

Developing a medical training game for visual assessment of head deformities in infants

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Motivation

CRANIAL DEFORMITIES

- Abnormal head shape occurring in infants caused by forces acting in the skull;
- 1 in 5 infants suffer from cranial deformities.



FIRST LINE OF DIAGNOSIS

- Visual evaluation of the infant's head
 - Not a straightforward task;
 - Highly dependent on the observer's experience;
 - Highly prone to observer variability;
 - Can mislead the diagnosis of cranial deformities.



Development of a serious game to train medical professionals to perform head shape evaluation through visual inspection

Head shape inspector - Play to train!

Head Shape Inspector

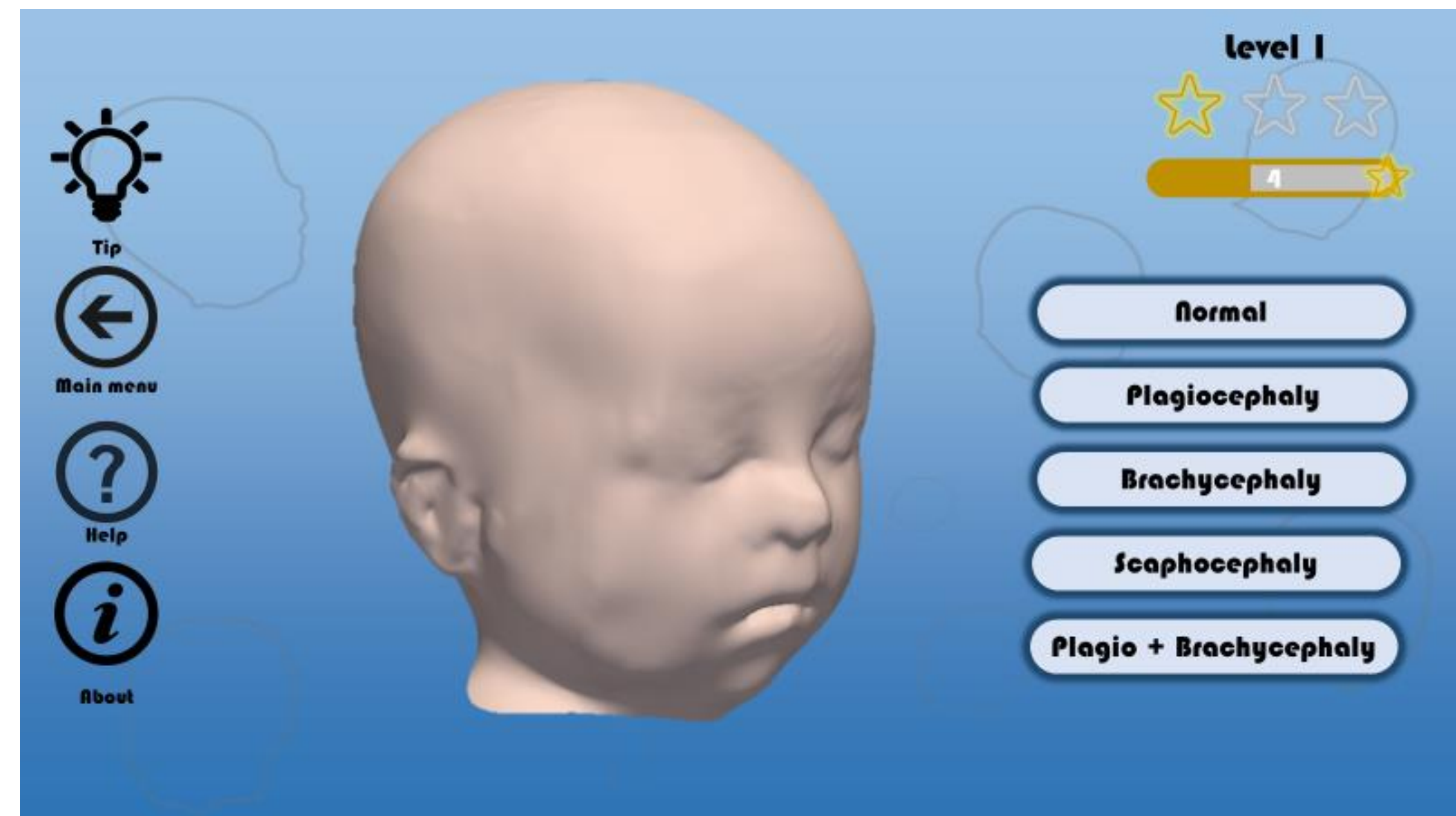
GAME DESCRIPTION

- Interactive, three-dimensional, and single-player game;
- The player assumes the role of a medical professional that has to evaluate the head shape of an infant;
- The player has to correctly classify a given head shape according to its deformity.



Is this head normal?

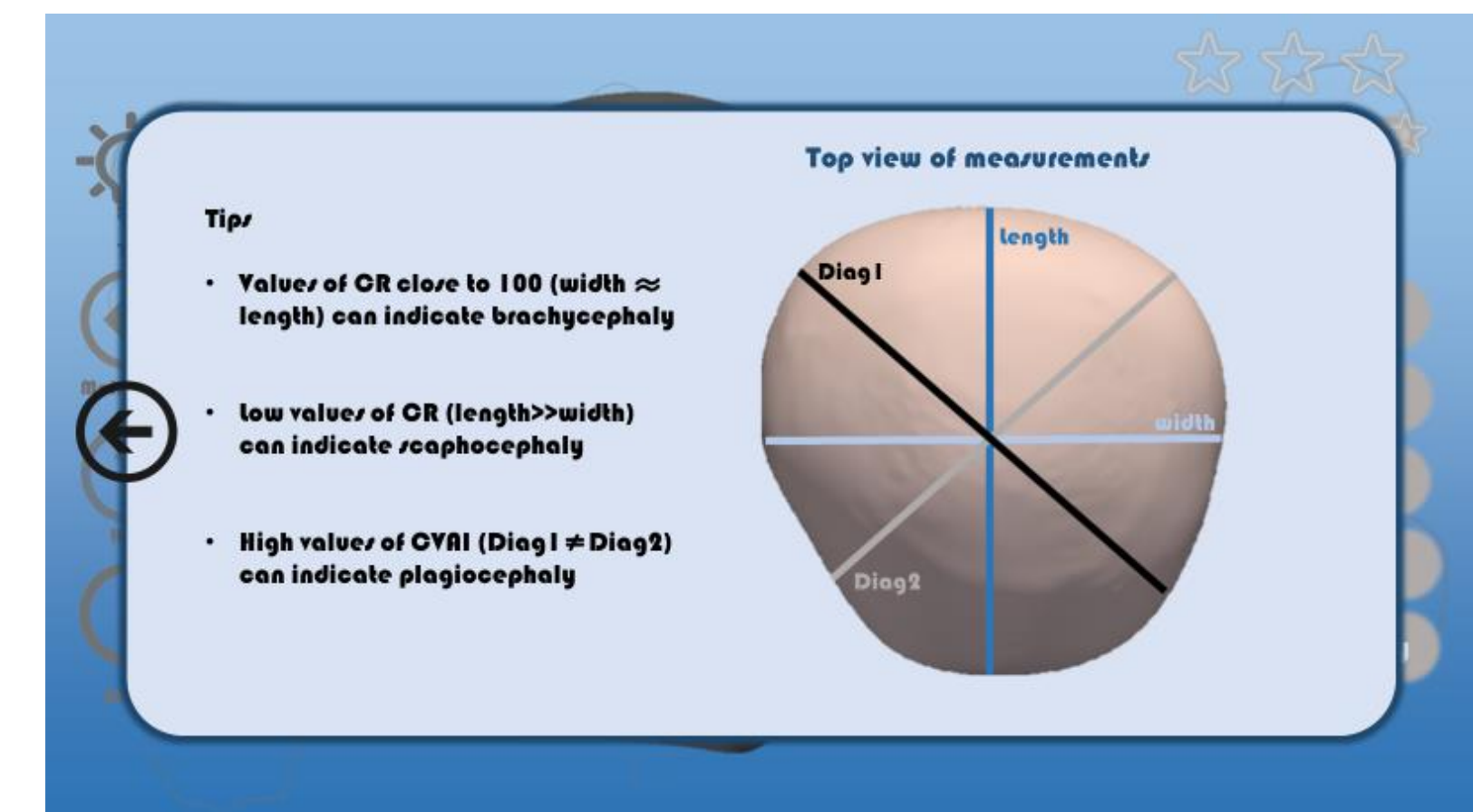
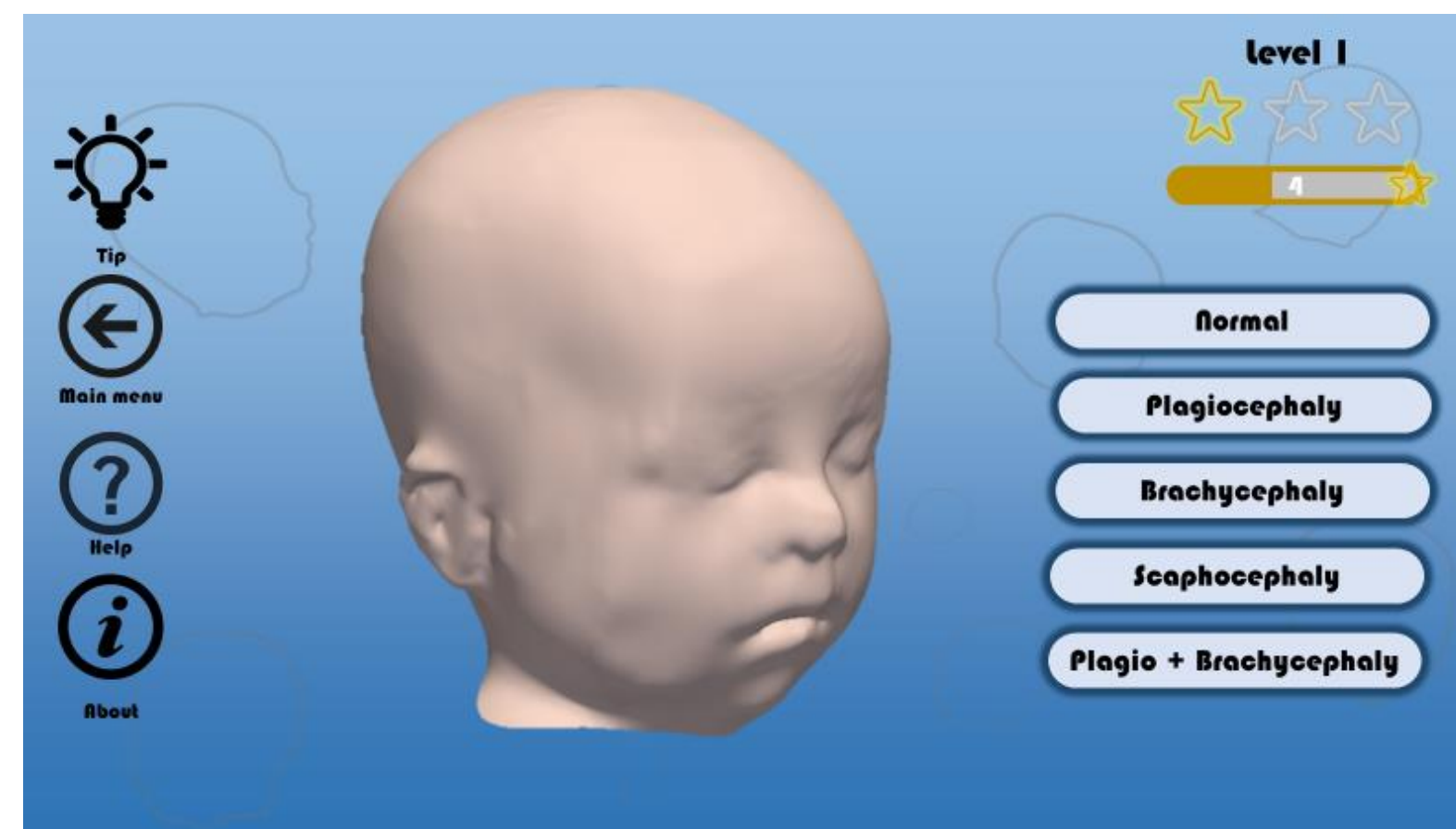
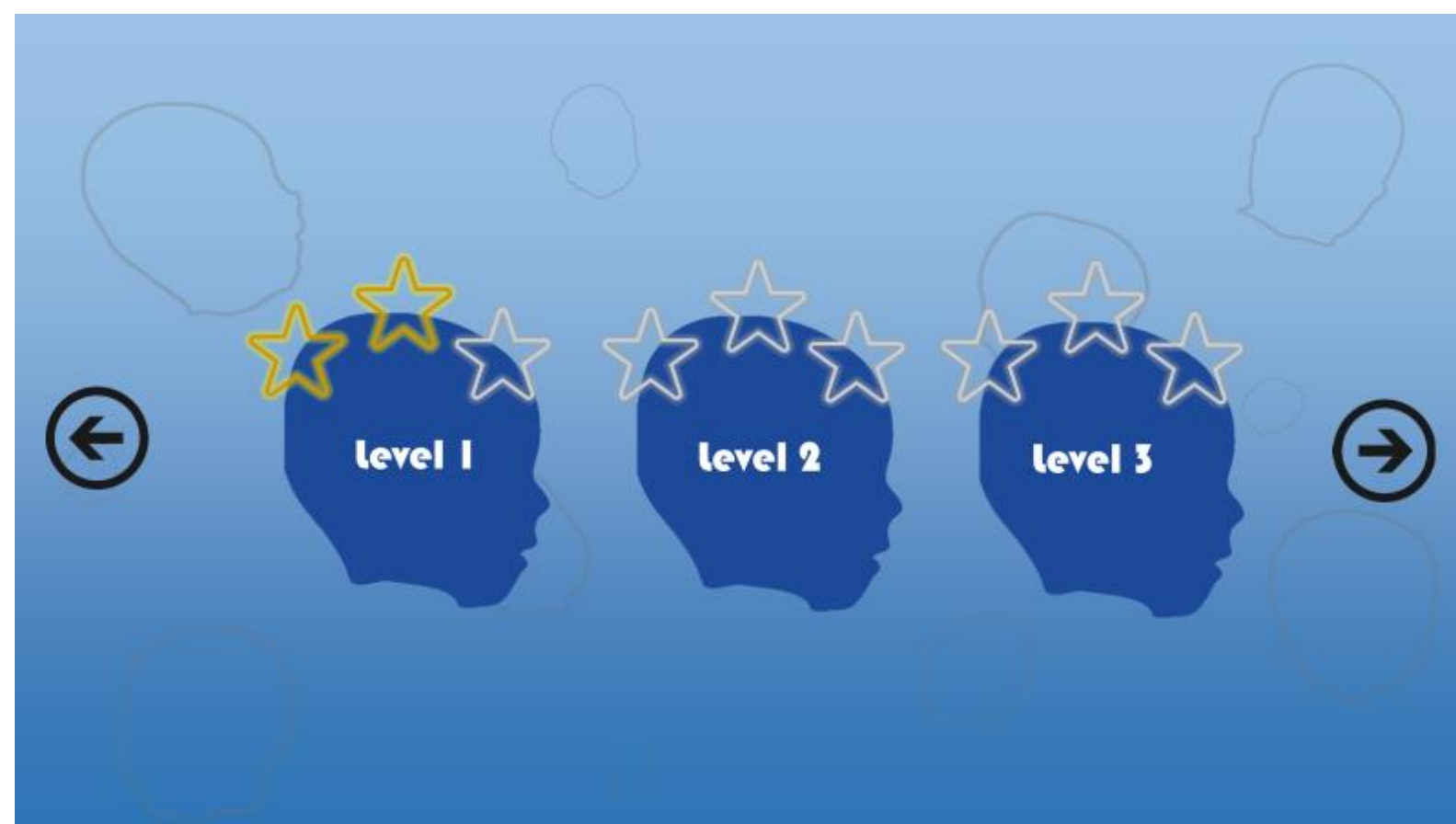
What is the type of deformation of this infant?



Head Shape Inspector

GAME WORKFLOW

1. Random assortment of a head surface;
2. Game-player interaction for visual assessment of the head shape;
3. Requirement of the tip to visualize the anthropometric measurements (optional);
4. Selection of the deformity;
5. Feedback to the player;
6. Score attribution (+5 points if the analysis is correct, 0 points if not, and penalization of -2 points if the tip is used).



Experiments and Results

PRELIMINARY EVALUATION – EXPLORATORY STUDY

- Study population of four observers divided into two groups:
 - The players and the non-players;
 - The players played the visual inspector game – categorization of 90 head models;
 - The non-players group did not play the game;
- A set of 15 independent head models was evaluated by both players and non-players afterward;
- The performance of all observers to visually categorize the testing head shapes was evaluated against the ground-truth.

Group	Observer	Accuracy (%)	<i>k</i> -coefficient
Players	1	86.7	0.83
	2	80.0	0.75
Non-players	3	60.0	0.49
	4	66.7	0.57

Good agreement

Fair agreement

Thank you!

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