Examen 8 novembre 2021
Techniques d'Interaction et Multimodalité

NOM : _____   Prénom : _____

Part A. True or false (3 points) For each statement, indicate if it is true (O) or false (X)

Q1. Concerning user perception in information visualization :

_____ Users don't have the same capacity for color perception;
_____ According to the Fitts' law, the size of a target affect the time to reach it
_____ There are only eight visual variables for coding information visually.
_____ The persistence of information in the auditory memory is longer than in the visual memory

Q2. About visualization strategies :

_____ Transfer functions are used to adapt the information to the screen
_____ Reducing the size of information and the amount of information cannot be used together
_____ They are used to adjust the amount of information to the size of the screen
_____ Navigation and Zooming are two techniques for exploring the information space

Q3. With respect to the visualization pipeline :

_____ Mapping of information to visual variables is typically done at the step of rendering
_____ The user activity only affects the steps of visual rendering
_____ The user activity is out of the steps of data acquisition
_____ The user activity might affect all steps of the visualization pipeline

Q4. With respect to the data dimensions :

_____ Tables, graphs and trees are examples de multidimensional data
_____ All information visualization techniques represent data as a regular grid
_____ The number of dimensions of an information visualization technique corresponds to the number
of pixels used in the rendering

Q5. With regards to motion sickness in virtual reality environments :

_____ Young people are more susceptible to motion sickness than medium-aged people
_____ The joystick is the best modality to use for navigation to avoid motion sickness
_____ The main factor that effects motion sickness is the physical condition of the user
_____ Headsets with 6DoF can ease motion sickness better than headsets with 3DoF

Part B. Multiple choice (3 points)

Q6. Mark the elements with respect to the Scheidemann's visualization mantra :
(A) Transforming (B) Overview first (C) Zoom (D) Details on demand (E) None of options are correct.

Réponse : _____

Q7. What are the types of augmented reality?
(A) Target-based AR   (B) Targetless AR   (C) Vision-based AR   (D) Location-based AR

Réponse : _____

Q8. Which interaction modalities are designed to address the problem of grasping objects that our <u>out of the physical reach of the user</u>?
(A) Hand / gesture recognition   (B) Clutching to adjust the control space
(C) Occlusion selection   (D) Ray casting

Réponse : _____

Q9. Which of the following trajectories would be <u>noticed</u> by an average user for redirected walking?
A) 6 meters of perceived meters for an actual trajectory of 7 meters
B) 180 degrees of actual rotation for 110 degrees of perceived rotation
C) over 60 degrees of deviation on a curvature of 30 meters
D) 100 degrees of perceived rotation for 70 degrees of actual rotation

** Recall that the range of <u>imperceptible</u> translation gain is 0,86 -1,26 ; rotation gain is 0,67-1,24 ; curvature gain is 0.024

Réponse : _____

## Part C. Matching (3 points)

Q10. Indicate for following statements their corresponding concepts: immersion (I), presence (Pr), plausability (Pl), embodiment (E)
_____ I can fully control the limbs of my virtual avatar
_____ The motion capture system accurately predicts my movements
_____ I feel like I'm placed in this virtual world
_____ The rubber hand illusion
_____ The non-player character greets me warmly when I approach
_____ Everywhere I look, the virtual world surrounds me
_____ The haptic feedback on the controllers indicate when I touch something
_____ The virtual character's animations are repetitive and predictable

*Q11. Complete the blanks in the following sentence with **technology**, **emotion**, or **psychology***

immersion concerns _____ while presence concerns _____

Q12. Observe the image below. Which trajectories correspond to each of the following navigation methods (indicate A-F) :

A

B

C

D

E

F
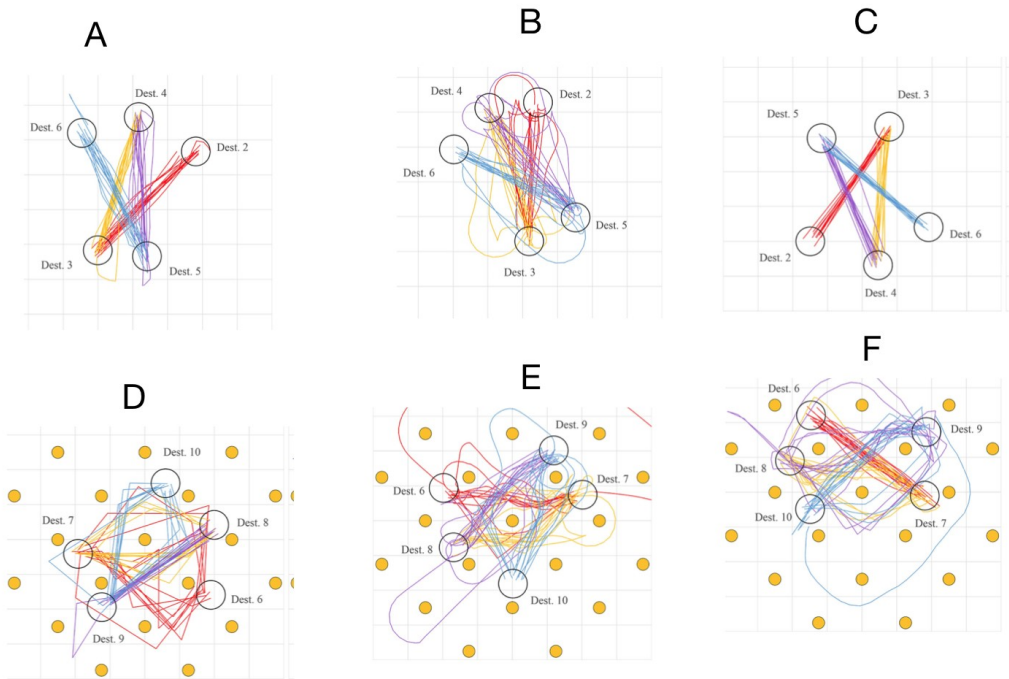
Redirected walking : _____
Teleportation : _____
Joystick: _____

Q13. Observe the below images. Choose for each image the term that best describes the inner data categorization of information for each from the folllowing list :

Graph (Network)   Graph (Tree)   Table   Geometry   List   Grid
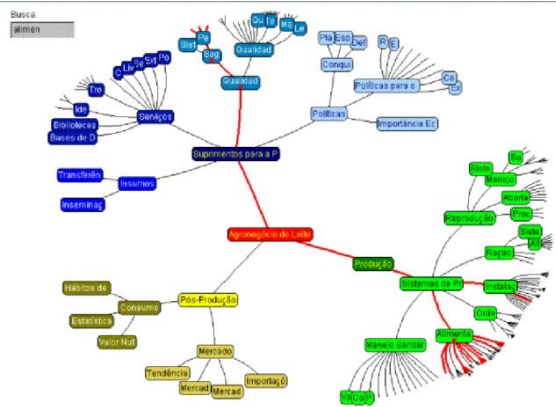
Réponse : _____   Réponse :_____

Part D. Short questions (2 points) : Answer the following questions in 1 sentence

Q14. How does augmented and virtual reality differ?

Q15. Provide an exemple of « fusion » and « fission » in multimodal interaction techniques.

Part E. Long questions (10 points) : Answer the following questions in 4-5 sentences

Q16. What are the differences between « focus + context » and « overview + details ». Illustrate both.

Q17. Explain the role of the three spaces (namely communication, coordination, and production) that compose the concept of cooperative work (i.e. tréffle des collecticiels).

Q18. Compare augmented reality glasses and a virtual head mounted display in terms of extent of world knowledge, reproduction fidelity, and extent of presence metaphor.

Q19. What is the significance of Fitt's law and the optimized initial impulse model for selecting and interacting with objects in mixed reality? Use some pointing and selecting modalities to prove your point.

Q20. Why is occlusion a problem in augmented reality? What are the solutions?