

Feedback on Touch Screen User Interfaces

Visual



Auditory



Haptic



Mobili-T Case Study



The goal of the Mobili-T project is to design a mobile swallowing therapy device for patients with swallowing impairments. A simplified form of the therapy consists of multiple swallows and a swallow that is held for a period of time.

The ideal is to reduce the complexity of the necessary equipment to a portable device such as a touch screen tablet and the adhesive pad placed on the chin for the swallowing muscle measurements.

Visual Feedback



Visual feedback is anything that would be seen on the screen of the device that occurs when the user interacts with the touch screen.

Auditory Feedback



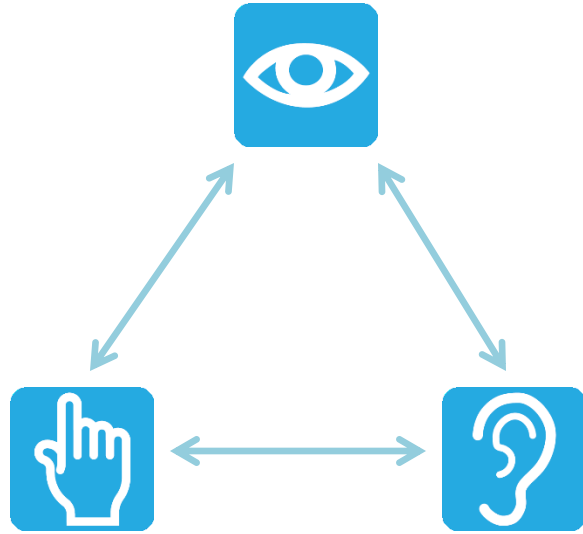
Auditory feedback is the sound emitted by the device when the user interacts with the device.

Haptic Feedback



Haptic feedback is about touch. For the most part, it is simple vibrations made by the device.

Multi-Modal Feedback



Any combination of the three main types of feedback.

Multi-Modal Feedback

Four combinations were studied.



Visual



Visual + Auditory



Visual + Haptic

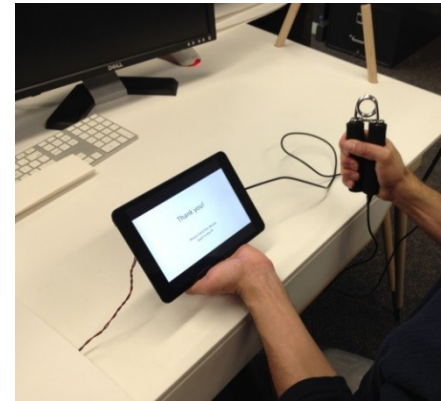
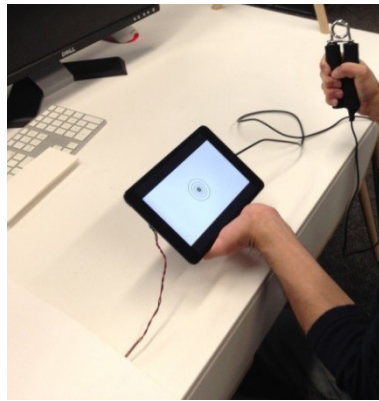
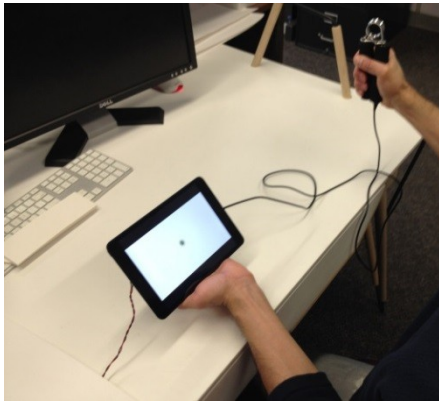


Visual + Auditory + Haptic

Study

The task consists of using a hand grip and doing two types of exercises:

- 1) The first exercise is holding the hand grip closed for a length of time while observing the feedback.
- 2) The second exercise is opening and closing the hand grip a number of times and observing the feedback.



Study

Grip and Hold

Participant hold hand grip closed until the circle on the screen touches the edge of the screen.

The following slides are an example of the simulated Visual and Auditory Feedback received by participants

Visual + Auditory

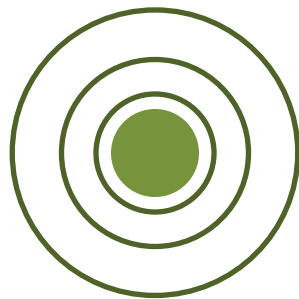
Grip and Hold



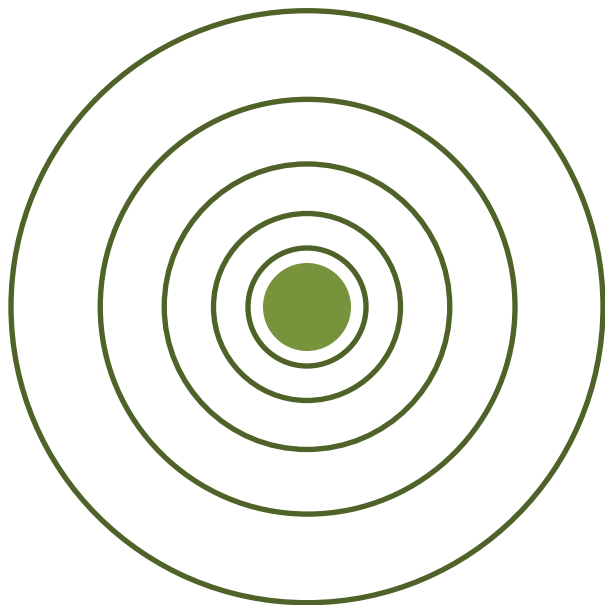


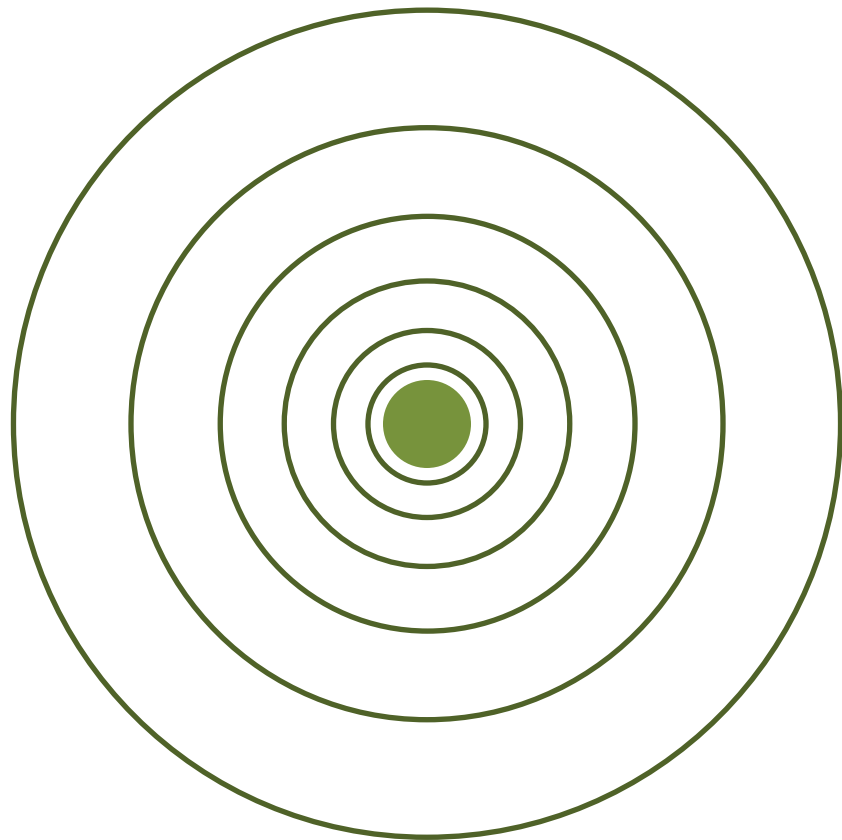


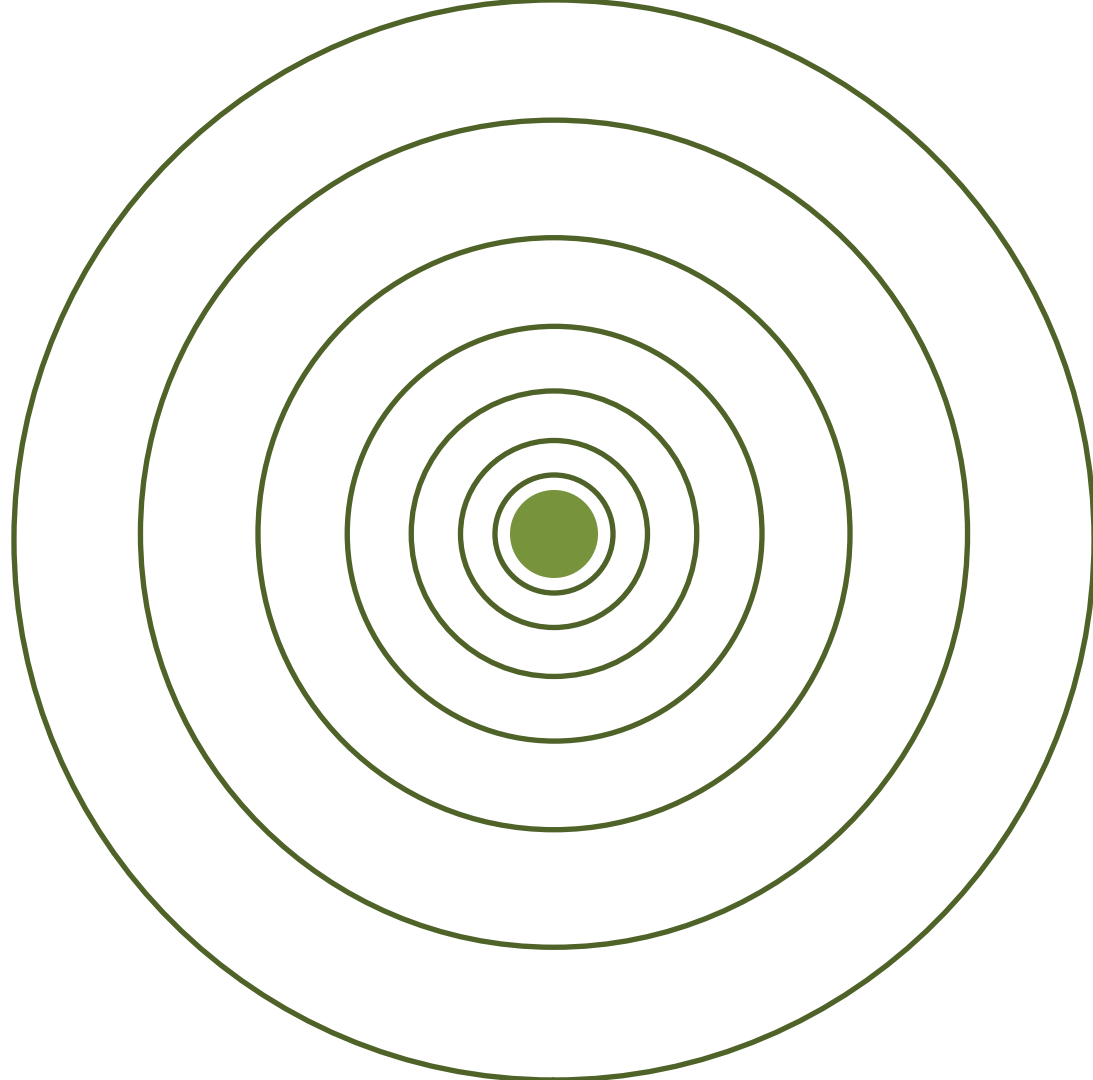




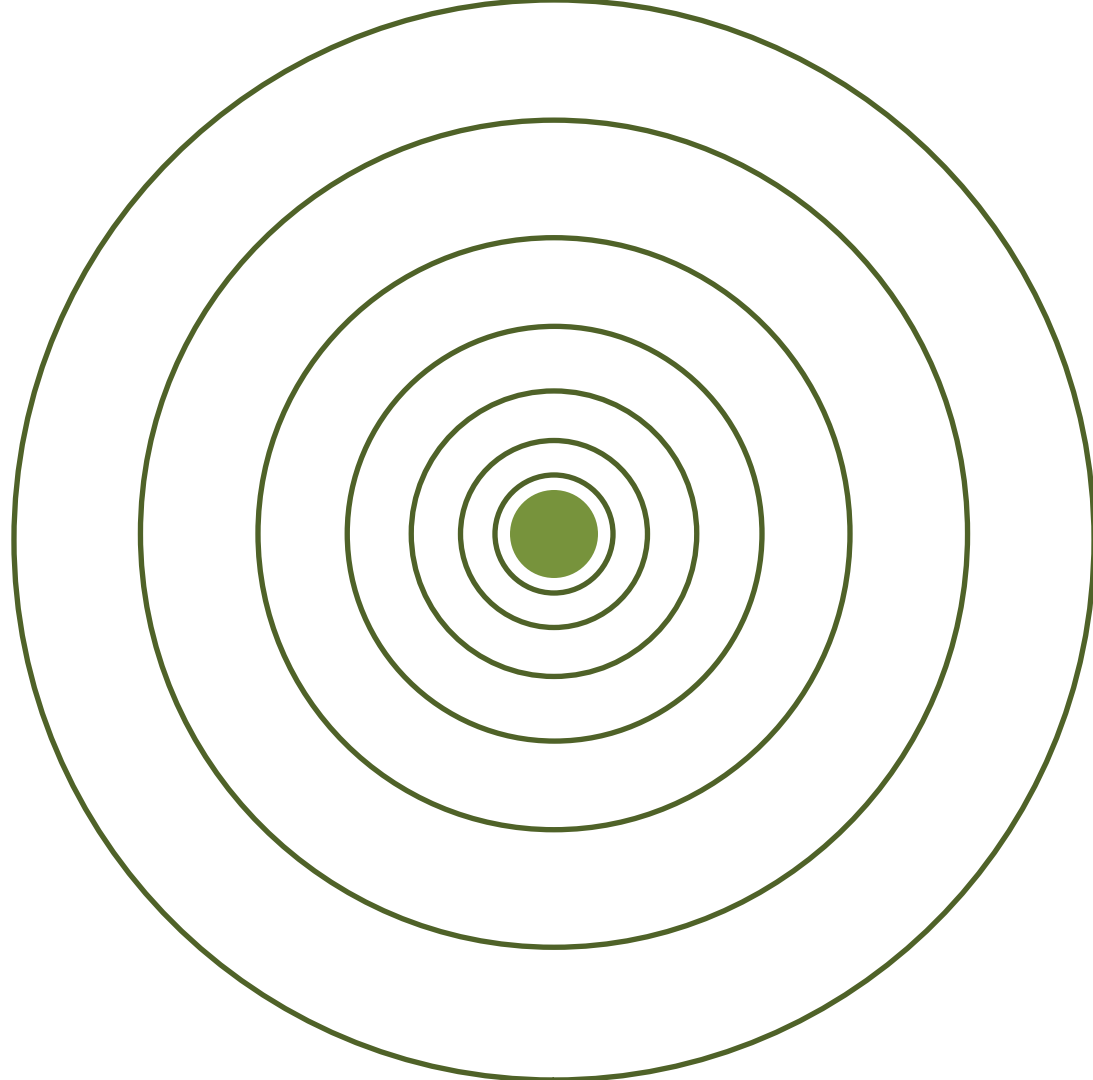


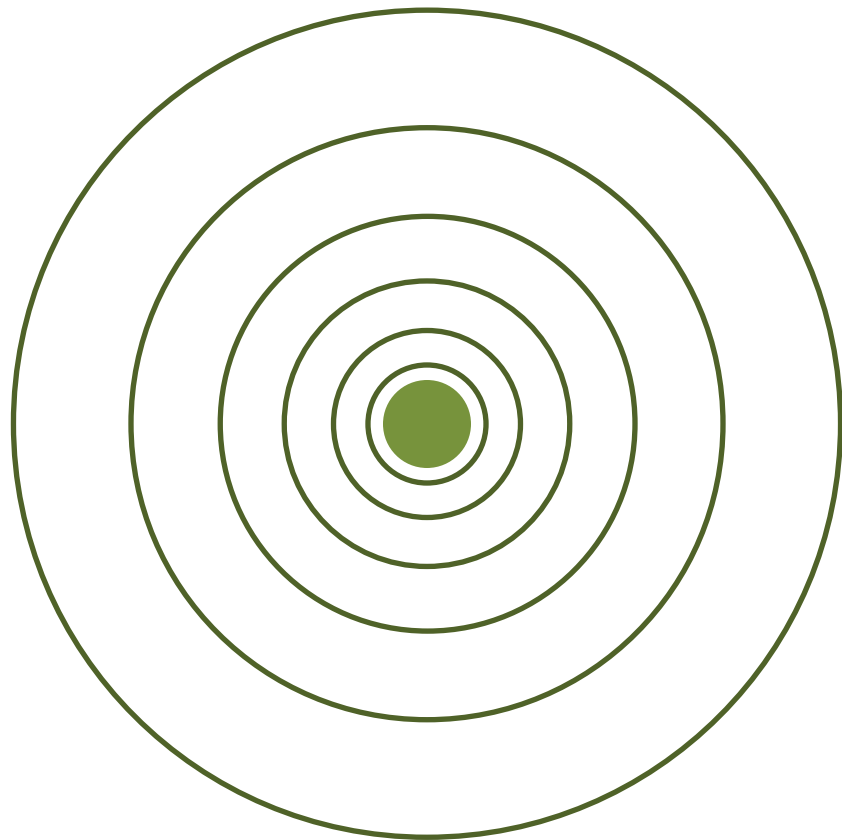


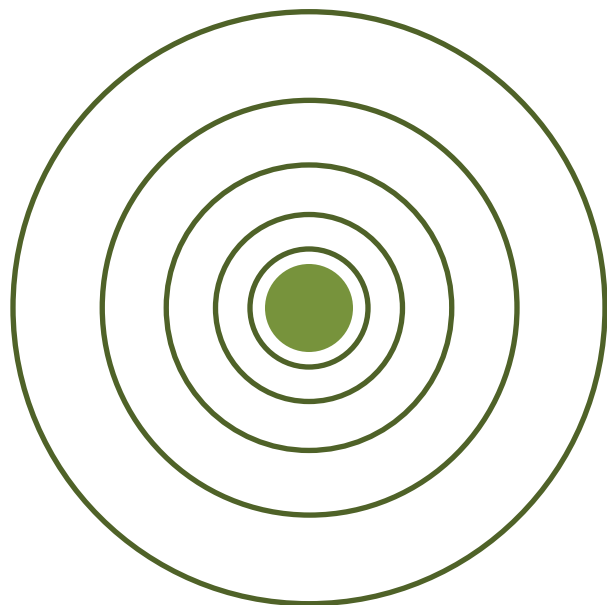




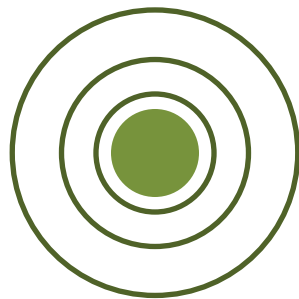




















Thank you!

Please hand the device
back to the PI

Study

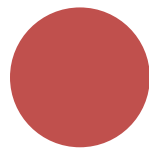
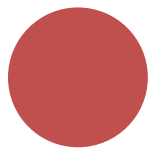
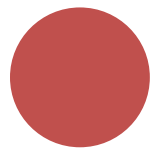
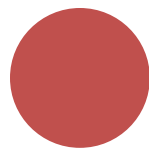
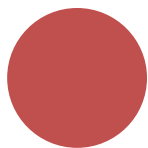
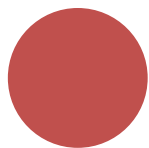
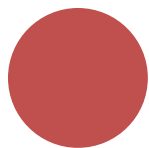
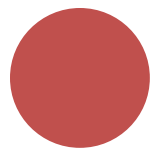
Grip Strength

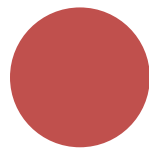
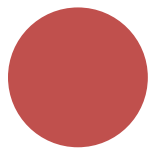
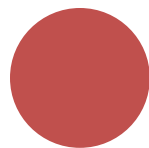
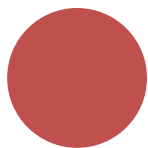
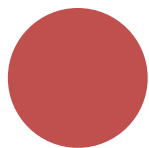
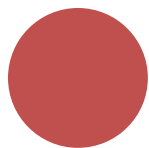
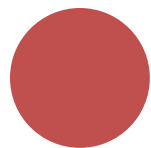
Participant opens and closes the hand grip until all the red circles on the screen become green.

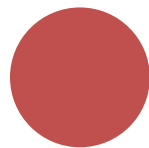
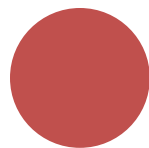
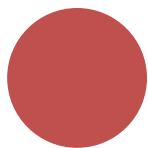
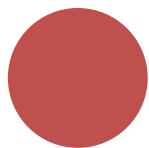
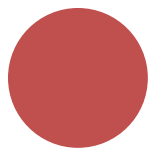
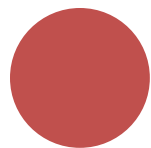
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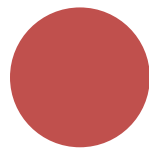
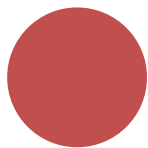
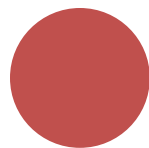
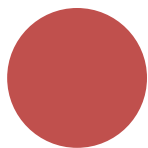
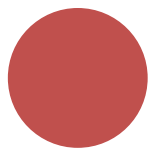
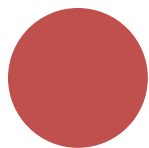
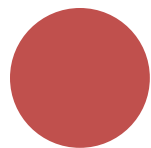
Visual + Auditory

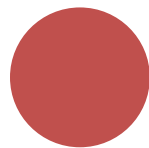
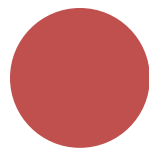
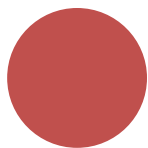
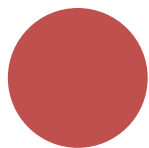
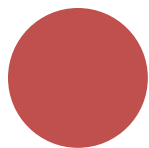
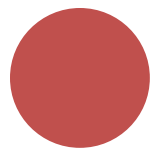
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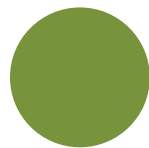
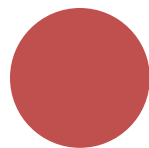
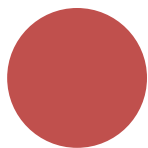
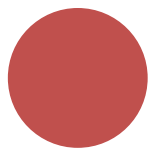
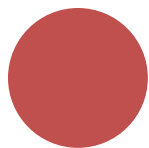
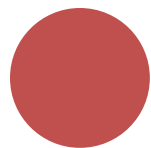


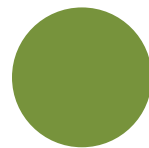
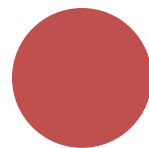
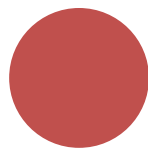
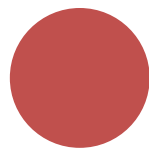
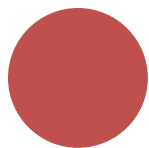


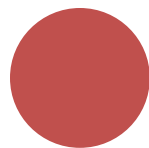
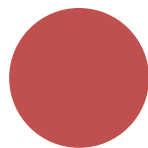
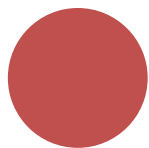


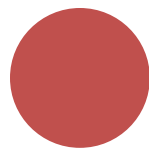
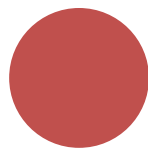
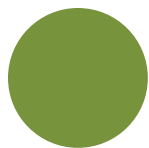


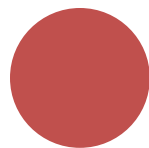


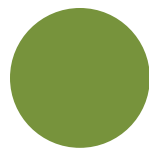




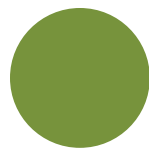


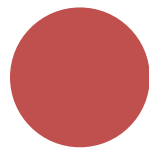
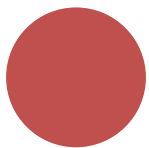
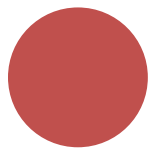
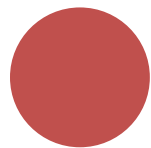
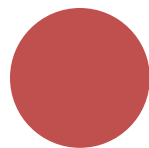
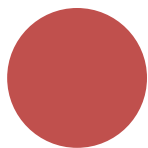
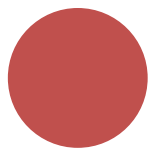
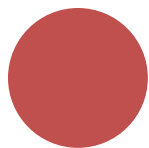
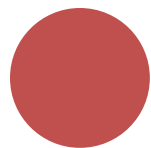












Thank you!

Please hand the device
back to the PI

Design Solutions

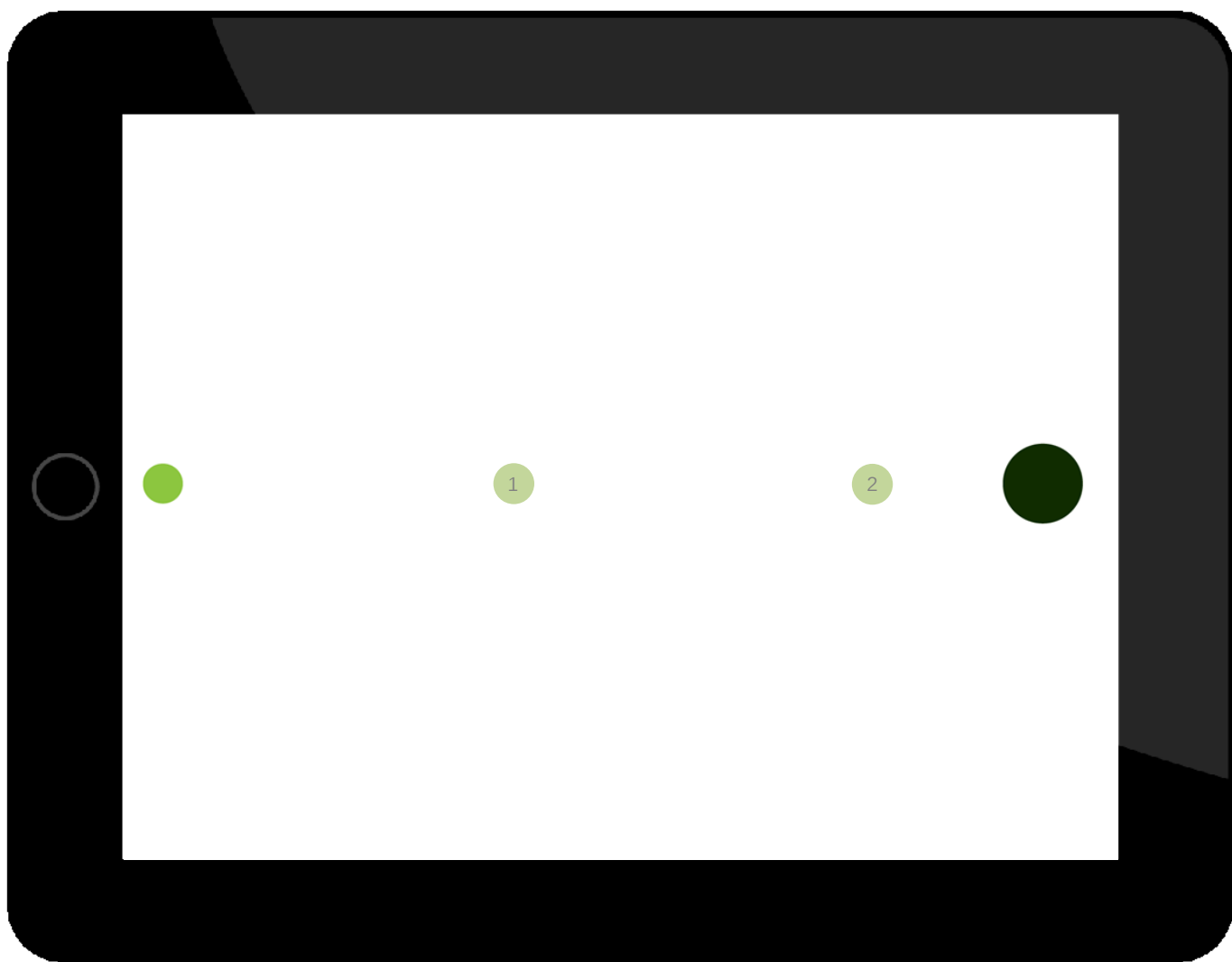
Reach the Target

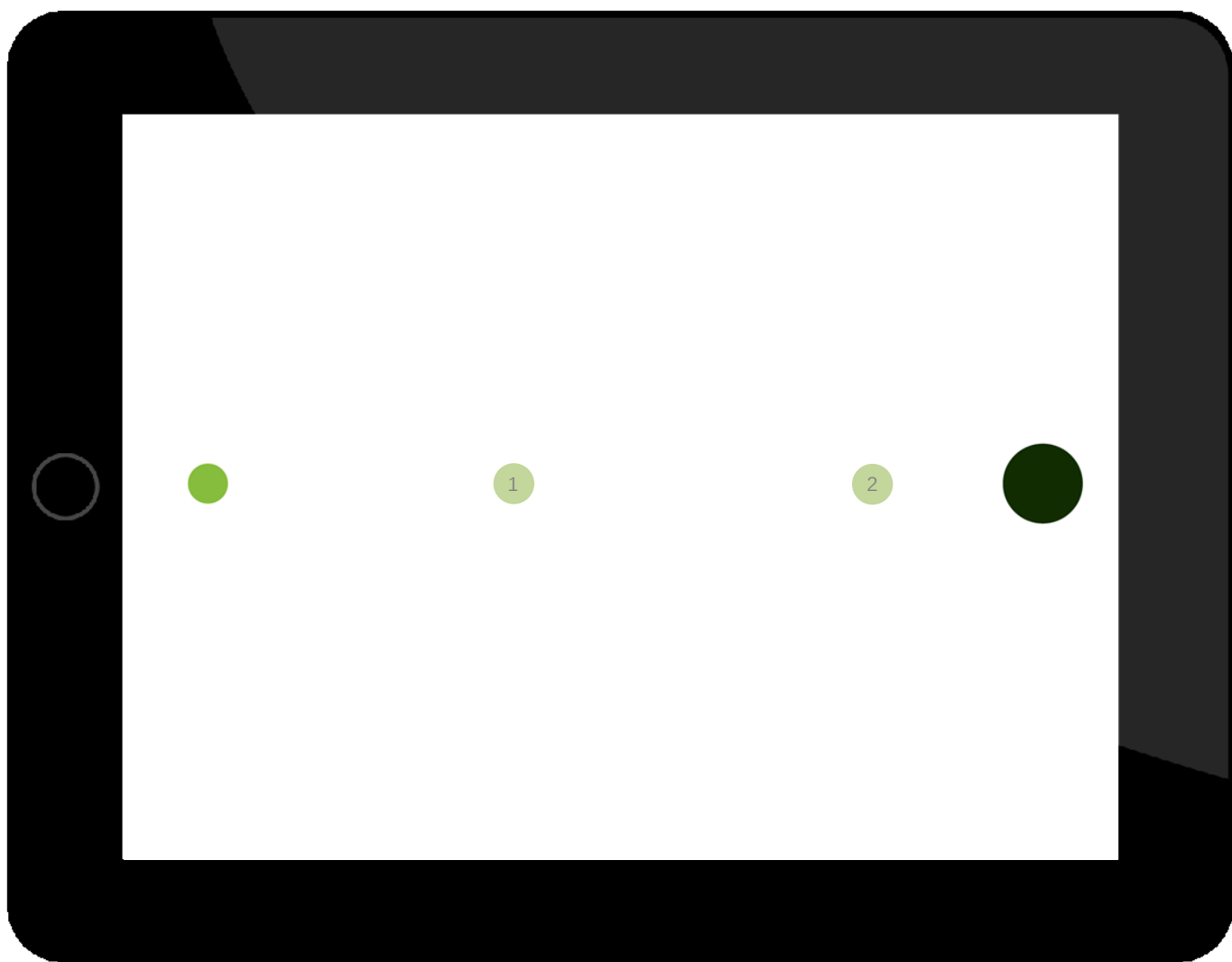
Goal: To reach the target at the far end of the screen.

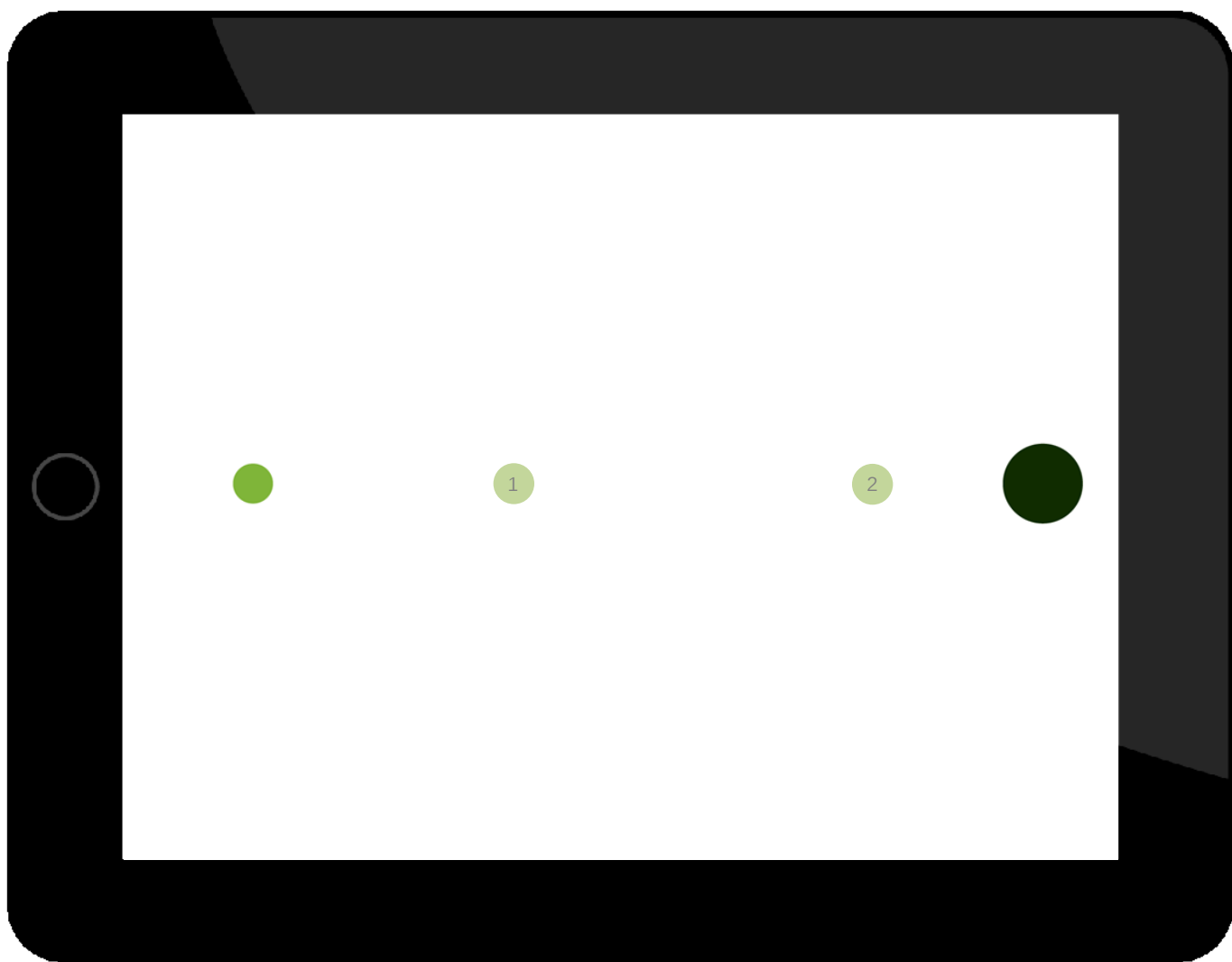
Purpose: Increase the concentration of the patient by focusing on the movement of the item on the screen.

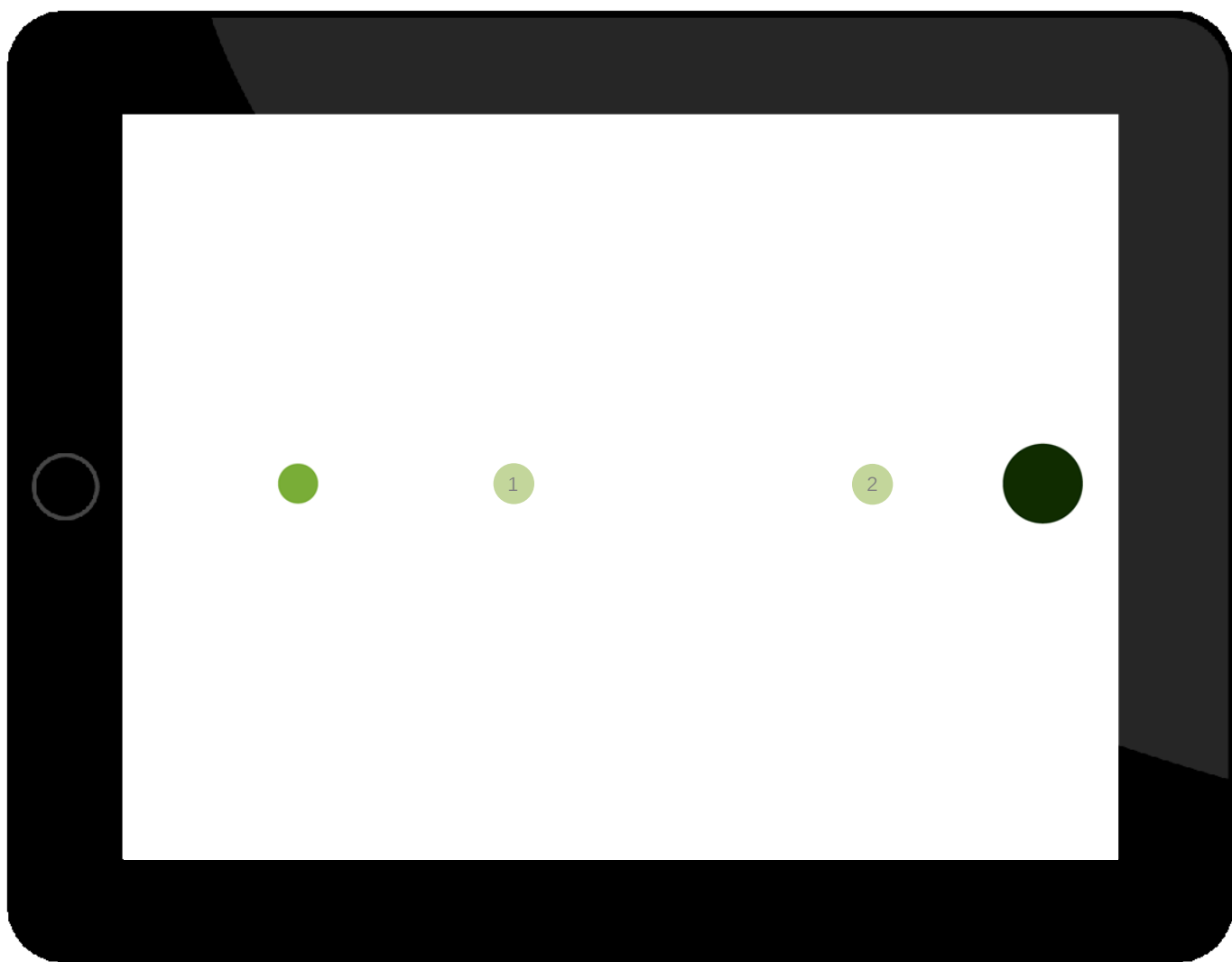
Swallow Hold: As patient holds swallow, the small circle moves left to right toward the target.

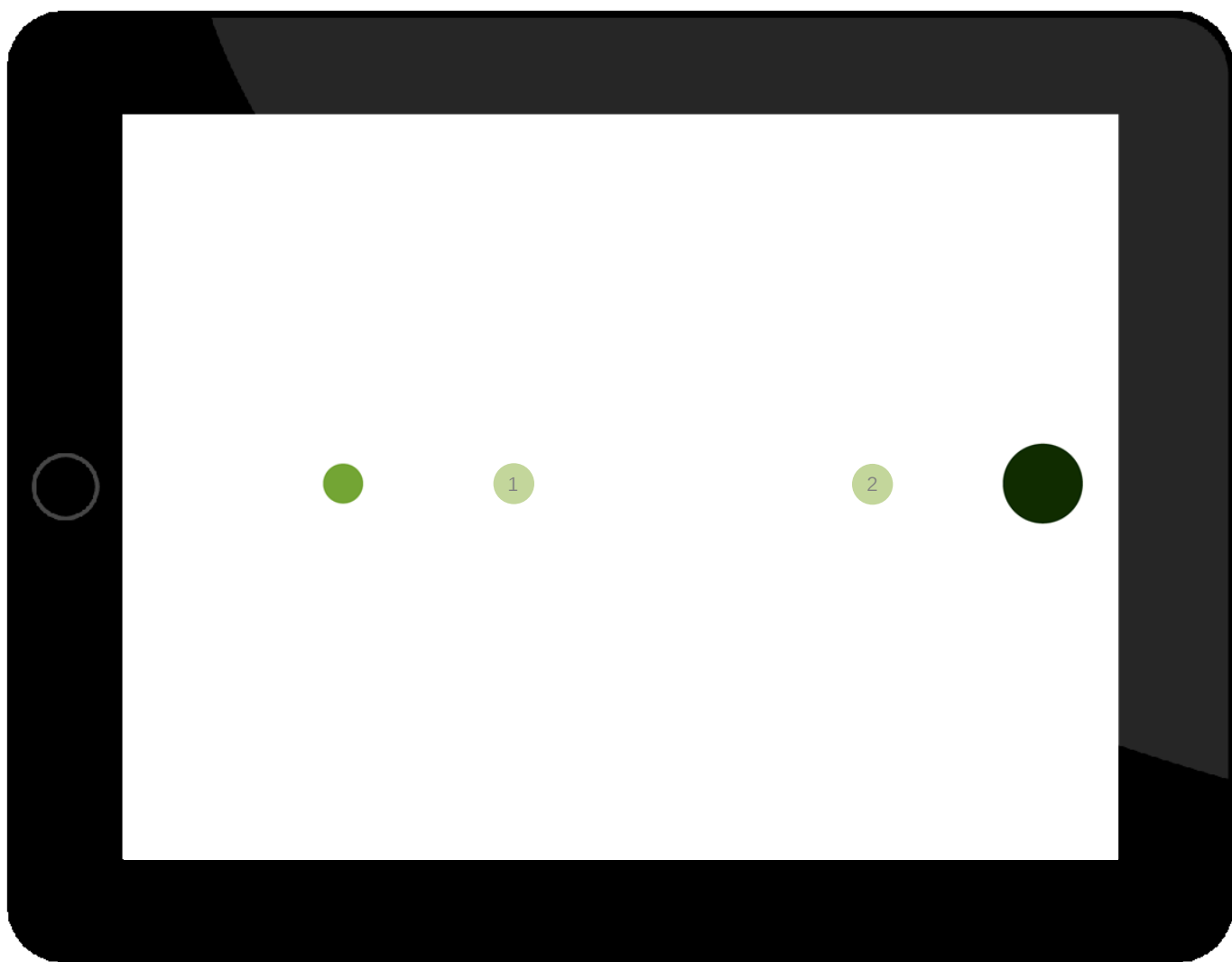
Previous Attempts: The faded circles with numbers indicate previous swallow hold attempts in this session.

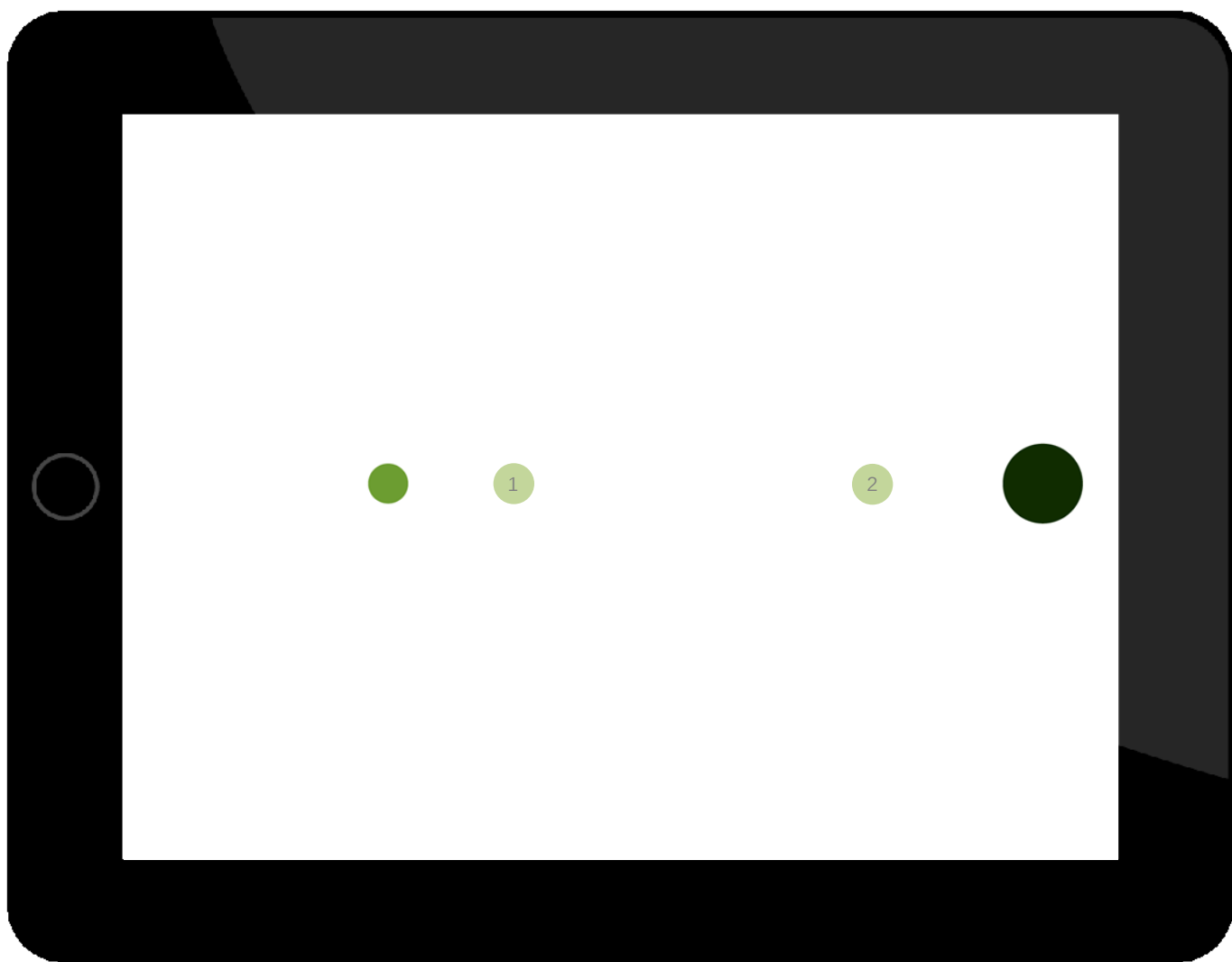


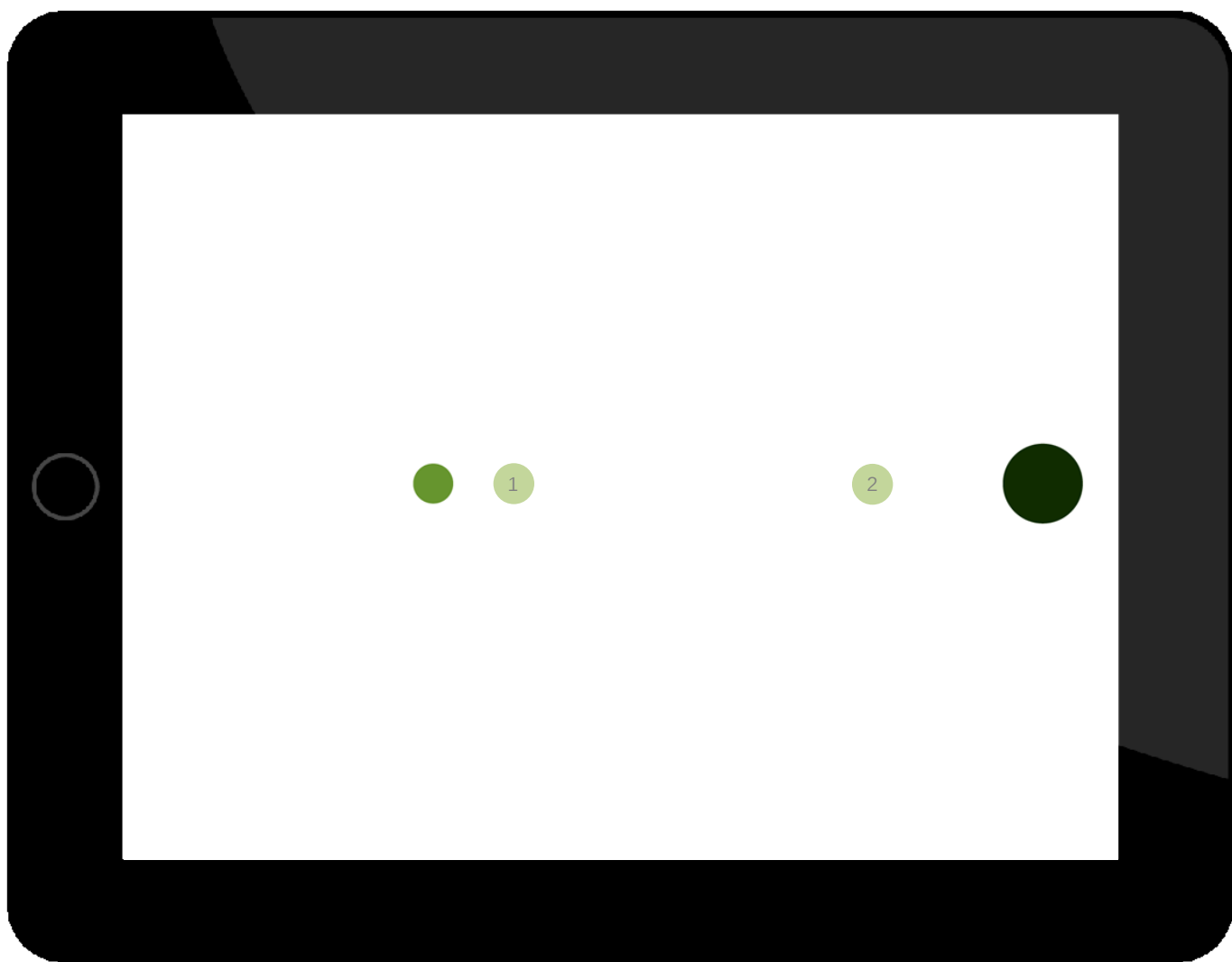


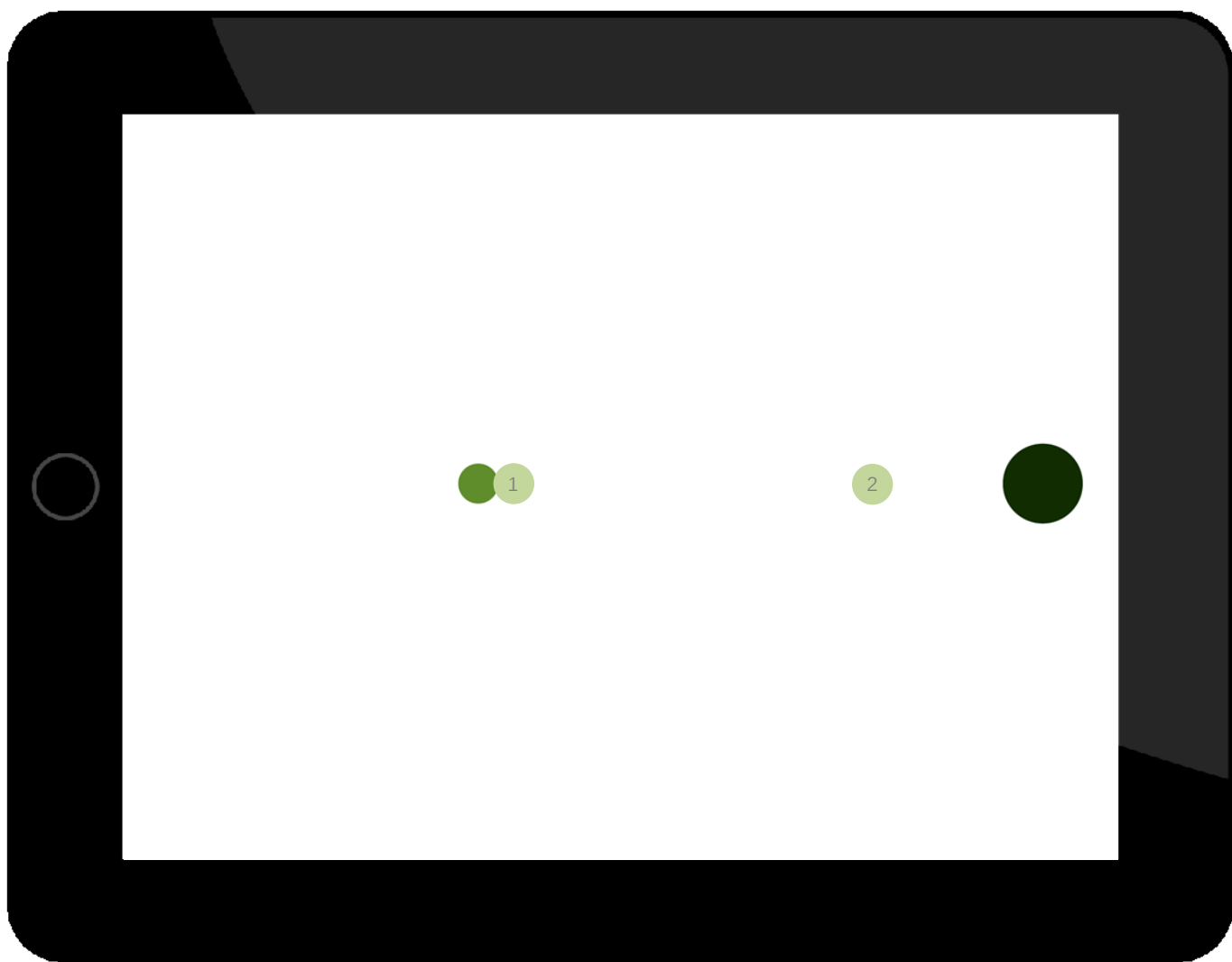


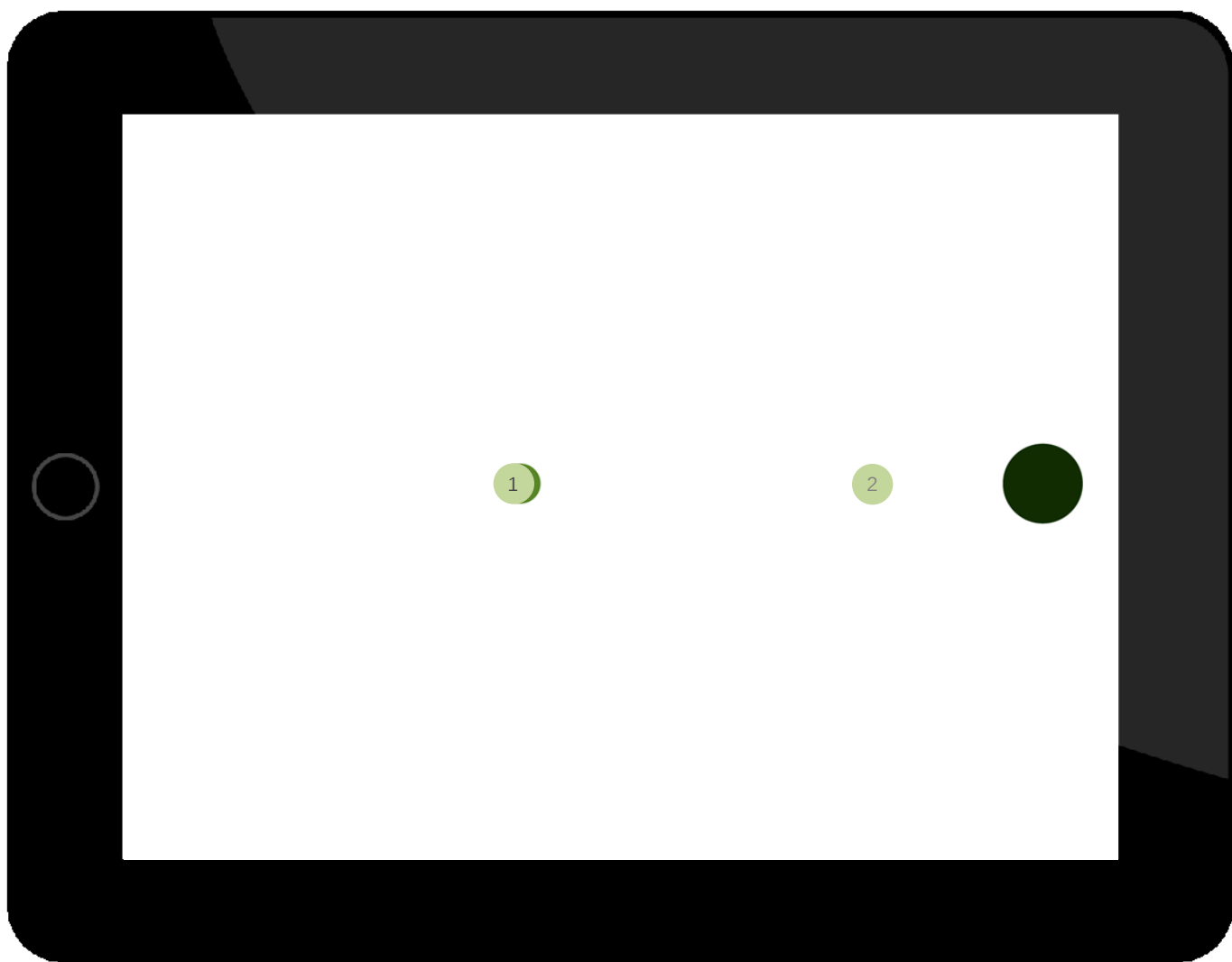


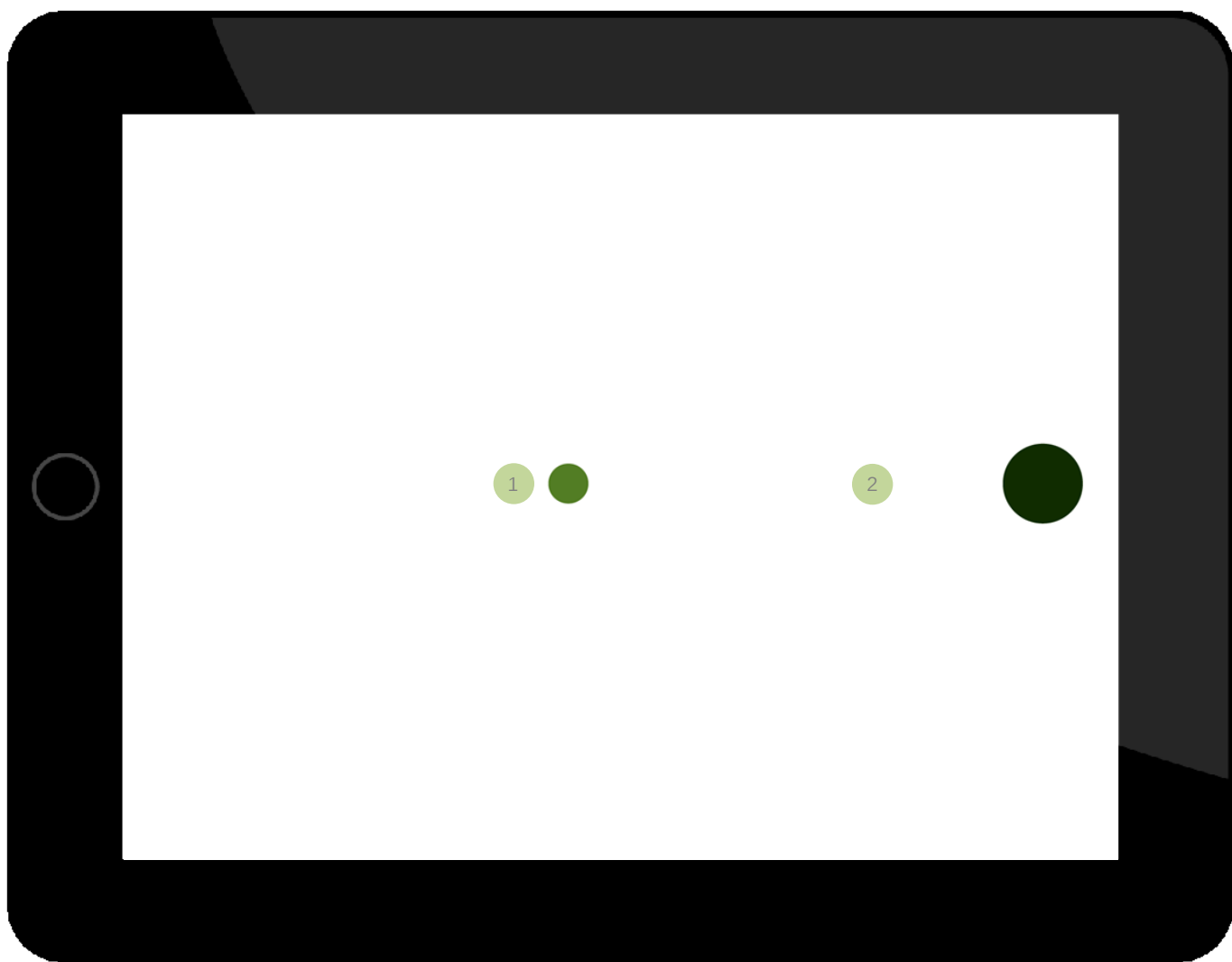


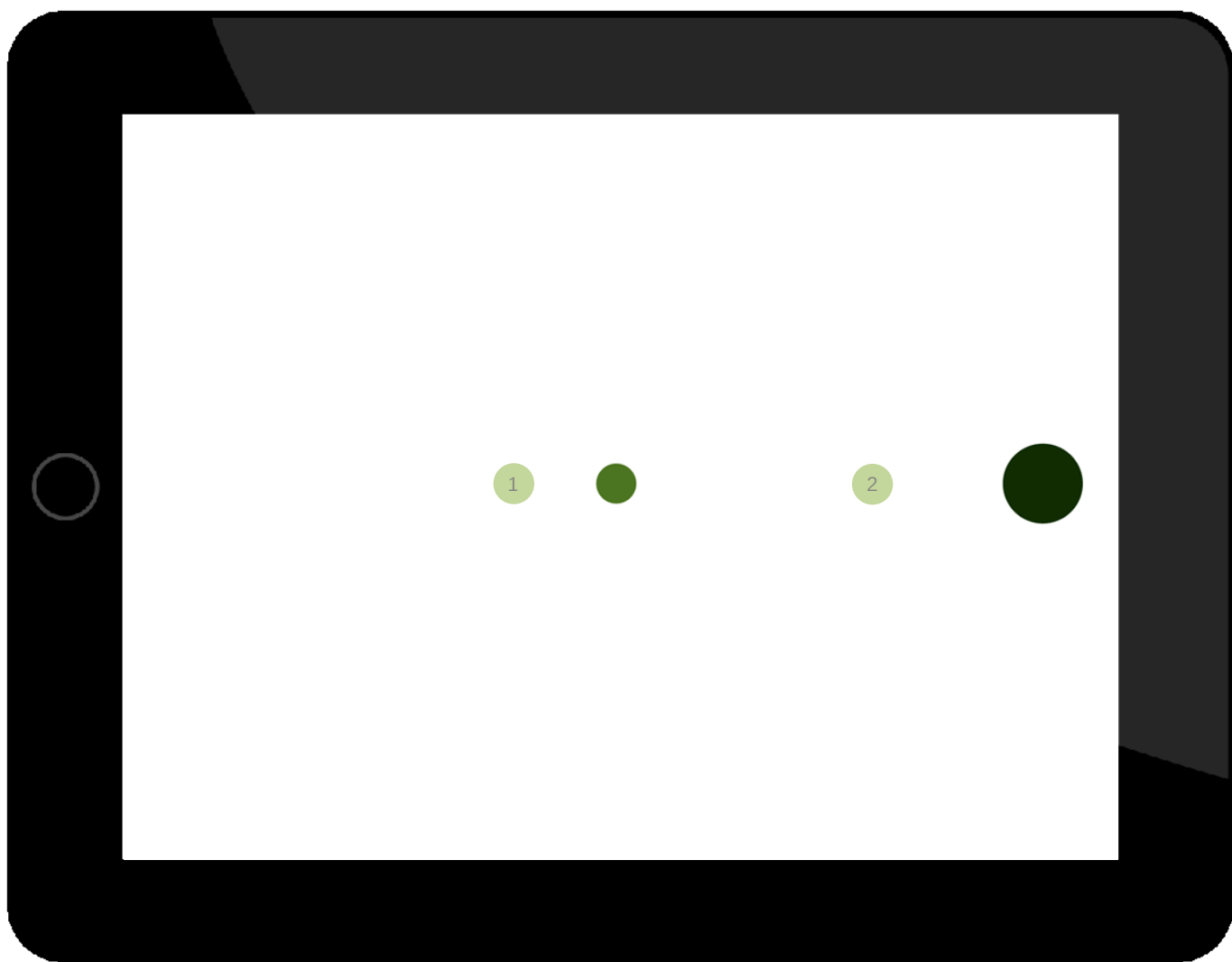


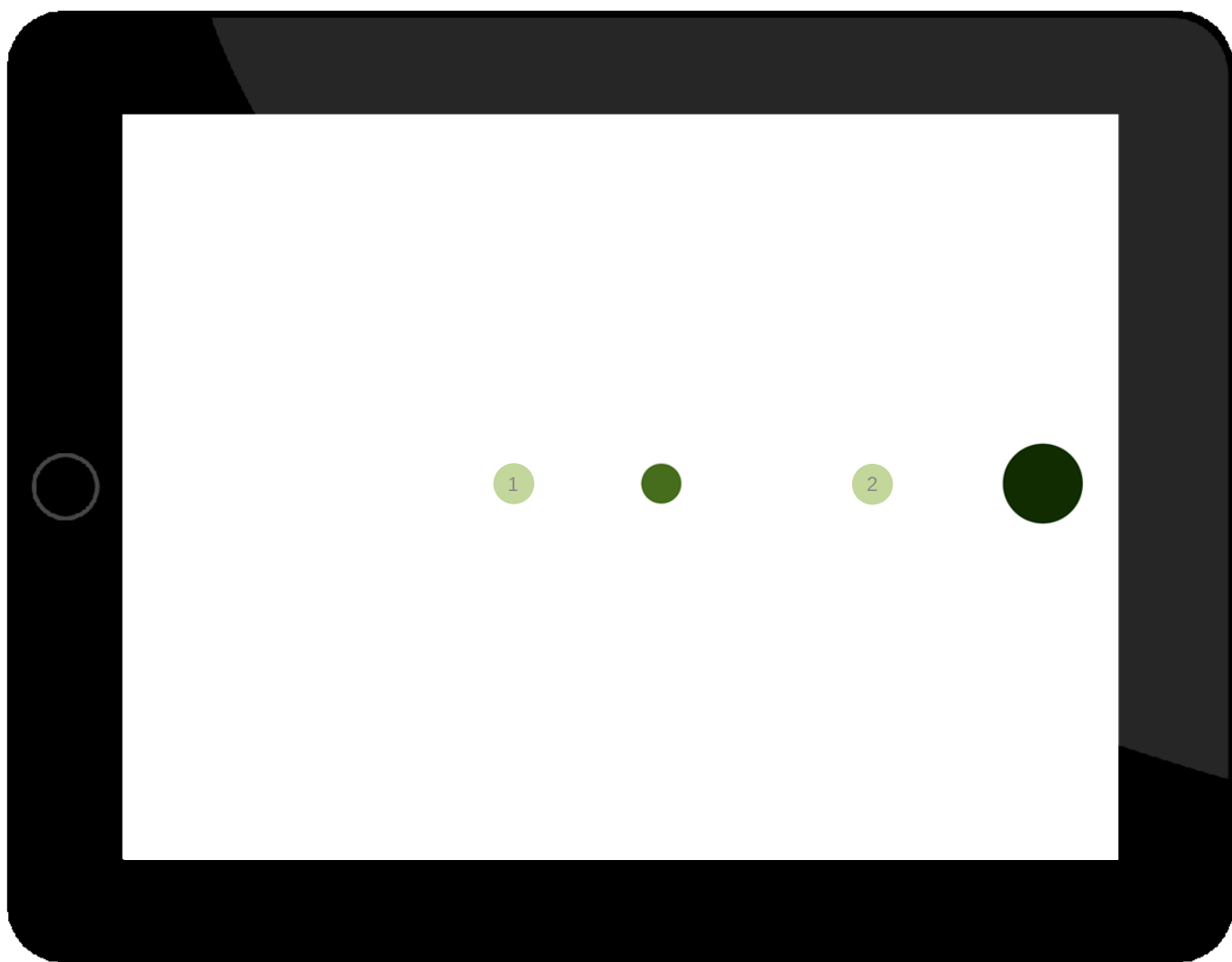


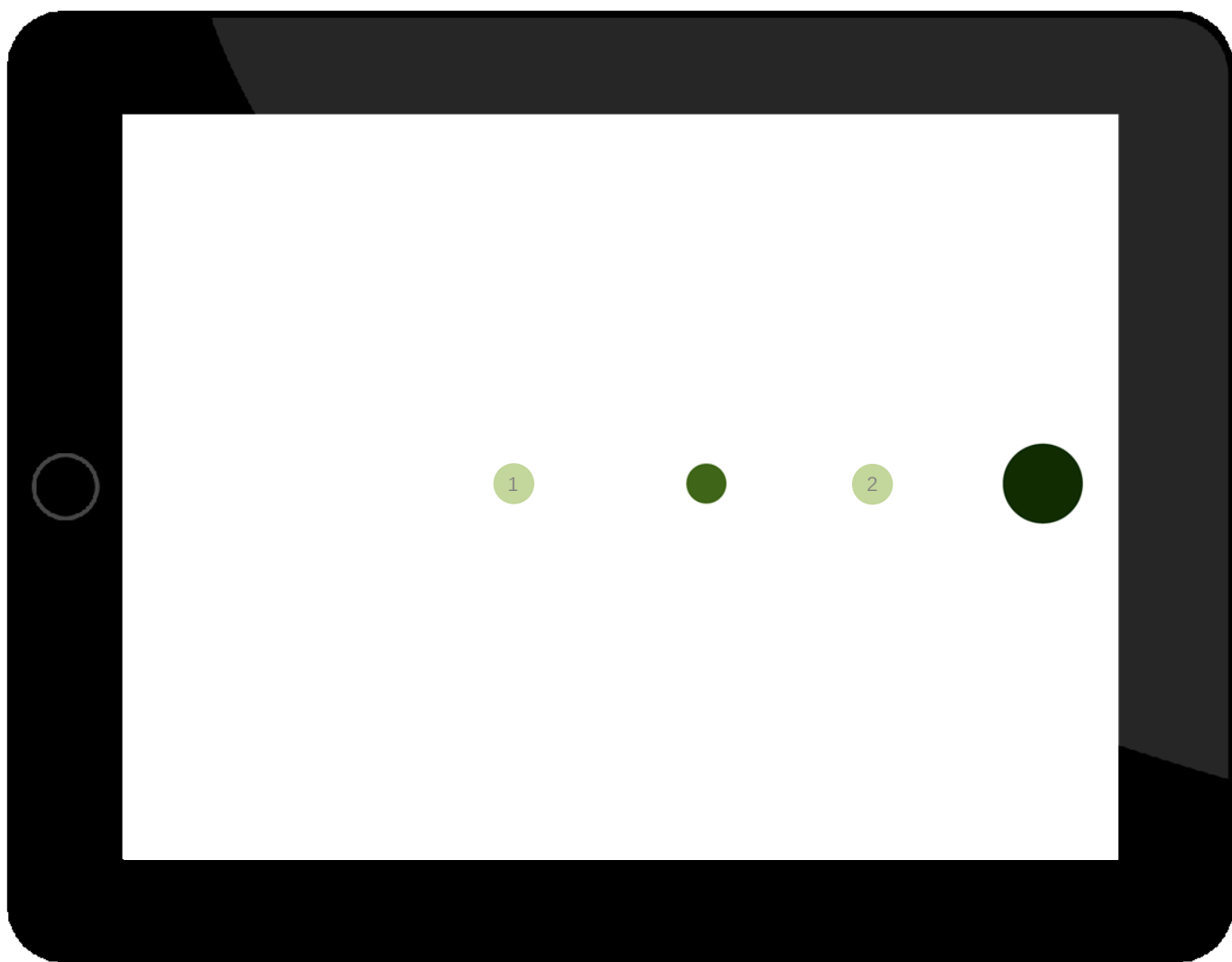


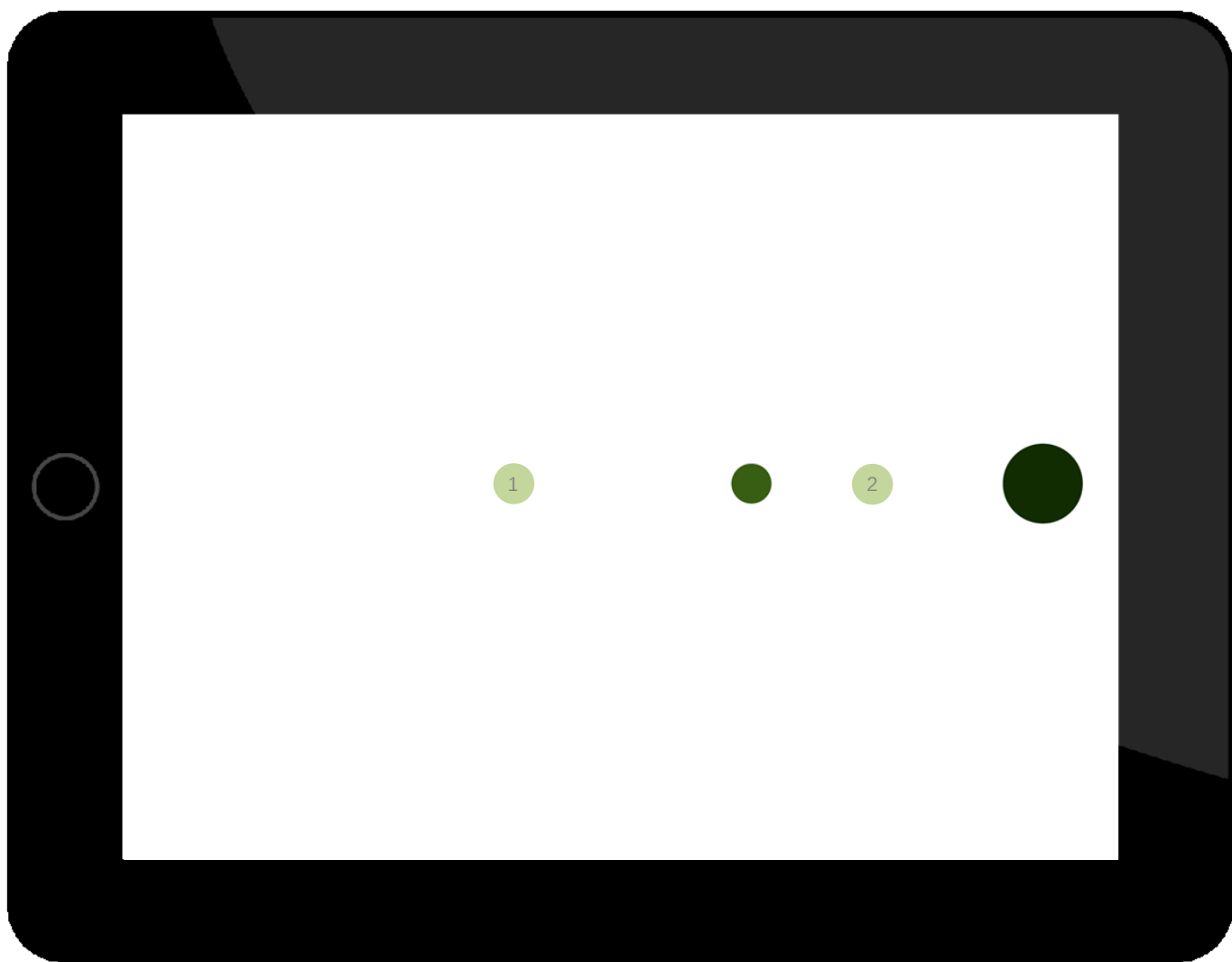


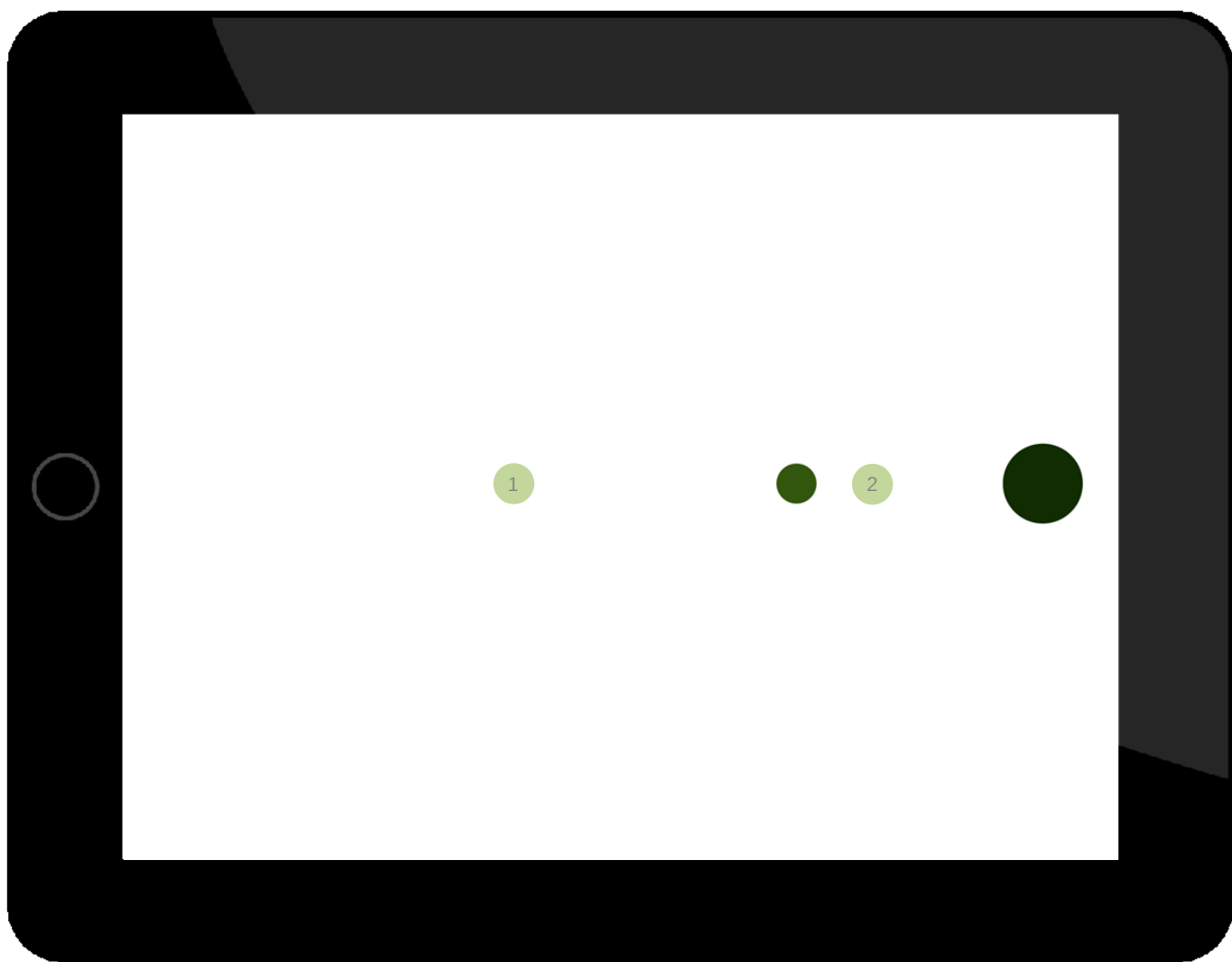


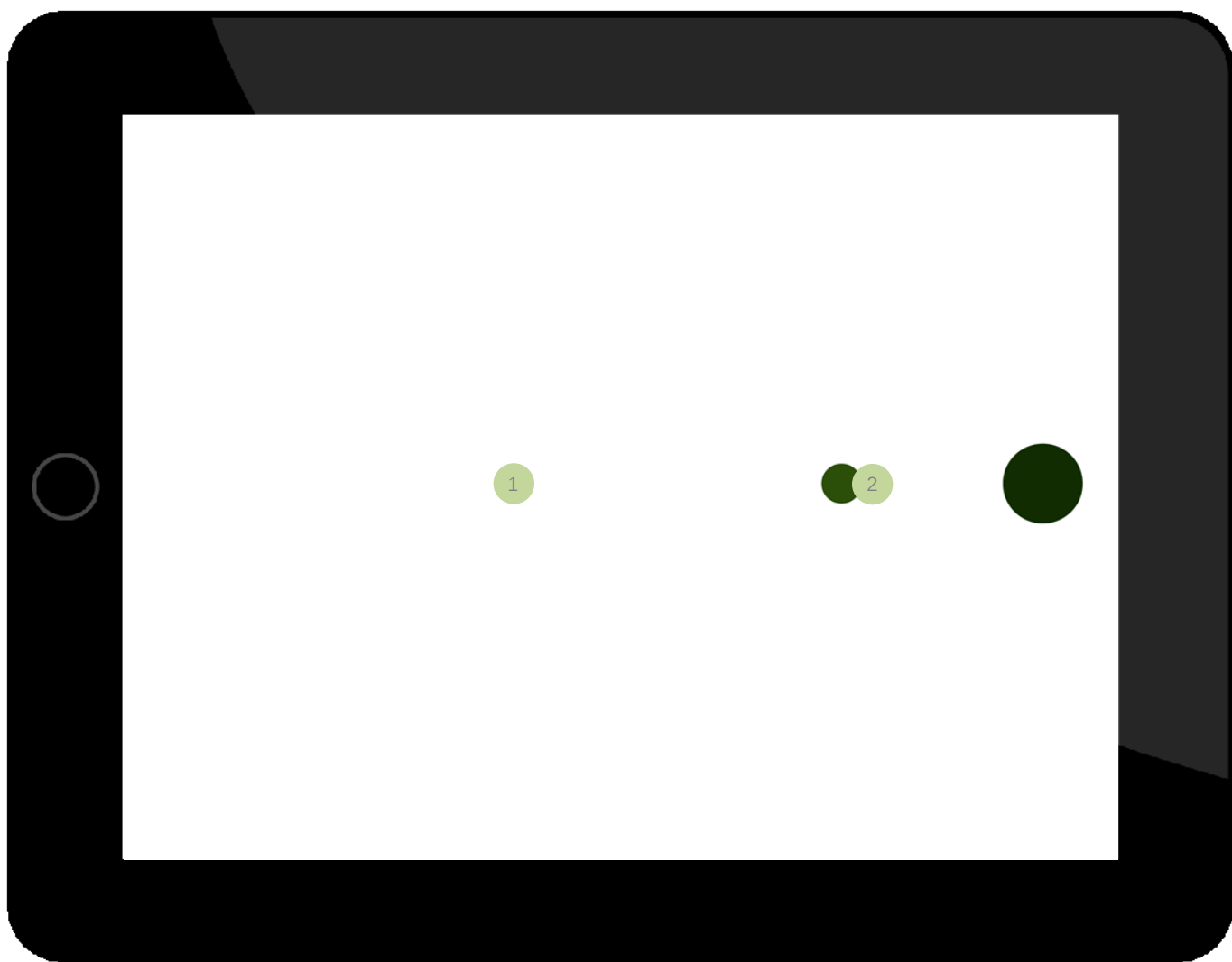


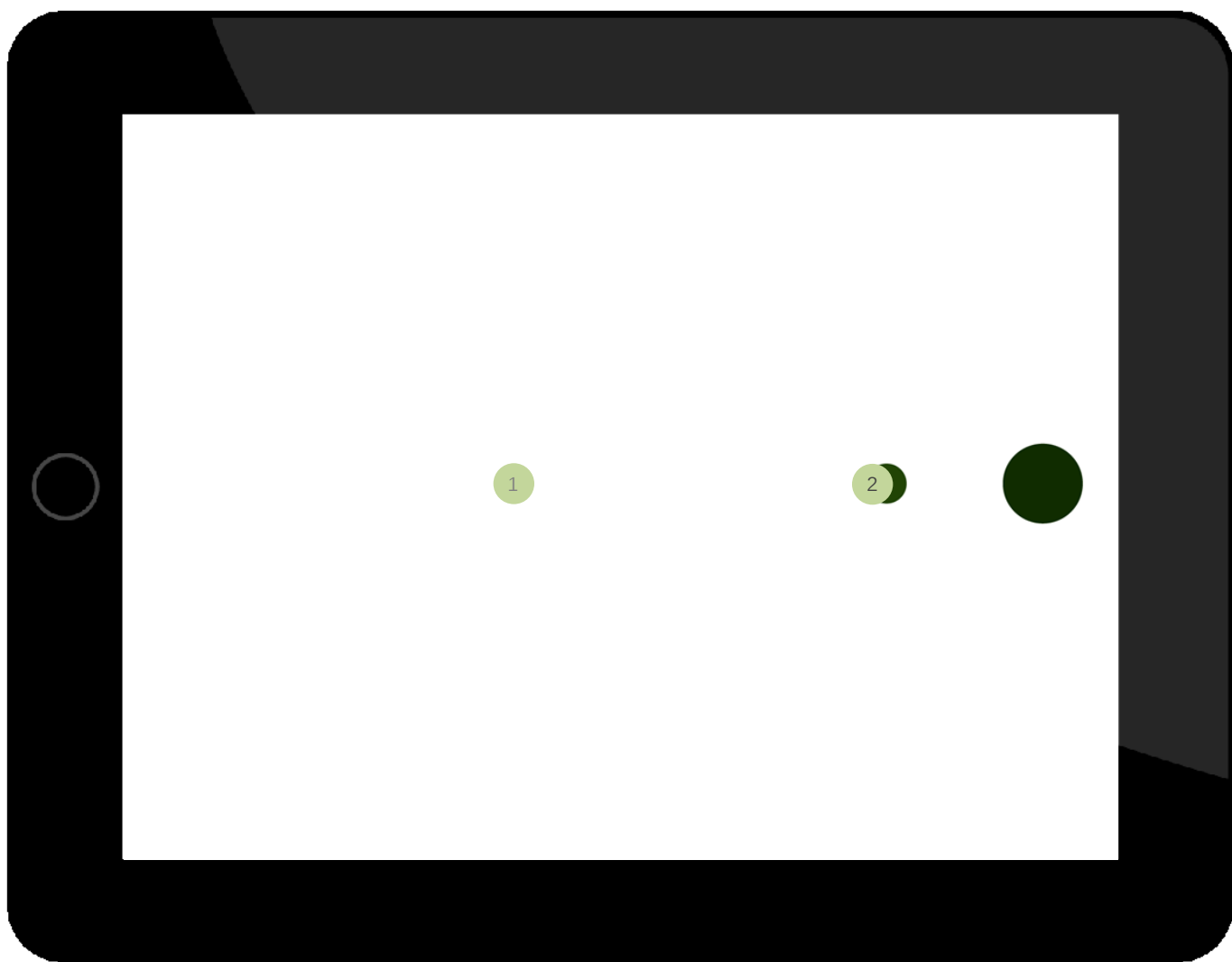


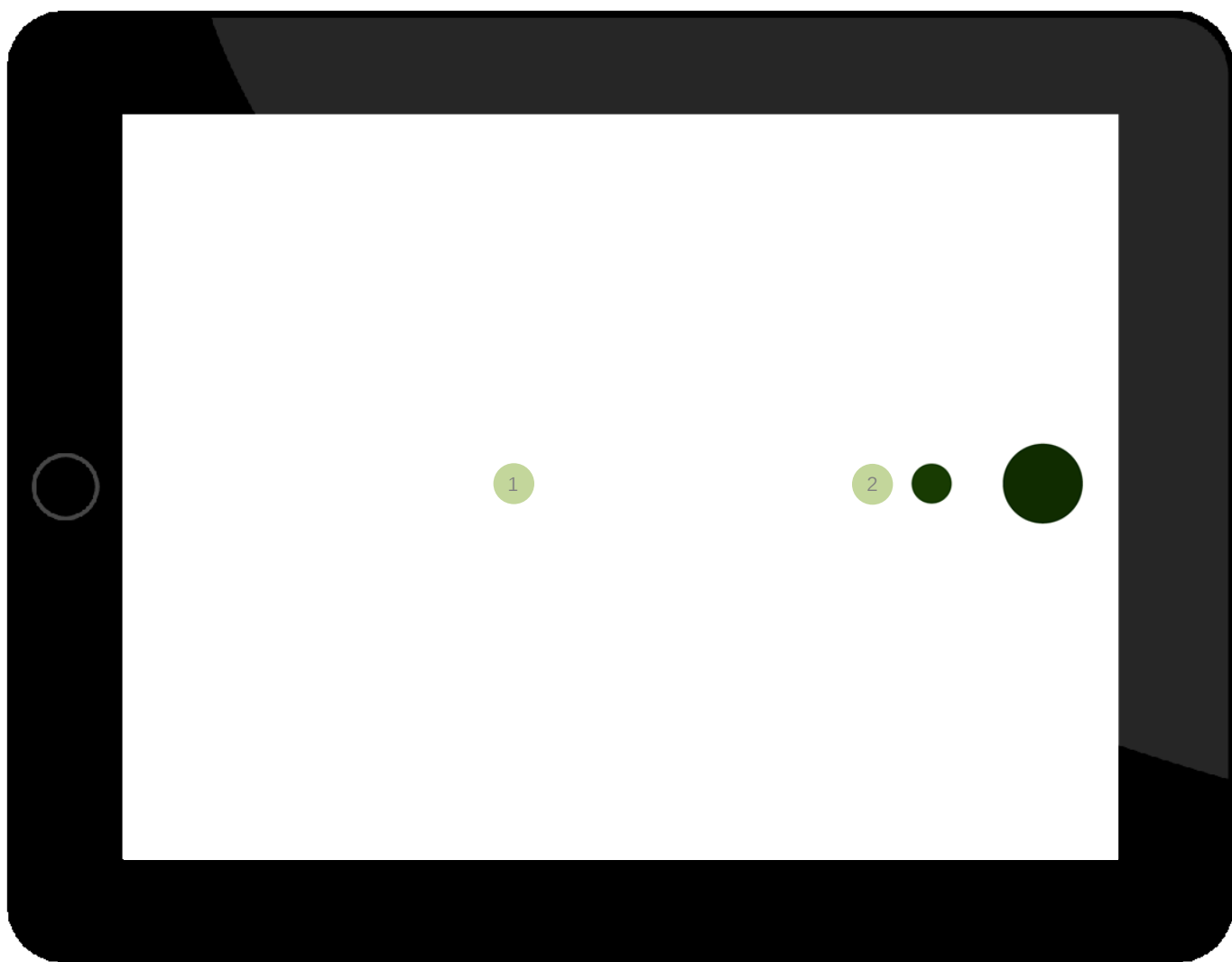


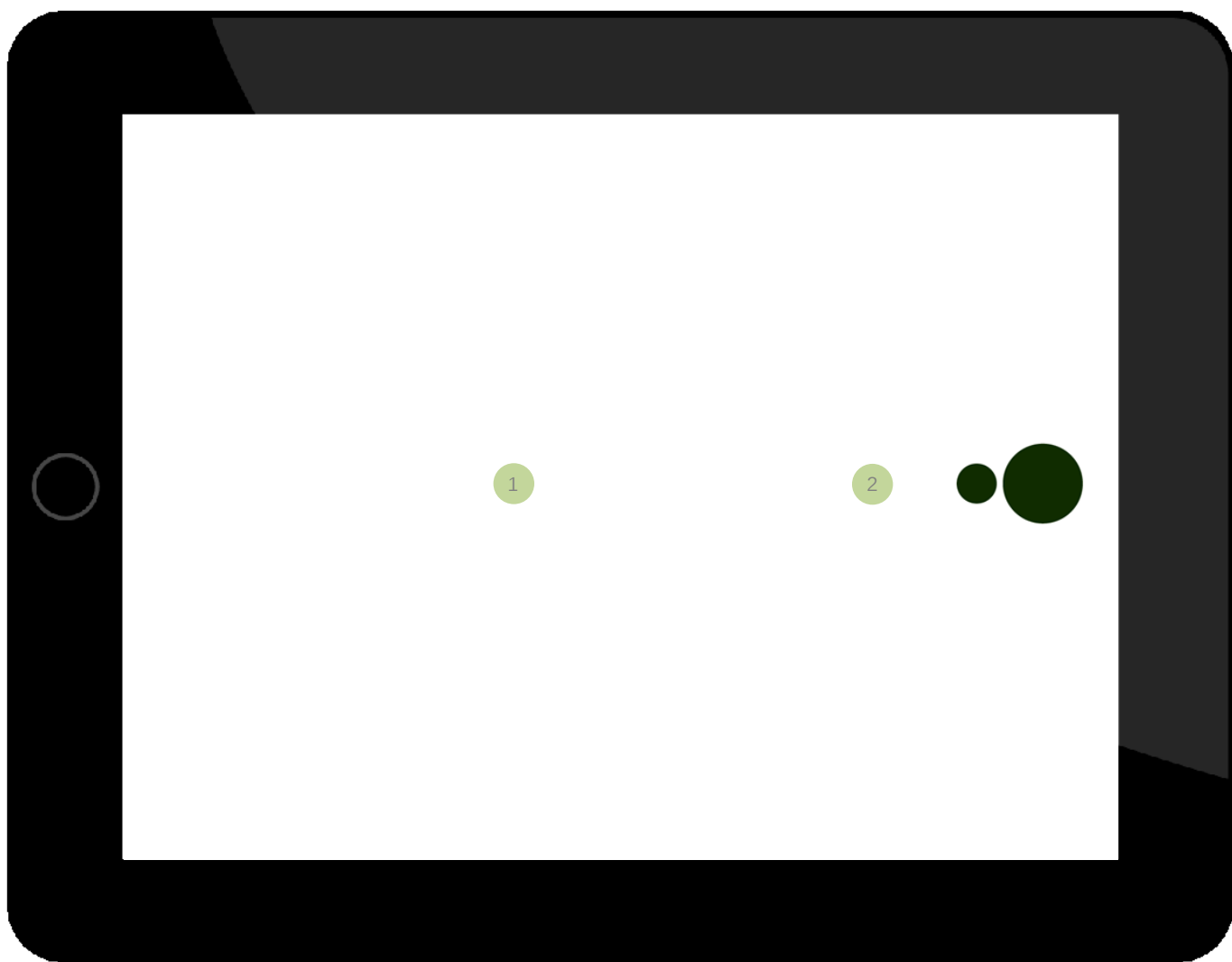


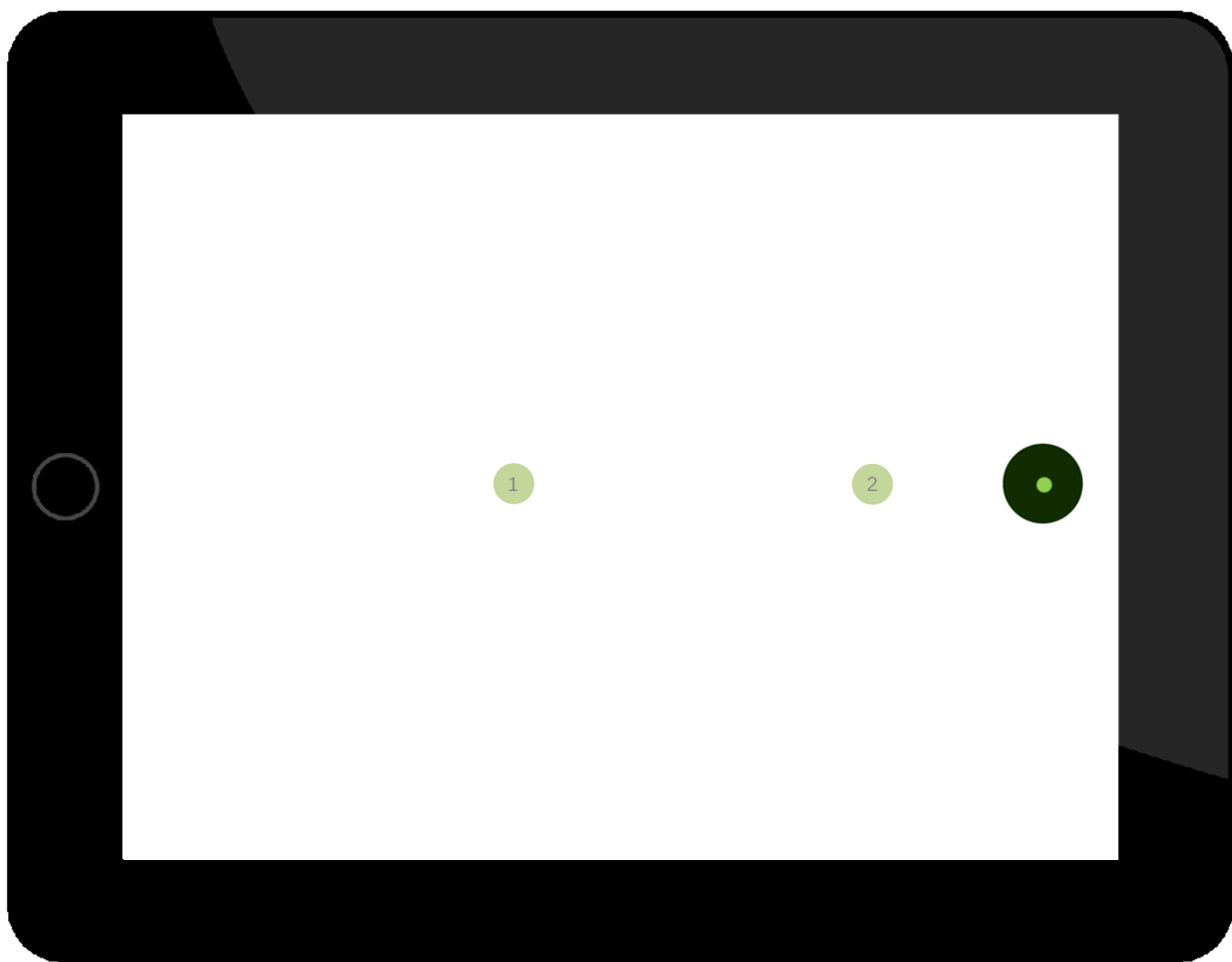


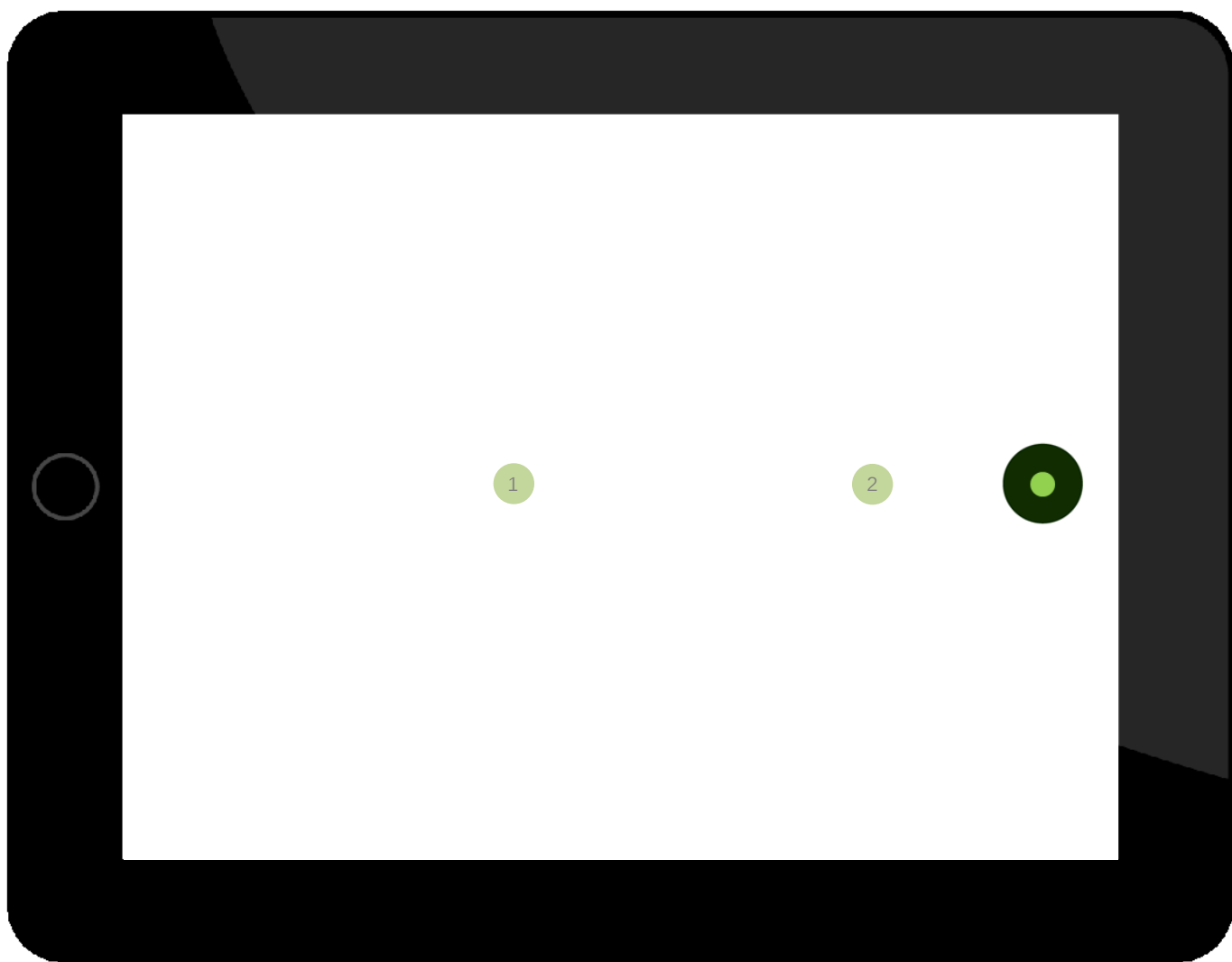


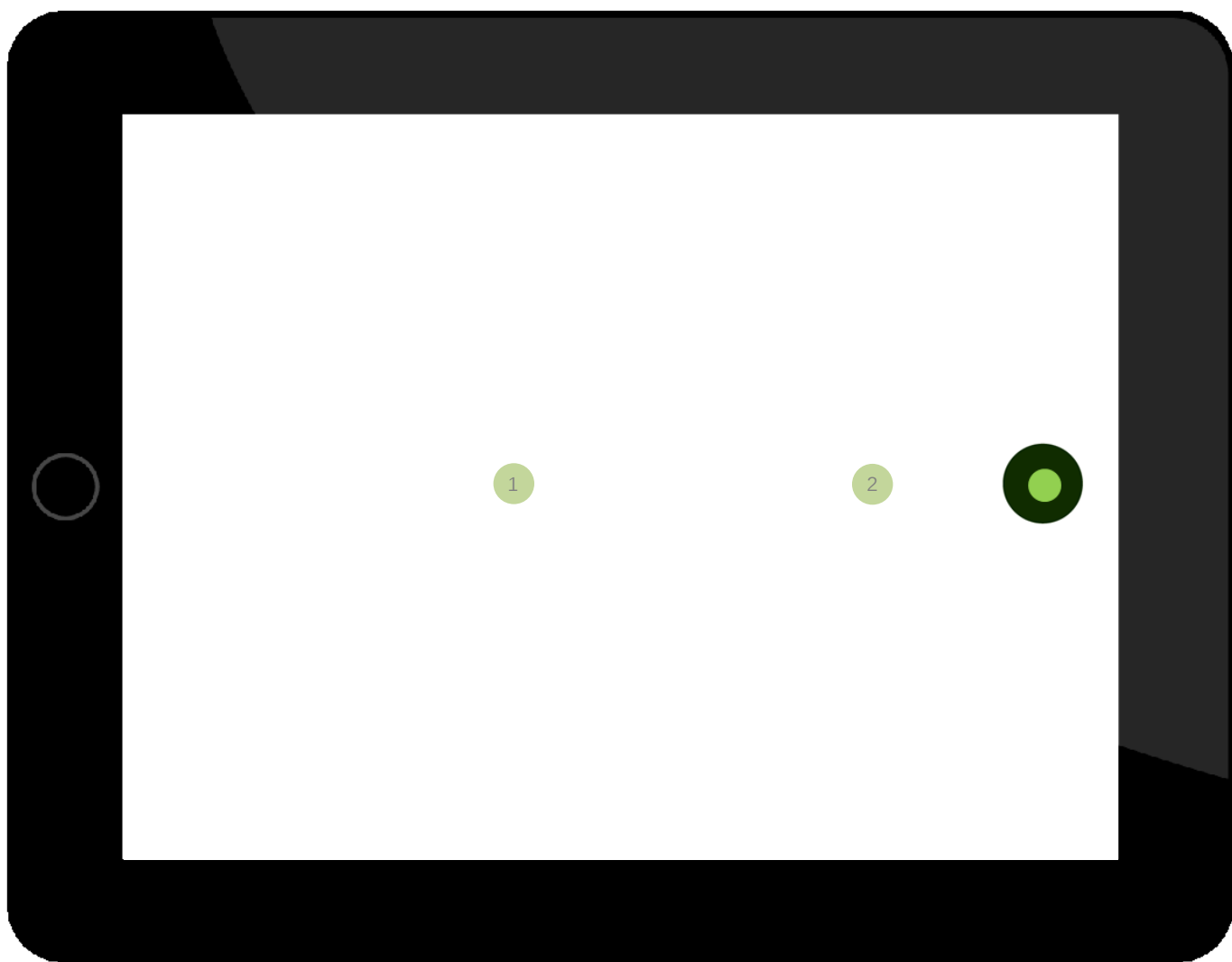


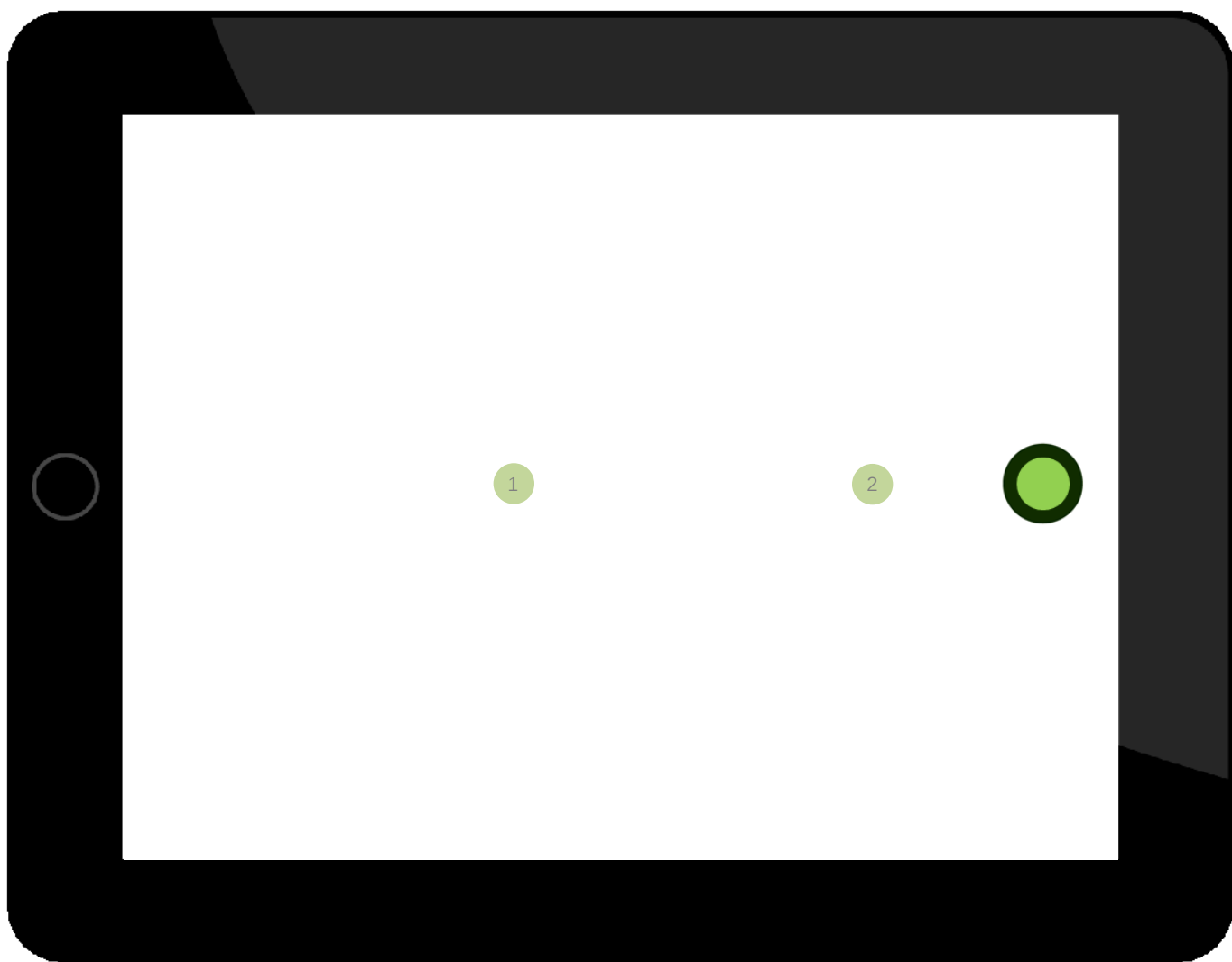


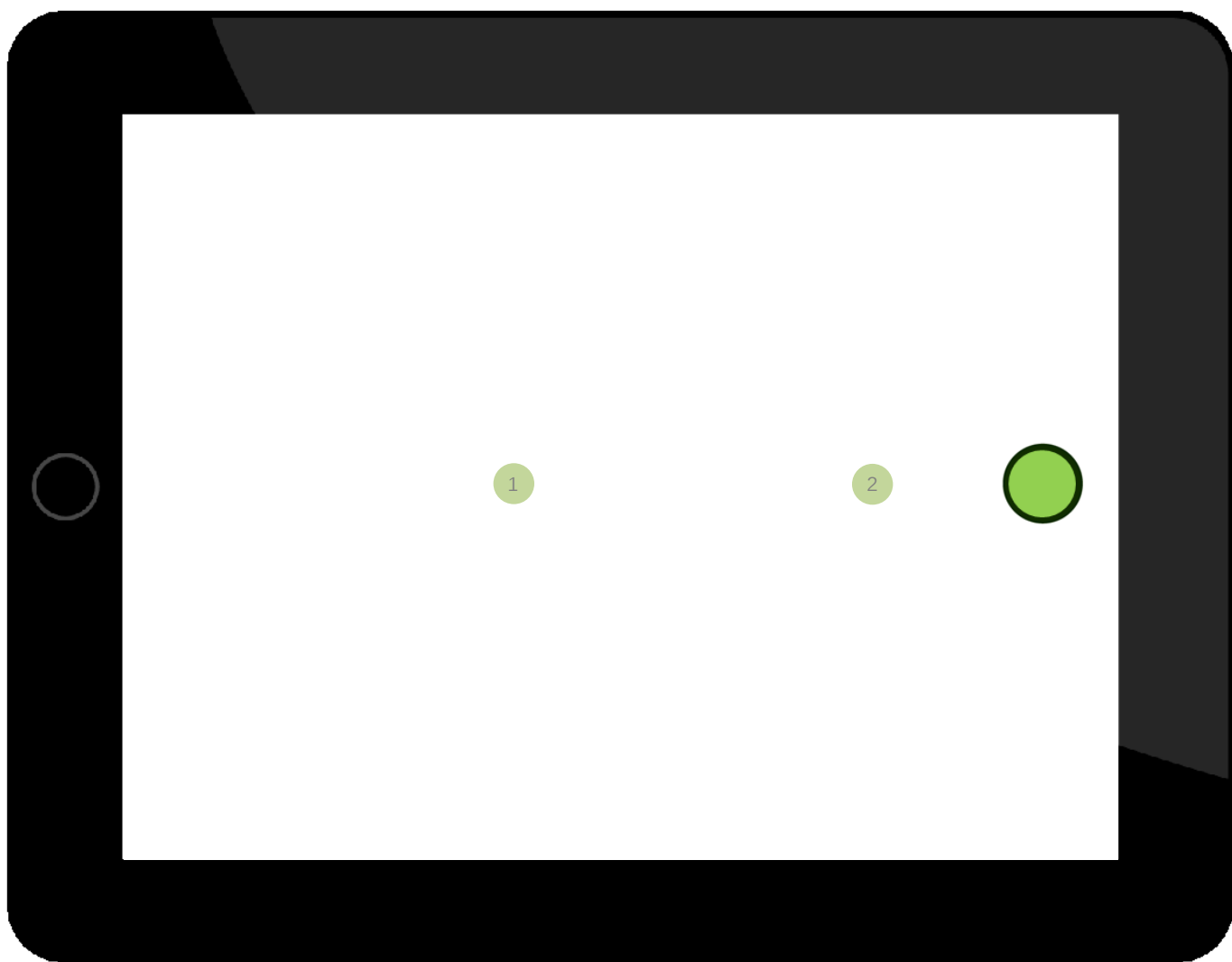














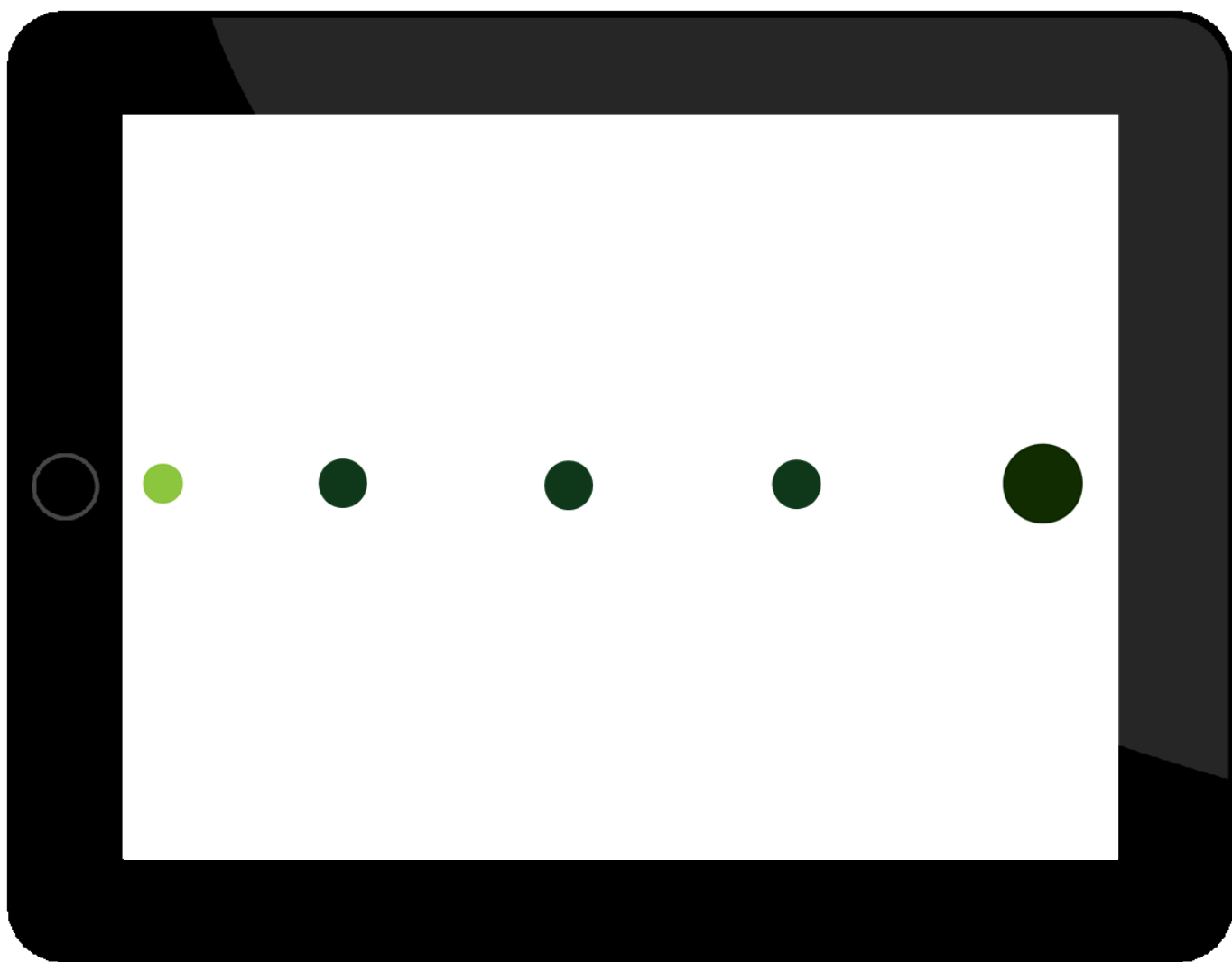
Design Solutions

Reach the Target

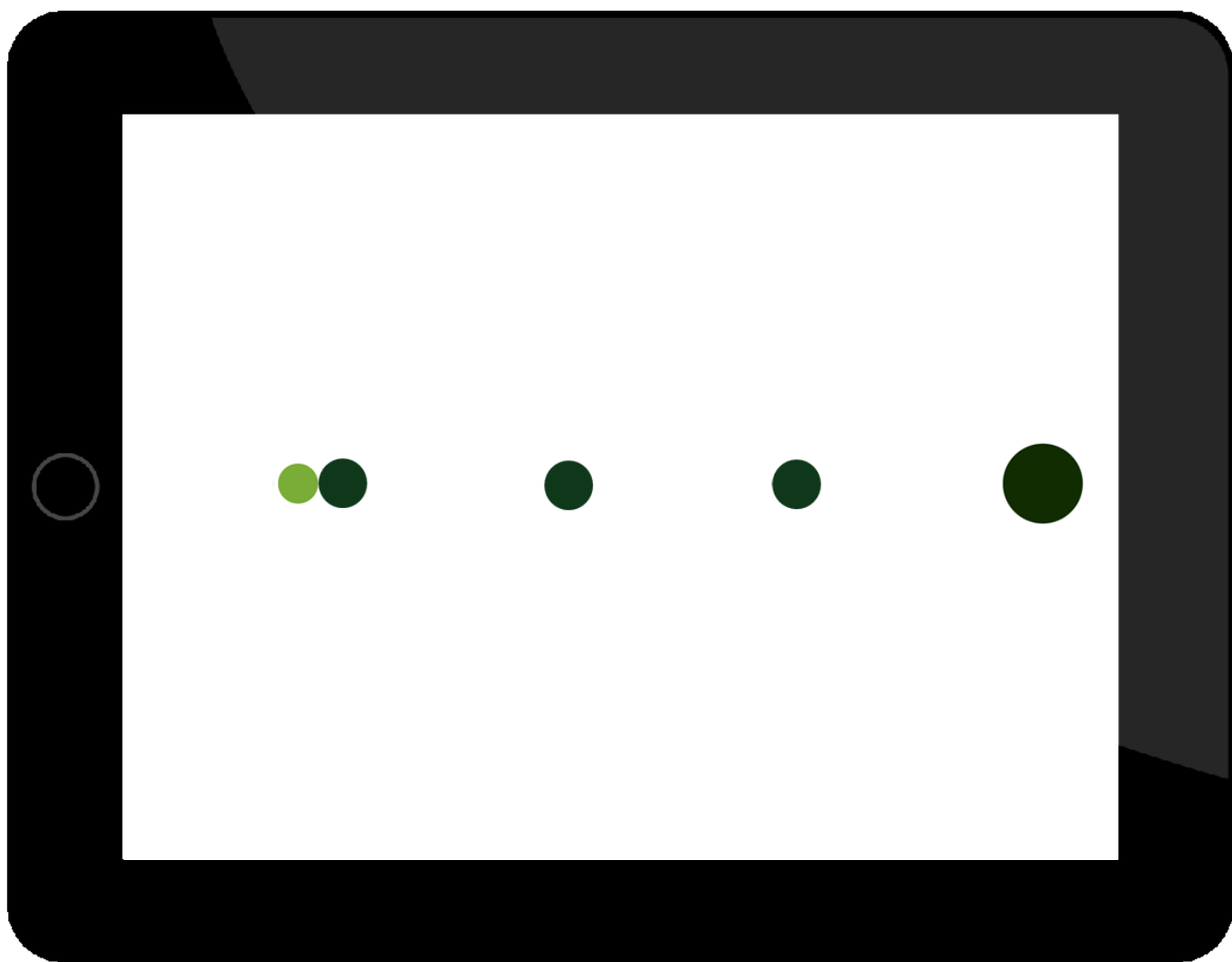
Goal: To reach the target at the far end of the screen.

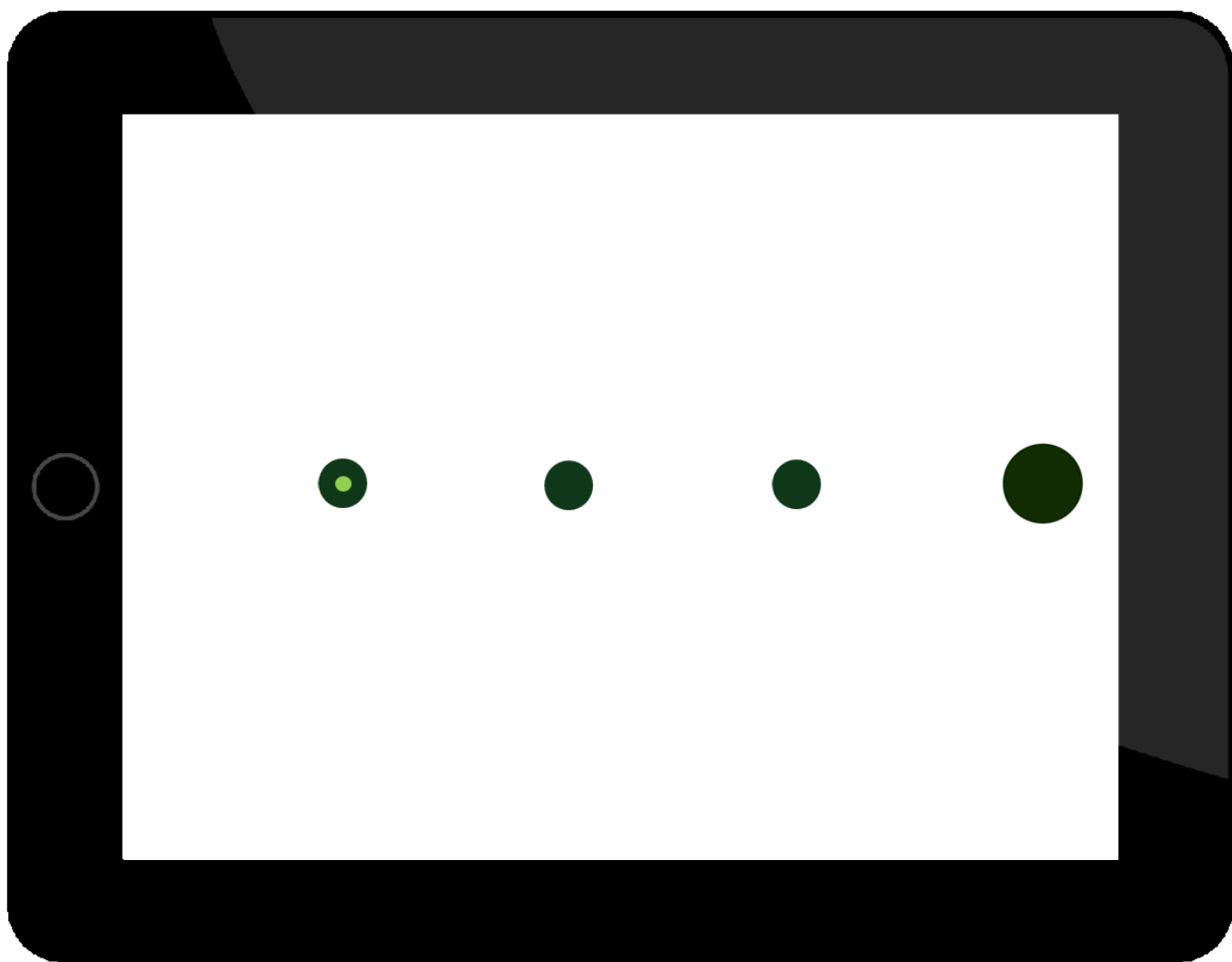
Purpose: Increase the concentration of the patient by focusing on the movement of the item on the screen.

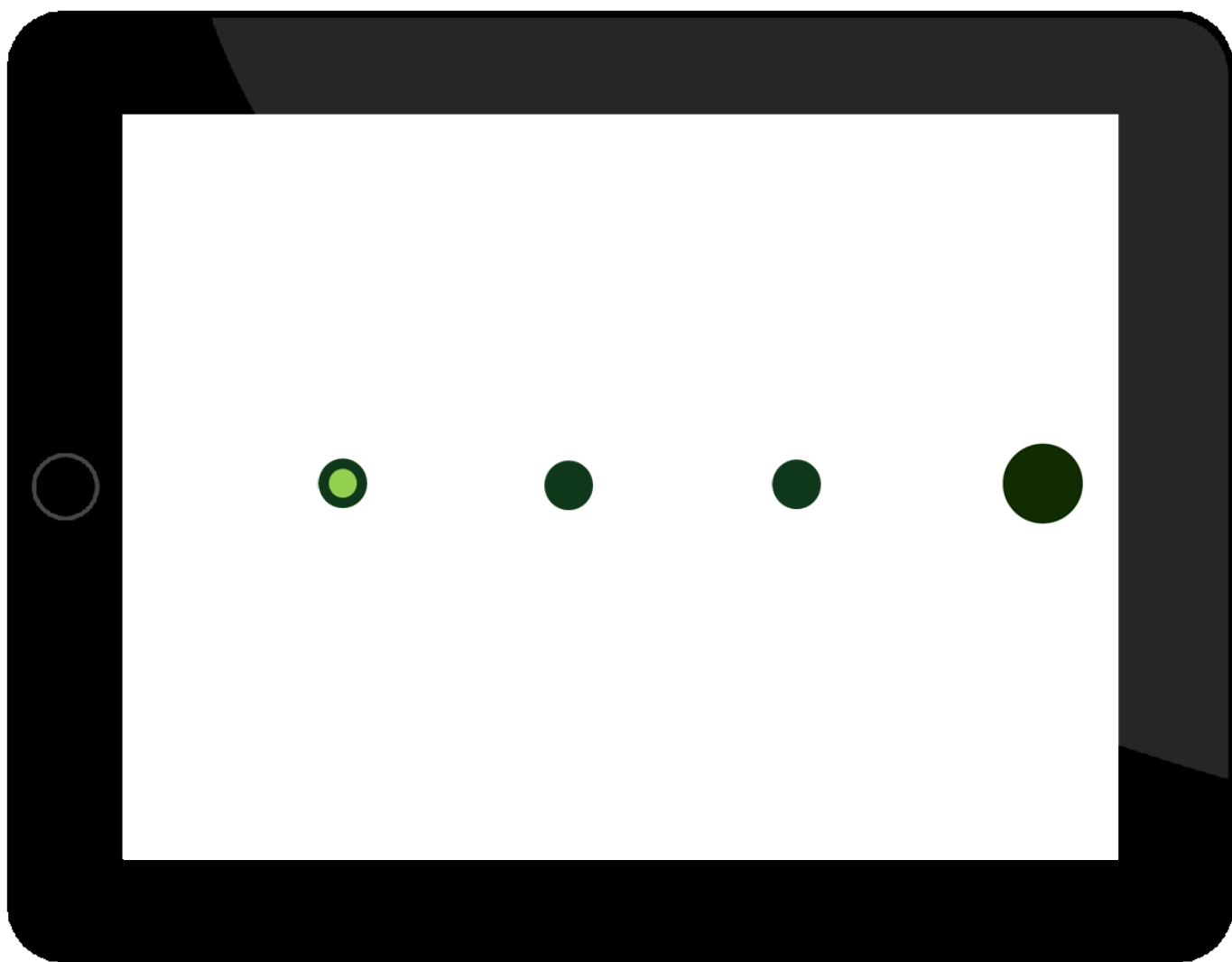
Multiple Swallows: Each swallow moves the circle to the intermediate goals before the final target.

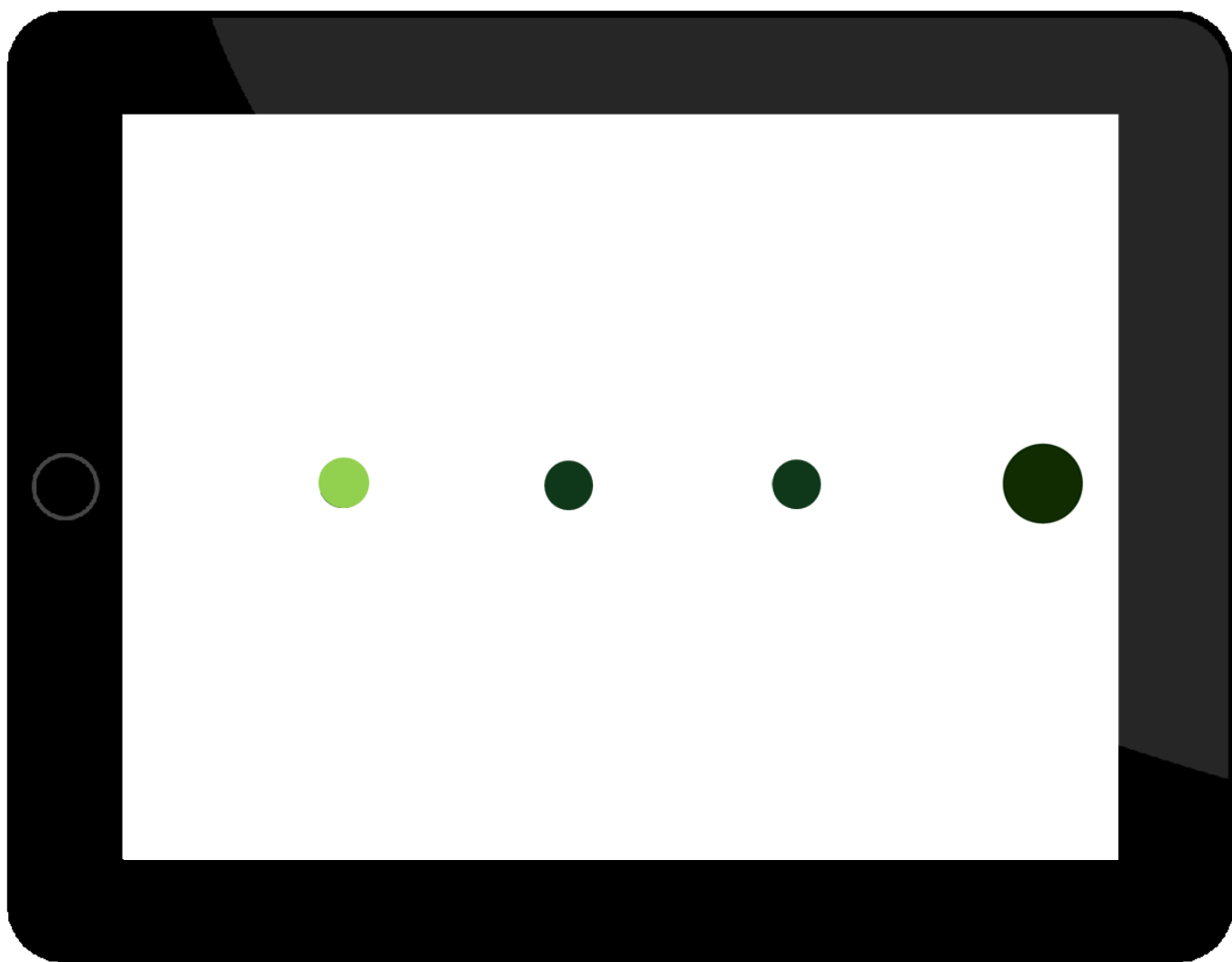


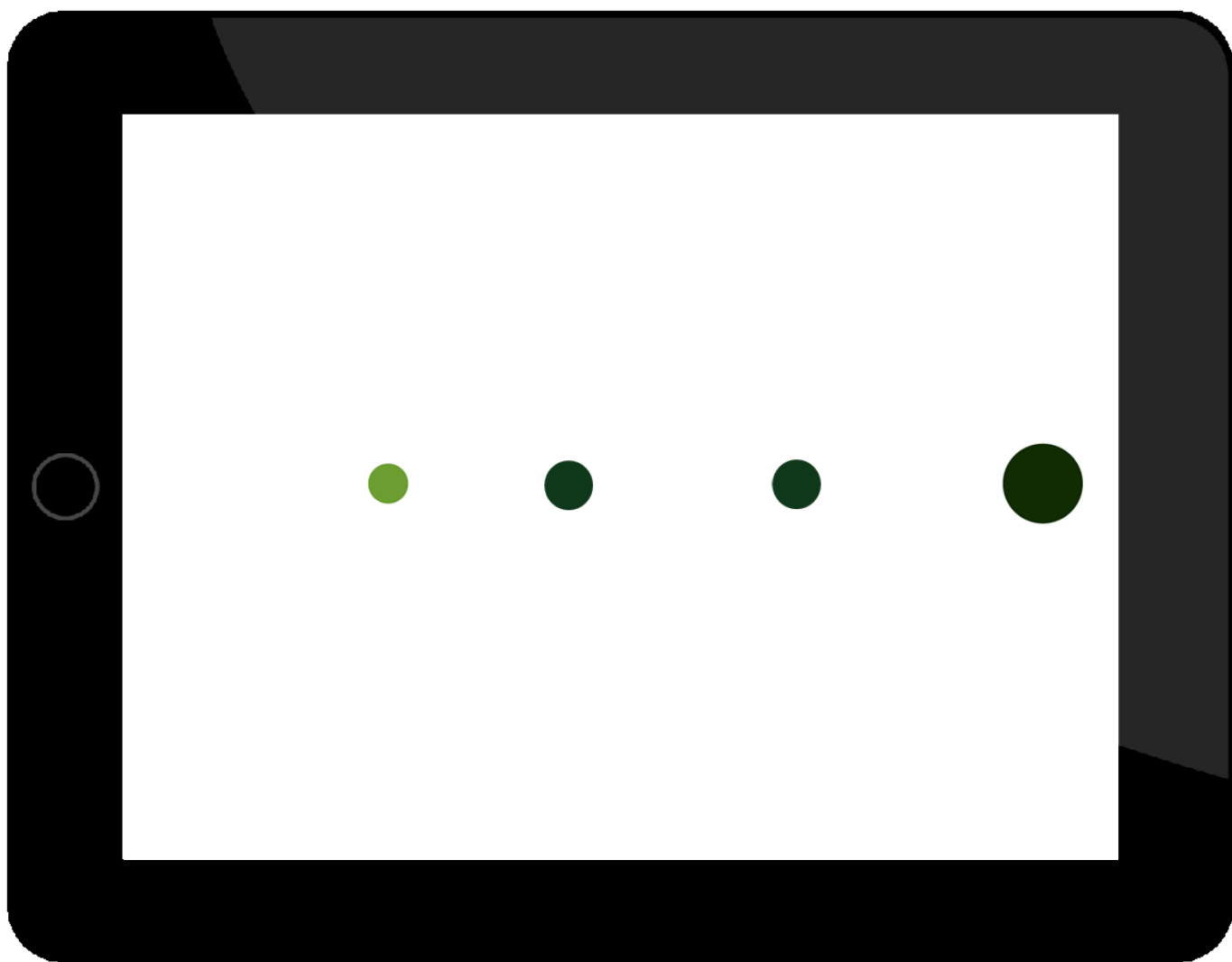


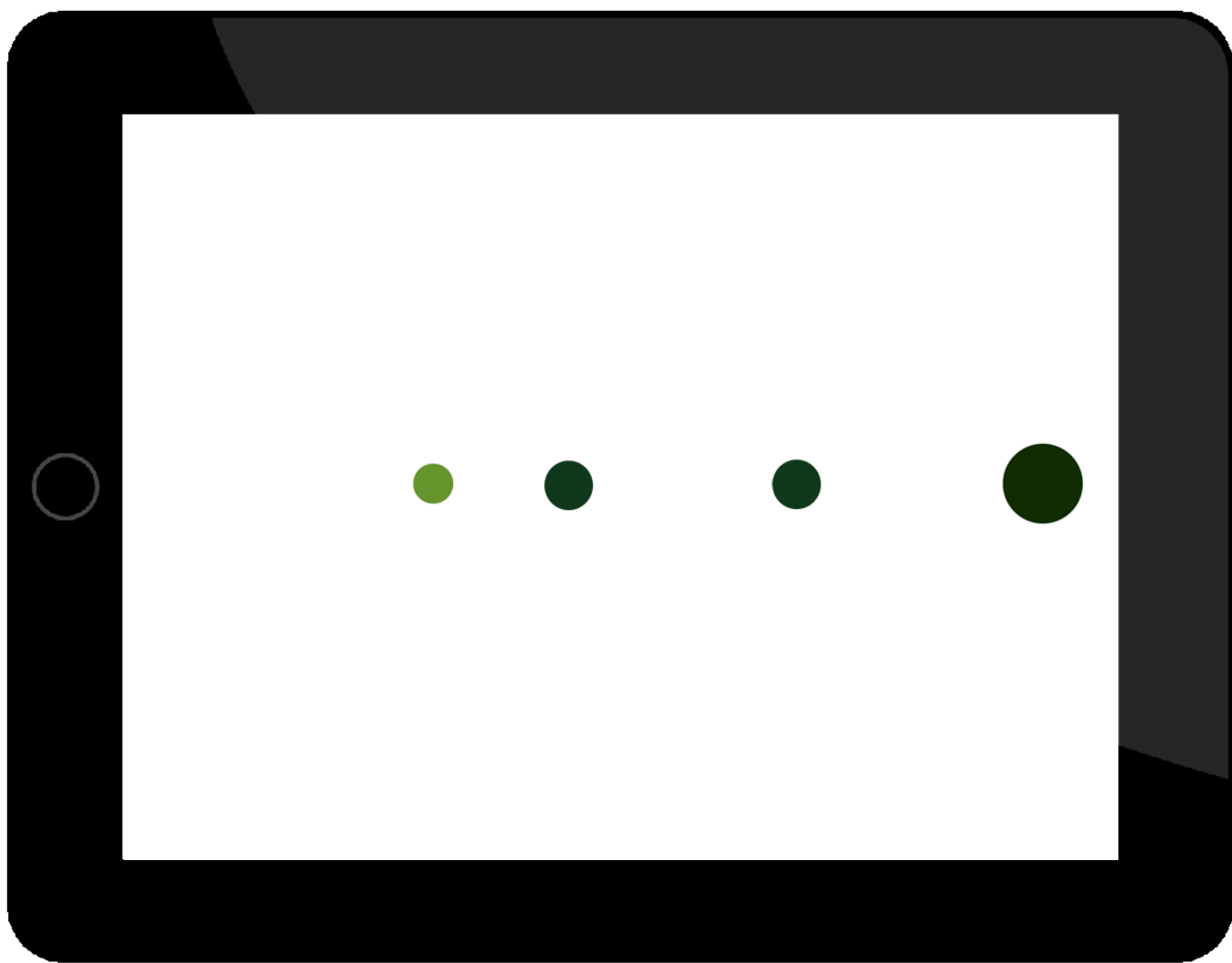


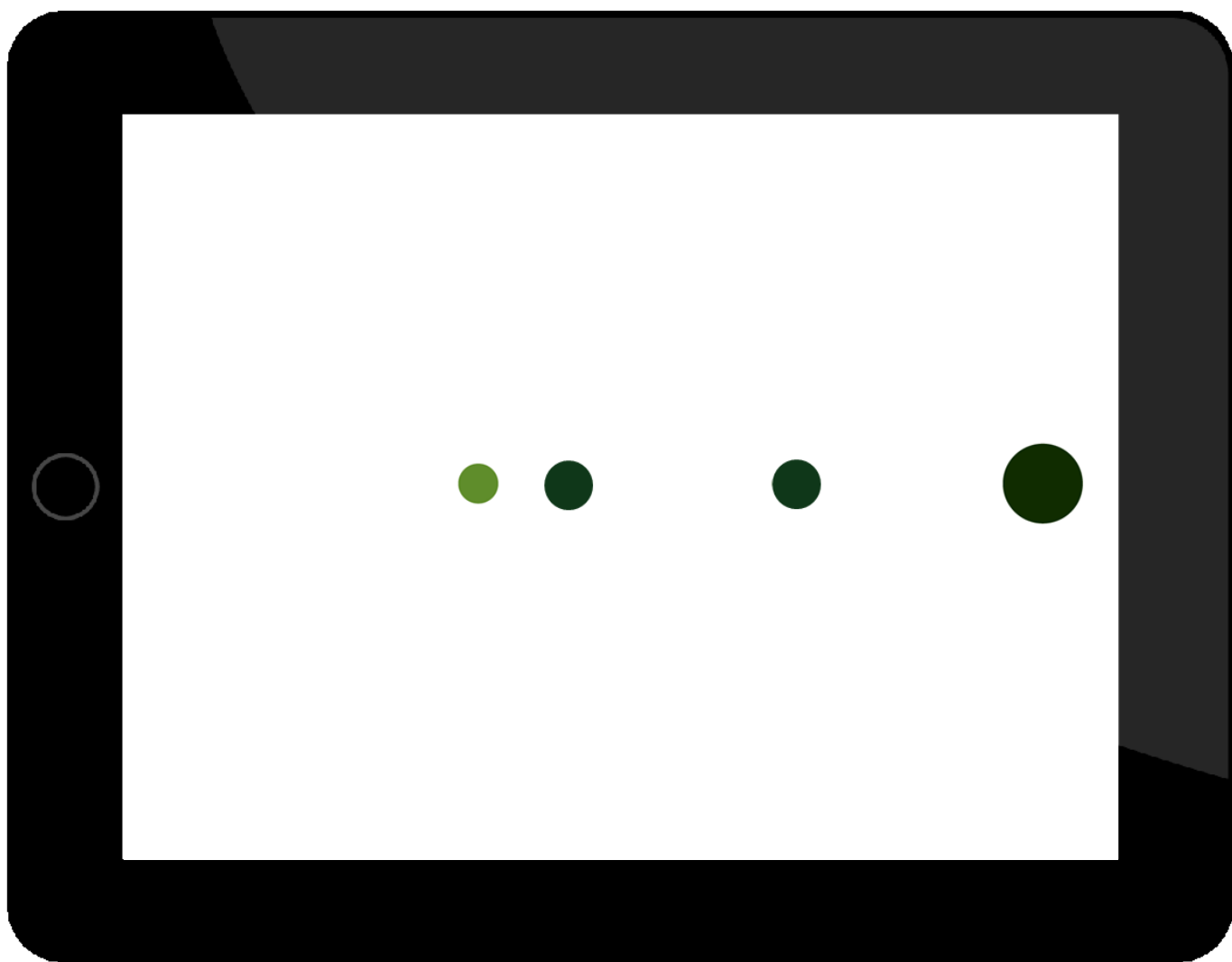


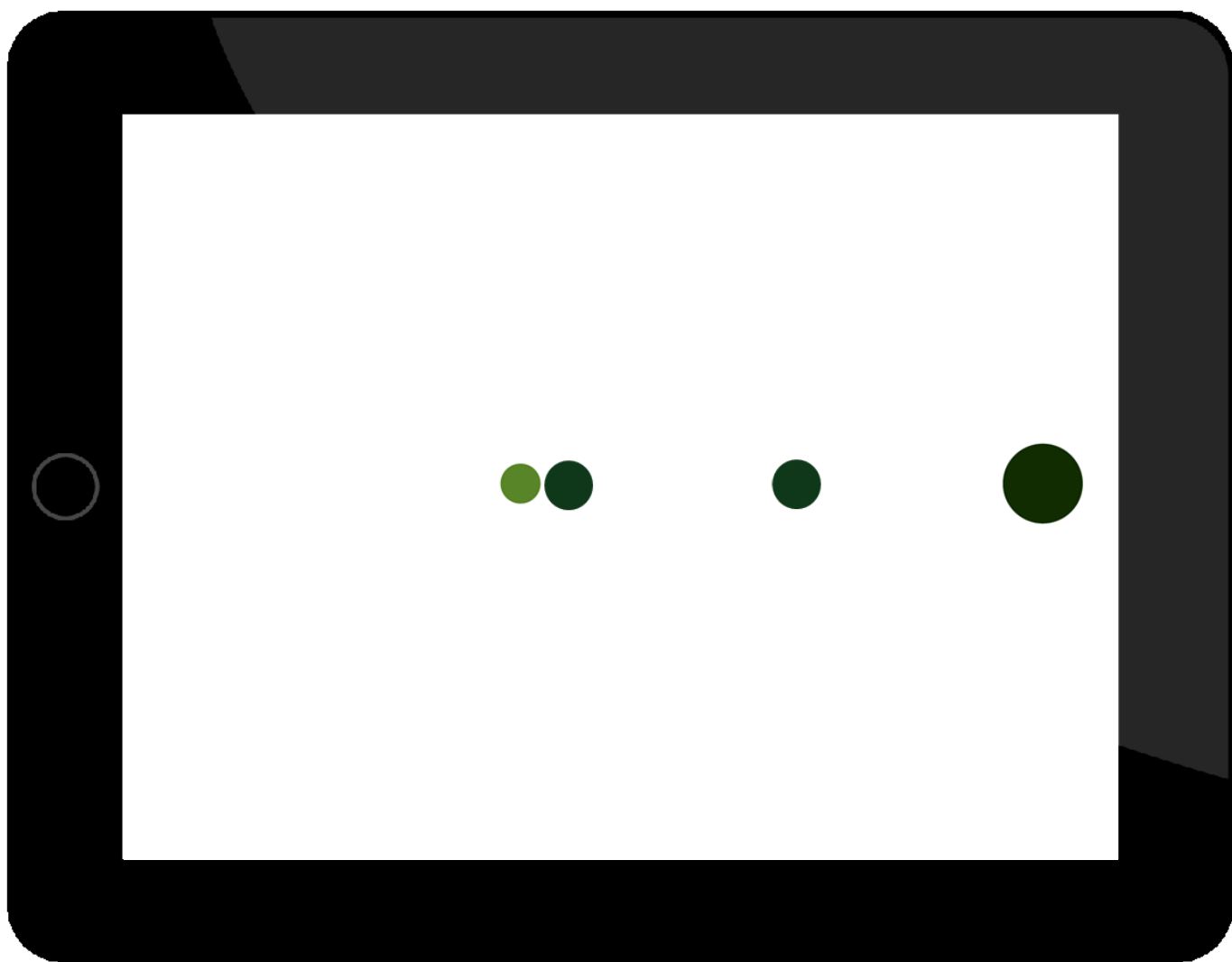


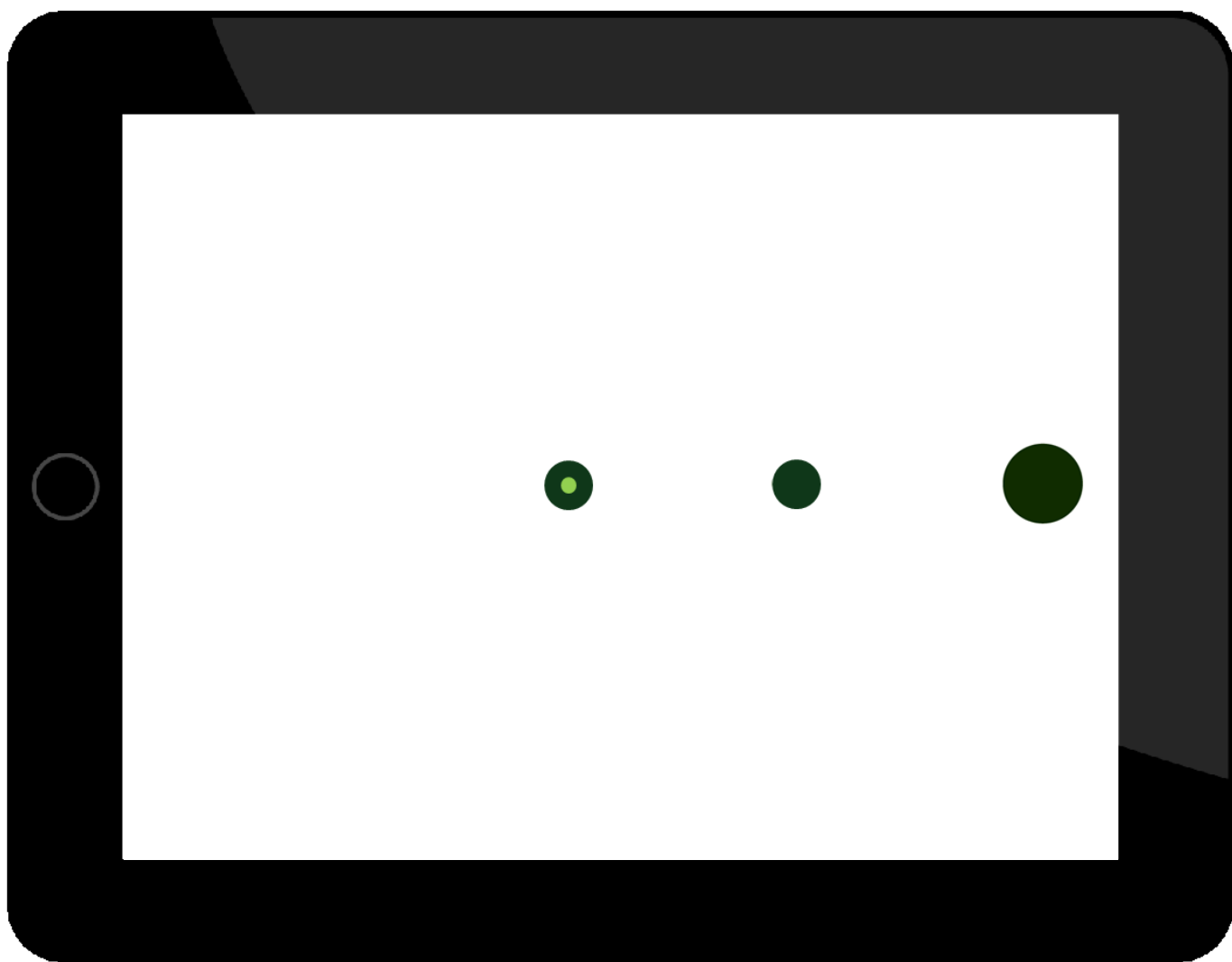


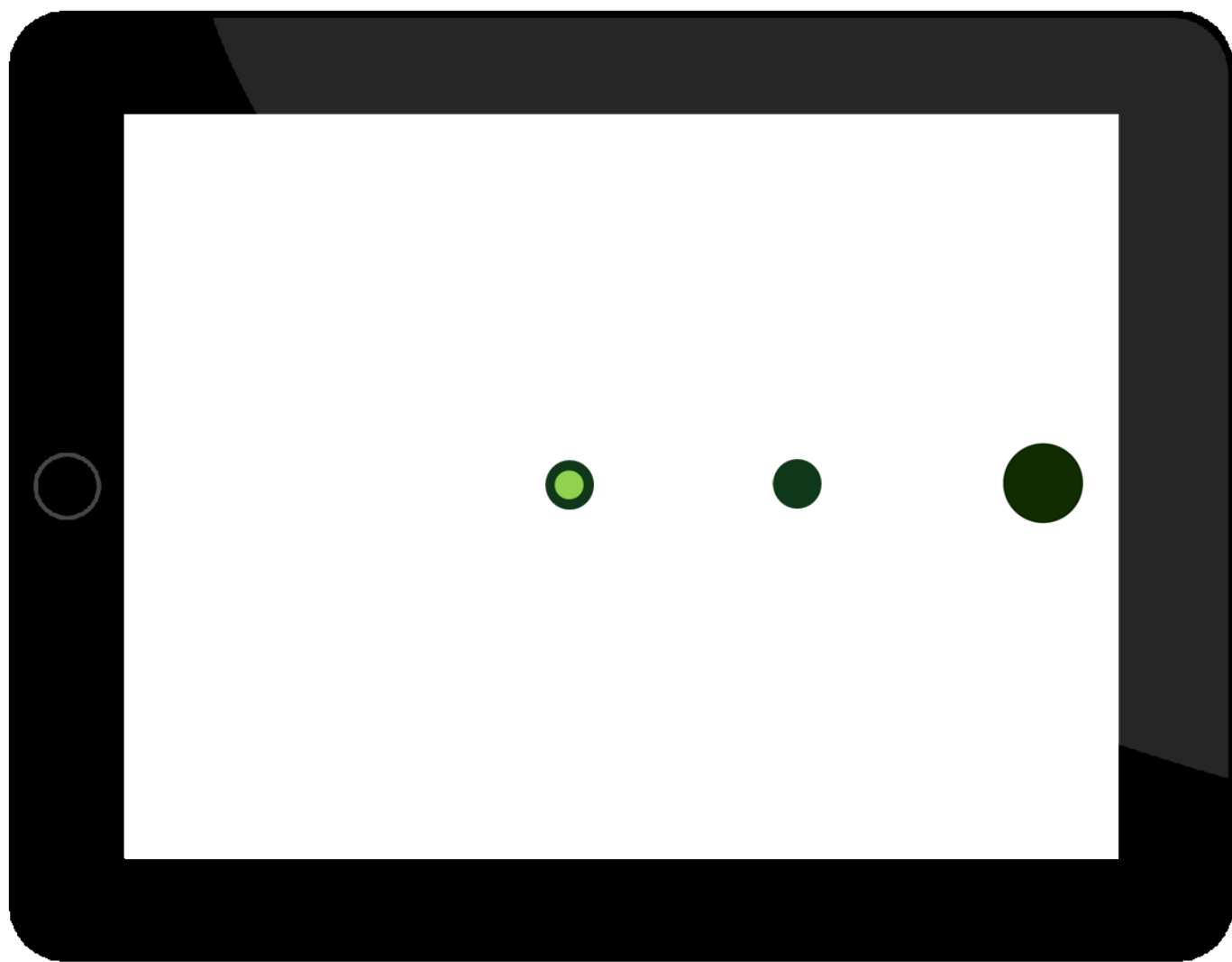


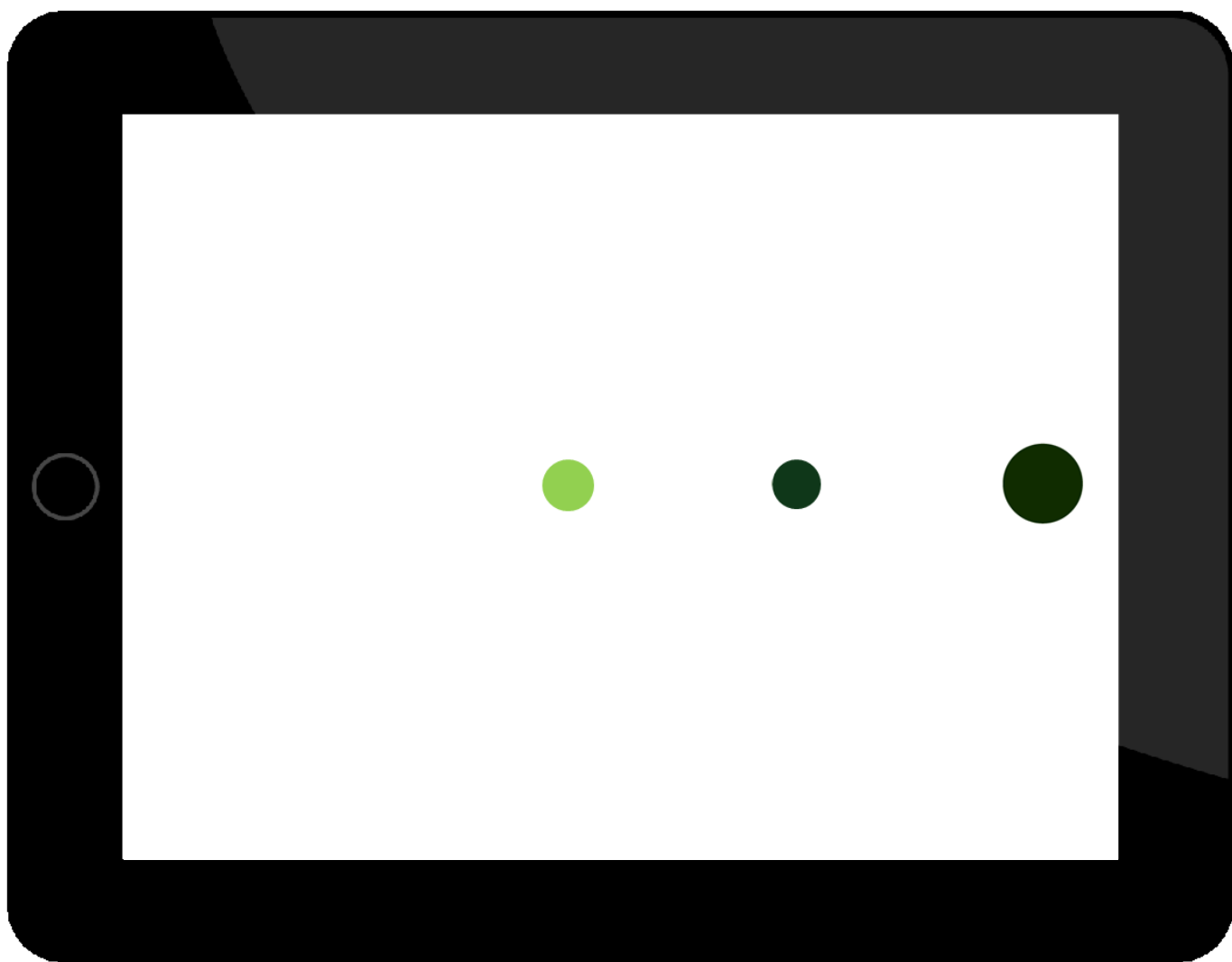


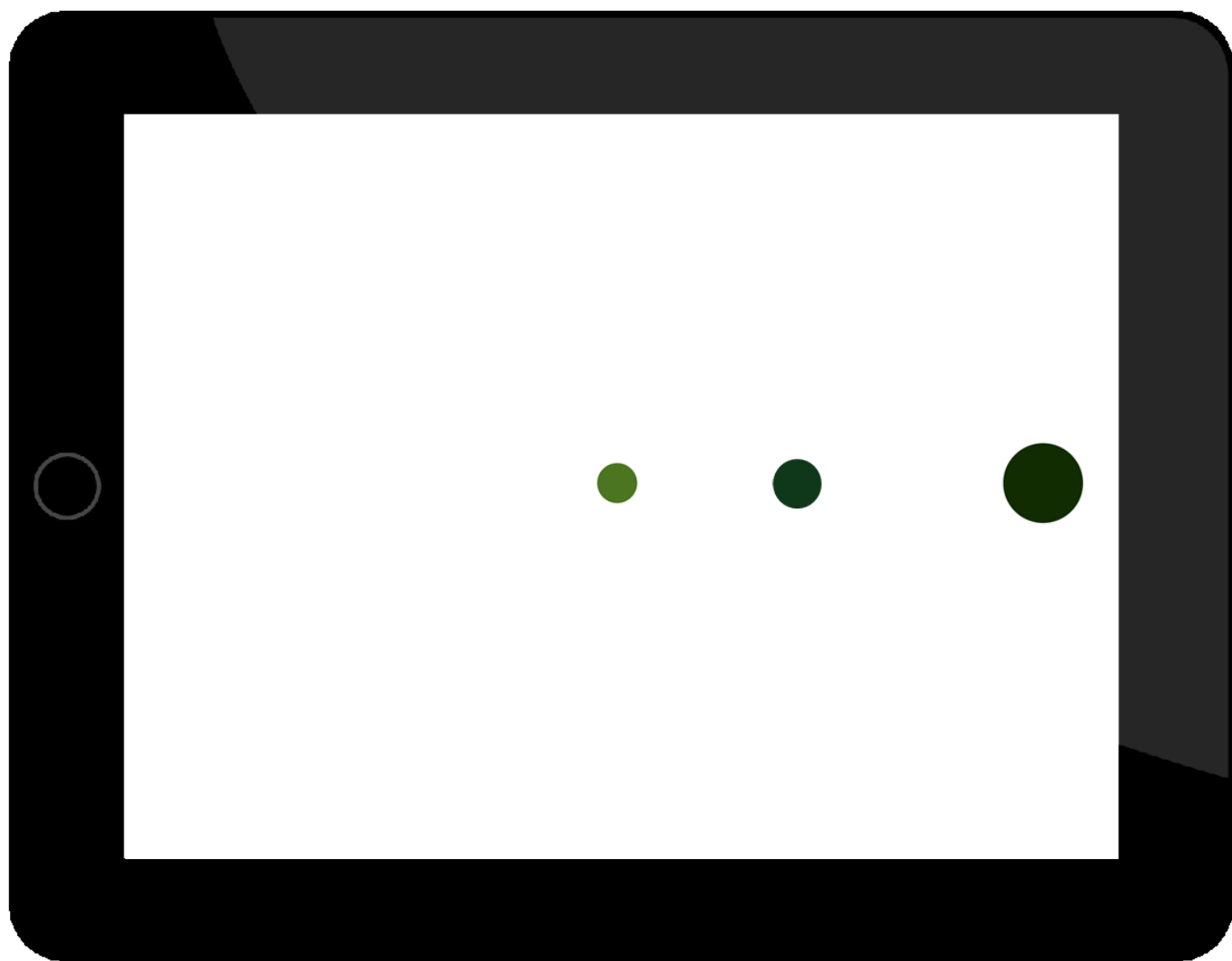


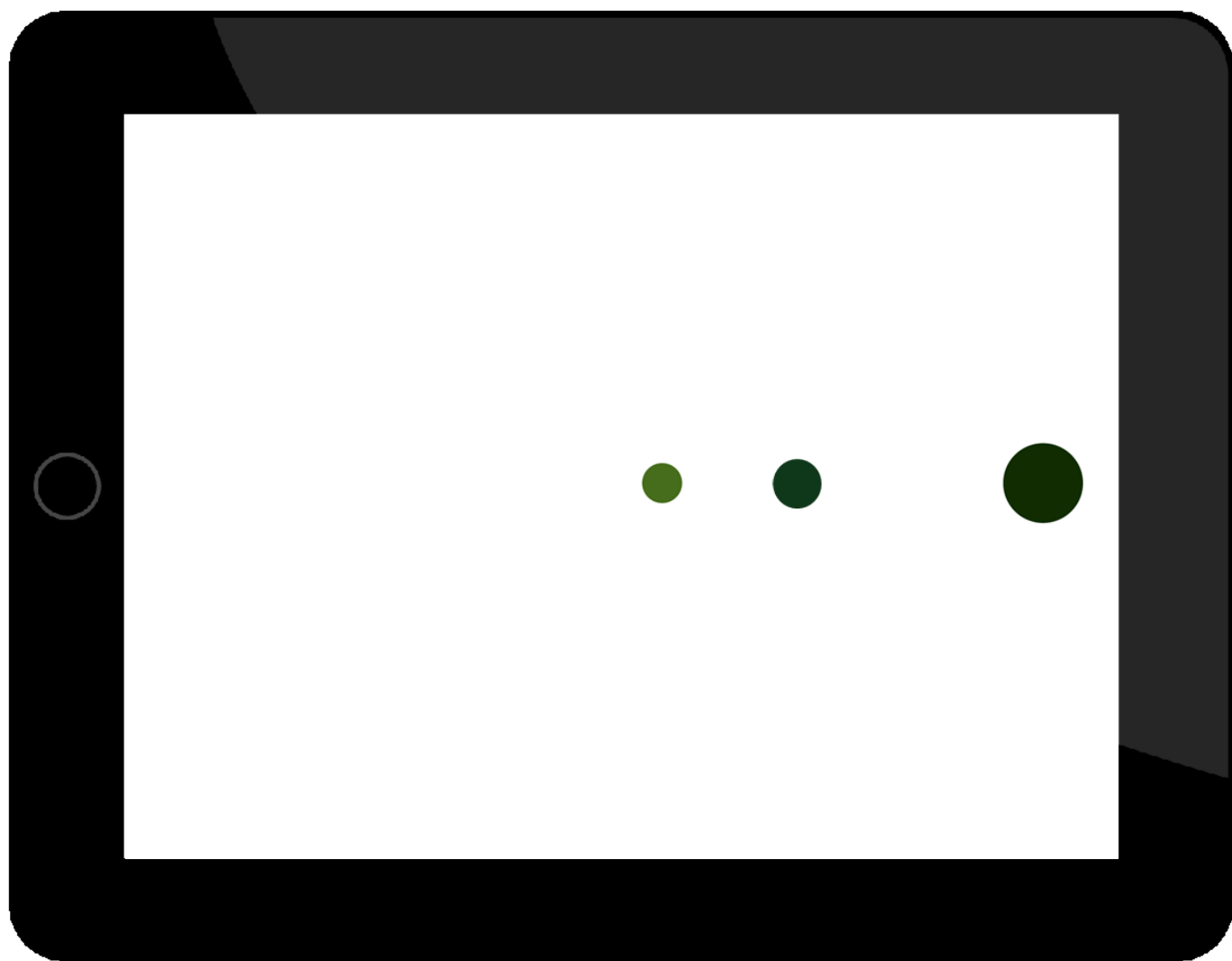


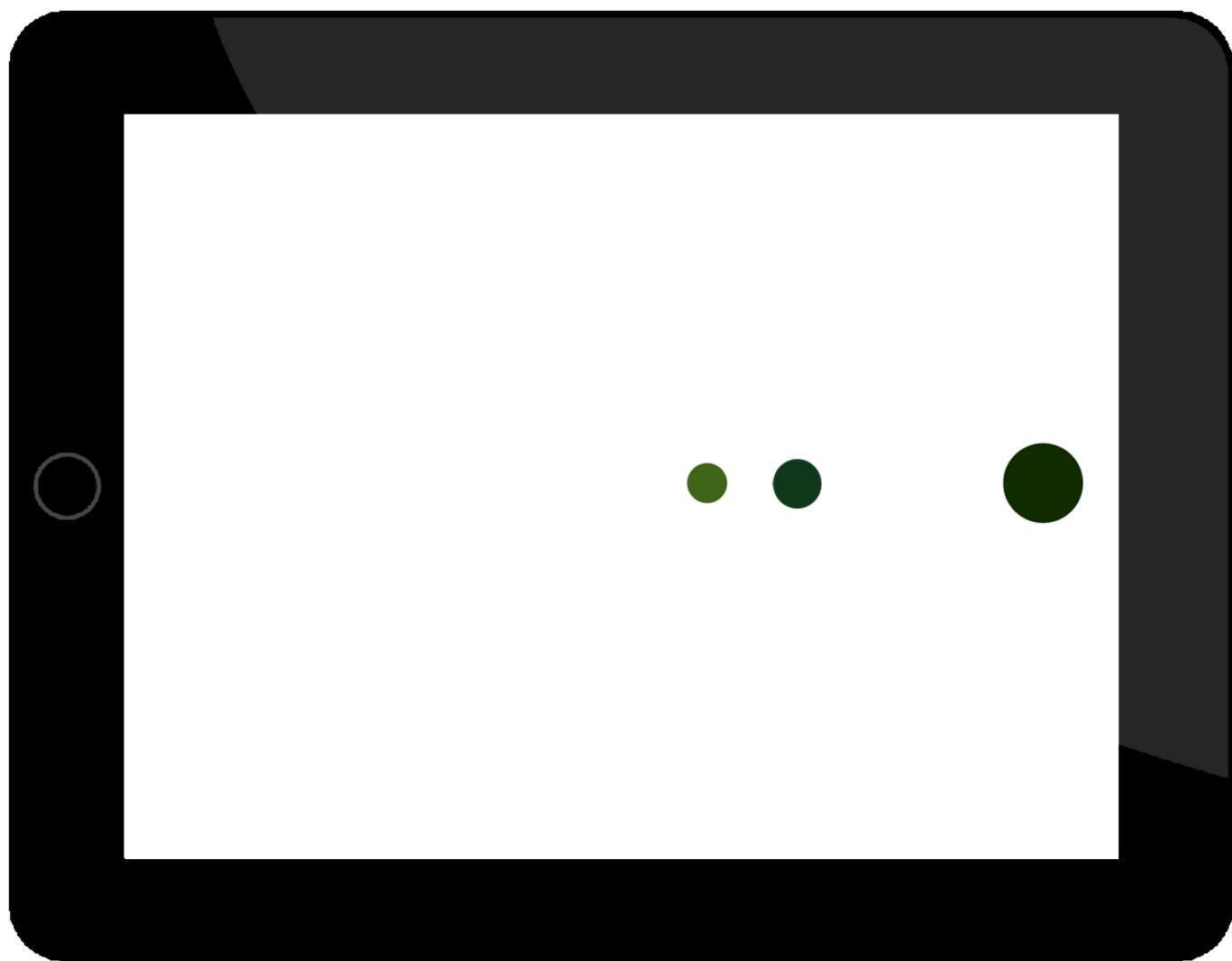


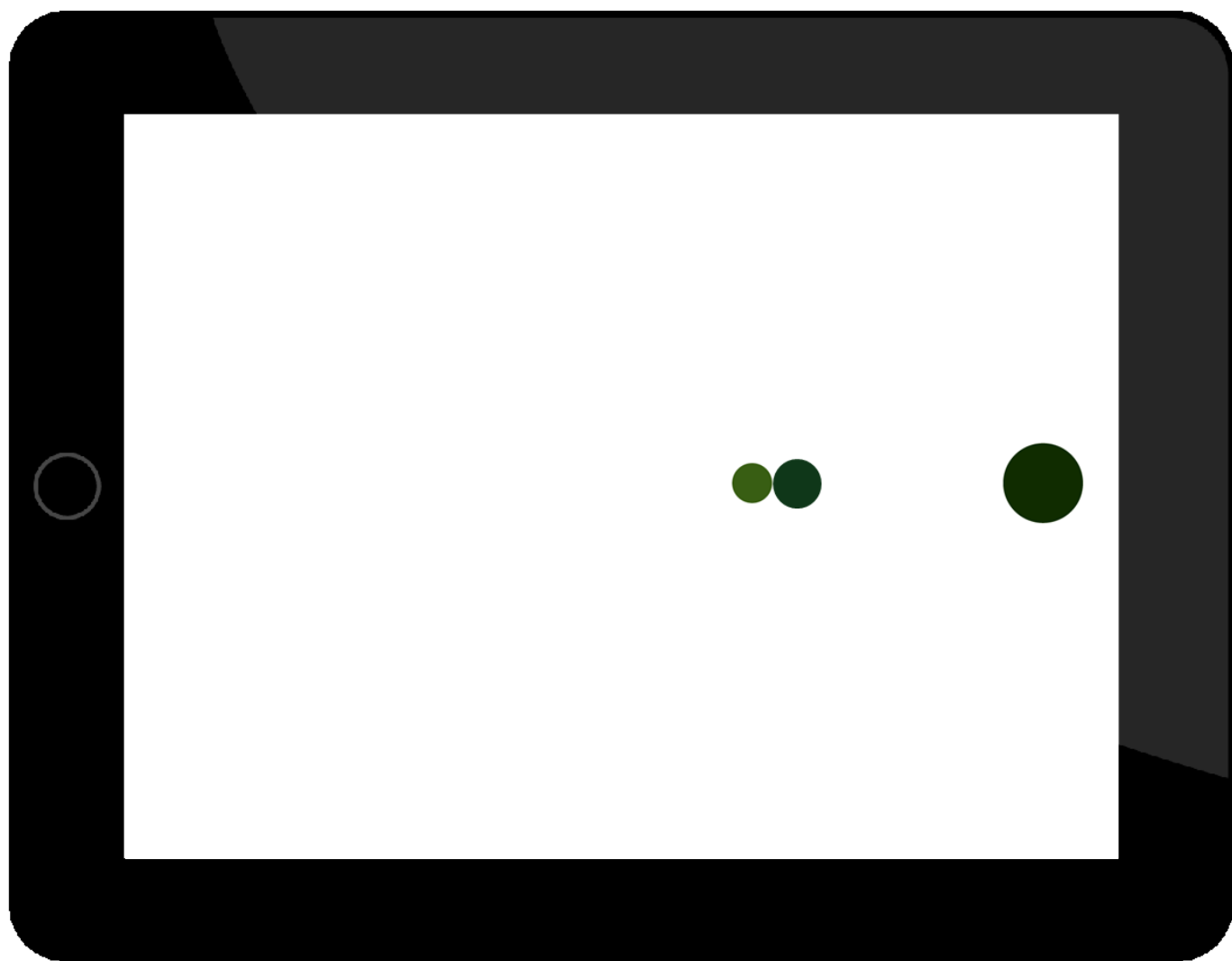


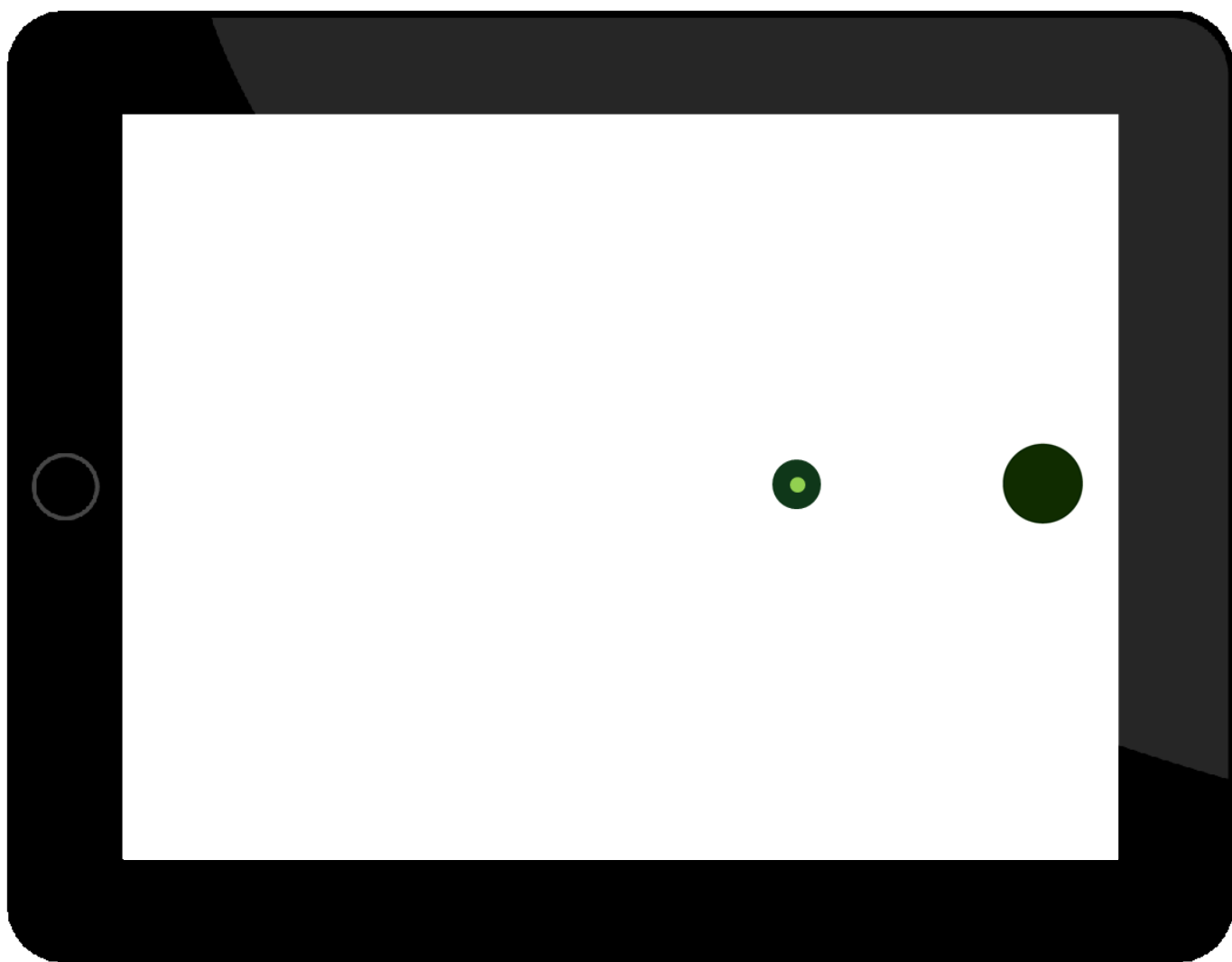


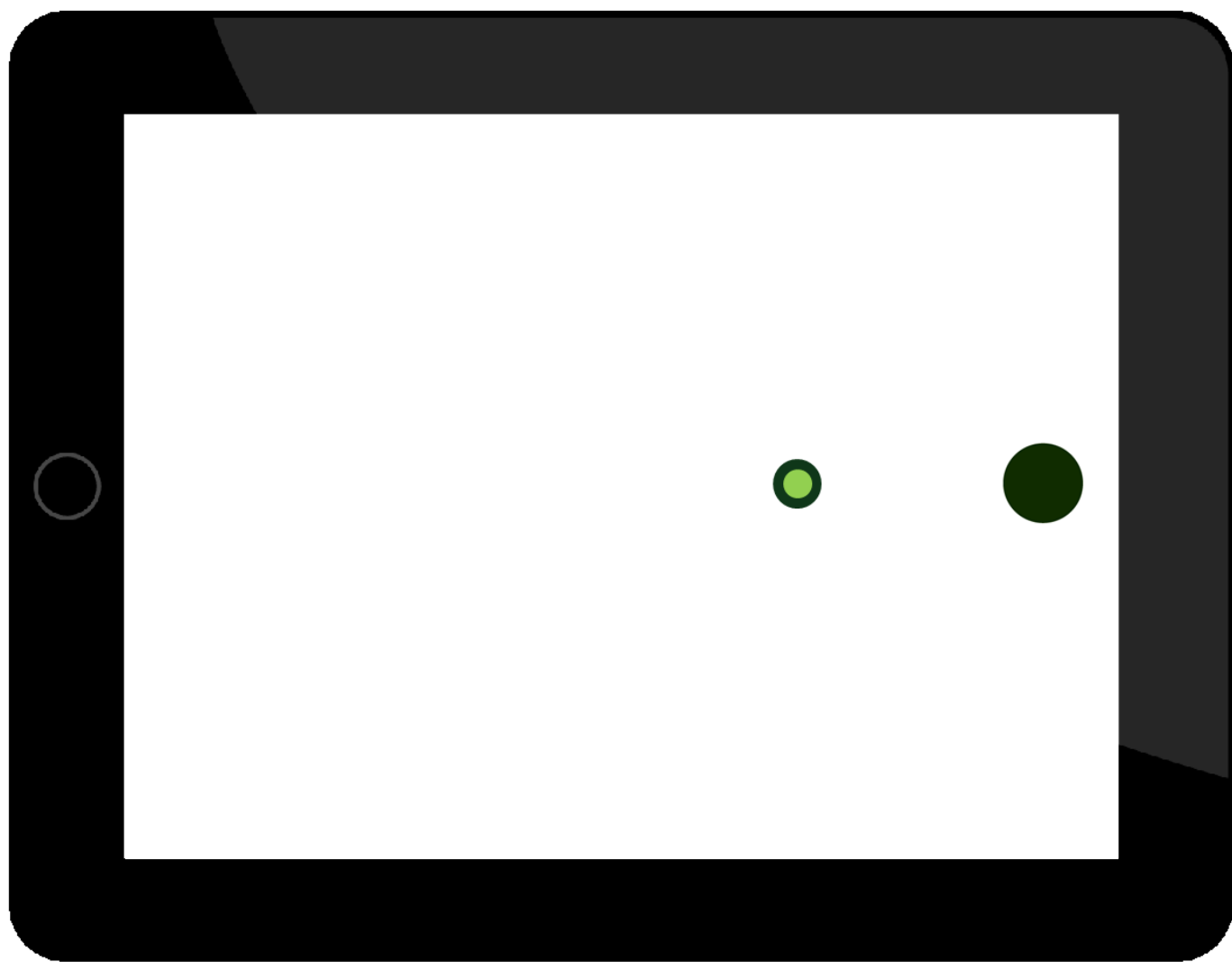


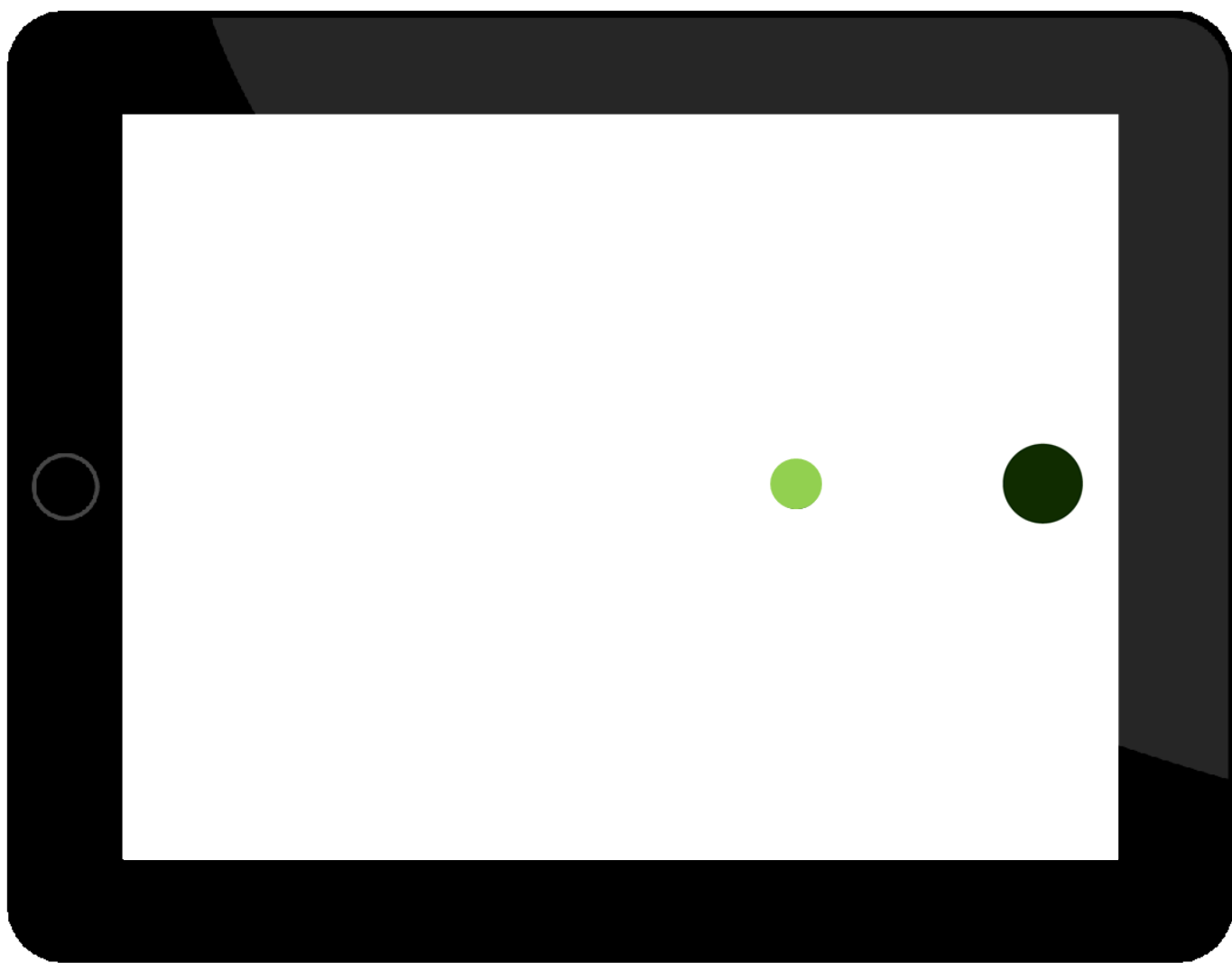


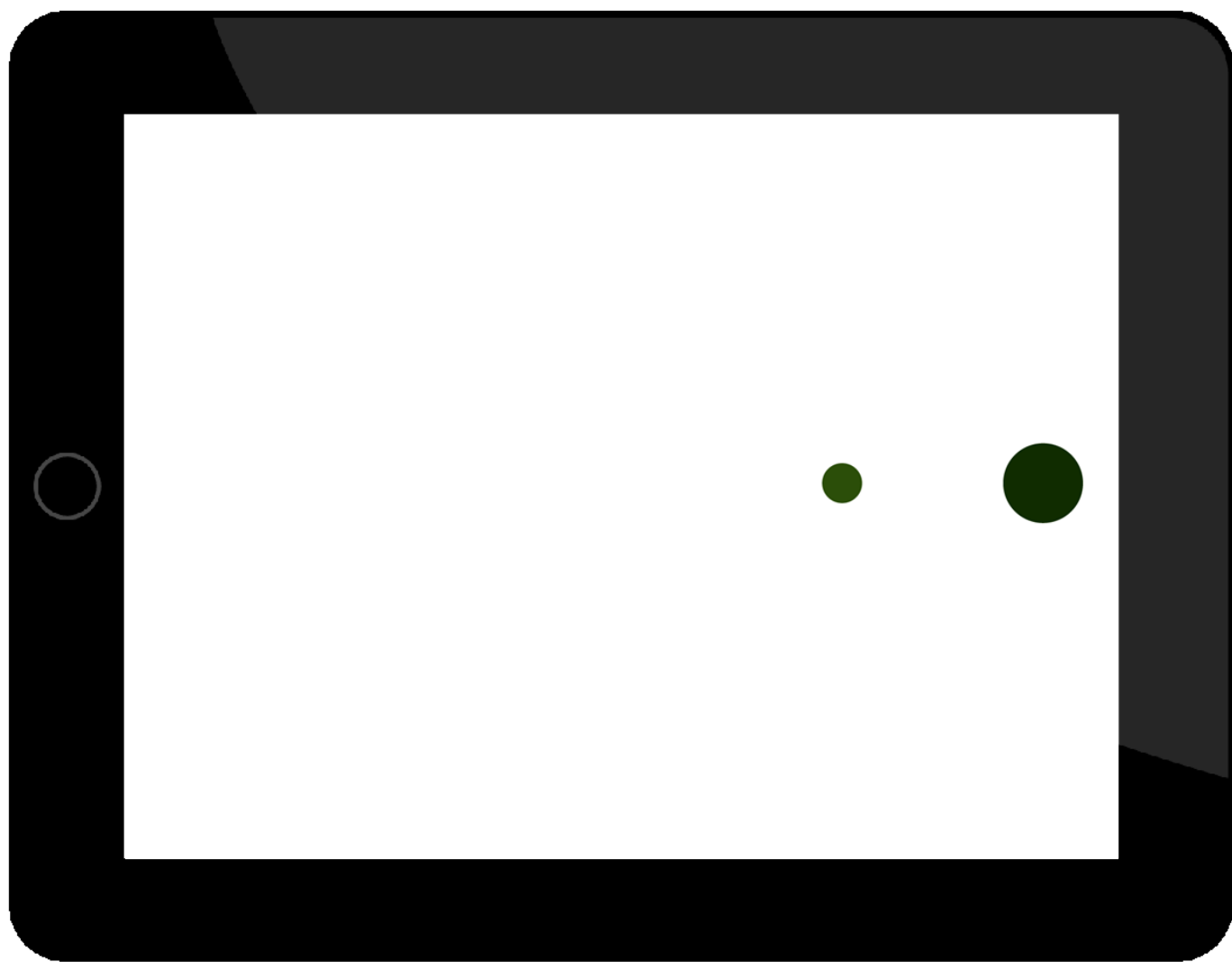


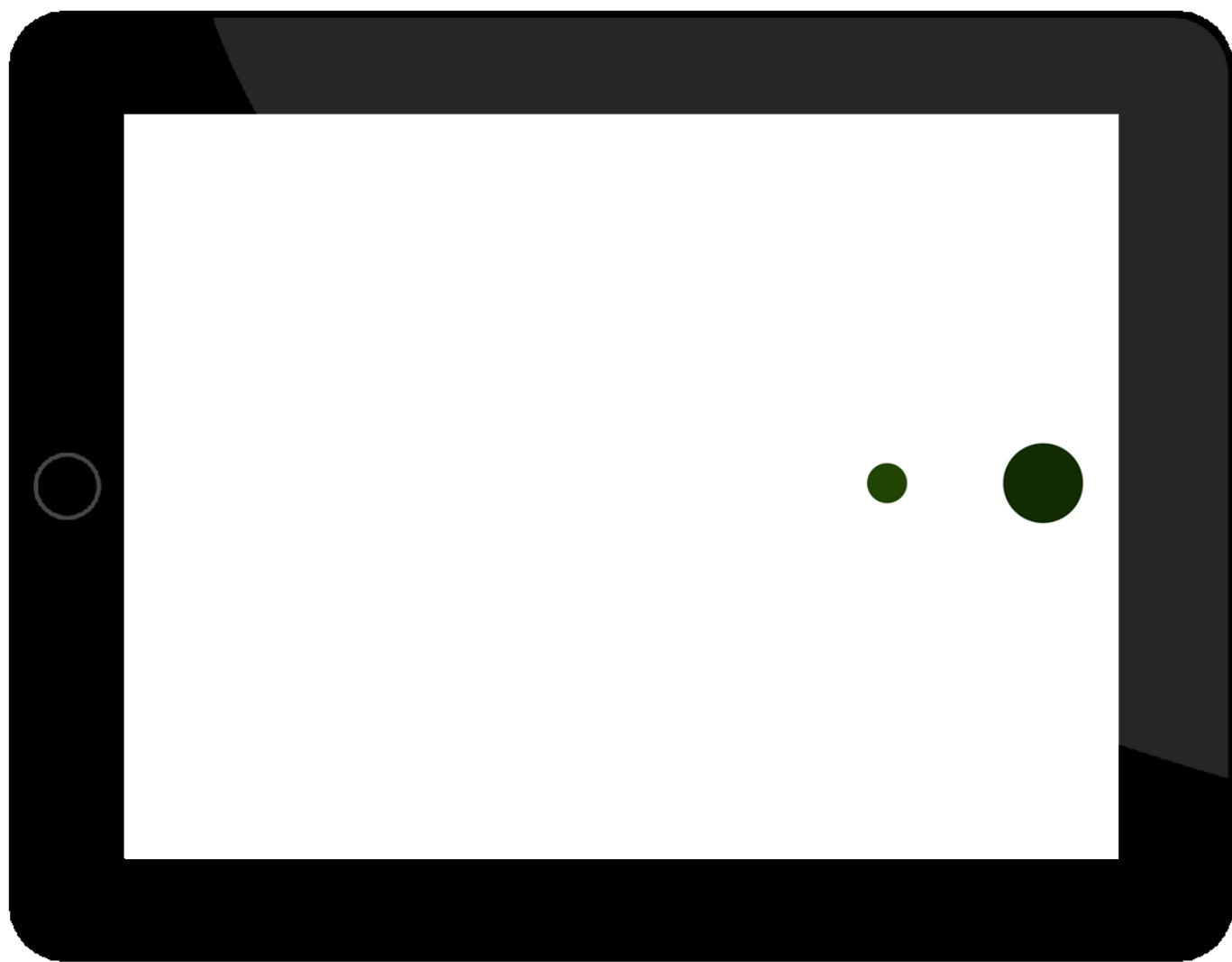


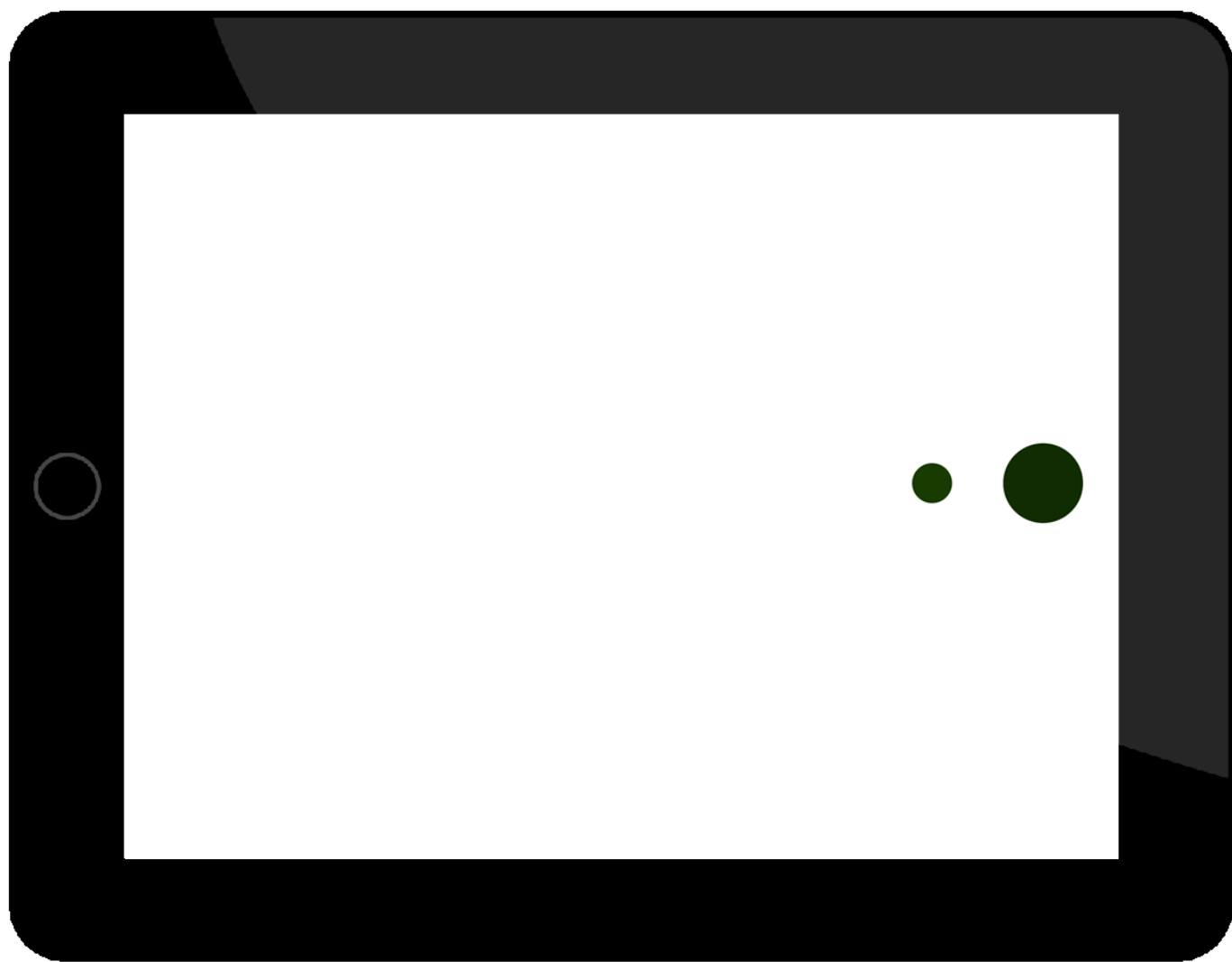


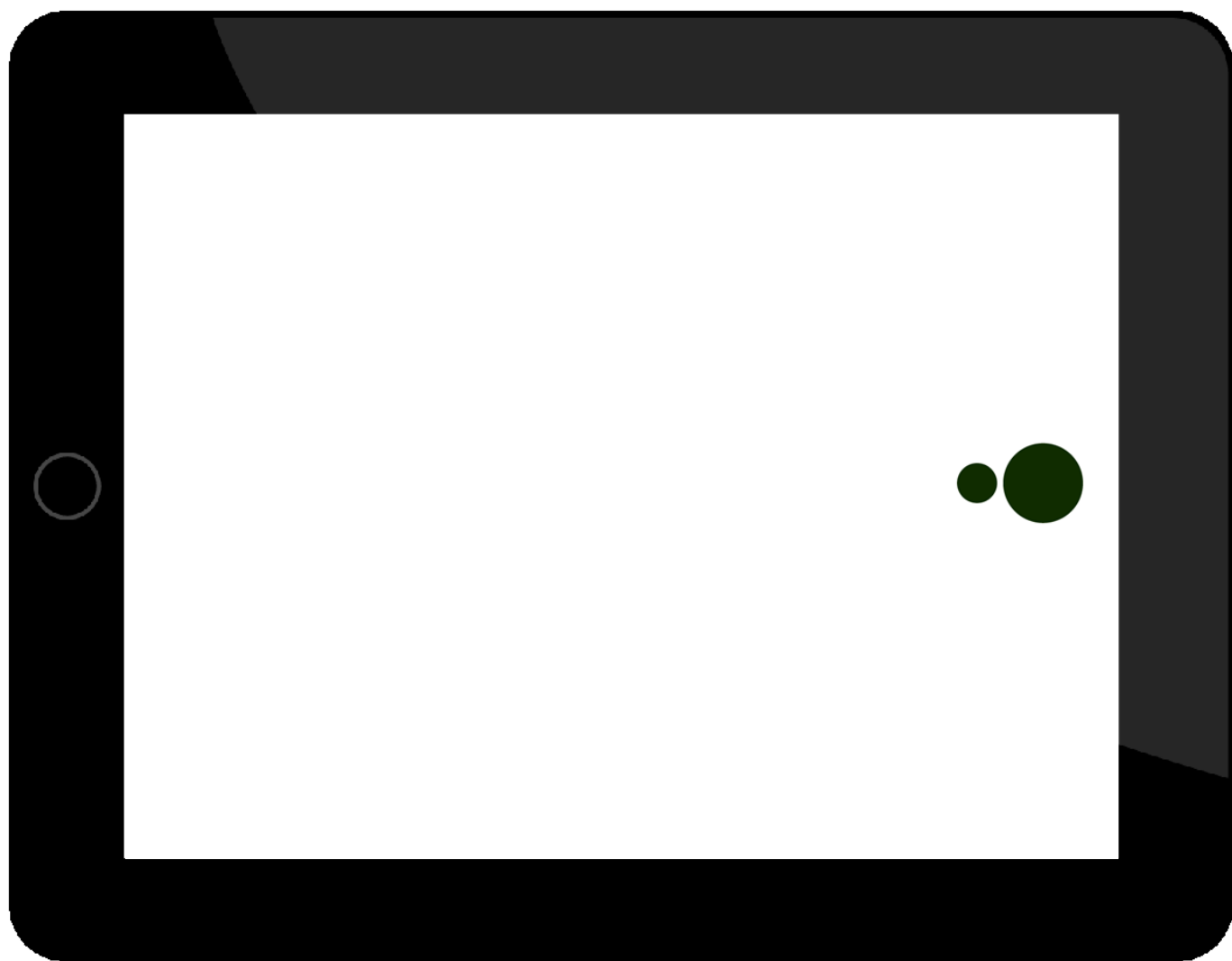


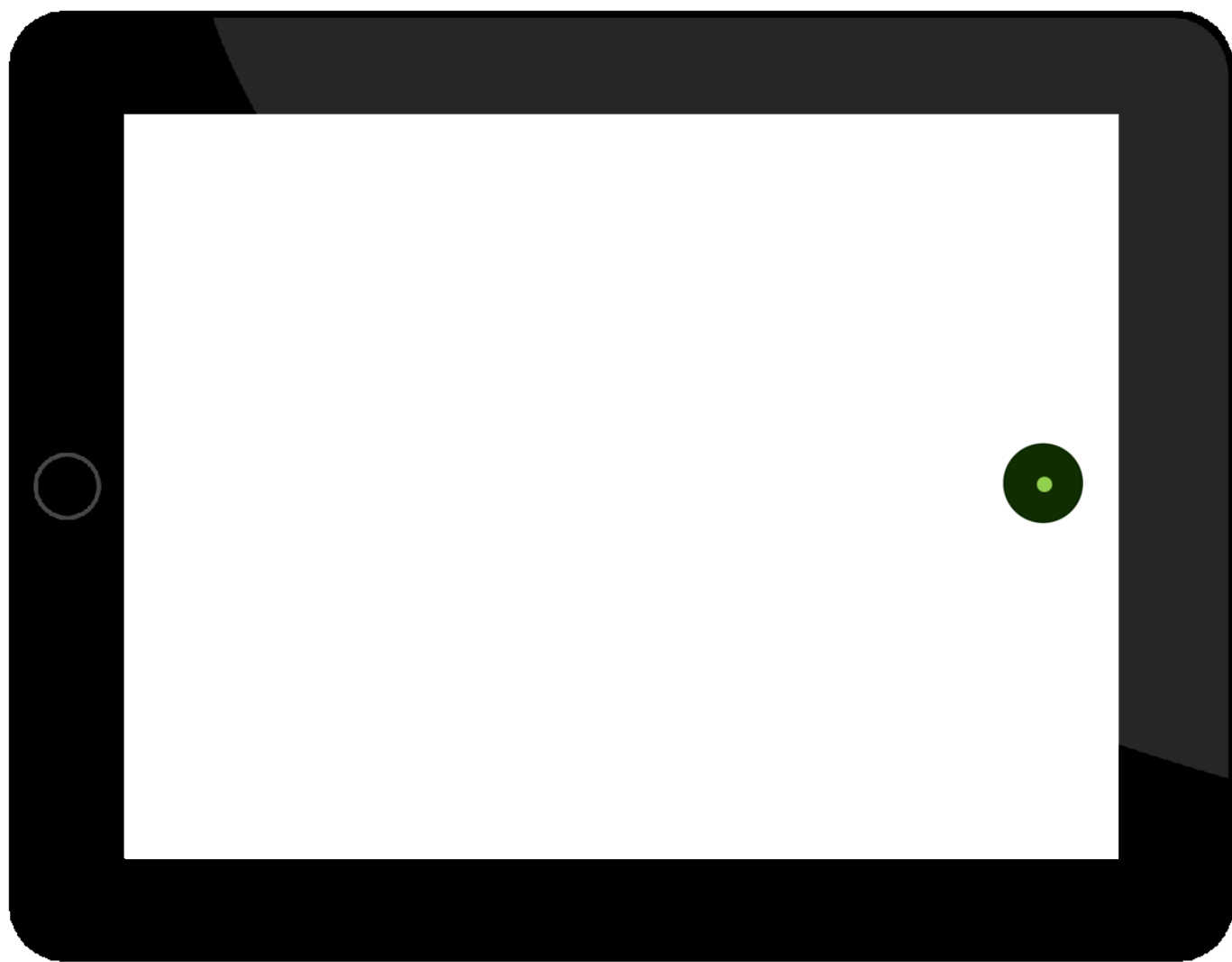


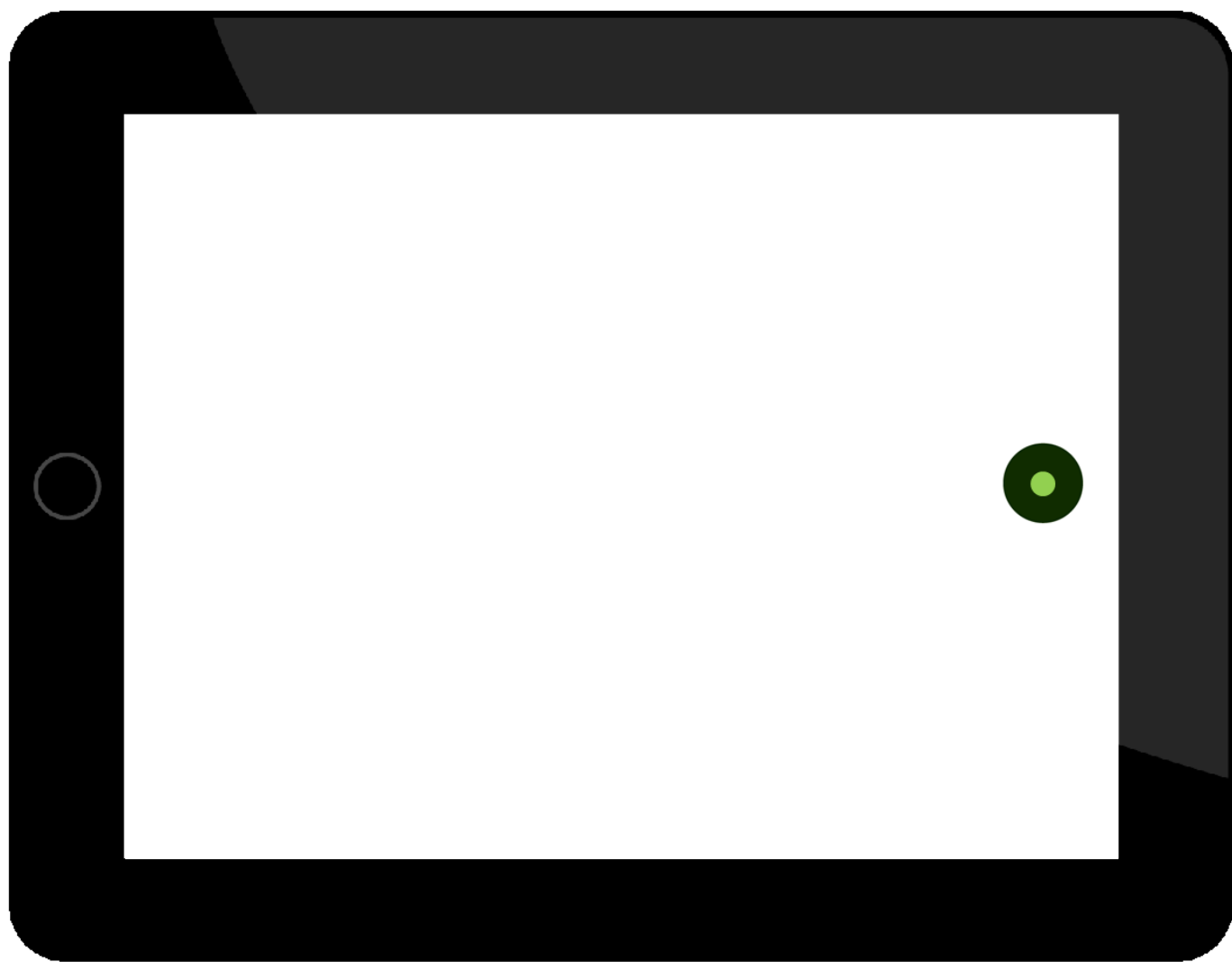


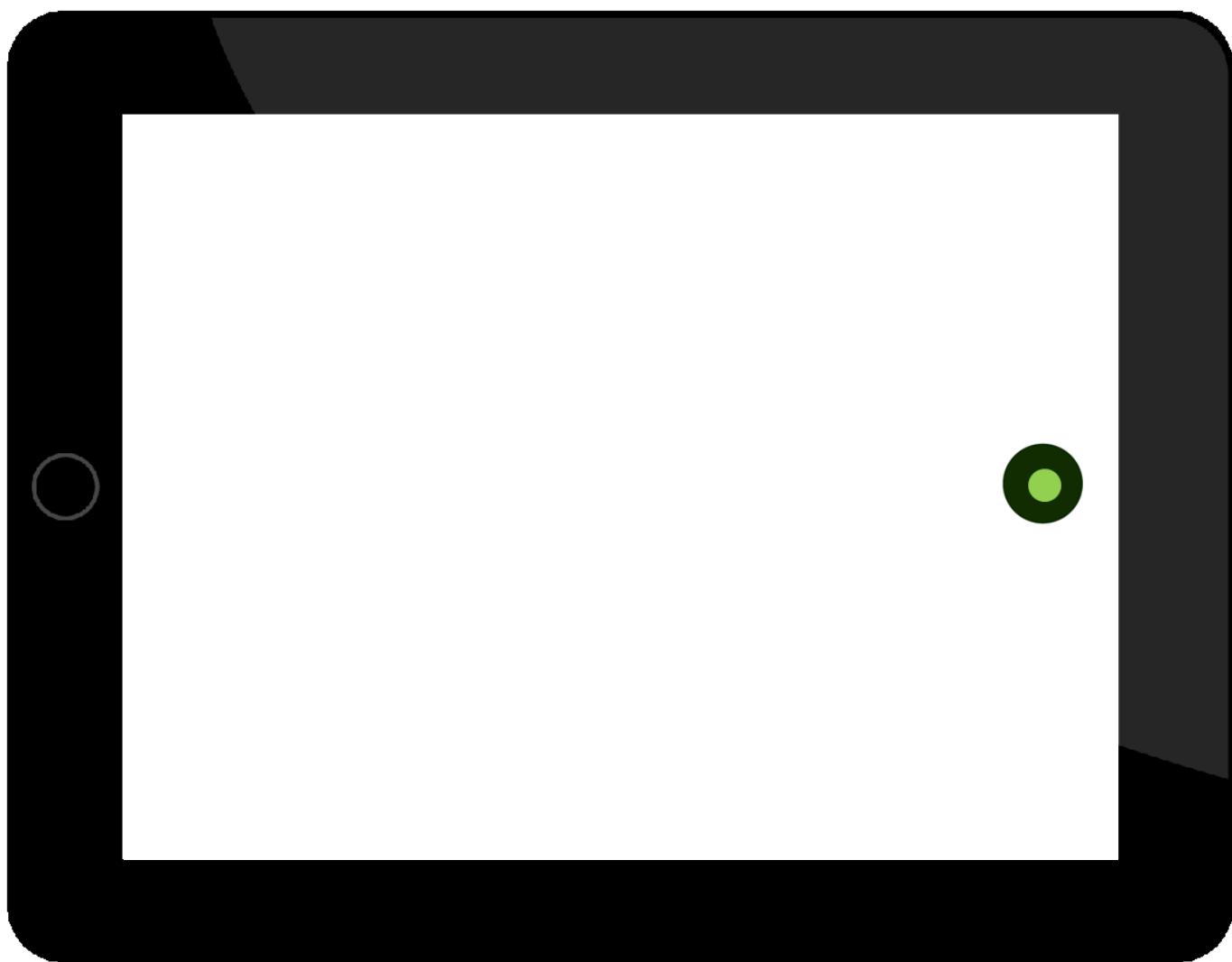


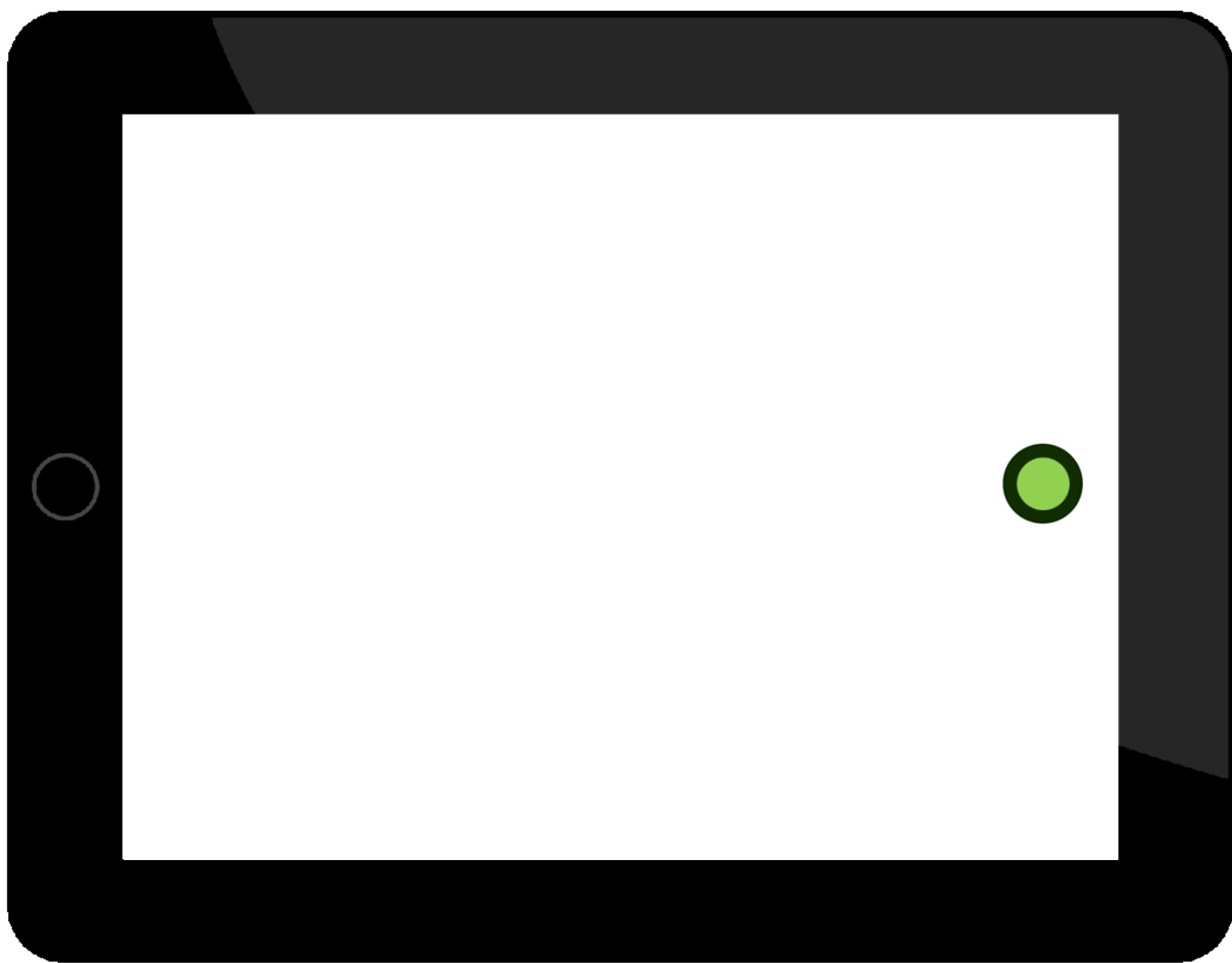


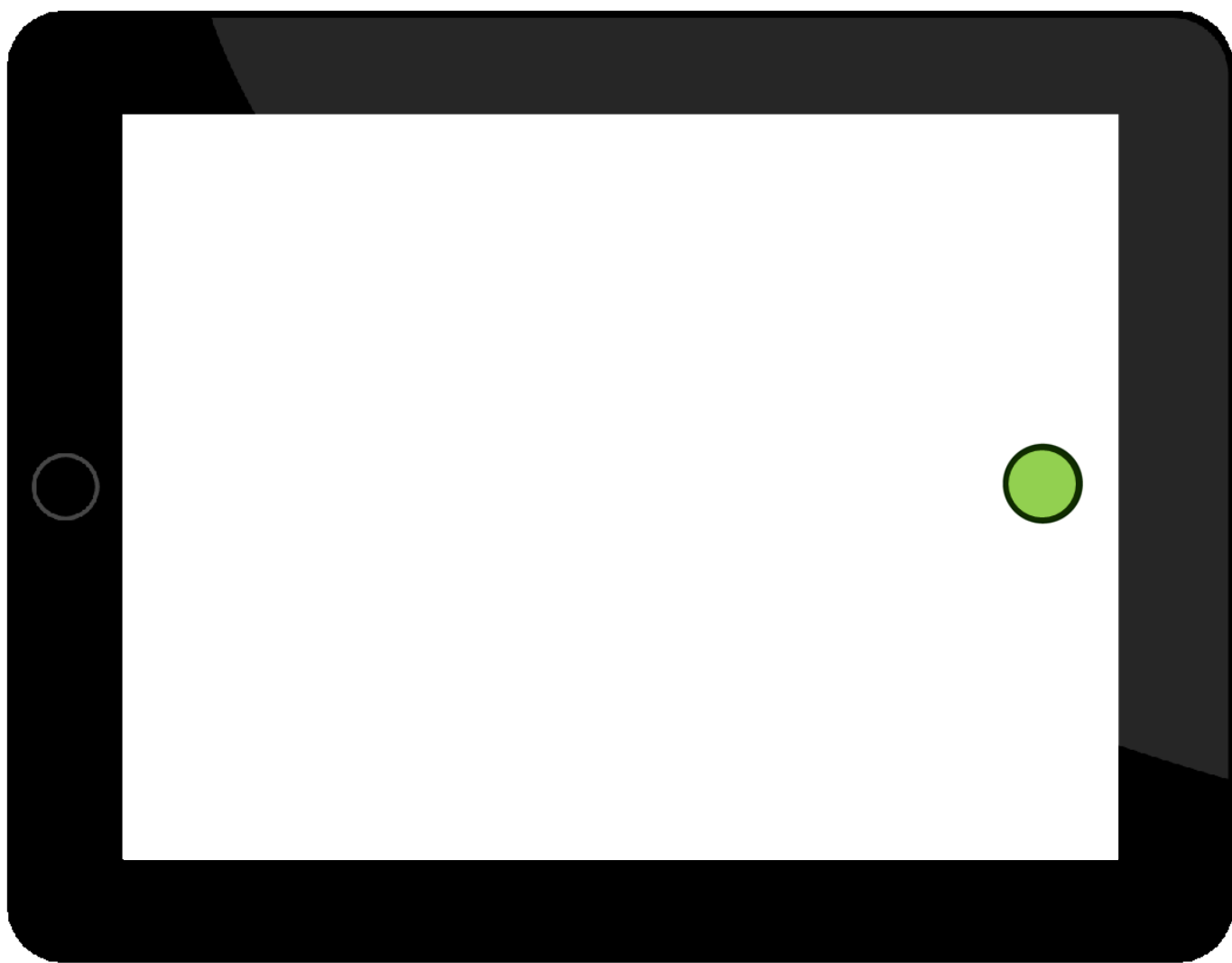














Design Solutions

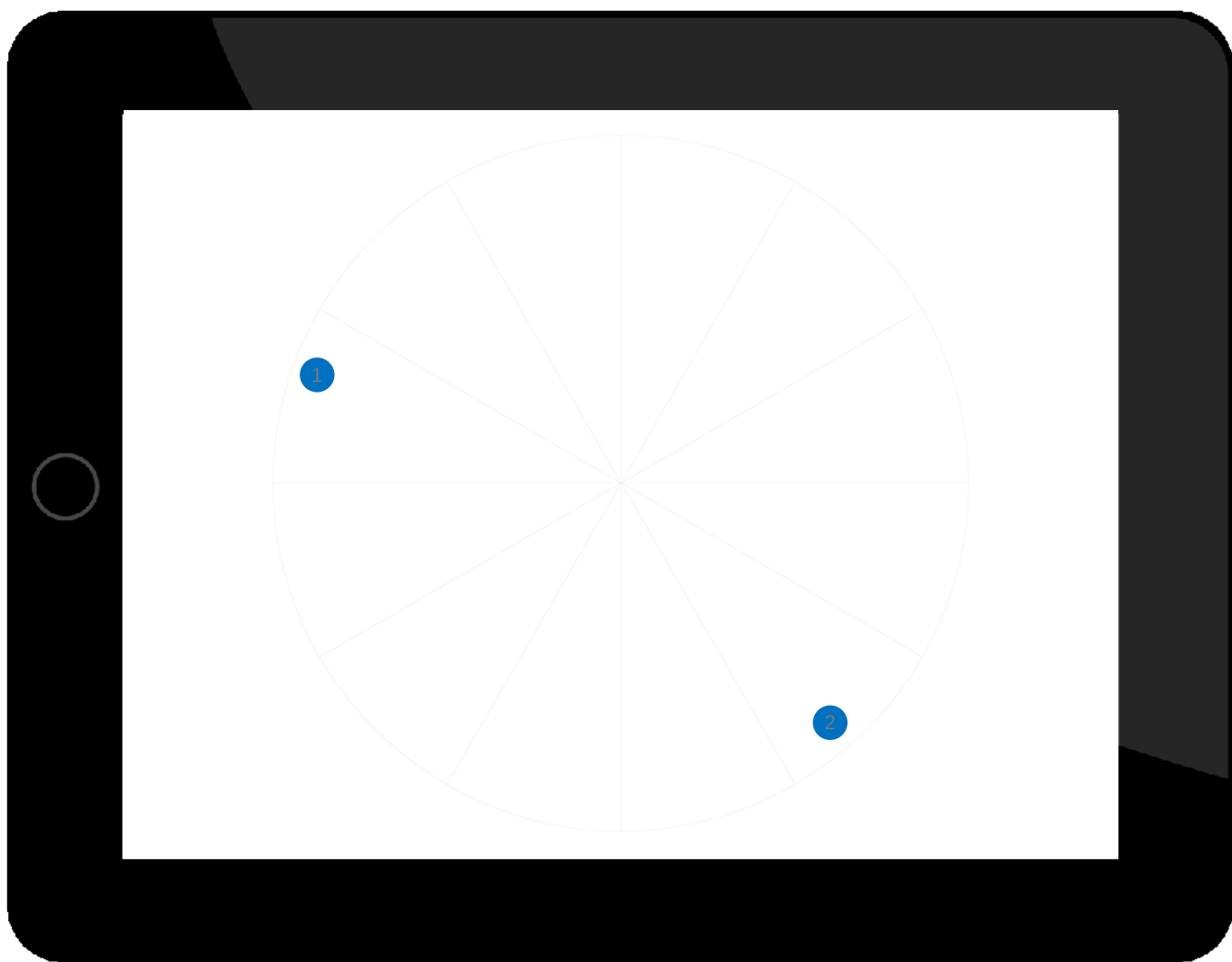
Fill the Circle

Goal: To fill the circle on the screen.

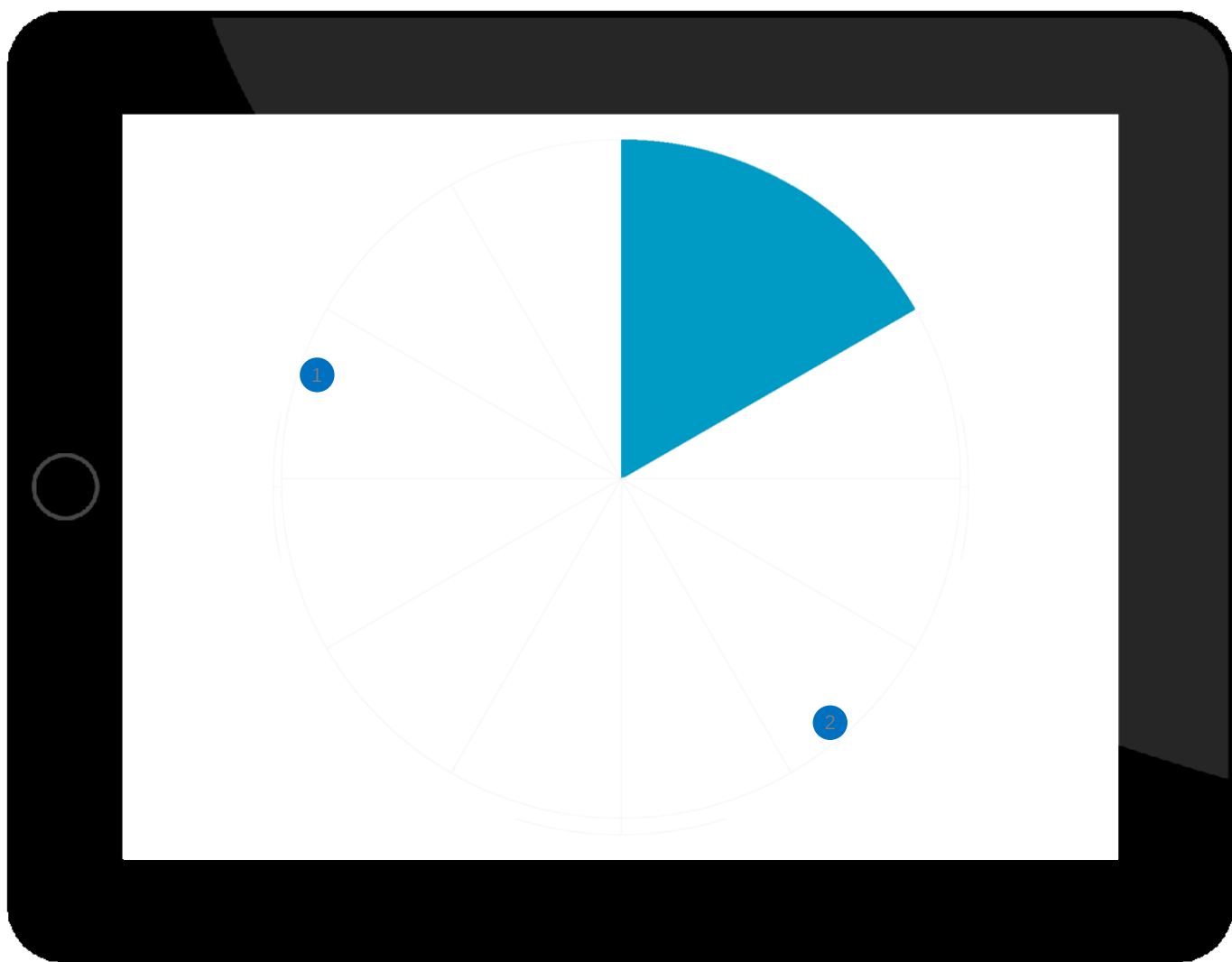
Purpose: Patient to want to complete the therapy session in order to fill up the image on the screen.

Swallow Hold: During a swallow hold, the circle is filled in a continuous clock wise direction.

Previous Attempts: The faded circles and numbers indicate previous swallow hold attempts in this session.













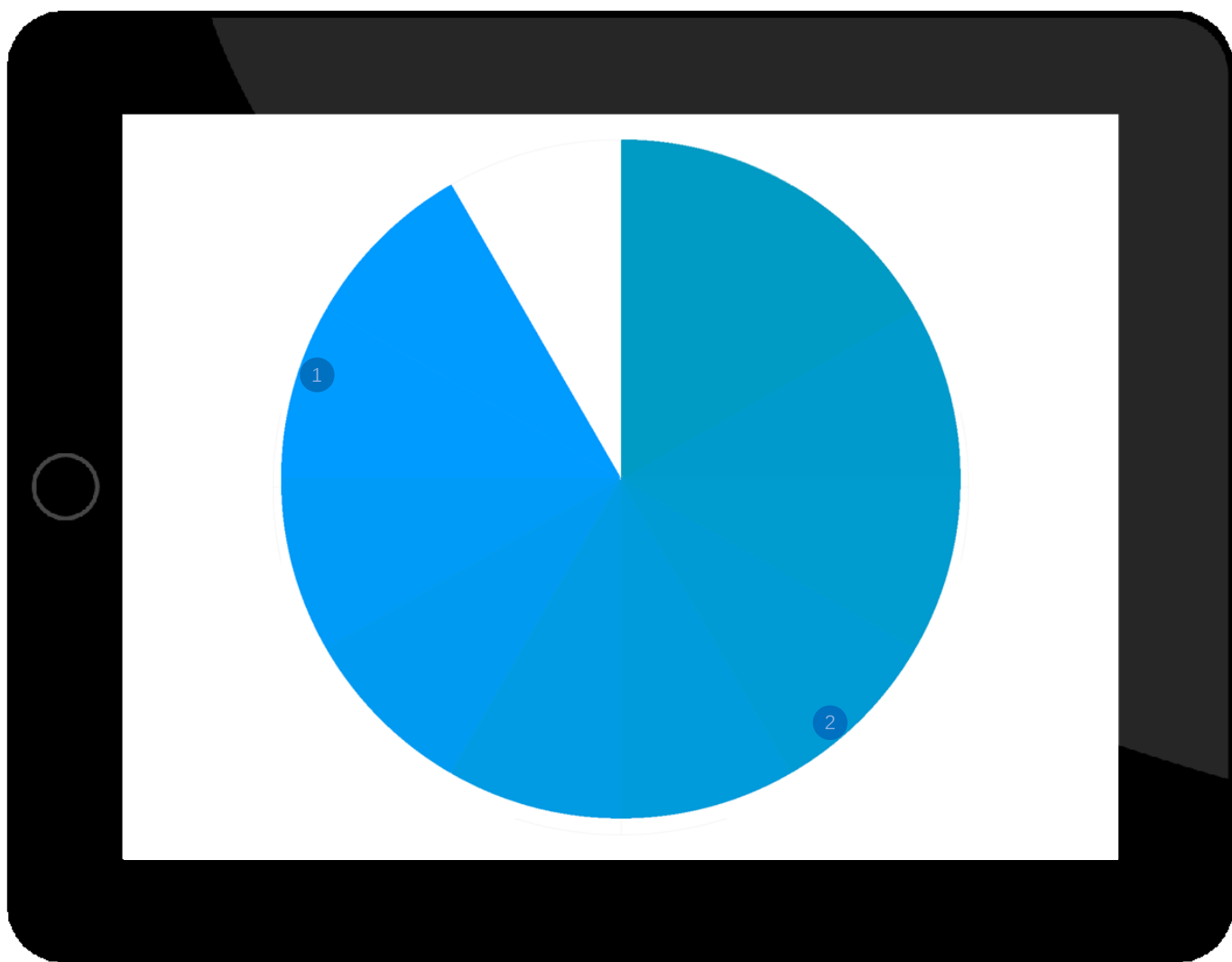


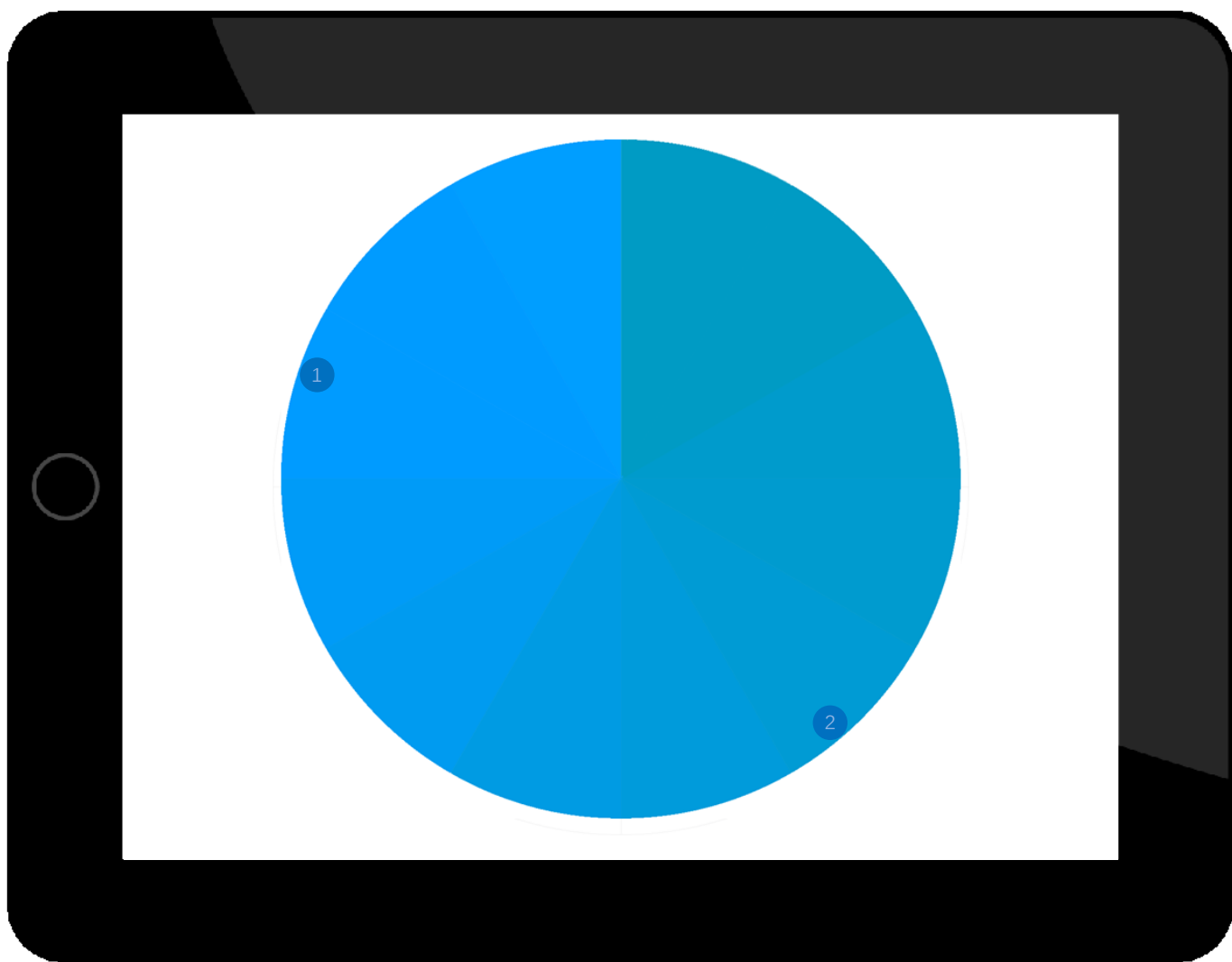


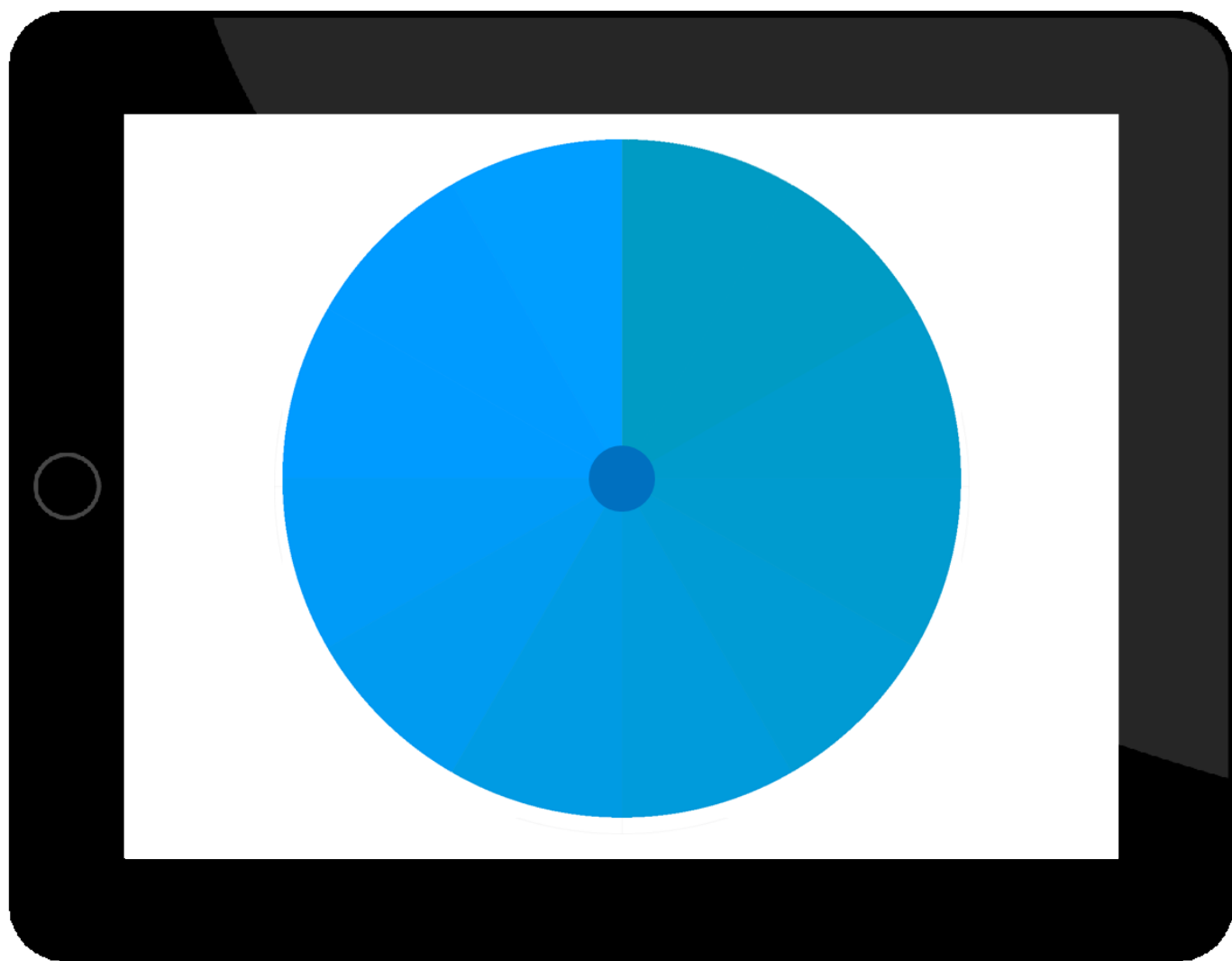


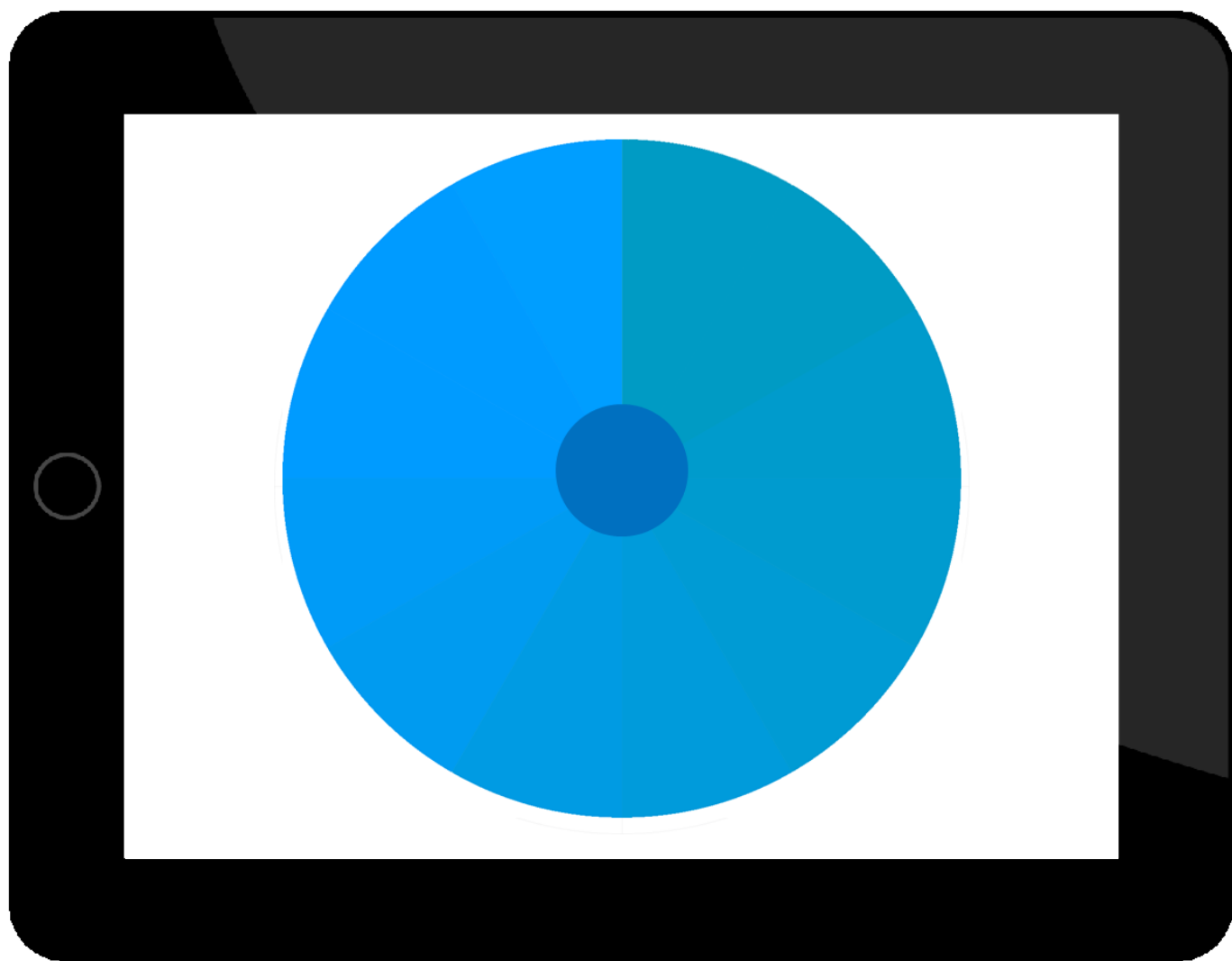


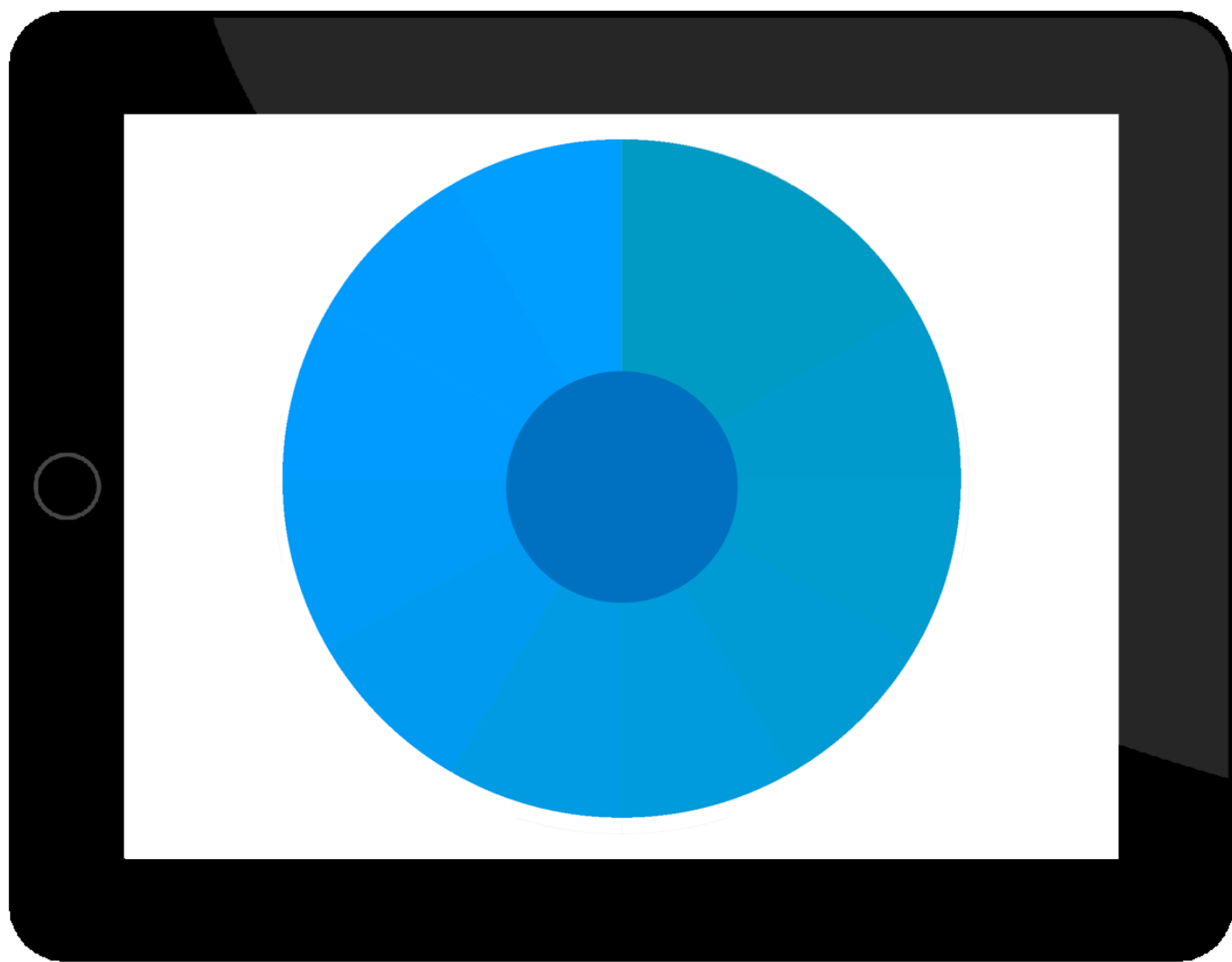


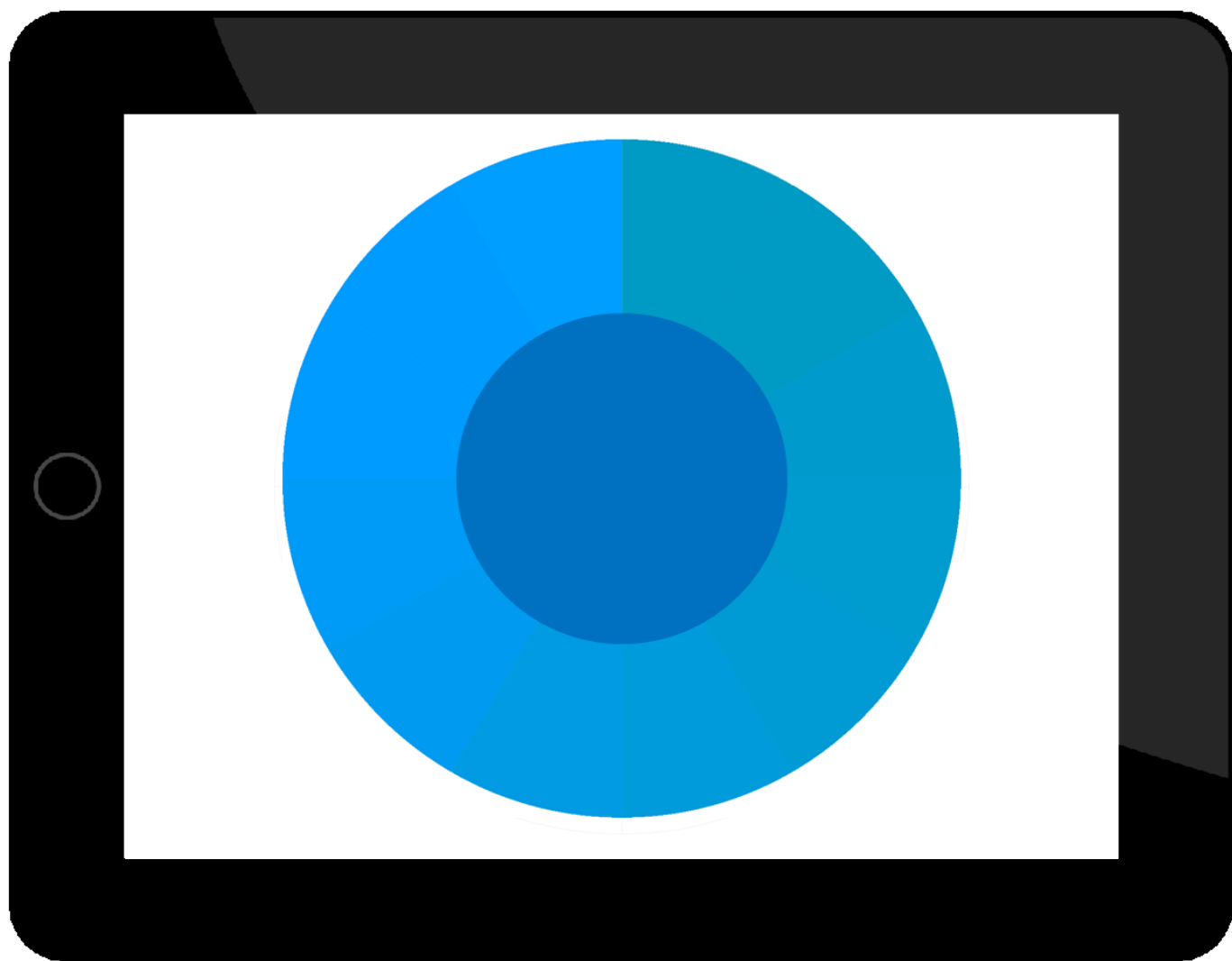


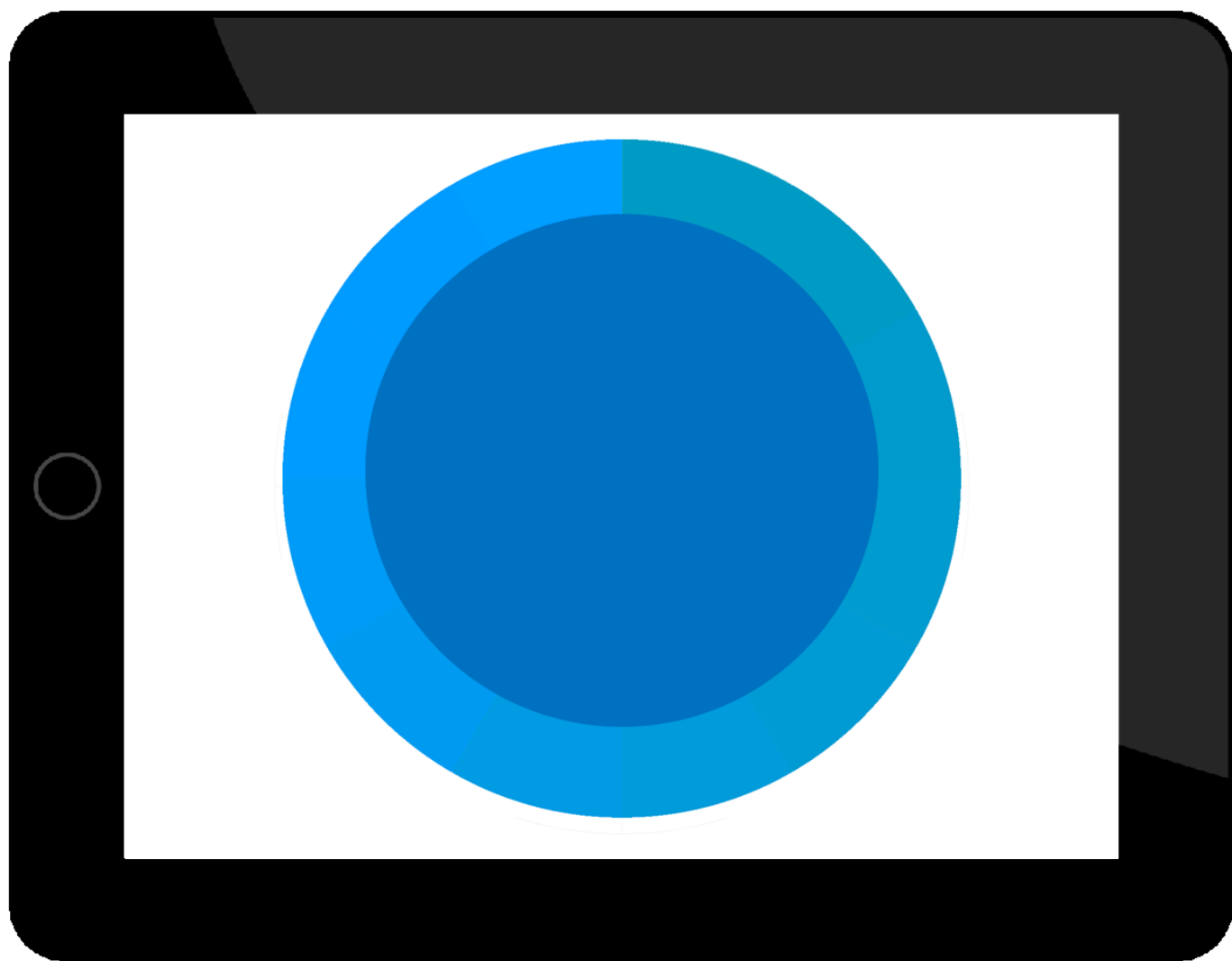


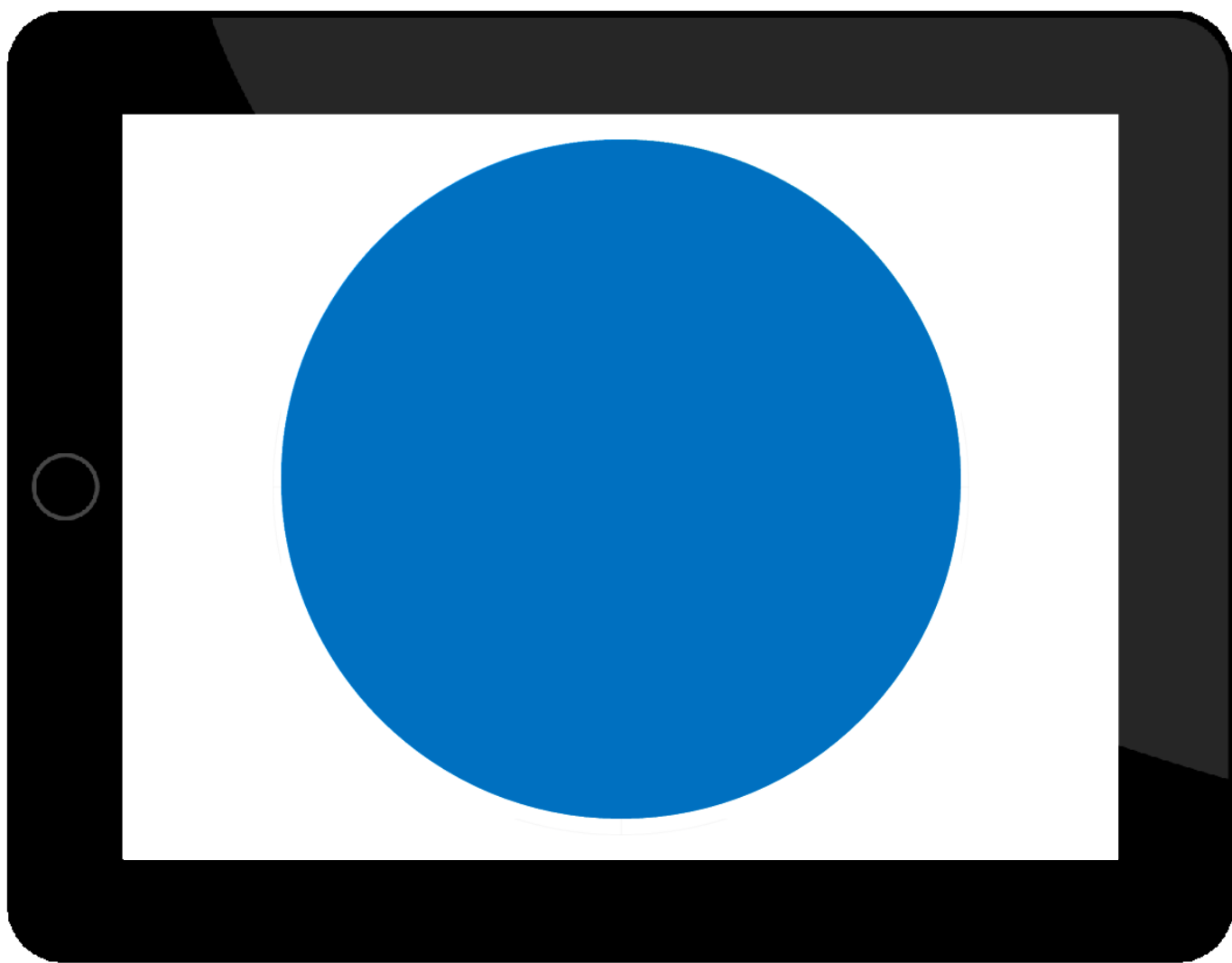












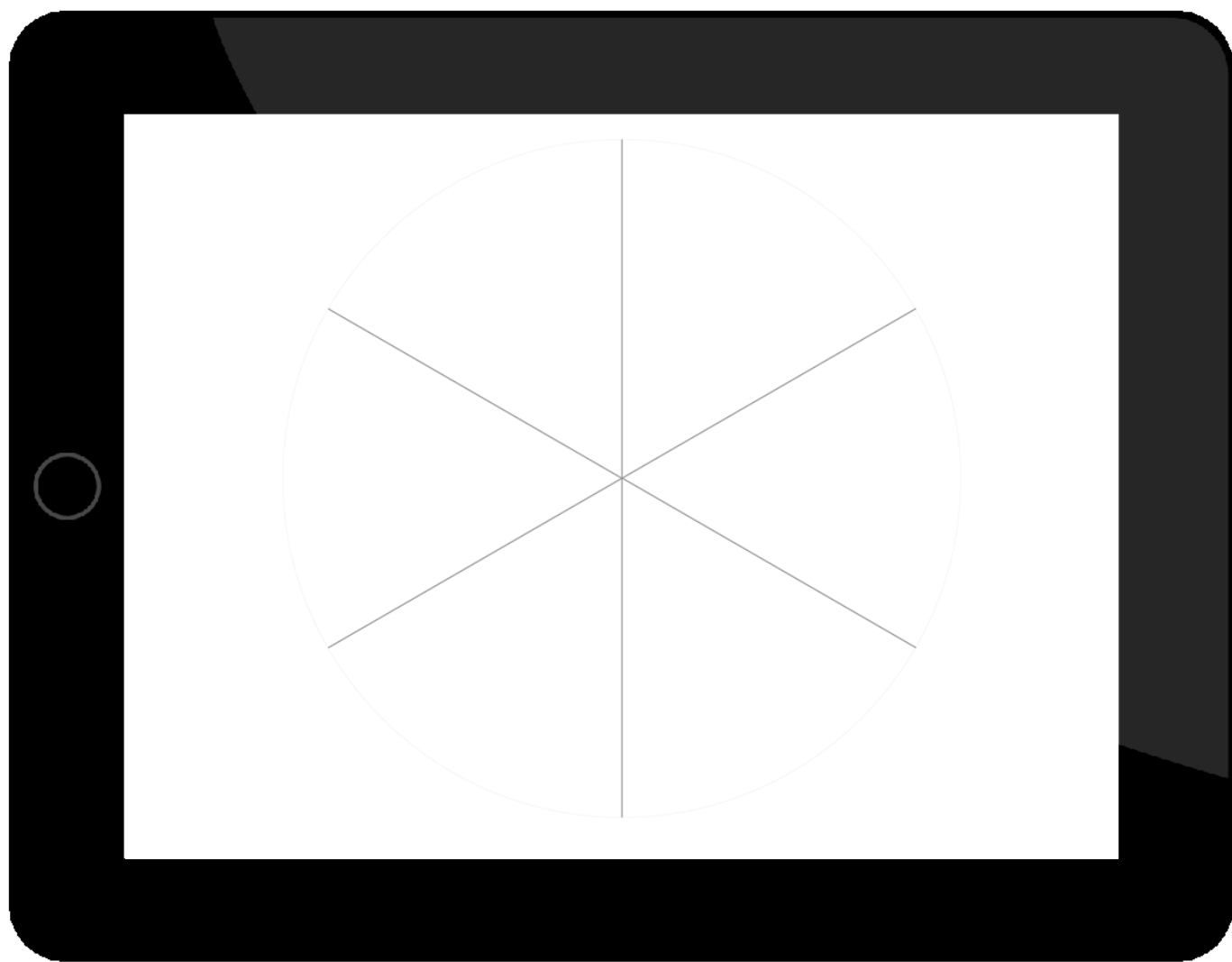
Design Solutions

Fill the Circle

Goal: To fill the circle on the screen.

Purpose: Patient to want to complete the therapy session in order to fill up the image on the screen.

Multiple Swallows: At each swallow, the circle will fill up in sections.



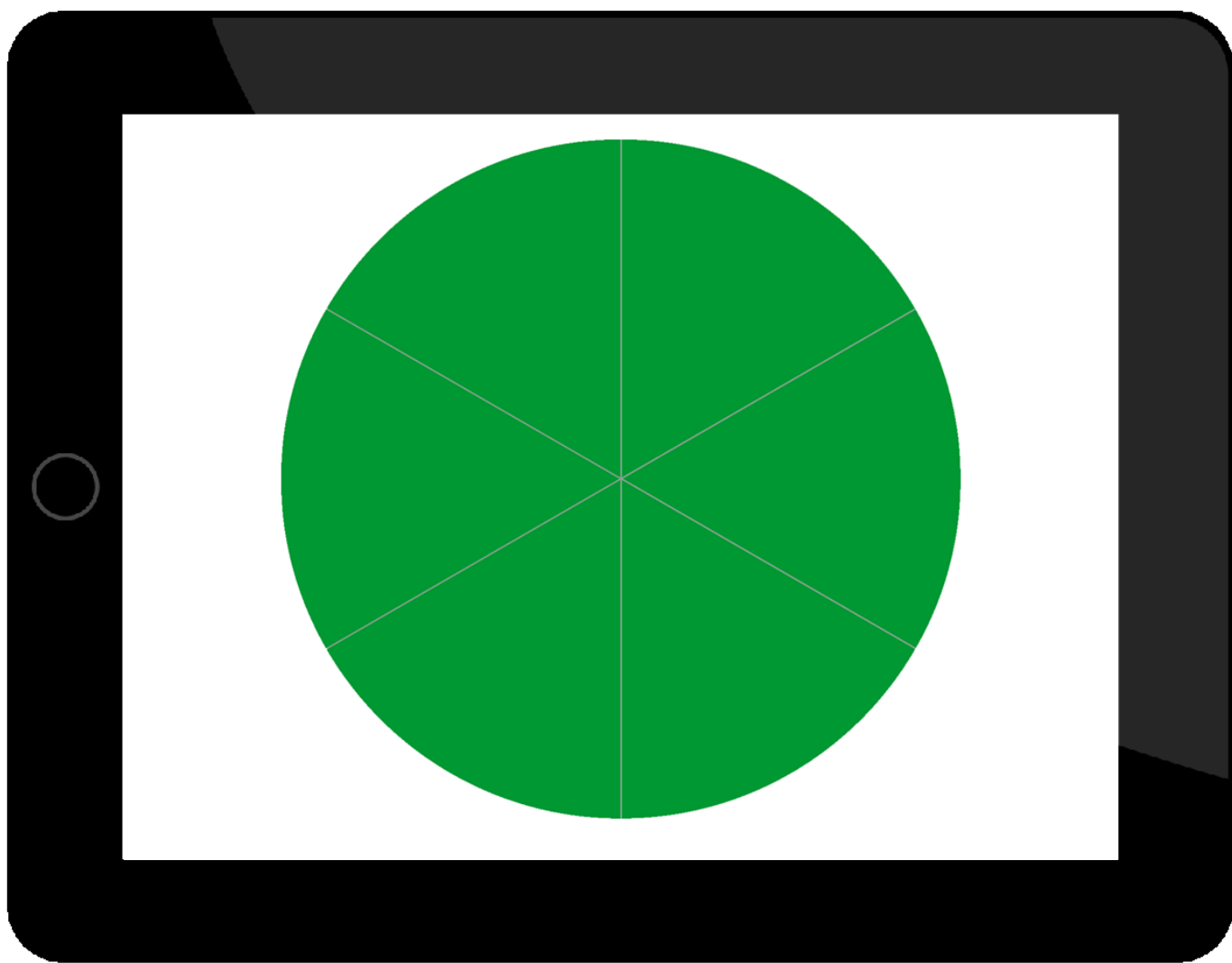


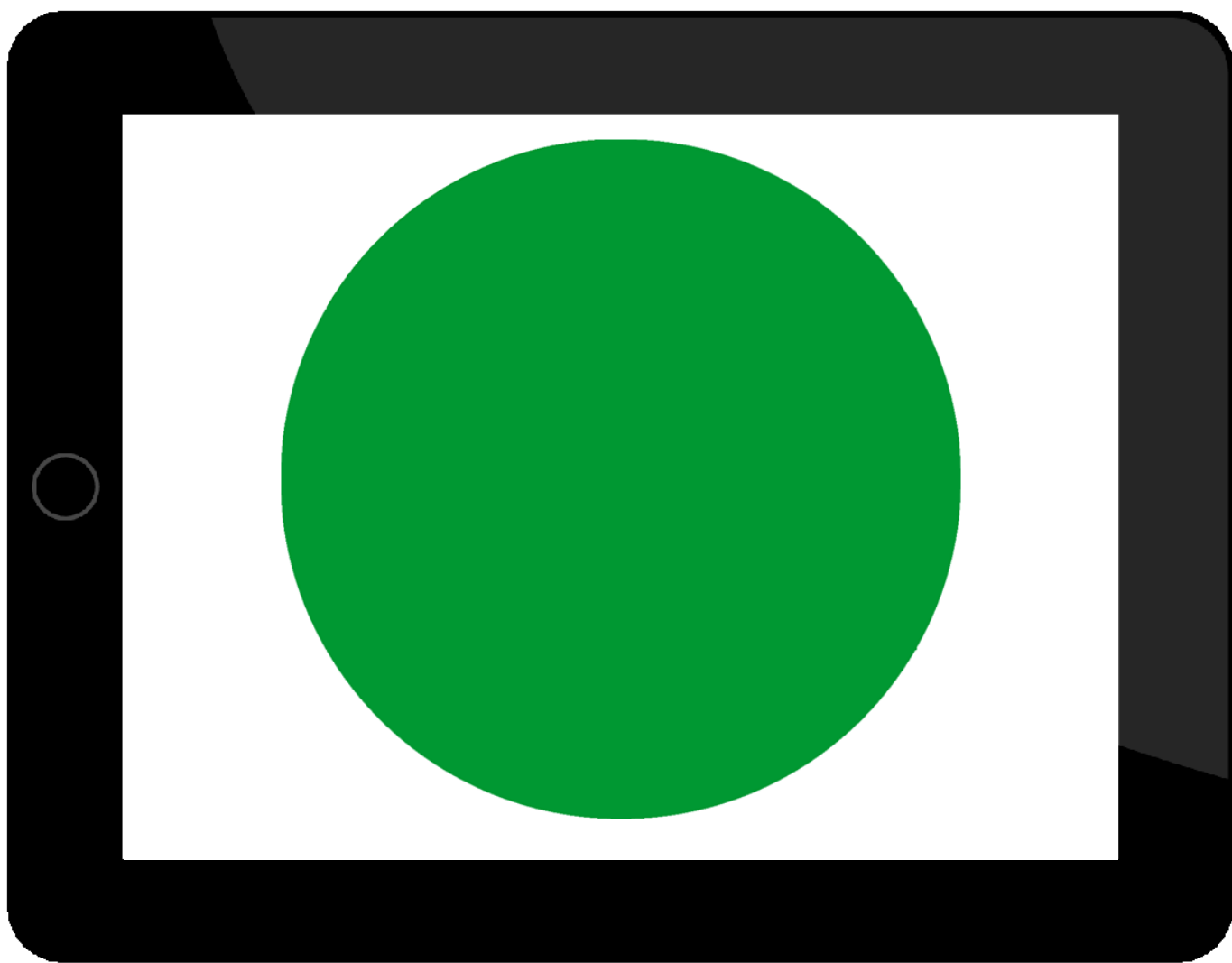












Design Solutions

Sweep the Screen

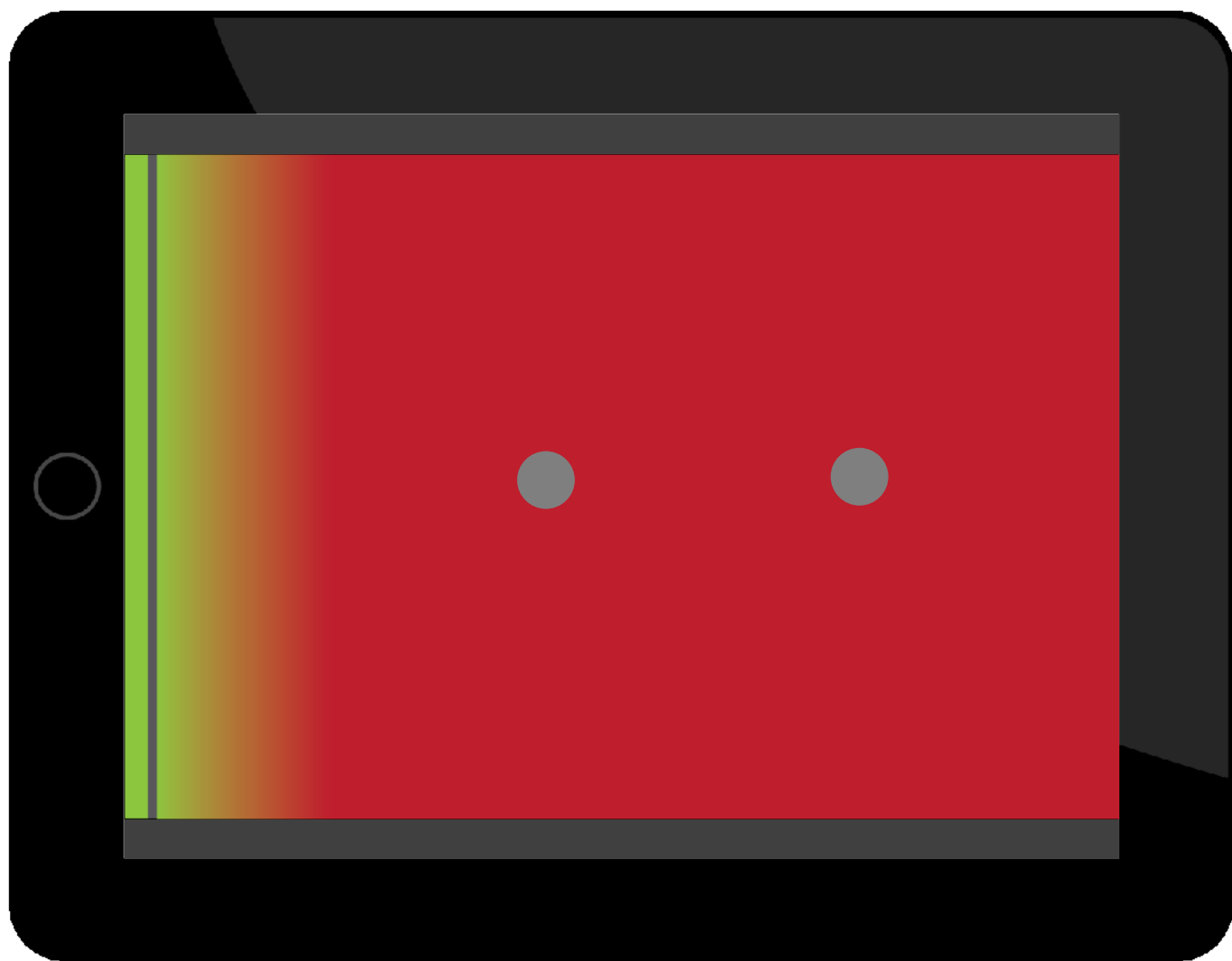
Goal: Change the colour of the entire screen by sweeping a vertical bar across the screen.

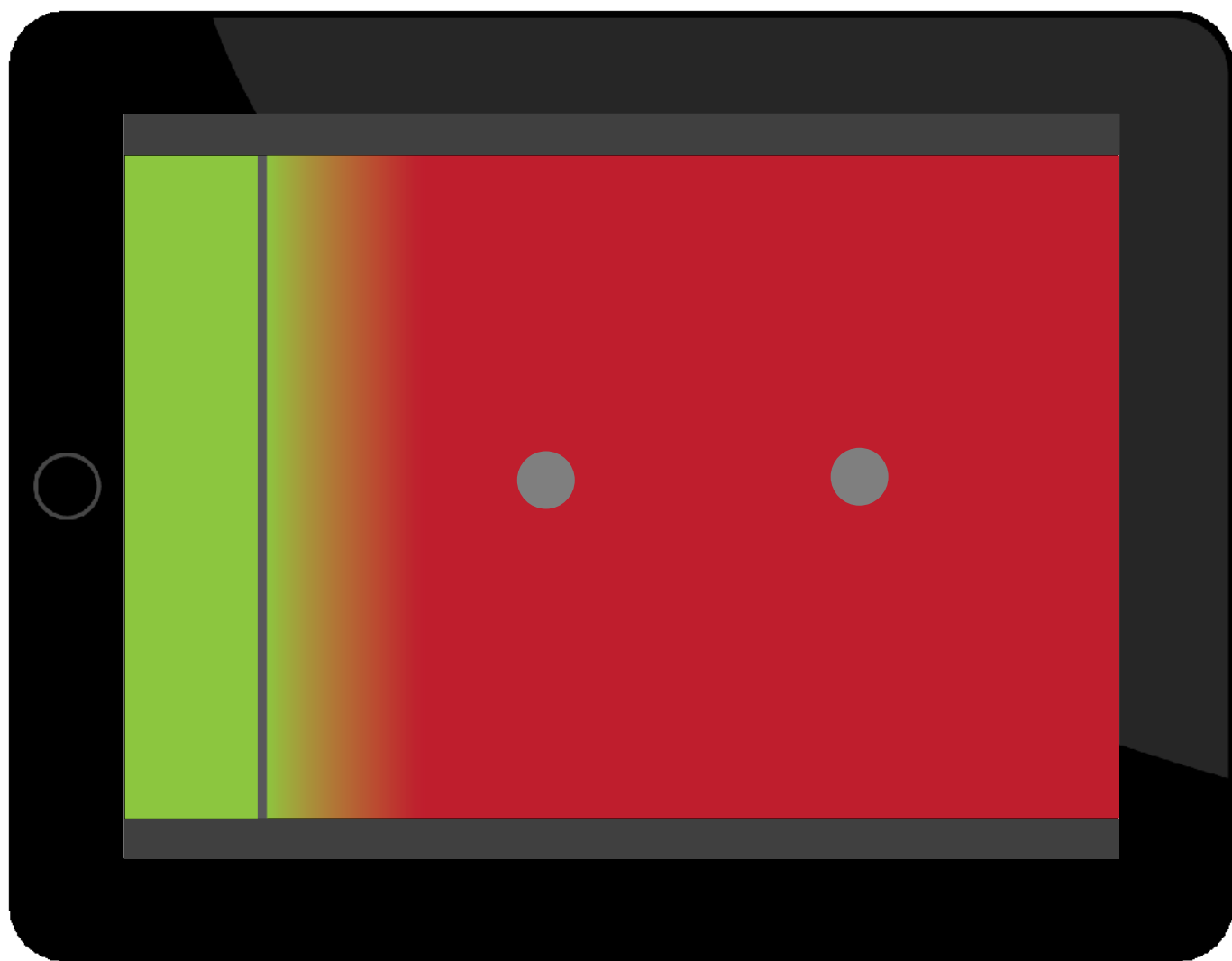
Purpose: Maximize the concentration of the patient and to want to complete the therapy session.

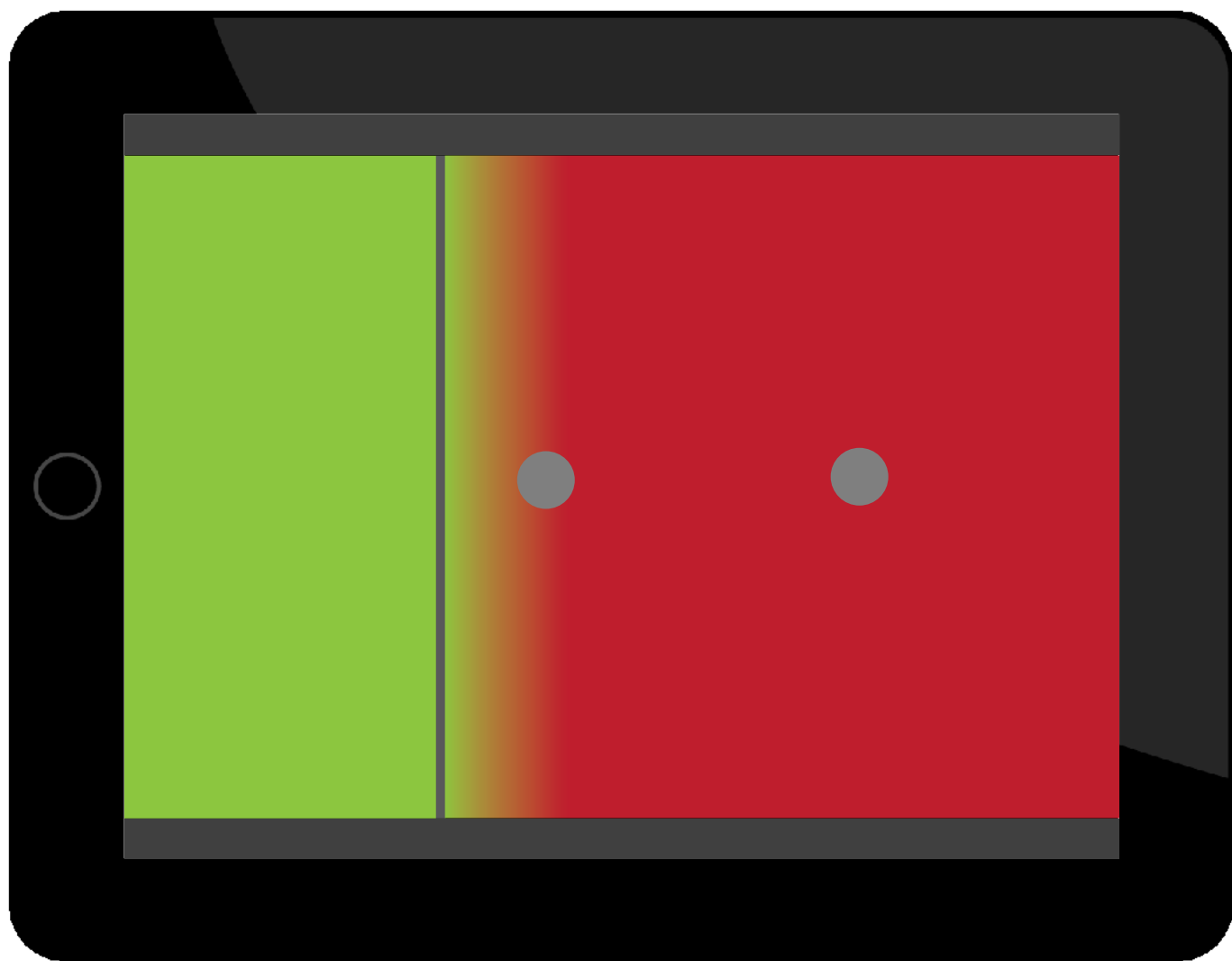
Swallow Hold: As the swallow is held, the vertical bar moves left to right changing the colour of the screen.

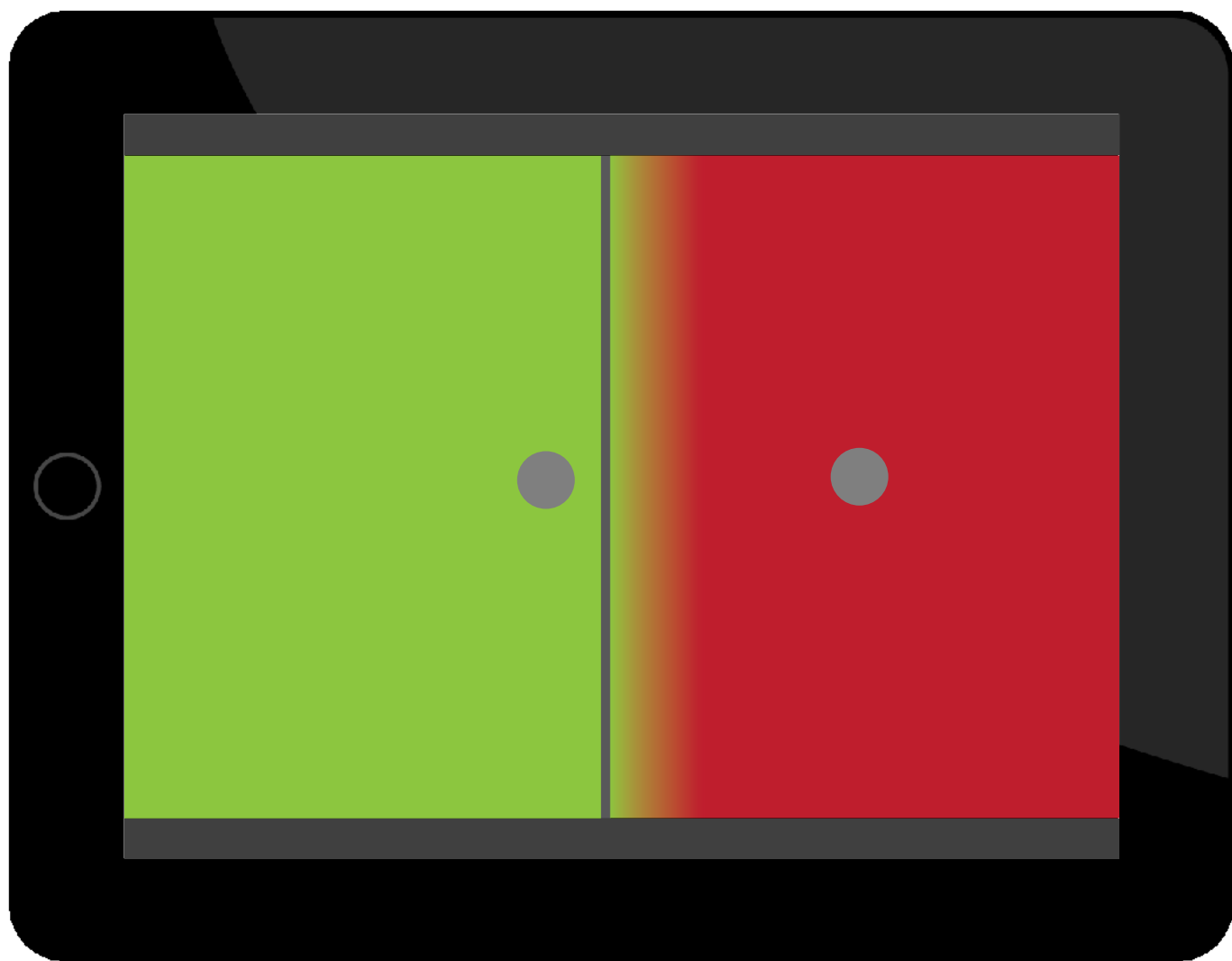
Previous Attempts: The faded circles with numbers indicate previous swallow hold attempts in this session.

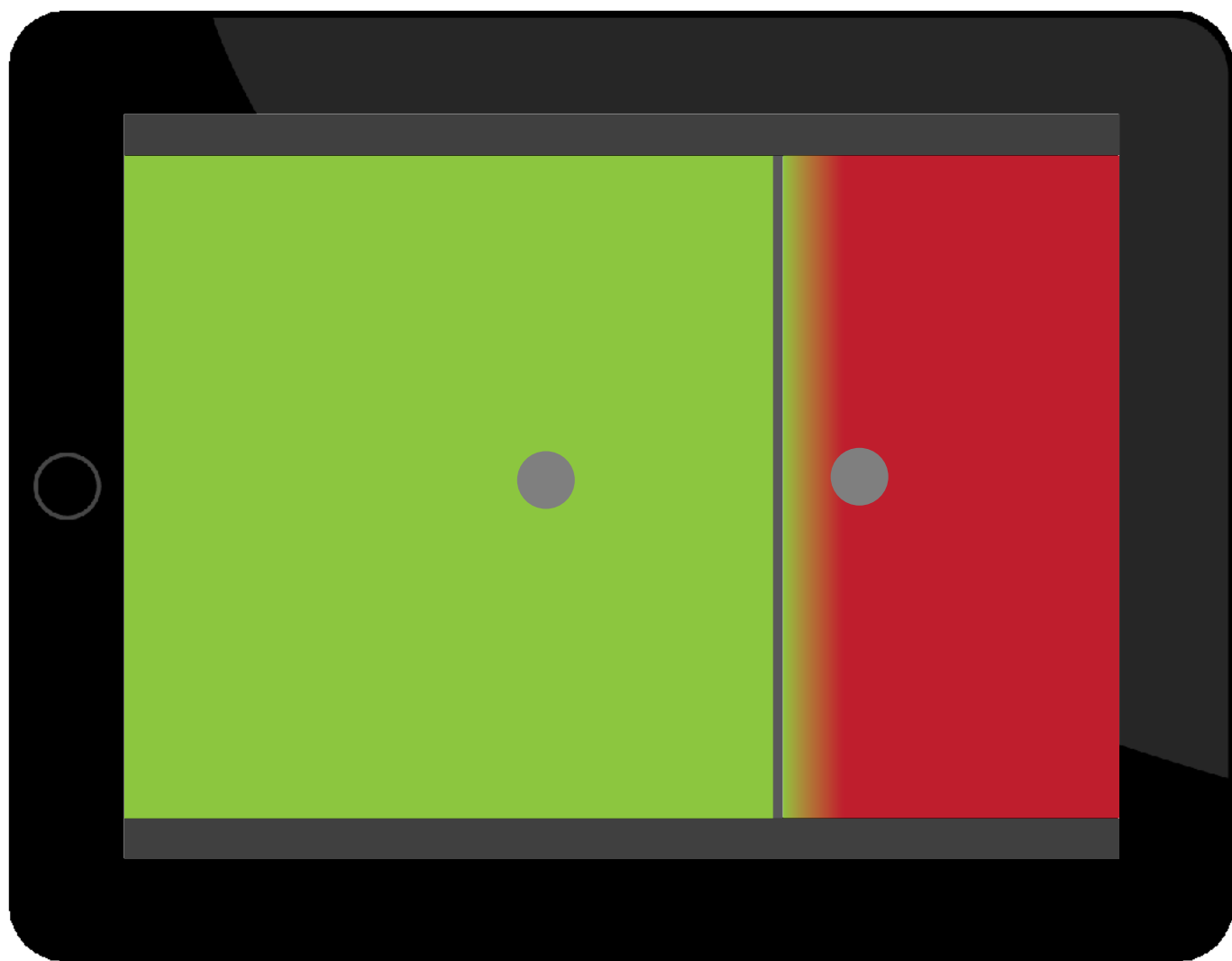


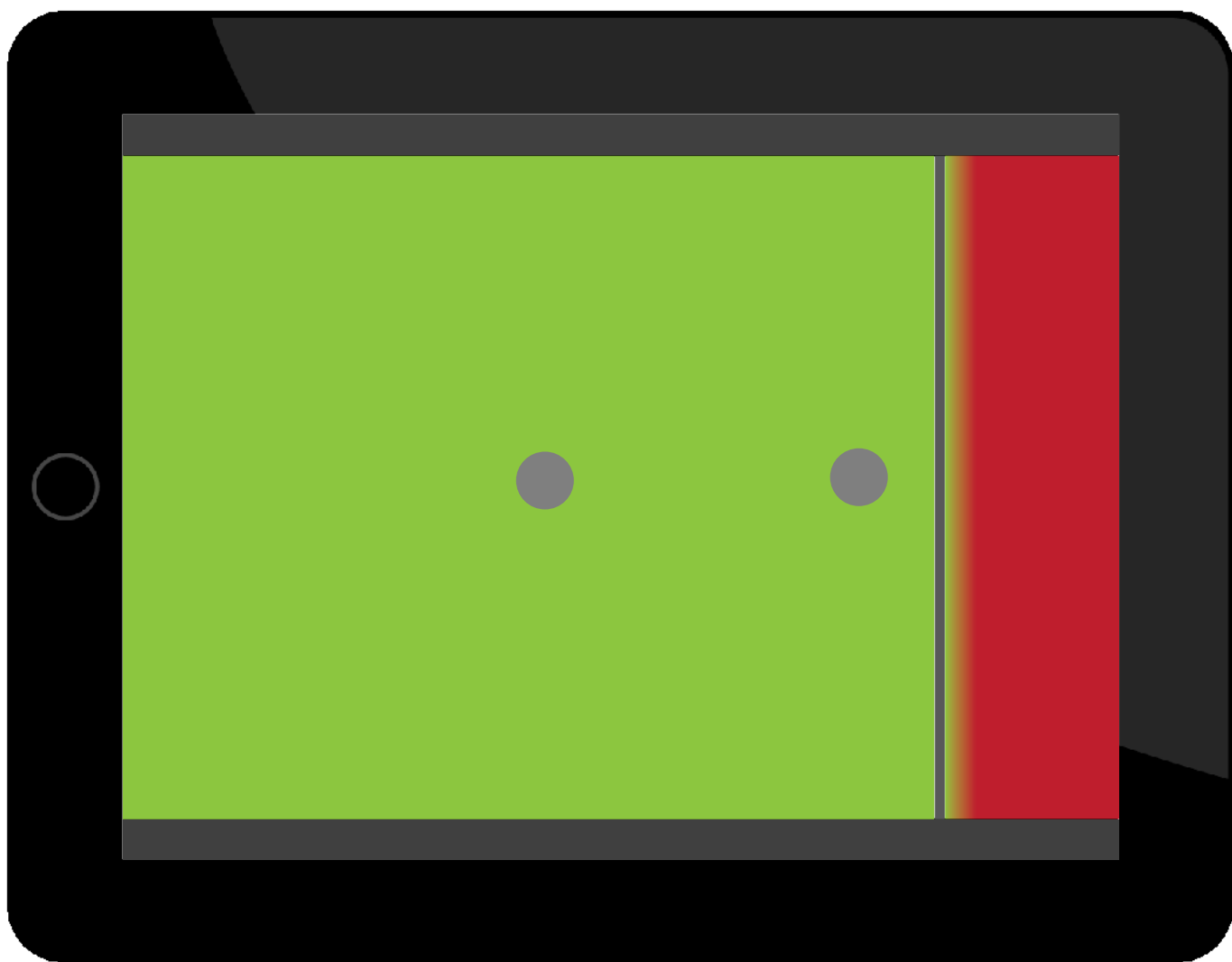


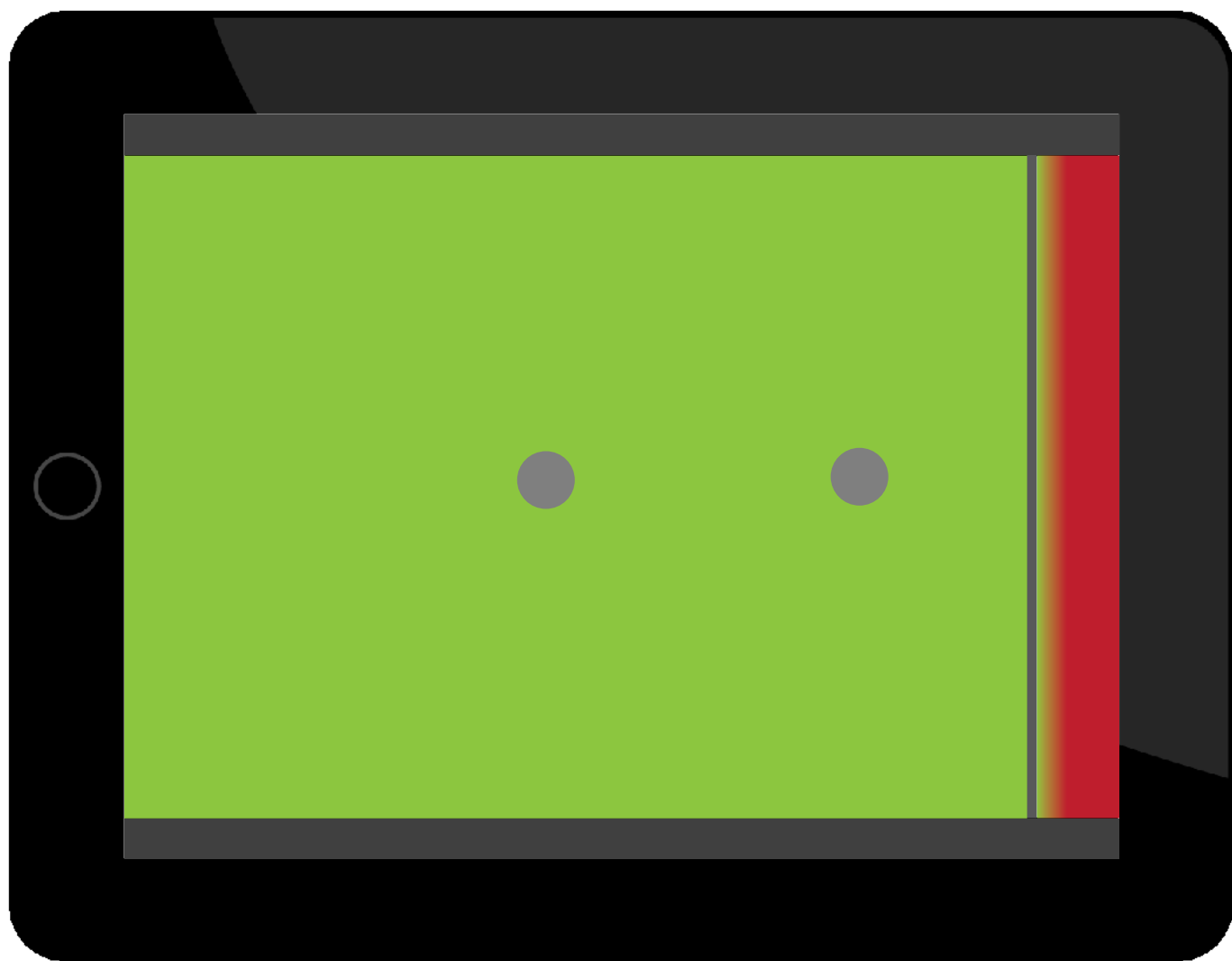


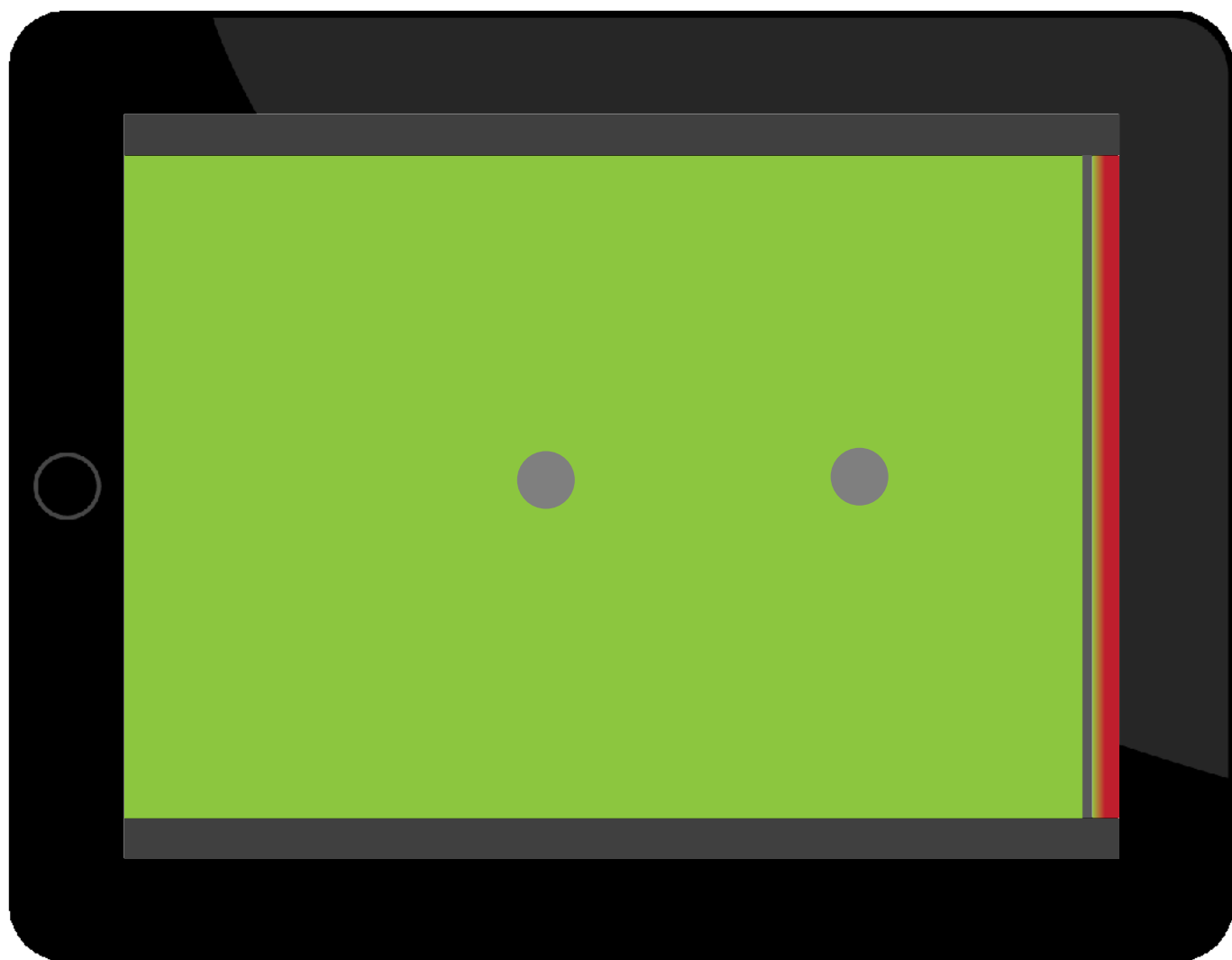














Design Solutions

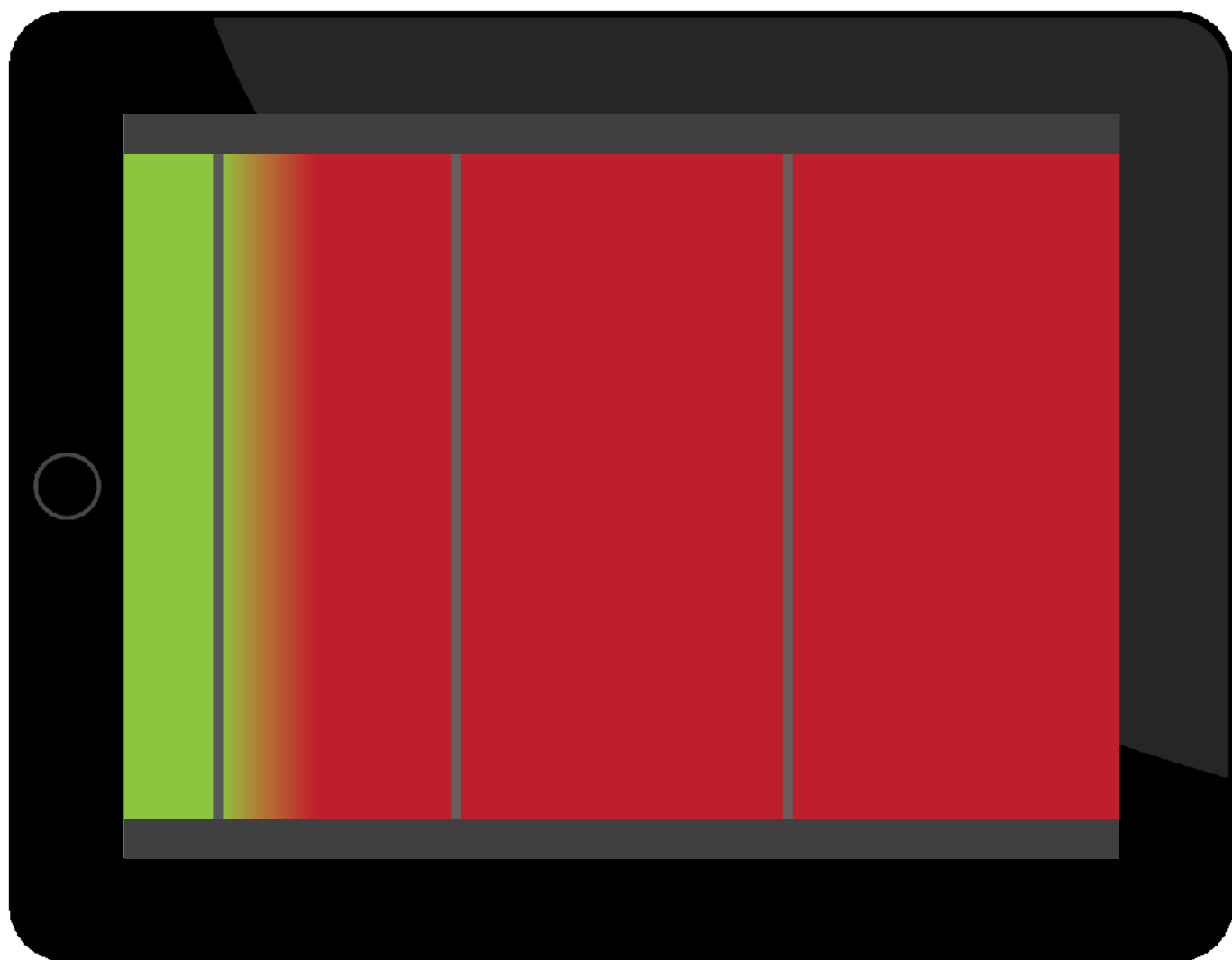
Sweep the Screen

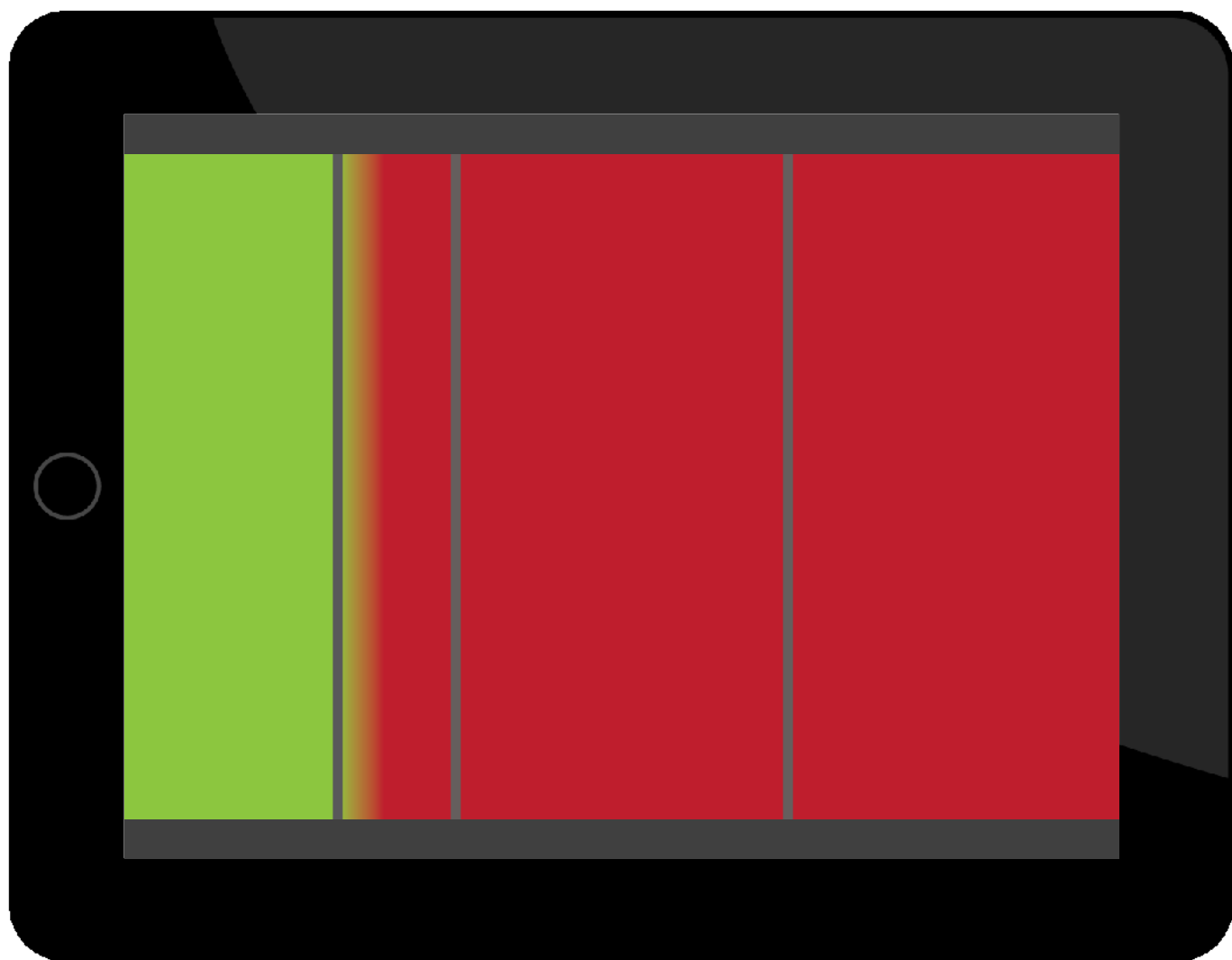
Goal: Change the colour of the entire screen by sweeping a vertical bar across the screen.

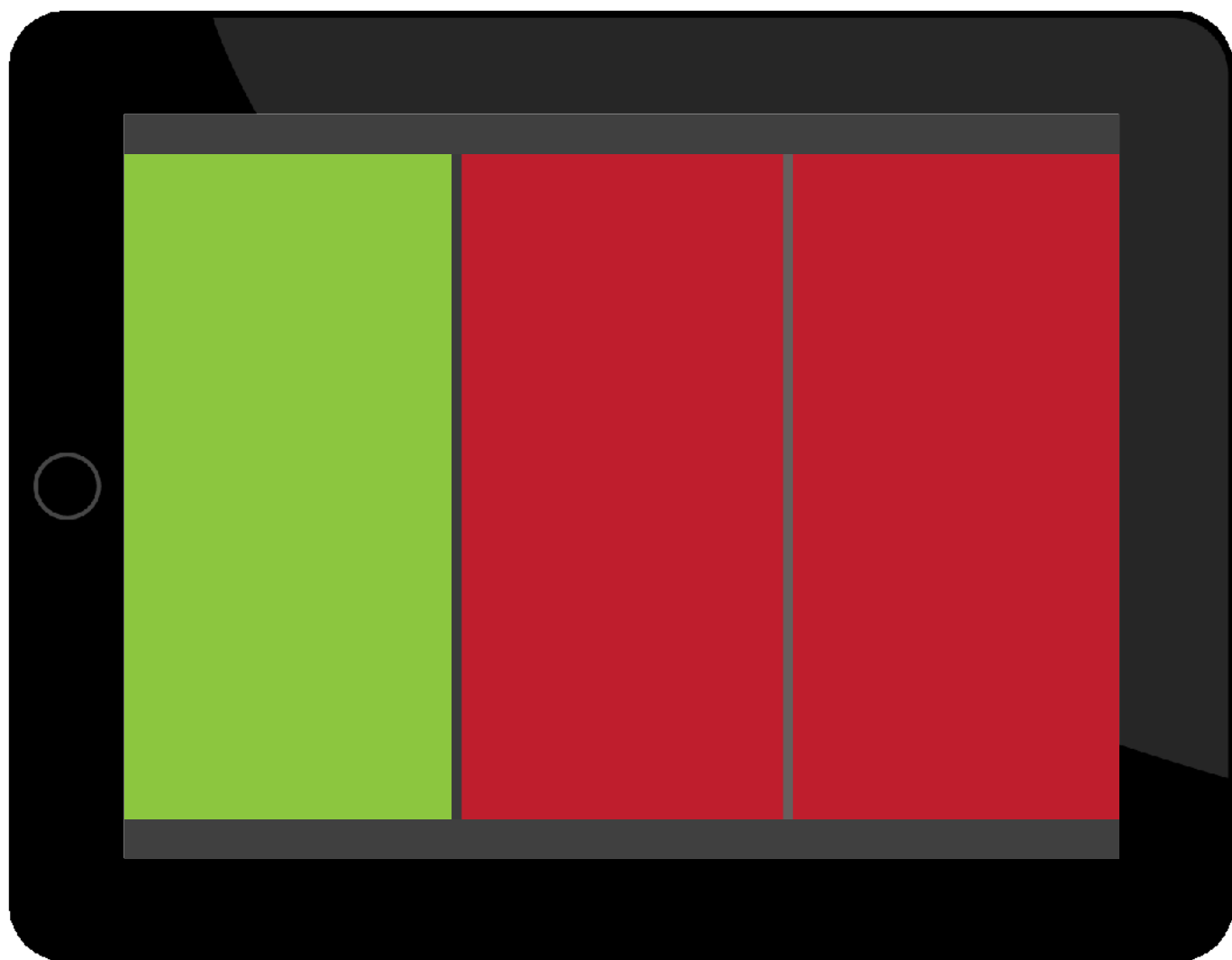
Purpose: Maximize the concentration of the patient and to want to complete the therapy session.

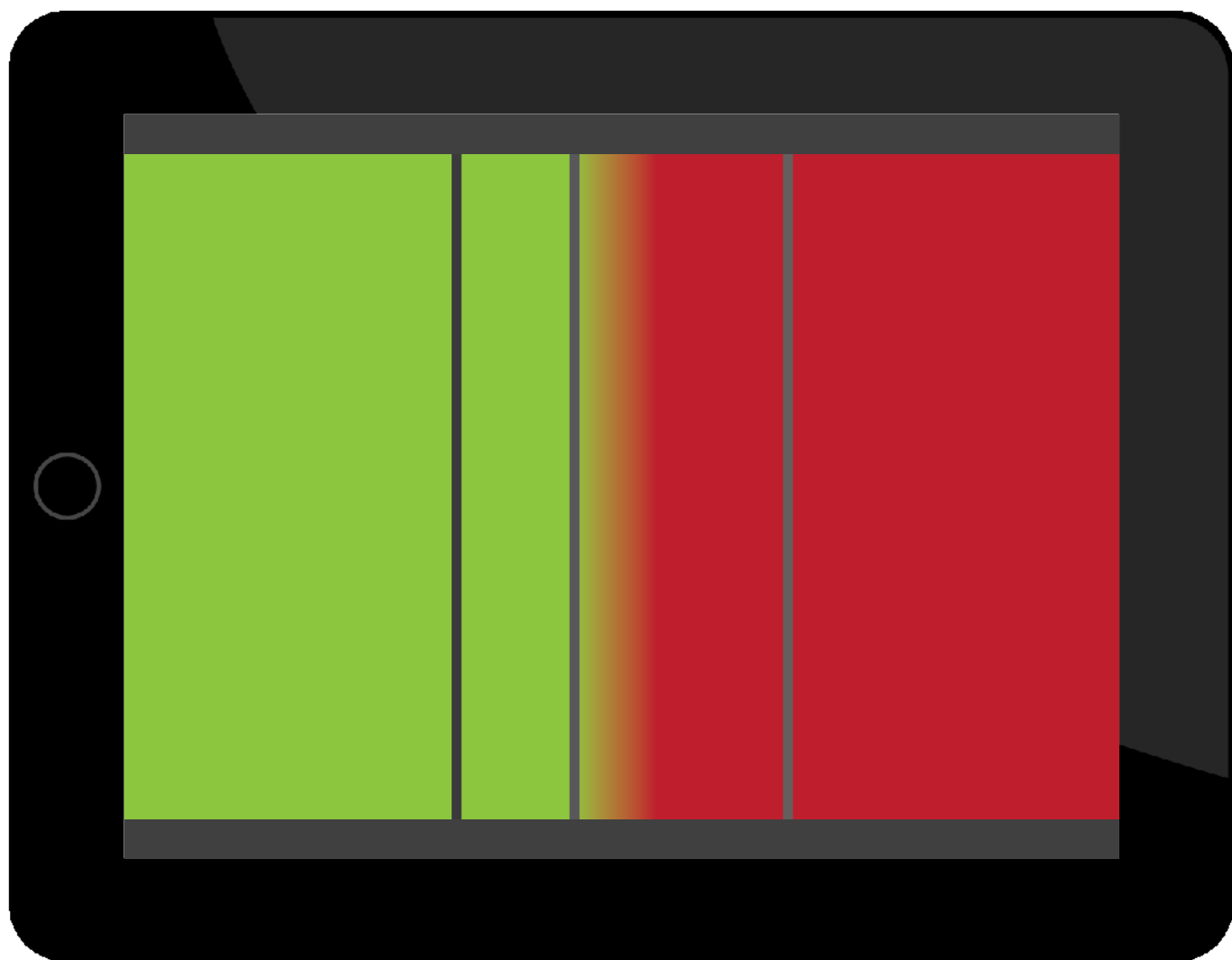
Multiple Swallows: At each individual swallow, each section of the screen will change colour.

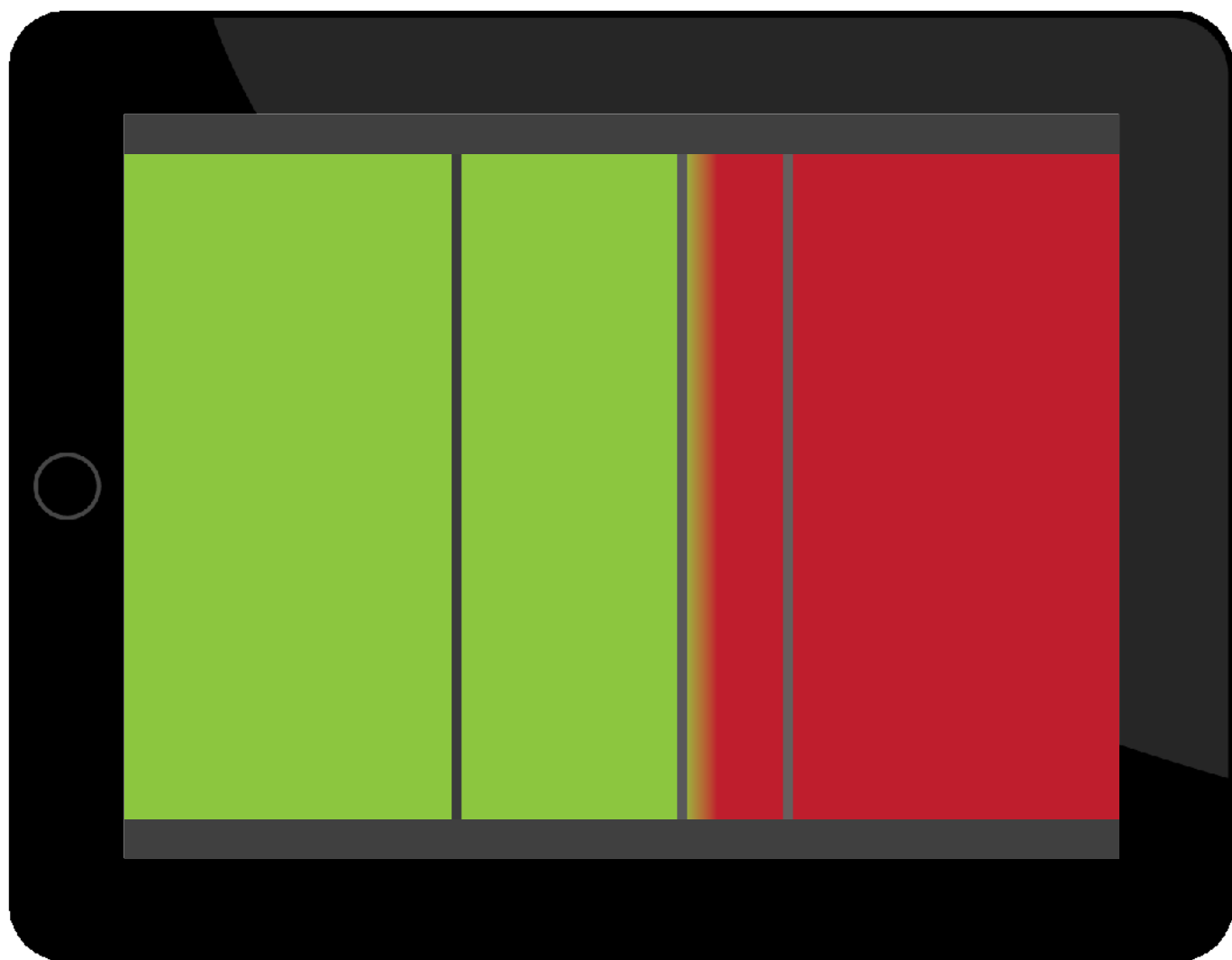


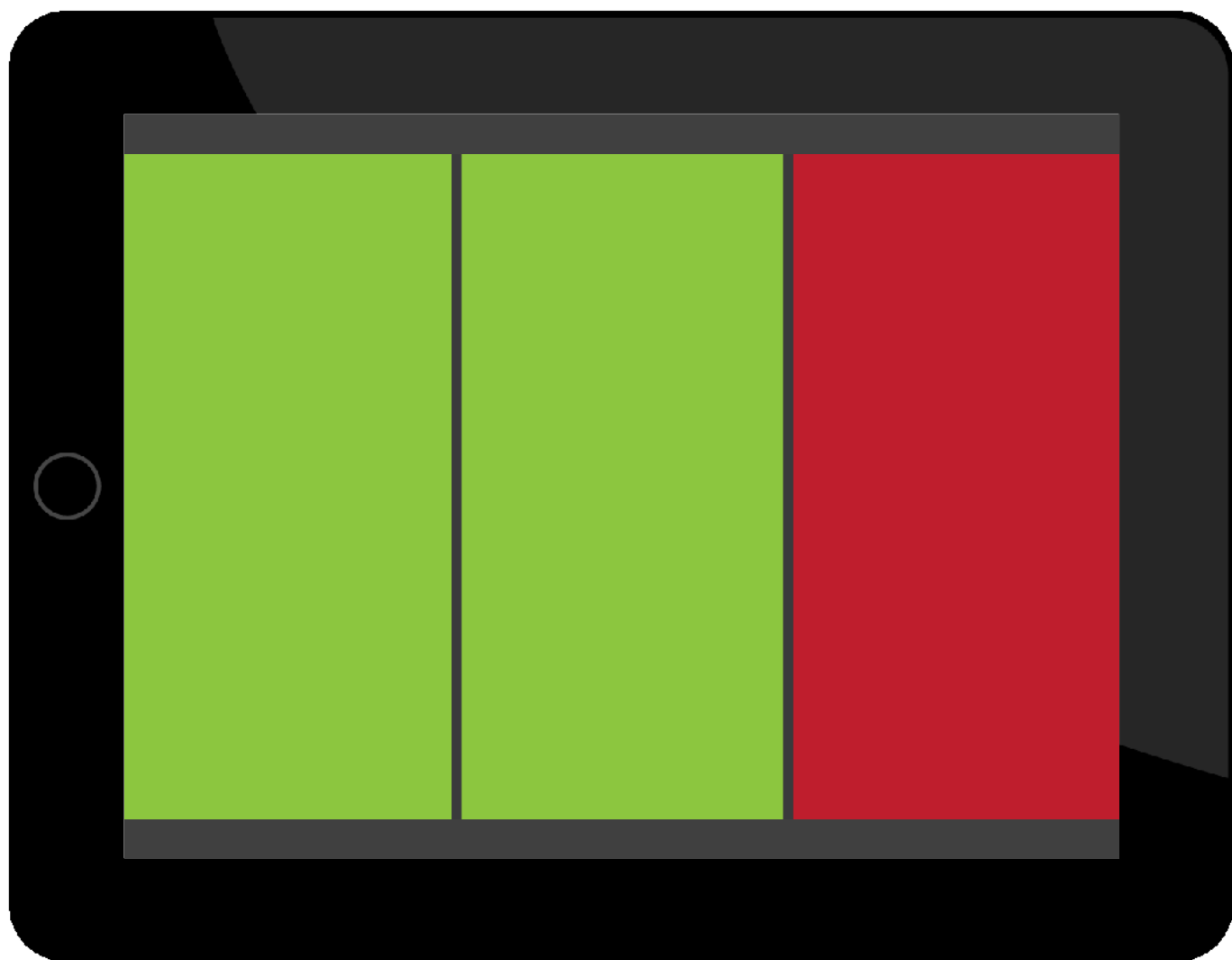


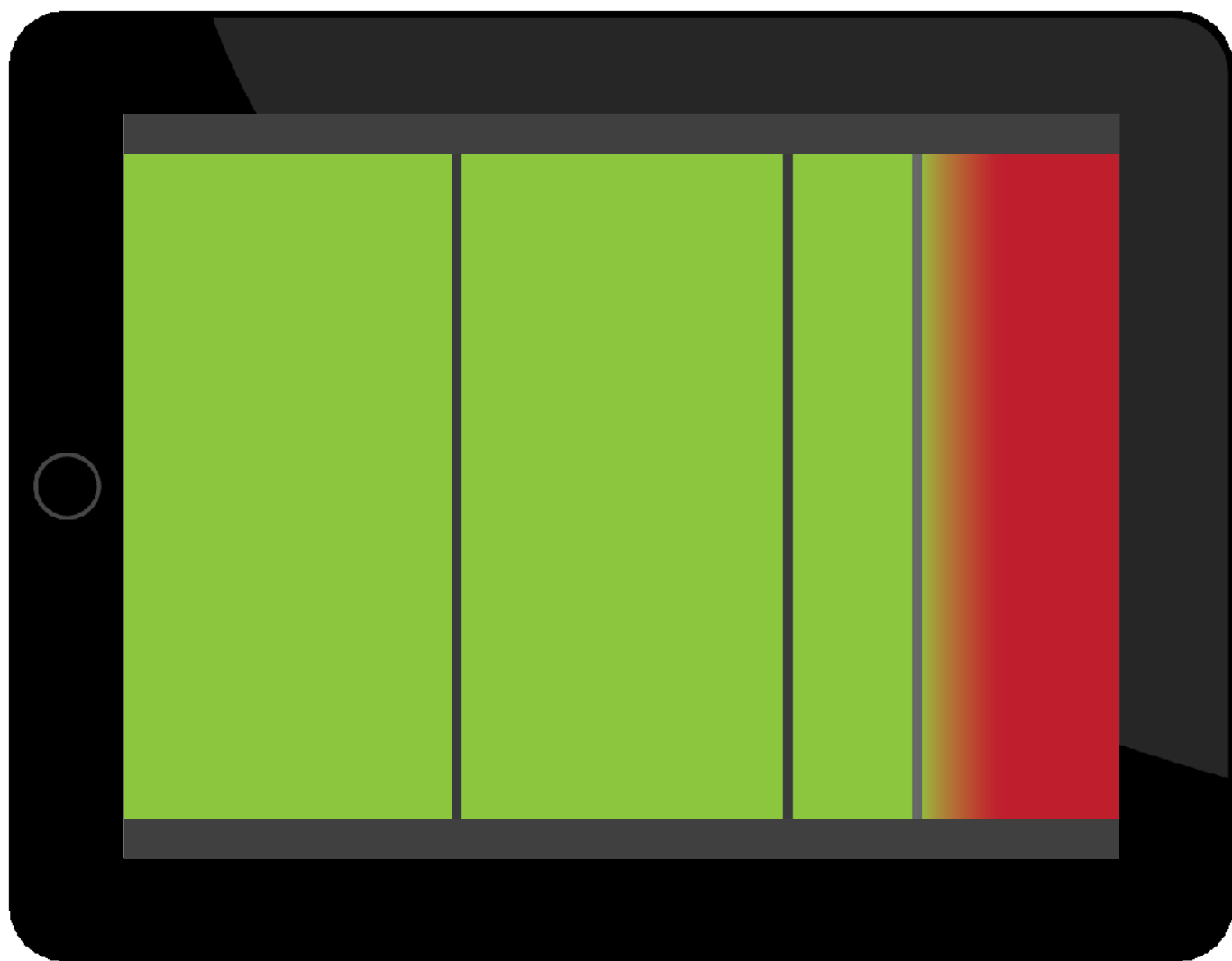


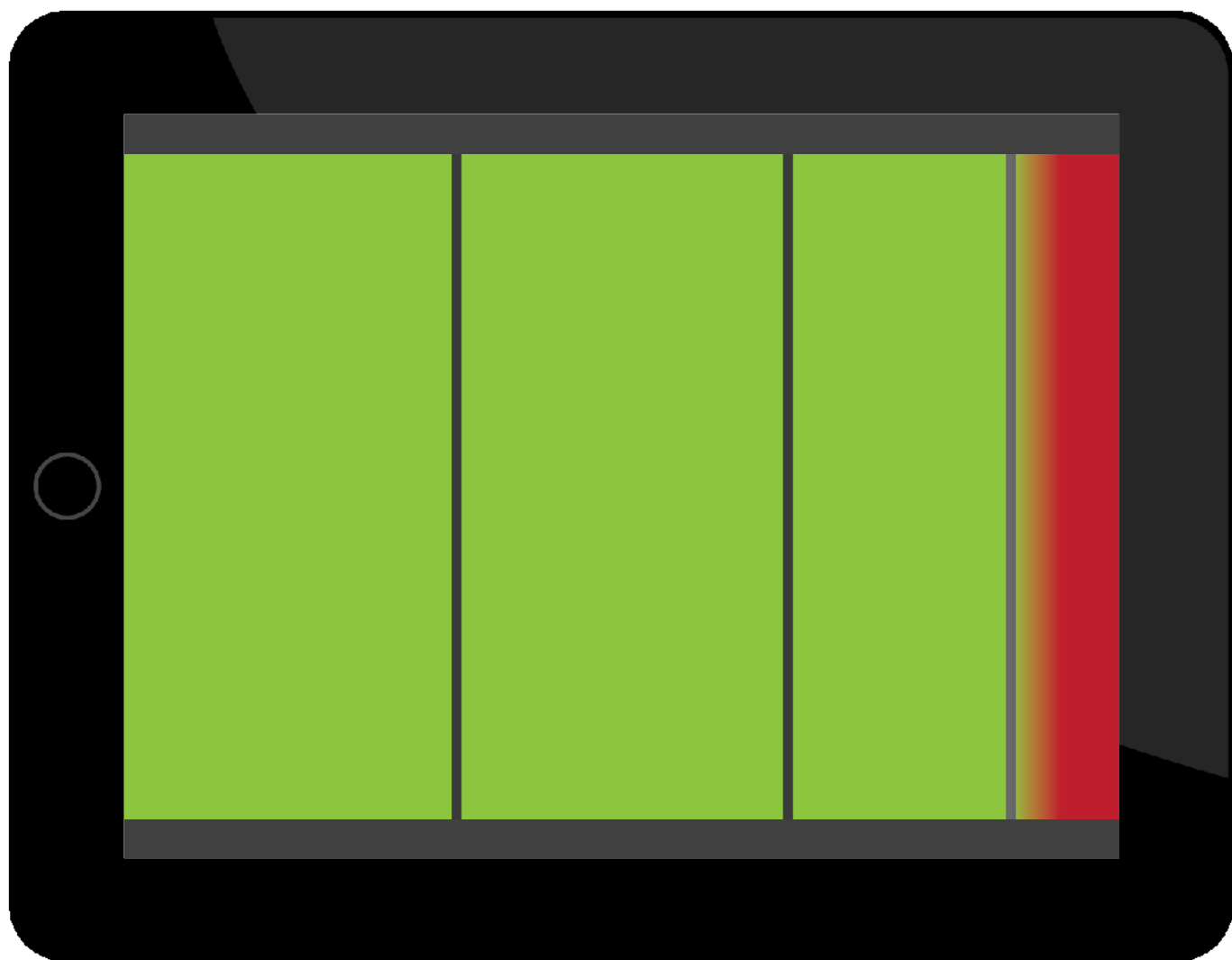


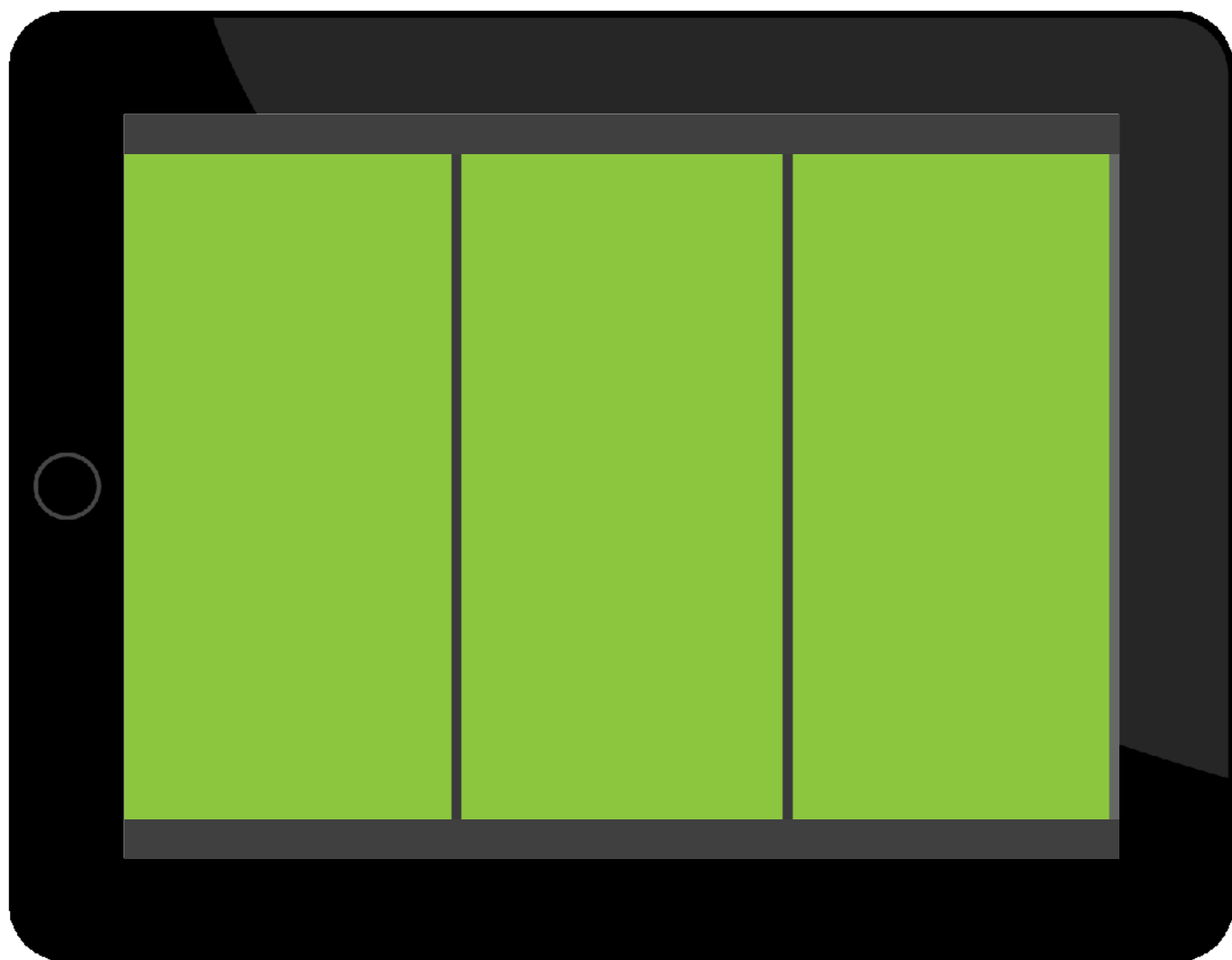


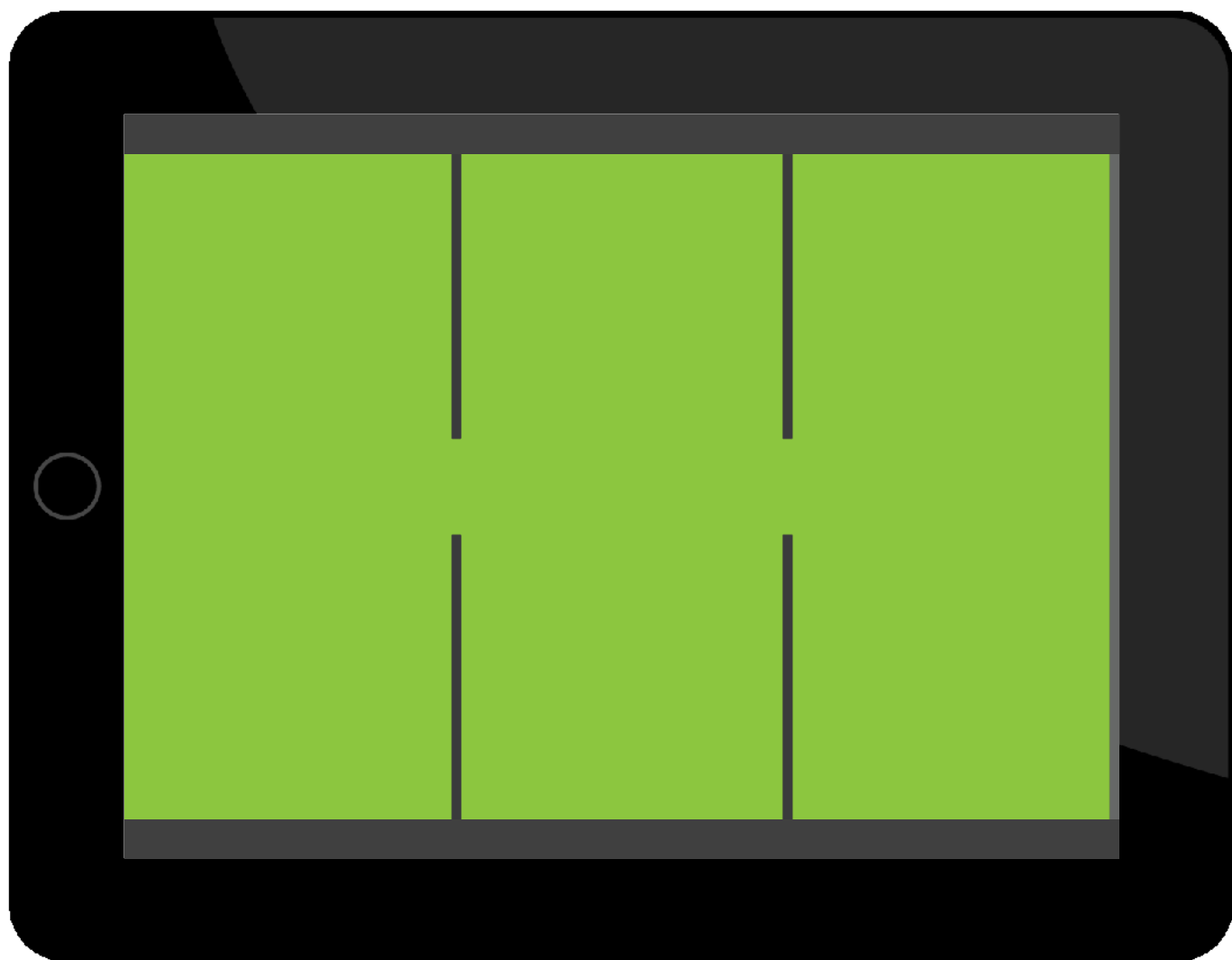


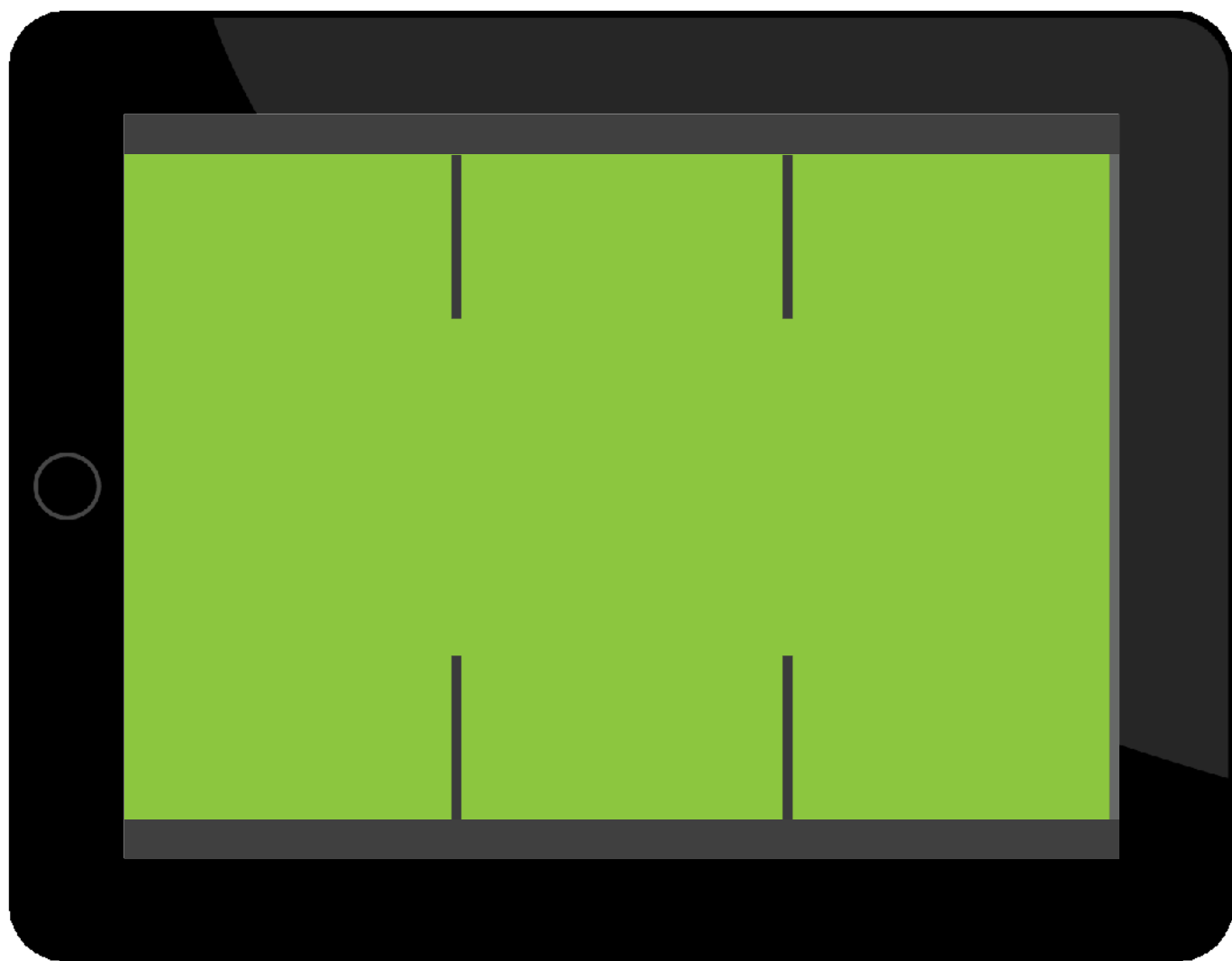


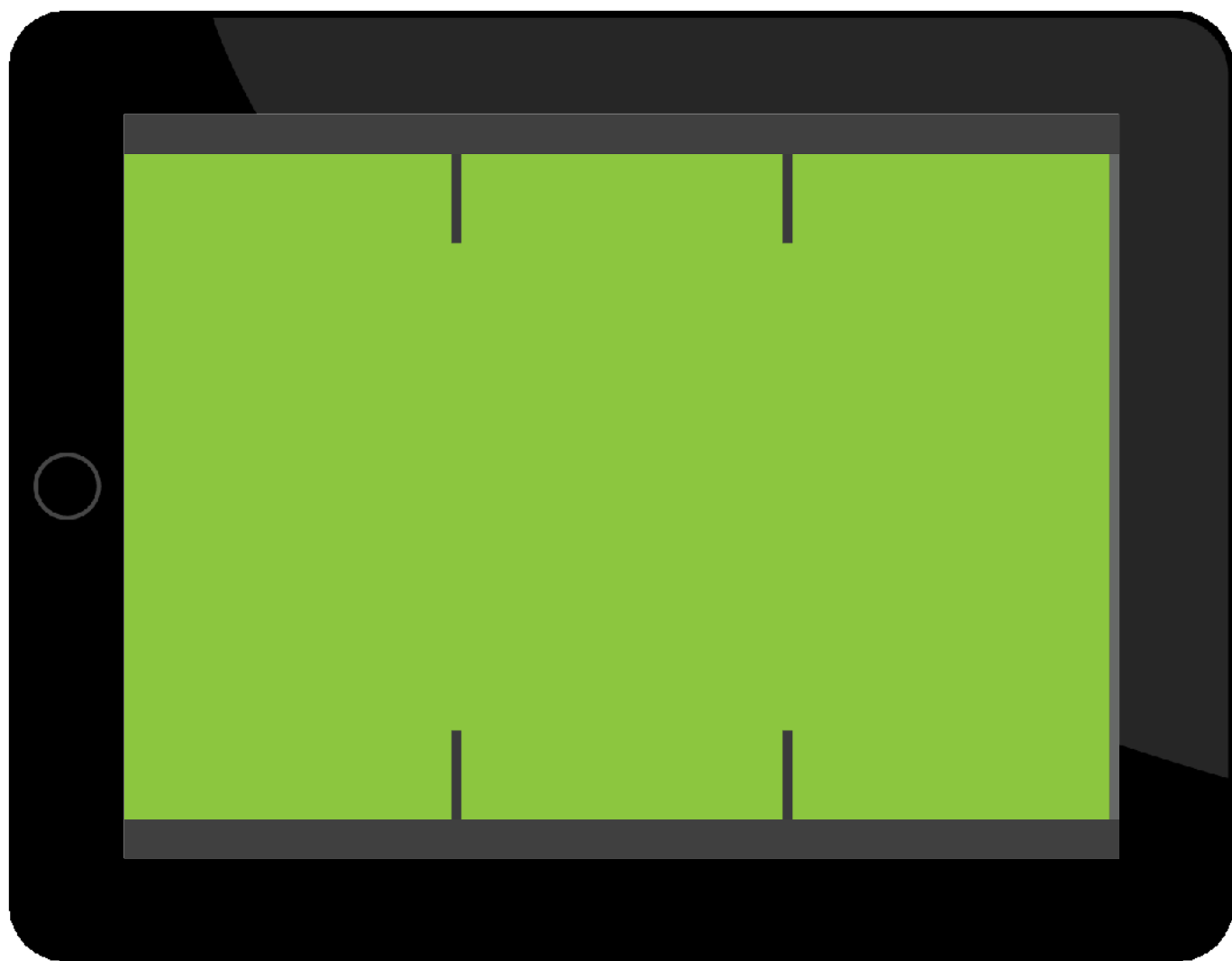














Future Research

Currently, the design solutions are simple and very basic. Complexity may be added to the solutions make them more game-like and engaging for the patients.

Reach the Target: Basketball moving across a basketball court or beach ball bouncing along a beach.

Fill the Circle: The circle becomes a clock face or a pizza.

Sweep the Screen: An image of a landscape or friends and family is revealed. Or each swallow reveals a panel of a comic.

Feedback on Touch Screen User Interfaces

Thank You

