

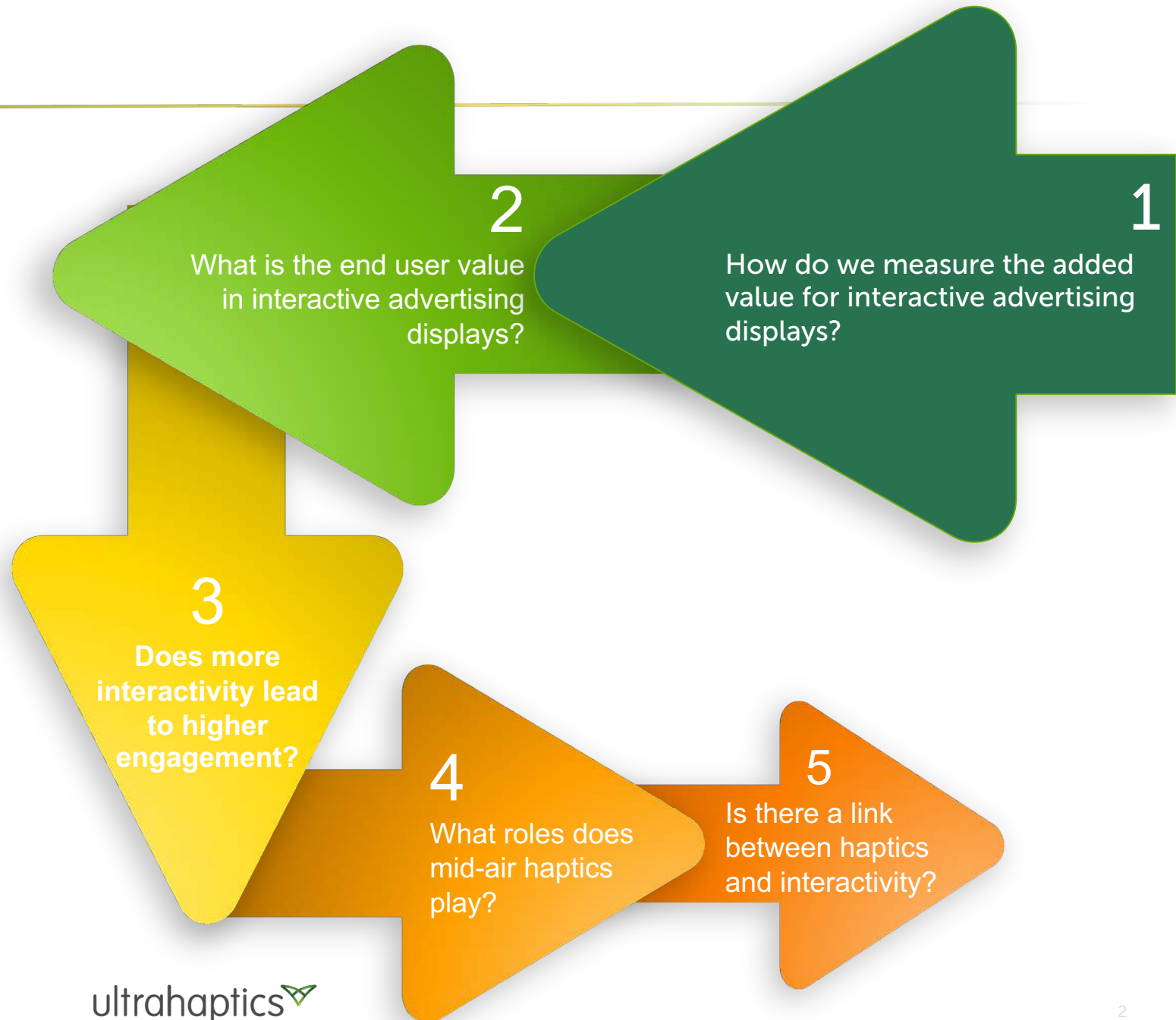
User Engagement for Mid-Air Haptic Interactions with Digital Signage

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Ultrahaptics

Motivation for study

Digital displays are becoming increasingly interactive.



User Engagement

User engagement is a quality of UX, and is characterised by the depth of an actor's investment when interacting with a digital system. Obrien et al. 2008



User Engagement scale

Focused Attention - the feeling of being absorbed in the interaction and losing track of time.

Perceived Usability – the degree to which an interface is fit to use and the degree of control and effort expended.

Aesthetic Appeal – the attractiveness and visual appeal of the interface.

Reward - involvement, having fun and interest in the interface and willingness to do it again.



Emotional response

Russell's circumplex model of affect



Verbal report

Post task interviews

Methodology

Aim: determine the impact that different levels of interactivity and mid-air haptic feedback have on user engagement with interactive digital signage.

Interactivity	Haptics
Gamification (high)	On
Non gamification (Low)	Off

17 participants. 5 male, 12 female

Mean age 34

Recruited from an online database

Half participants had tried the mid-air haptics briefly at an event.
Half were completely new.

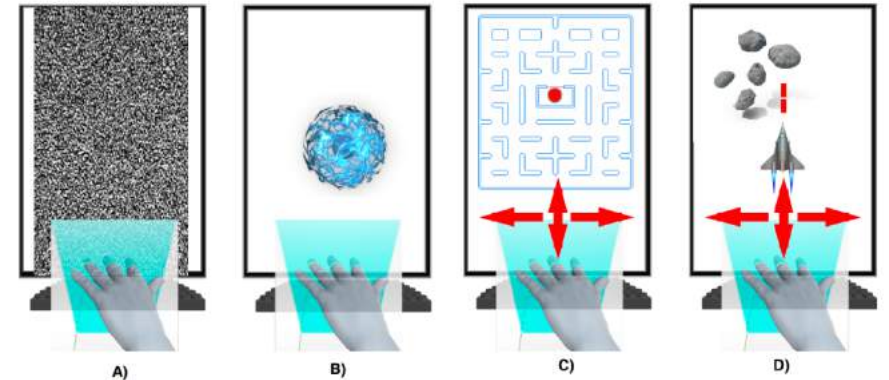


Figure 2 Descriptive image of interactions. A) Dead Static, Level 1 B) The Sorcerer, Level 2 C) 2D Maze, Level 2 D) Beyond Terra, Level 2. Red lines indicate required actions to complete game.

Stage	Steps Involved	Duration
Study Explanation / Demographic Questions	Study explained to participant Demographic questions answers	5 mins
PHASE 1		
Practice Stage	User explores the Ultrahaptics sensations via 'Sensation Library'	10 mins
PHASE 2		
Main Study	User undertakes 1 of the 8 conditions Answers questionnaire	8 x 2mins 8 x 3mins = 30mins
PHASE 3		
Post-Evaluation	Post-evaluation questions administered	5 mins

Quantitative Results

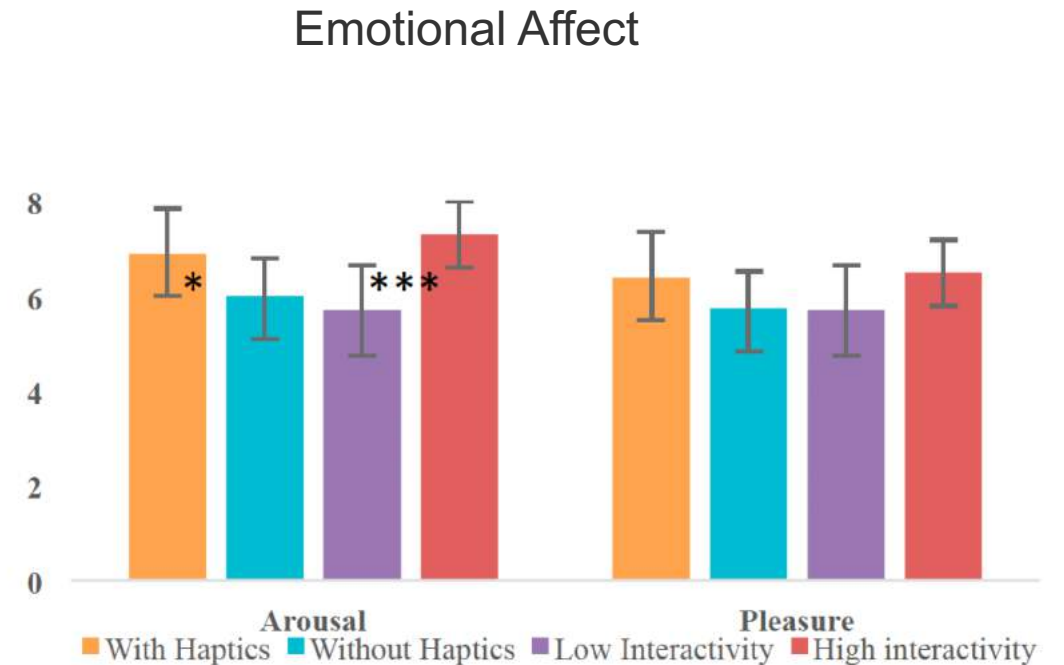
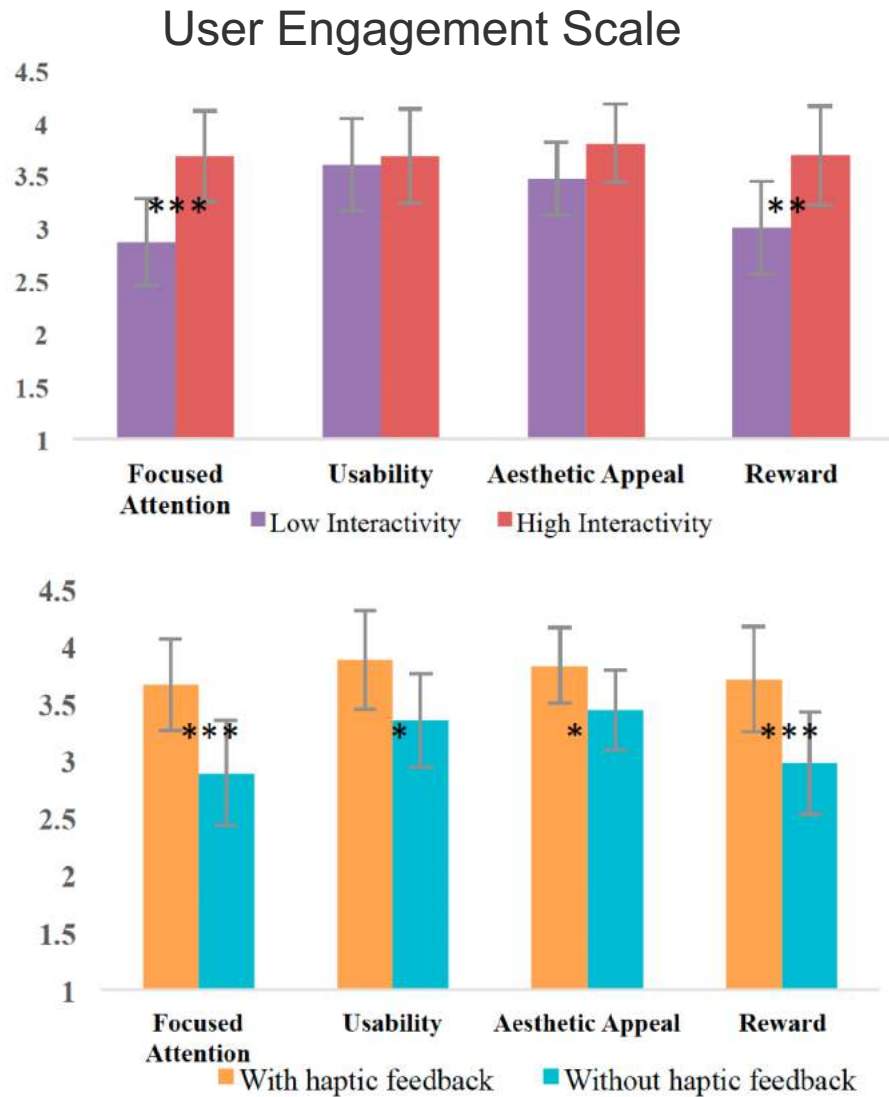


Figure 5. Emotional Affect ratings for the haptic and interactivity conditions. Asterisks show higher affect scores. More asterisks signify lower p values.

Qualitative results

83%
participants
mentioned
enhanced
experience
with haptics

“It is fun! The haptics make it easier to do, it allows you to know what to do. Without haptics it feels like I am missing out.”

Gamification
more
engaging

“I was very engaged in the gameplay, I felt a bit disappointed that the others were a bit less immersive.”

Increased
usability with
haptics

“The maze was easier with the haptics, it was more satisfying.”

Need for a
call to
interact

“I wouldn't know it was interactive”

Findings

Higher interactivity (gamification) =

- More focused attention
- Increased reward
- Higher emotional arousal

Presence of haptic feedback =

- More focused attention
- Increased reward
- Better perceived usability
- More aesthetic appeal
- Higher emotional arousal

Directions for future user research

Future work

Public spaces?

The spectator experience is also important for public displays

Brand recall

Groups of people

More complex gestures

Kiosks or utility driven public displays

QUESTIONS
