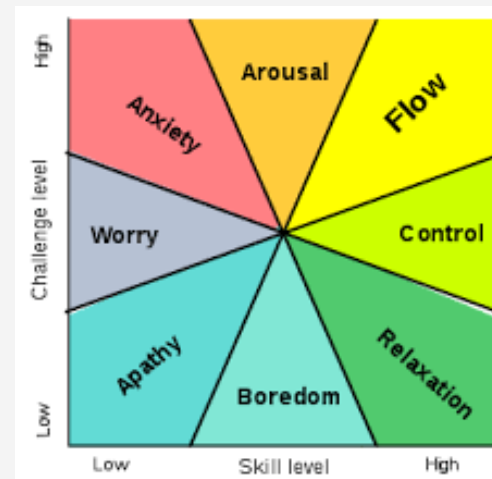
Generate gameplay ?

1. Procedural Gameplay Generation relies both **modelisation** and **evaluation** of this gameplay.
2. Modeling and evaluating gameplay is still a very complex problem (Koster, etc...)
3. For instance : **challenge (difficulty)**

Difficulty is fundamental

Difficulty and play enjoyment:

- [Juul2005]: **effort** in Juul's definition.
- [Malone1982]: **challenge**, curiosité, fantasy
- [Ryan2006]: SDT -> **compétency**, autonomy, social link
- [Csikszentmihalyi1990]: link between .



Difficulty : open questions

Définition ?

- Complexity, mental load, physical exertion, performance, specific law (Fitts). [Levieux 2011]

How to estimate objective difficulty ?

- [Levieux 2011 , Constant 2017, Allart 2017]

Different types of difficulty?

- Perceptive, Logical, Motor [Levieux 2011]

Optimal level of difficulty ?

- Link between difficulty and motivation [Allart 2017]

Perception of difficulty ?

- **Hard / easy effect. [Pulford 1997]**

Méthodologie & Expérimentation

Trois gameplays différents

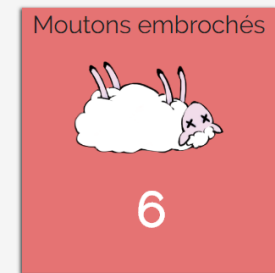
L'épreuve de déduction

Combien misez-vous de moutons sur vos chances de gagner ?



1	2	3
5	4	6
7	8	9

Temps restant	Déplacements restants de la case bleue	Tours de jeu restants	Mouton(s) misé(s)
8	1	1	?



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Logical Difficulty

A sliding-puzzle game:

- Restore the original grid numerical order.
- Move the blue square, step by step.

Difficulty parameter:

- Number of steps to restore the original order.



1	2	3
4	5	6
7	8	9

GÉNÉRER un plateau de jeu

Temps restant	Déplacements restants de la case bleue	Tours de jeu restants	Mouton(s) misé(s)
18	0	2	6

Estimation de la difficulté objective

$$P(FAIL \mid \text{diff param}, \text{capacités joueur})$$

- Estimation de la performance
- Facilement interprétable
- Permet des comparaisons inter jeux
- Peut être estimée avec suffisamment d'évènements répétés
- Régression logistique mixte
 - Effets fixes: paramètre de difficulté
 - Effets aléatoires: capacités de chaque joueur

Motor Difficulty

Reflex-based task:

- Stop the cursor on the target.

Difficulty parameter:

- The speed of the cursor.



Perceptive Difficulty

A visual memory task:

- At the end of a timer, 5 grey squares will flash then fade out.
- Find the squares by clicking on them.

Difficulty parameter:

- The size of the grid.



Measuring Subjective Difficulty

Players have to bet on their chances of success:

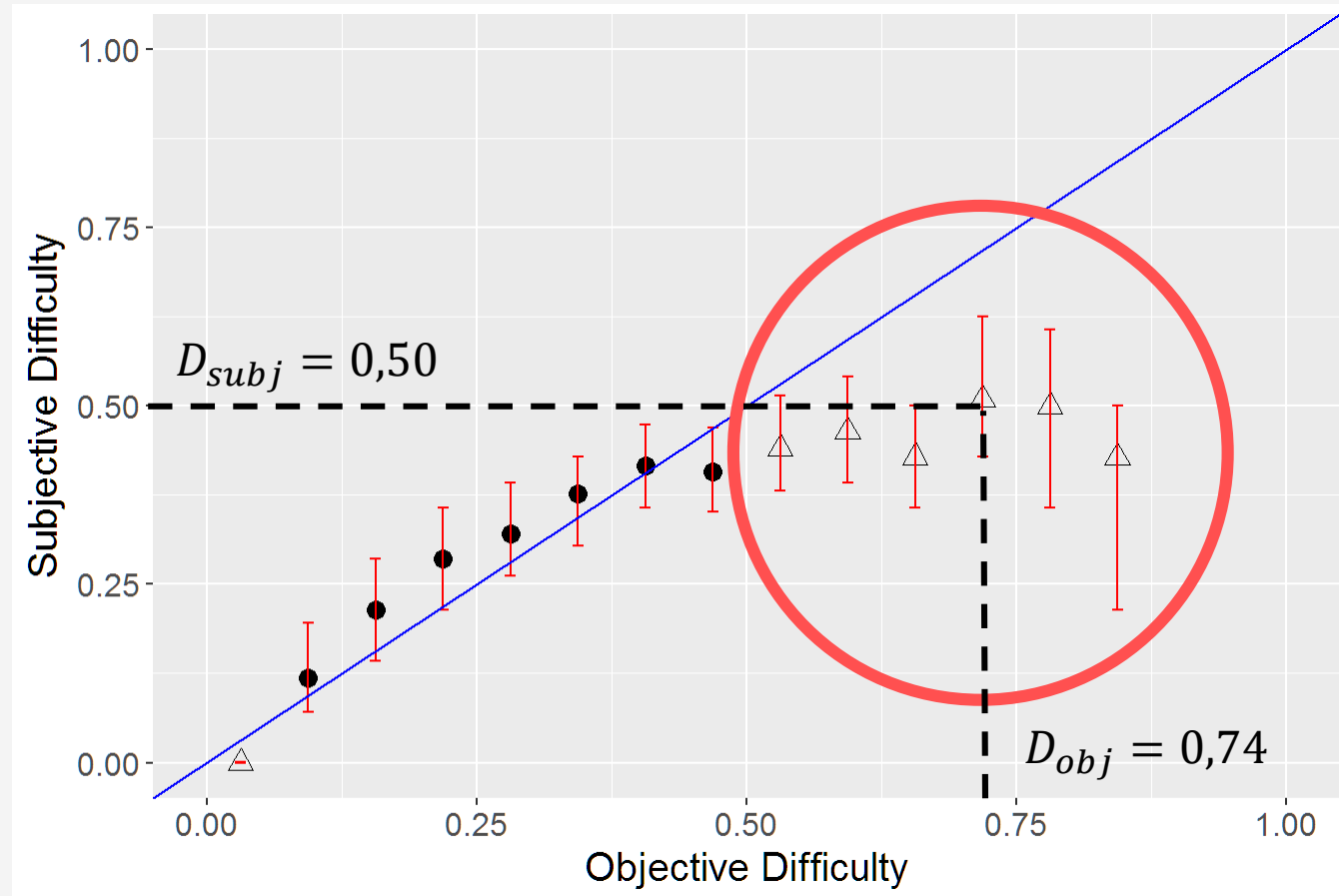
- 7 point Likert Scale
- Tied to their score:
 - Players have to pay attention.

Results

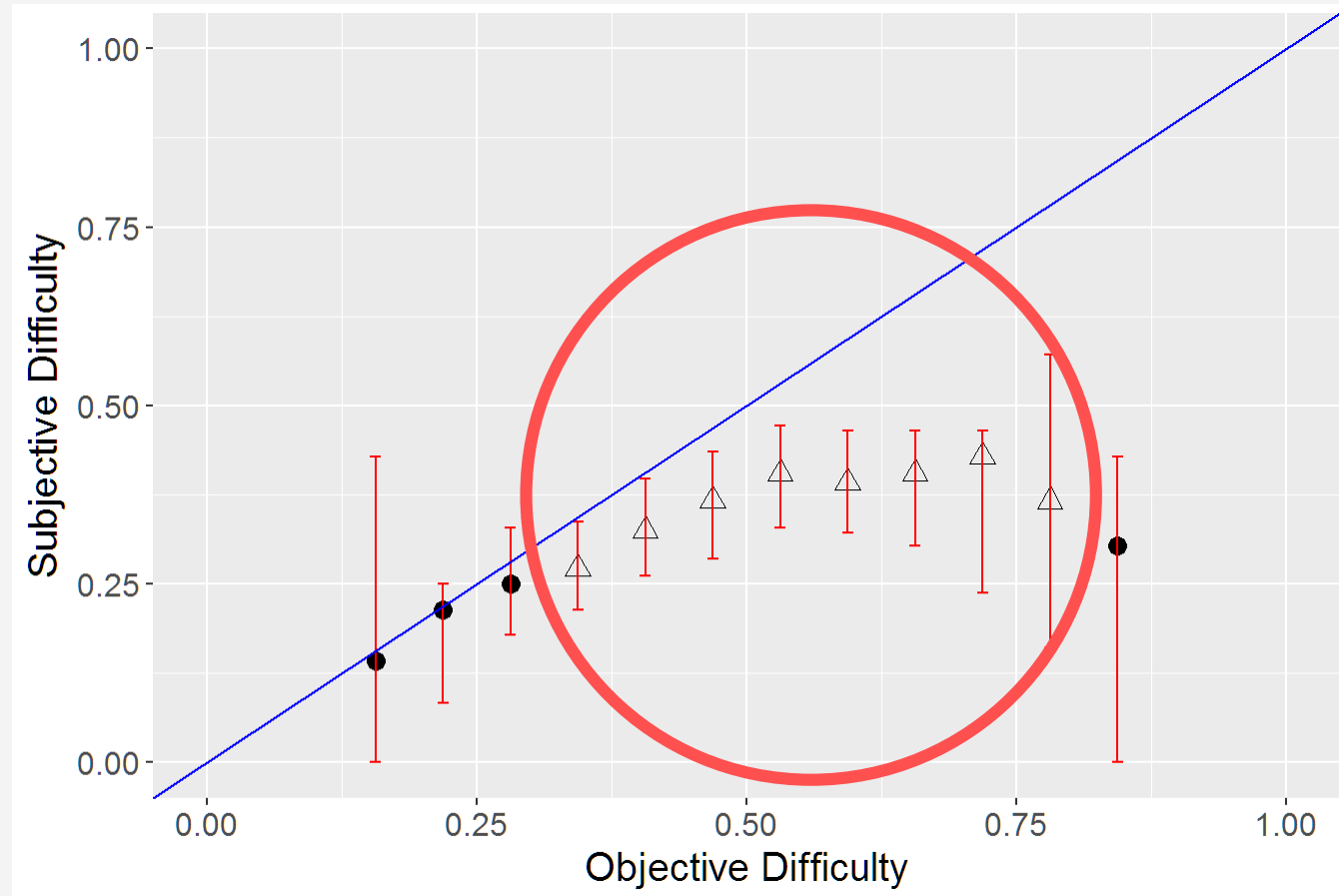
Objective difficulty of the games.

- 80 participants: 57 male, 23 female
- Median age: 15
- 30 turns on each game

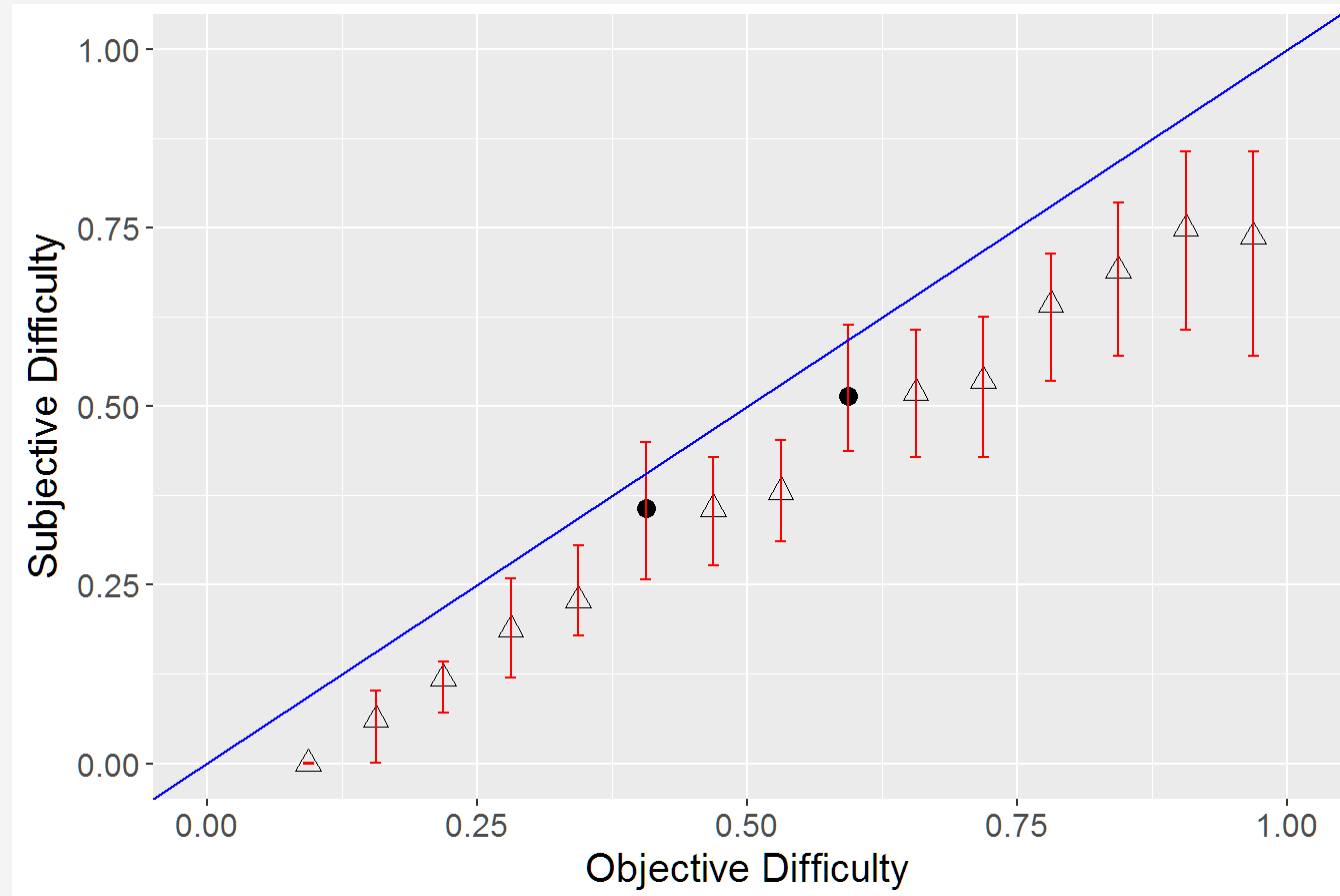
D_{obj} vs D_{subj} : logical task



D_{obj} vs D_{subj} : motor task



D_{obj} vs D_{subj} : *perceptive task*



Discussion et Conclusion

Difference between objective and subjective difficulty on 3 gameplays:

- High overconfidence when $D_{obj} > 0,5$ on two games
 - More confident when playing a vidéo game ?
- Slight, uniform overconfidence for perceptive task:
 - Type of task ?
 - Evaluation timing ?

Projet :

- Confirm results on different gameplays
- Study why perceptive task is different
- Explore the impact of specific difficulty curves

Références

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