



Effect of the structuring of an instruction on the exploration and comprehension of a text: a dual oculometric and behavioural approach

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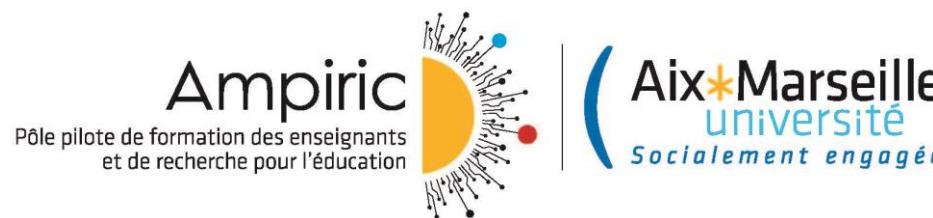
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4 au 6 octobre 2023



Effect of the structuring of an instruction on the exploration and comprehension of a text : a dual oculometric and behavioural approach.

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Darwinium, a serious game

Objectives

To identify how the elements of the Darwinium game are perceived by young people and what effects the specificity of a set of instructions has on their understanding of the rules of the game.

Context of the research

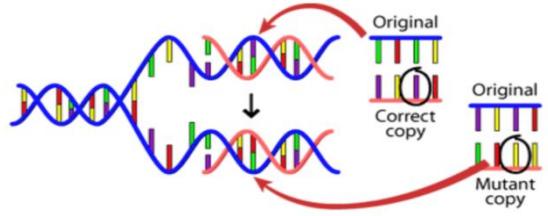
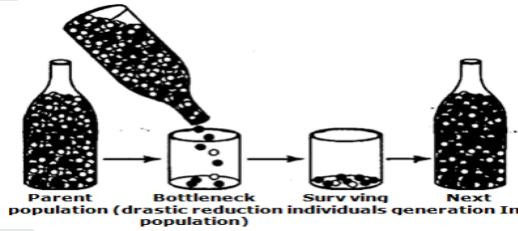
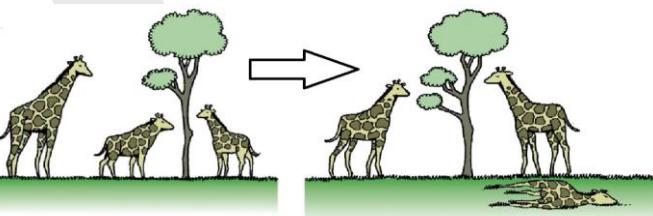
Randomness in ToE

Approaching randomness in ToE through an educational game

Darwinium game: Approaching randomness in ToE

Randomness in ToE

Gayon, 2005 ; Merlin, 2013

Evolution mechanisms	Associated ideas of Randomness
Genomic variation 	Chance Unintentional fortuitous event (not associated with any purpose) Associated with mutations and can sometimes give genetic innovations
Genetic drift 	Random probabilities Depending on the size of the biological population and the laws of probability. For a population to evolve, it is not necessarily related to adaptation, it may simply reflect the effect of random probability at any stage of reproduction (Jacob, 1981).
Natural selection 	Contingence Intersection of independent causal series: the presence of external factors and the internal variation of an organism Mechanism combining fortuitous events, that are contingent in a historical perspective

Approaching randomness in ToE through an educational game

- Randomness, intrinsically linked to gaming (Solinski, 2015)
- Games in education:
 - Allows to experiment with the right to make mistakes (Sanchez et Romero, 2020)
 - Engaging et motivating
 - (Alvarez et al., 2016)
 - Allows access to the complexity of a concept
 - Must be efficient (Sanchez et Romero, 2020)

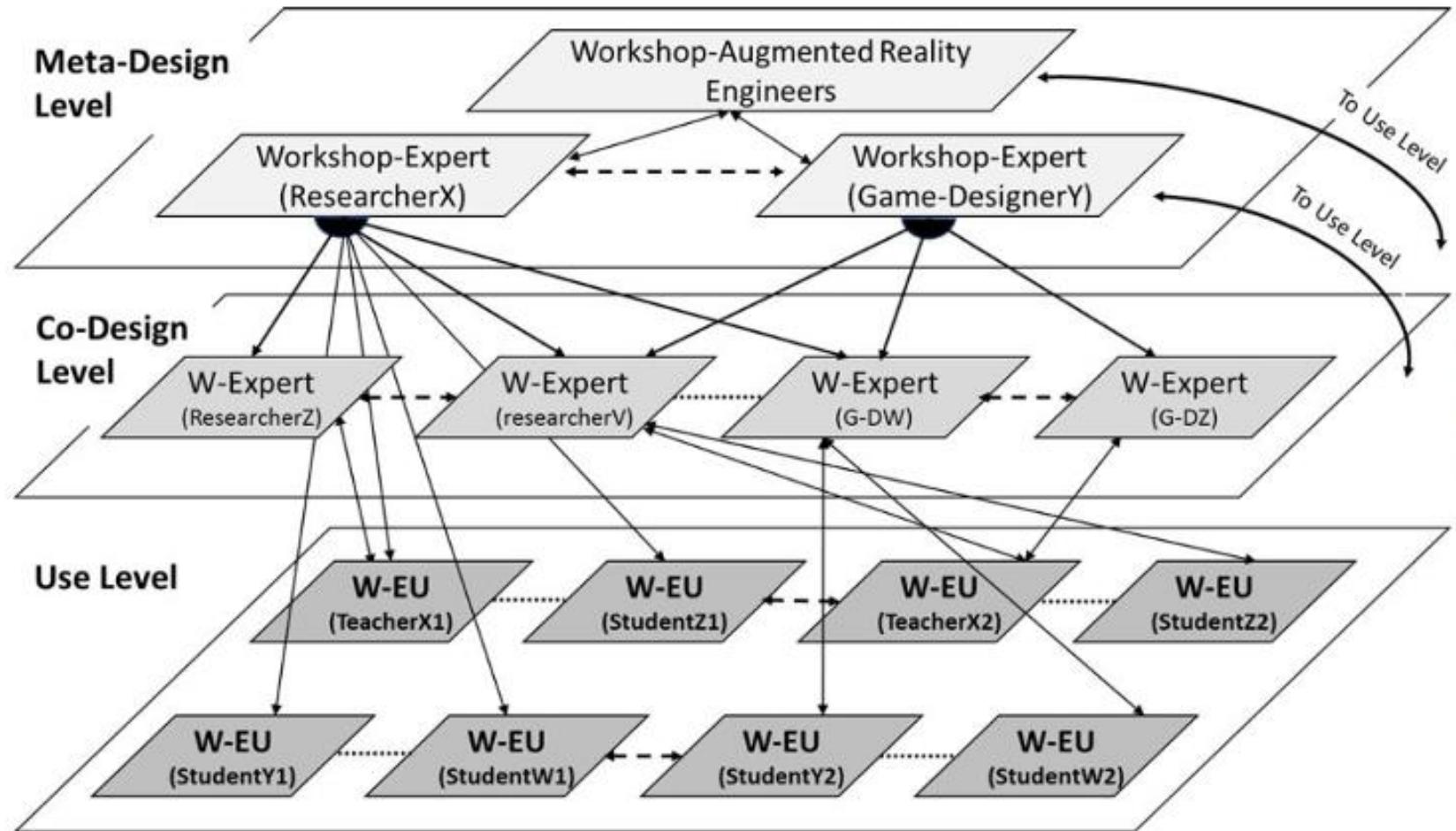
Du premier prototype



Au jeu de
plateau tangible

Metaconception process of the game « Darwinium »

(adapted Ardito and al., 2015)



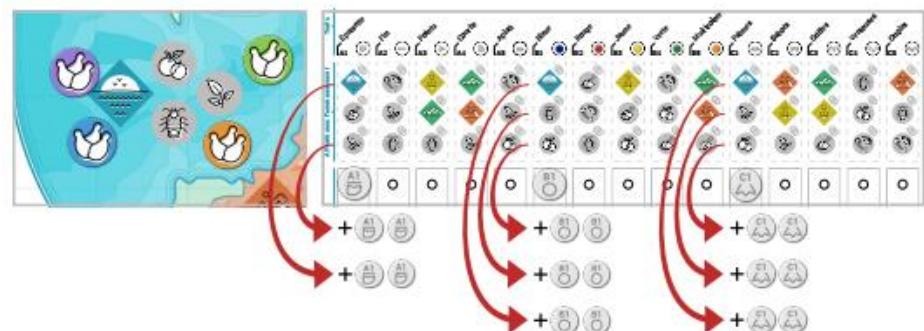


Darwinium game: Approaching randomness in ToE

Random probability



Contingency



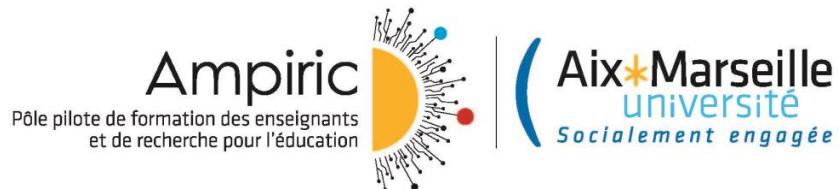
Recherche en éducation

COLLOQUE INTERNATIONAL
en hommage à JACQUES GINESTIÉ

4 au 6 octobre 2023

Research question

How the elements of the Darwinium game are perceived by young people and what effects the specificity of a set of instructions has on their understanding of the rules of the game ?



Methods

Material

Response modalities

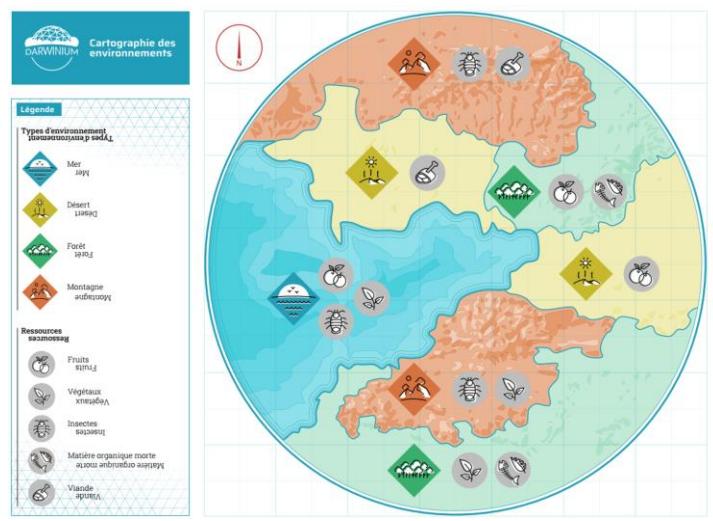
Design

Participants

Procedure

Material

- 10 elements from the game (rules, board game and cards)



En montagne et dans les déserts, les joueurs qui ont des jetons peau bleue (B1), rouge (B2) ou verte (B4) en perdent 1 de chaque. Les joueurs qui ont des jetons peau jaune (B3) ou multicolore (B5) en gagnent 2 de chaque.



Response modalities

- Different modalities of responses (open question, forced choices, drag and drop items)

Cite une particularité associée aux caractéristiques des animaux mentionnée dans l'une des 3 cartes que tu viens d'observer.

Réponse du participant...

Suite

Coche les symboles qui correspondent aux traits de caractère de la population de départ.

- | | | | | | |
|---|--------------------|---|------------------|---|-----------------------|
| <input type="checkbox"/> A1  | A1 – Bec épuisette | <input type="checkbox"/> B1  | B1 – Peau bleue | <input type="checkbox"/> C1  | C1 – Pattes palmes |
| <input type="checkbox"/> A2  | A2 – Bec fin | <input type="checkbox"/> B2  | B2 – Peau rouge | <input type="checkbox"/> C2  | C2 – Pattes sabots |
| <input type="checkbox"/> A3  | A3 – Bec pointu | <input type="checkbox"/> B3  | B3 – Peau jaune | <input type="checkbox"/> C3  | C3 – Pattes griffes |
| <input type="checkbox"/> A4  | A4 – Bec courbe | <input type="checkbox"/> B4  | B4 – Peau verte | <input type="checkbox"/> C4  | C4 – Pattes ventouses |
| <input type="checkbox"/> A5  | A5 – Bec plat | <input type="checkbox"/> B5  | B5 – Peau orange | <input type="checkbox"/> C5  | C5 – Pattes ongles |

Suite

Recherche en éducation

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Design

We choose a 2x1 design with 'Instruction' as 2-level factor ('detailed' / 'global')

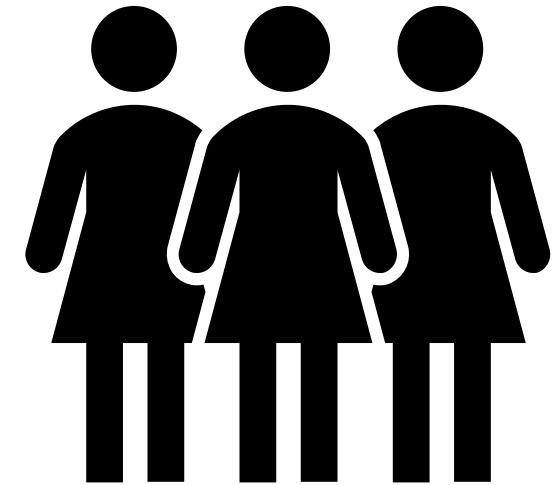
Detailed : « Discover the story of the game presented in the image on the first page of the research booklet, then find out what characterises the starting population of animals. »

Global : « Explore the image on the first page of the research booklet, which tells the story of the game and describes the starting animal population. »

Participant

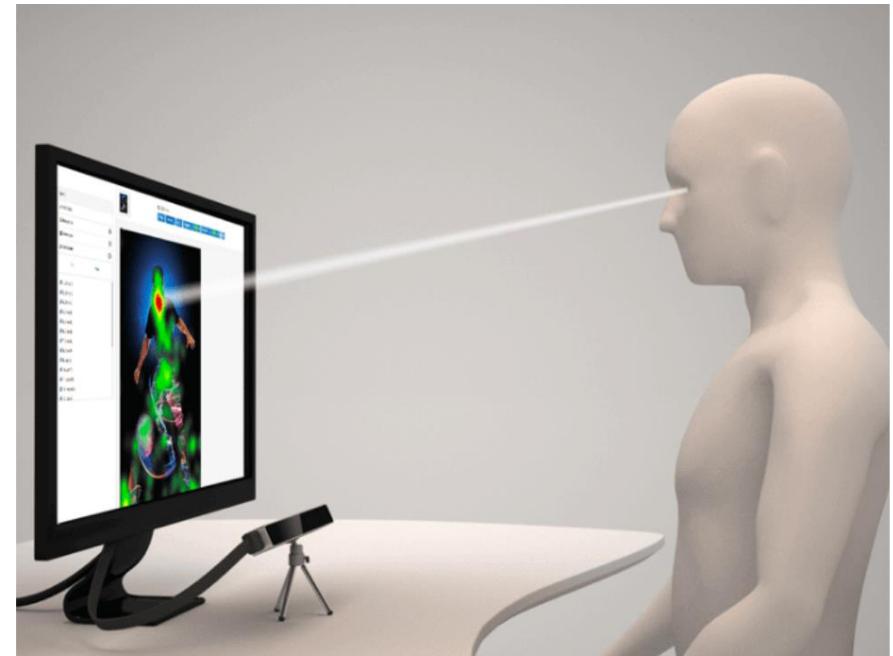
➤ 8 volunteer student

- naive to the purpose
- 6 girls + 2 boys
- from 14 to 25 y.o (M=21; SD = 3.9)
- normal or corrected-to-normal vision



Procedure

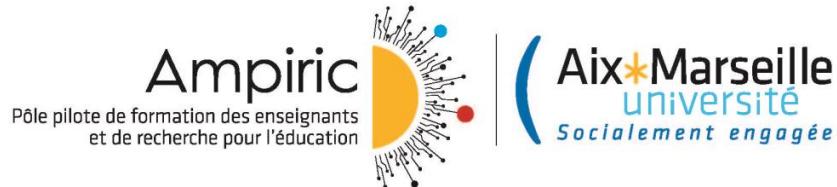
- Tobii Pro Fusion 250
- 27" screen
- at 144 Hz
- Webcam Logitech



Explore l'image du plateau central pour
comparer les ressources qui se trouvent dans
les mêmes types d'environnement.

Suite

① Appuis sur la touche ESPACE quand tu as fini !



Results

Comprehension (accuracy & response time)
Eye tracking (heatmaps)

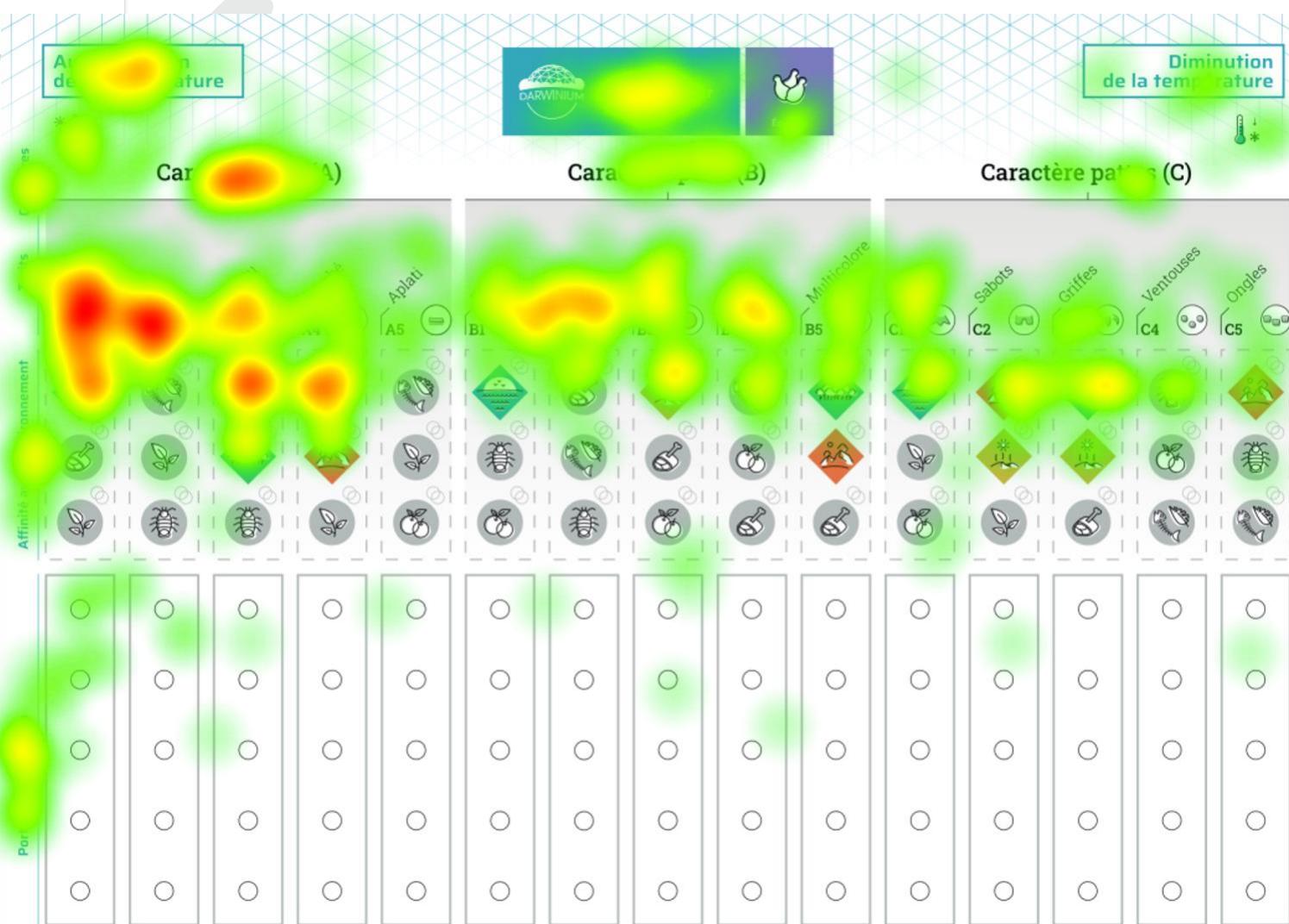


Comprehension (accuracy & response time)

Accuracy (%)	Mean	SD
Instruction +	70.79	38.77
Instruction -	70.31	32.55

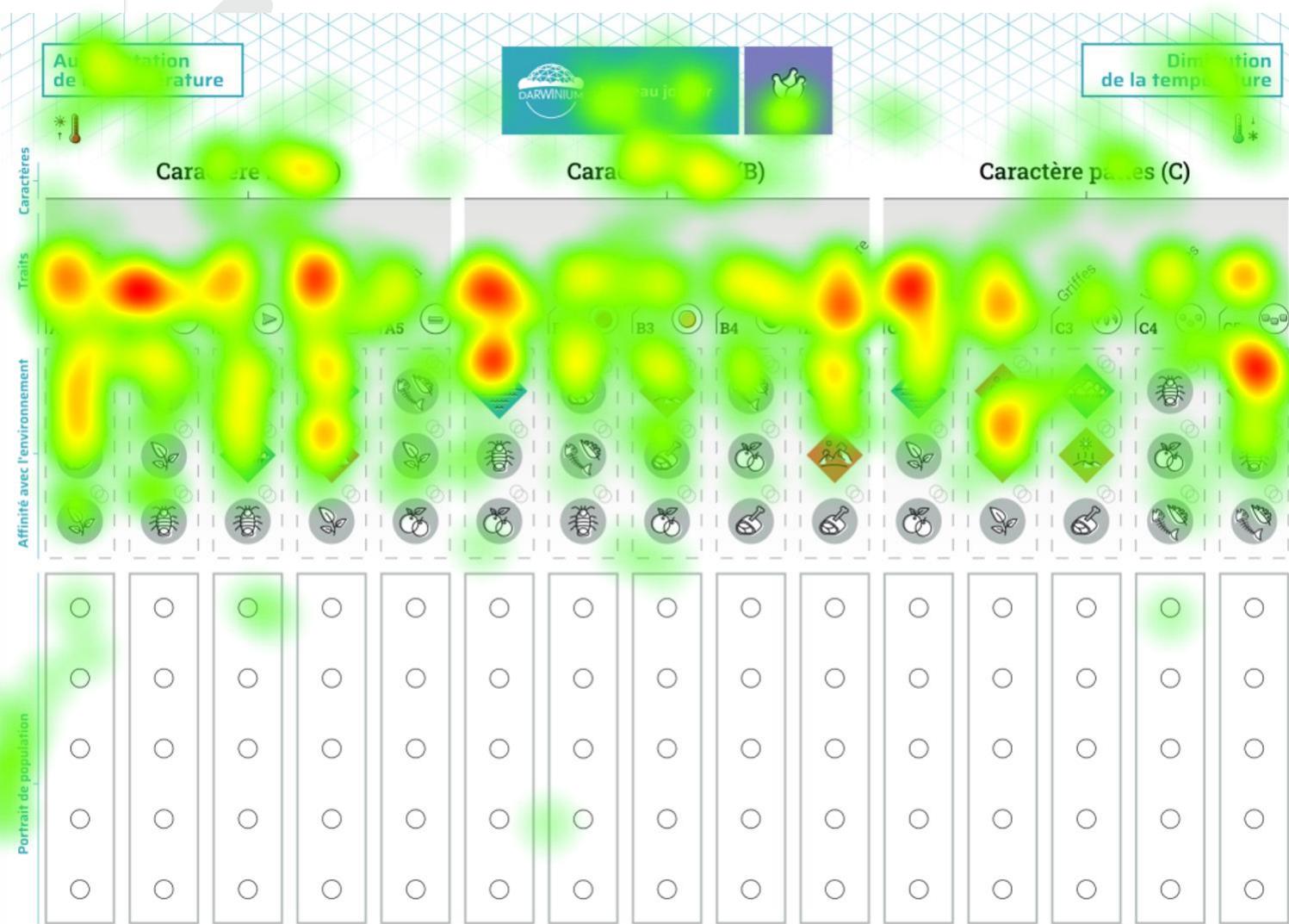
RT (s)	Mean	SD
Instruction +	60.21	14.46
Instruction -	63.14	35.65

Eye tracking (heatmaps)



Detailed instruction

Eye tracking (heatmaps)

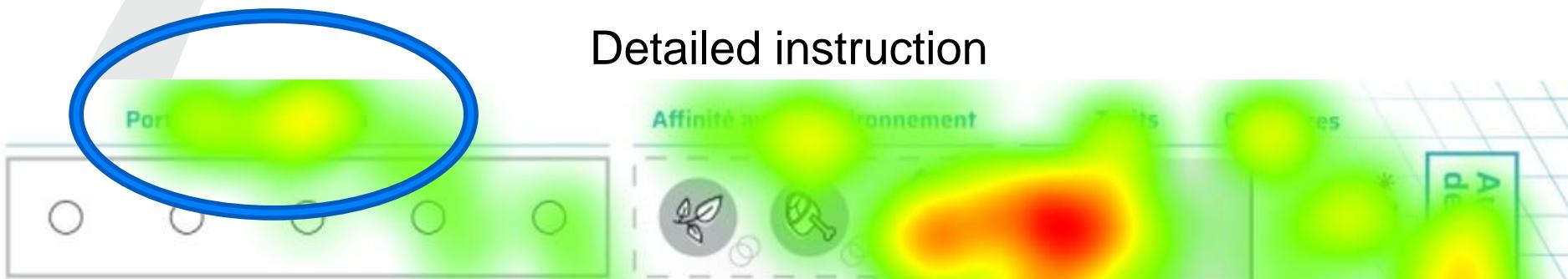


Global
instruction

Eye tracking (heatmaps)



Detailed instruction



Global instruction



Eye tracking (heatmaps)



Detailed instruction



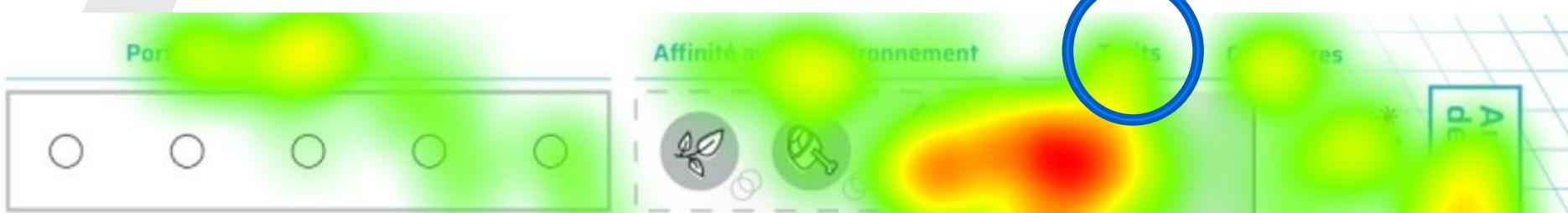
Global instruction



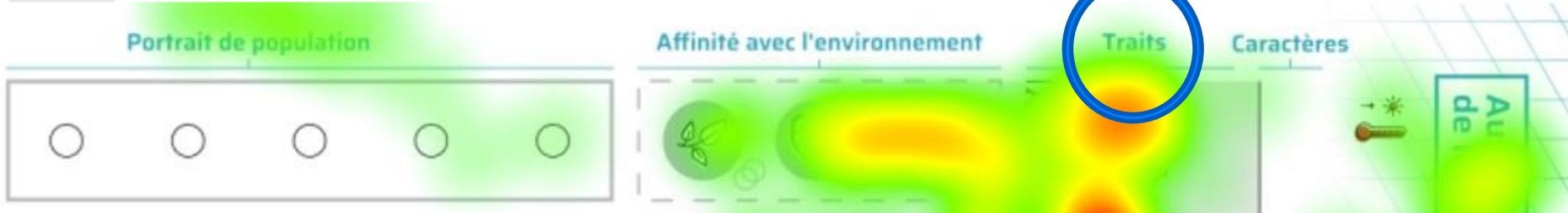
Eye tracking (heatmaps)



Detailed instruction



Global instruction



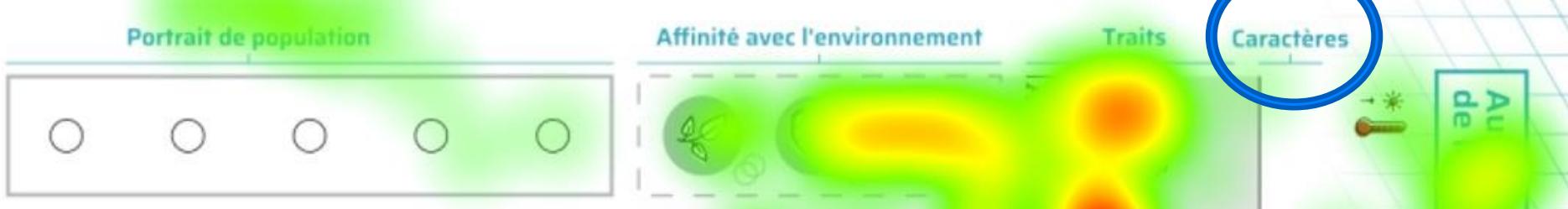
Eye tracking (heatmaps)

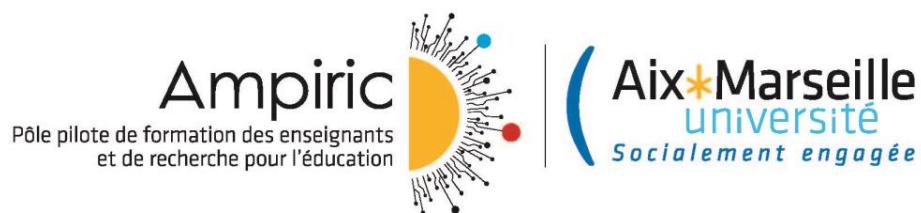


Detailed instruction



Global instruction





Conclusion

In conclusion
Perspectives

Conclusion



Detailed instructions seem to allow children to access faster to the information.



However, the accuracy seems to be equal in both cases.



The game's elements seem to be self-sufficient for pupils to play but teachers can improve the experience with focused instructions.

Perspective

- To continue “proof of concept” by improving the design and the population