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Contextualizing Context: Investigating the Role of Environmental Cues on Product Acceptance Using Immersive Technologies.

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Society of Sensory Professionals
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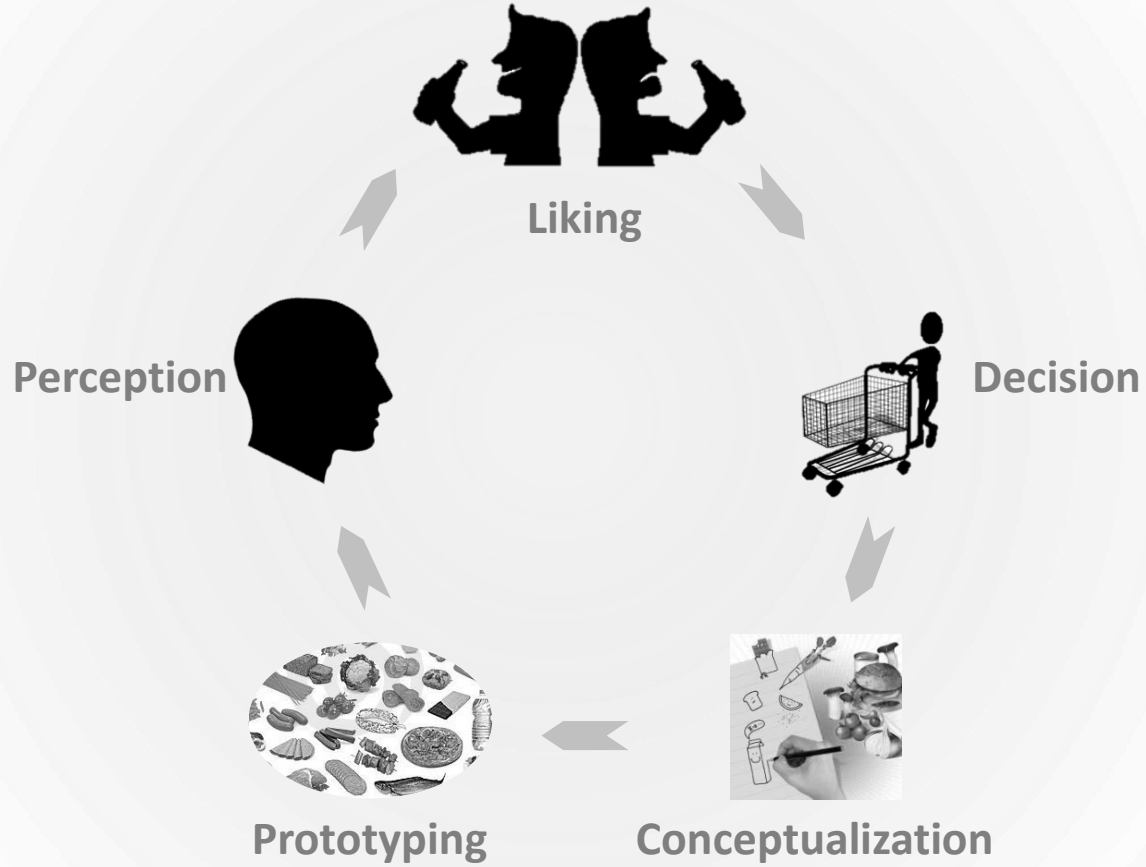
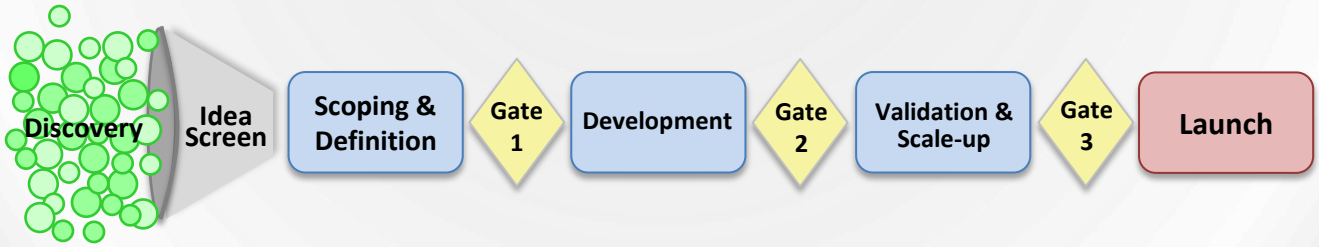
Sensory & Product Development

"Prediction is difficult, especially if it's about the future." Niels Bohr



The Problem…

- New food product launches fail at an alarming rate
  - 60% of new products are removed from grocery shelves within 1 year (Costa & Jongen 2006)
  - Billions of dollars lost annually (Stewart-Knox & Mitchell 2003)
  - Despite a managed innovation process



Predicting Consumer Behavior—Testing Environment

Sensory and consumer testing is often inconsistent, noisy, and lacks predictive power



Testing methods are not engaging



Ecological validity is poor—Meaningful context stripped away

Immersive Environments

- Objective: Determine the impact of relevant contextual information on acceptance testing power, reliability and ability to engage panelists.

	Coffee/ Virtual Coffeehouse	Cola/ Virtual Food Court	Cookies/ Virtual Kitchen
Traditional Paradigm			
Immersive Paradigm			

Testing Environment

Traditional Environment

- Sensory booth
- Samples served in typical plastic or Styrofoam serving cups
- Liking & engagement assessed using paper ballot or tablet computer



Immersive Environment

- Video wall displayed relevant audiovisual contextual information
- Congruent aroma delivered into testing space
- Samples presented in serving ware consistent with environment
- Furniture consistent with environmental theme
- Liking & engagement assessed using paper ballot or tablet computer



Assessing Engagement

- Traditional testing environments lack engagement
  - Engagement is a complex construct that maximizes attention, motivation and interaction
  - Improving engagement of testing paradigms, therefore, likely to improve data quality
    - Depends on aesthetic appeal, novelty and usability of a system
- Assess engagement of testing conditions
  - Developed a 21-question engagement questionnaire derived from previously validated measures (GEQ & PQ)
    - Assess 8 dimensions contributing to engagement
    - Linear combination of dimensional scores used to obtain single Total Engagement Score

Assessing Engagement

- Engagement Questionnaire

Dimension	Question
Usability	The testing environment assisted in my evaluations of the samples.
Environmental Aesthetics	The testing environment was appealing.
	The testing environment engaged my senses.
Novelty	The testing environment inticed my curiosity.
	The testing environment distracted me.
Involvement	The testing experience was boring.
	The testing experience was fun.
	I was engaged in the sensory task I performed.
Immersion	I felt like I was in a coffee house.
	I lost track of time.
Sensory Factors	How completely were all of your senses engaged by the testing environment?
	How much did the visual aspects of the testing environment involve you?
	How much did the auditory aspects of the testing environment involve you?
	How much did the olfactory aspects of the testing environment involve you?
Distraction Factors	How aware were you of events occuring in the real world around you?
	How quickly did you adjust to the testing environment experience?
	How much did the testing environment interfere or distract you from perfoming your sensory evaluation?
Realism Factors	How disconnected did you feel from the testing environment?
	How much did your experiences in the testing environment seem consistent with your real-world experiences?
	How completely did you feel immersed in the testing environment?
	How involved were you in the testing environment experience?

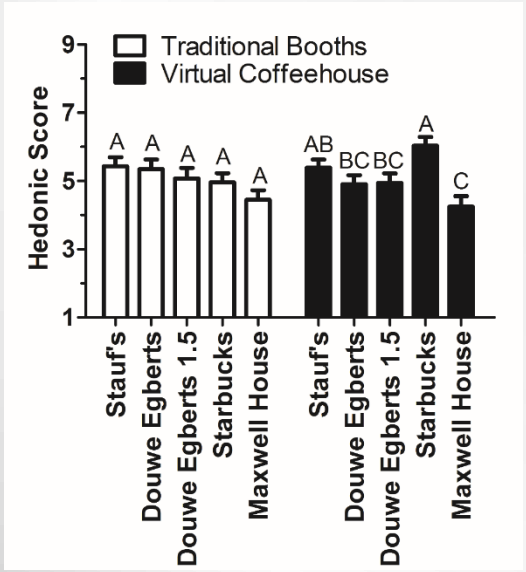
Derived from Brockmyer et al., 2009 (GEQ) and Witmer & Singer 1998 (PQ)

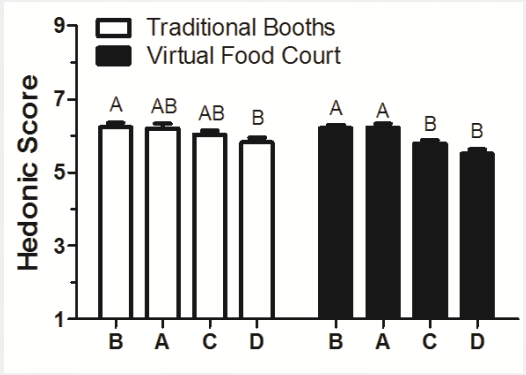
Results: Discriminability

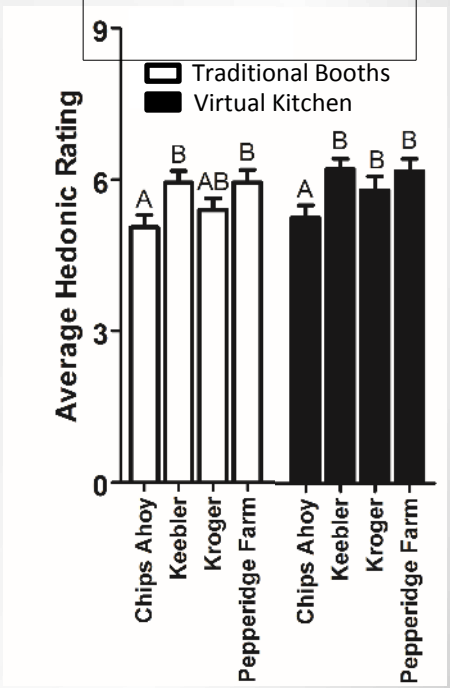
- Context improves ability to resolve product differences





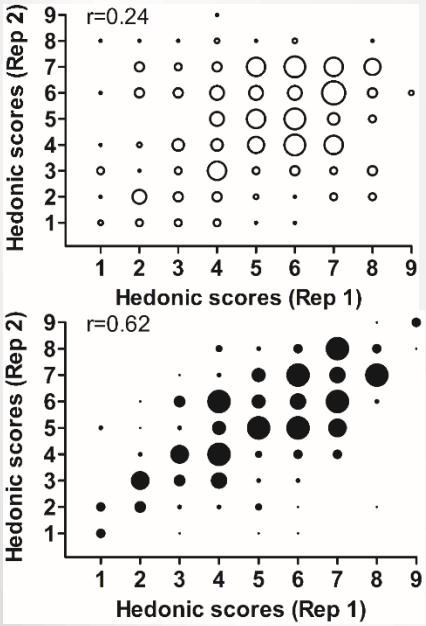


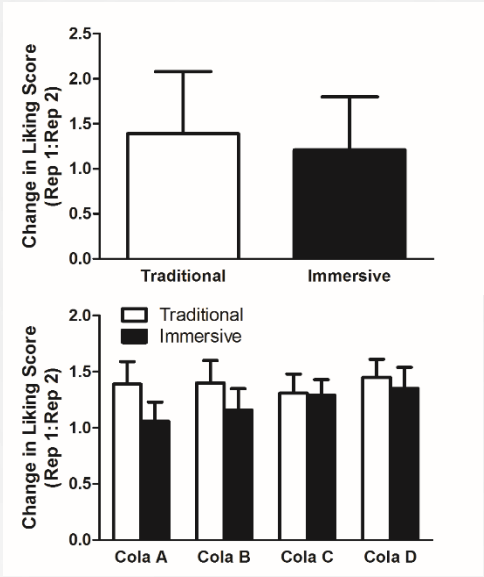


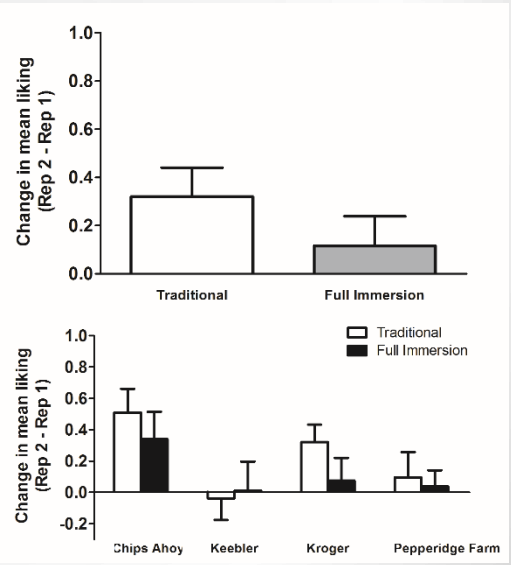


Results: Reliability

- Context improves reliability of hedonic measurements
  - Better correlations
  - Smaller deviations

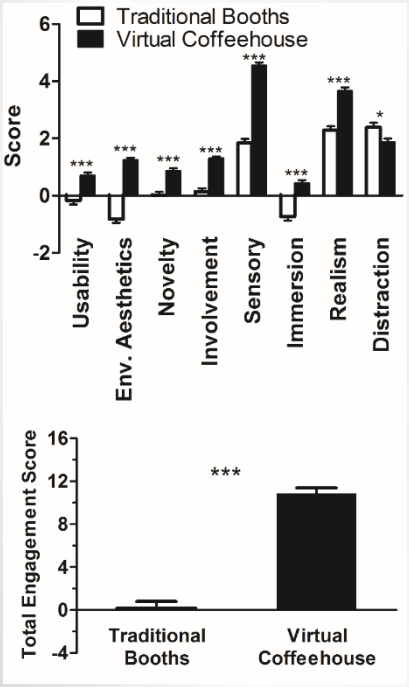


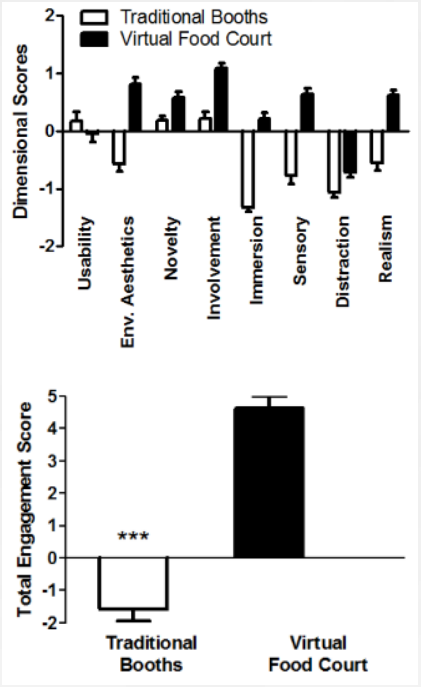


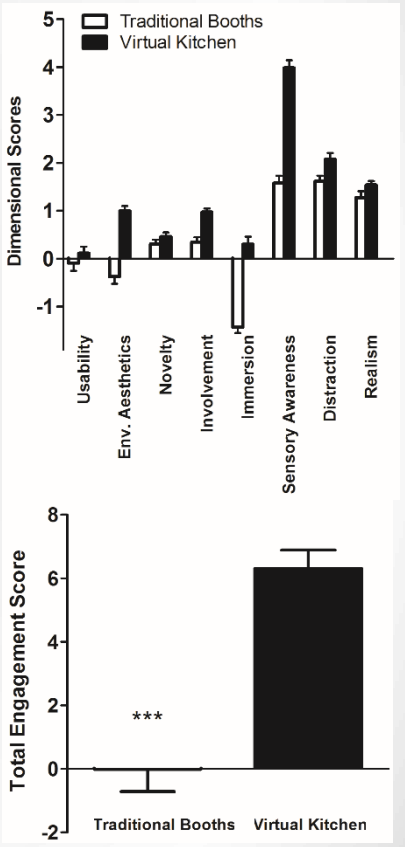


Results: Engagement

- Panelist engagement higher when testing *in situ*

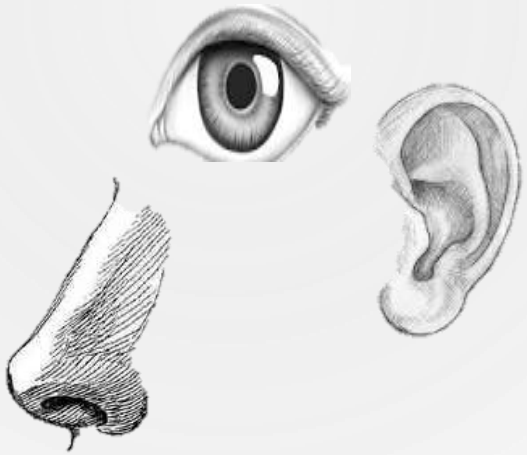






Information Streams

- What information are people attending to?
- Which information stream is most salient?
- How is the contextual information processed and prioritized?



Information Streams

Objective: Use immersive technologies to determine how modulating the congruency of visual, auditory and olfactory information streams impacts consumer liking of cold brew coffee

- Lowering the congruency of the contextual cues will result in lowered hedonic scores when compared to the contextually congruent scenario

Objective: Gain fundamental insight into which cue is most salient in influencing consumer hedonic assessments

- Most salient cue will exert the largest impact on hedonic scores

Experimental Design

	VISUAL	AUDITORY	OLFACTORY
First Presented Ctrl	Coffee house	Coffee house	Cinnamon Roll
Second Presented Ctrl	Coffee house	Coffee house	Cinnamon Roll
Visual Incongruent	Laboratory	Coffee house	Cinnamon Roll
Auditory Incongruent	Coffee house	Construction	Cinnamon Roll
Olfactory Incongruent	Coffee house	Coffee house	Detergent
All incongruent	Laboratory	Construction	Detergent

Experimental Design

Each panelist:

- Evaluates the 3 brands of cold-brewed coffee per condition
  - 2 oz. portions served in 5 oz. plastic iced coffee cups
  - Receives coffees in the same order for each condition to eliminate order effects
- Performs rank rating procedure
  - Rank coffees from most to least preferred
  - Rate using 9 point hedonic scale
- Wait 2.5 minutes in between conditions

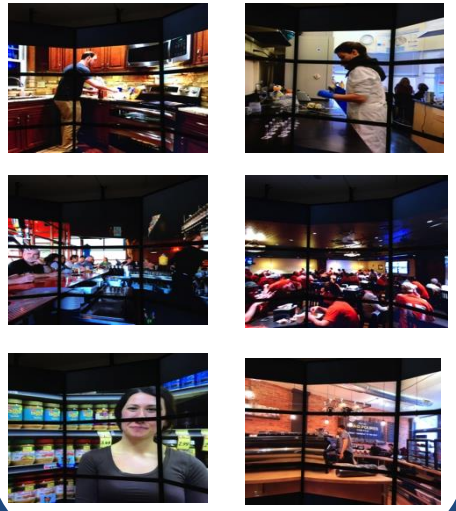
Experimental Design

Recall Questionnaire

AROMA



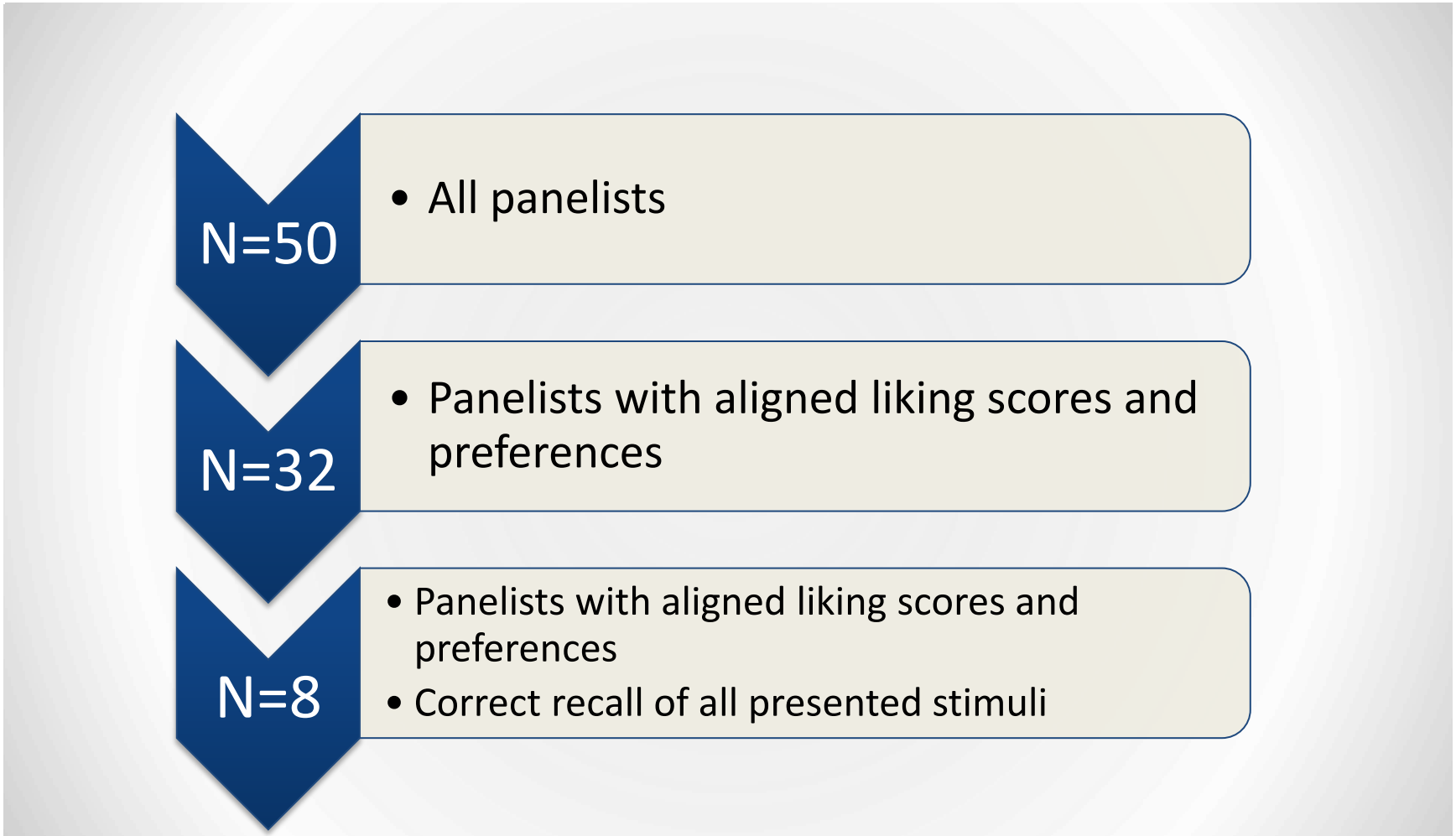
VISUAL



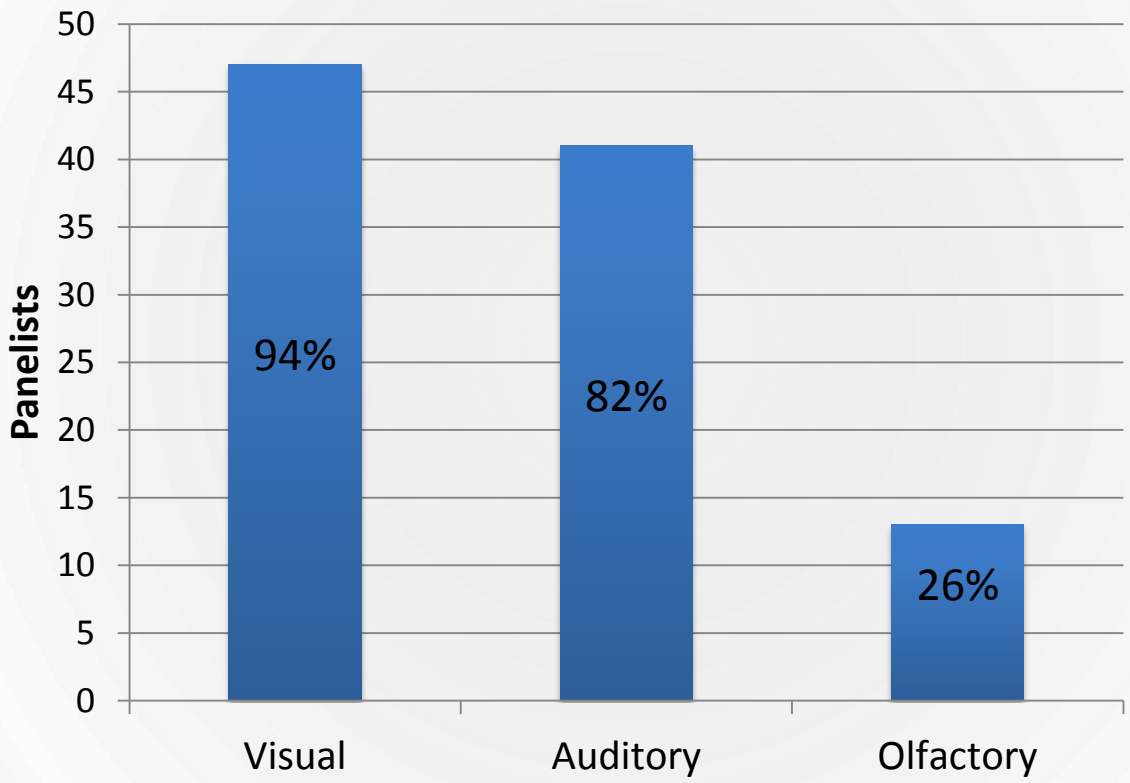
AUDIO



Data Analysis

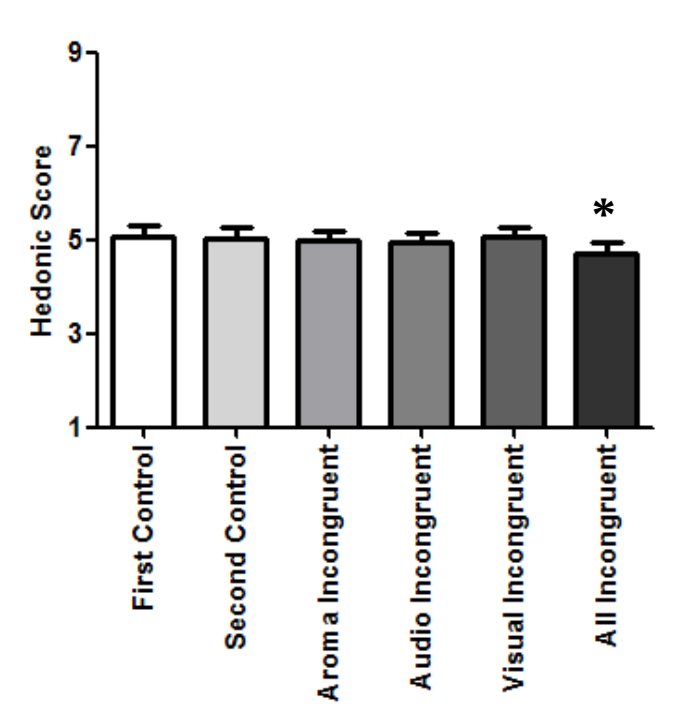


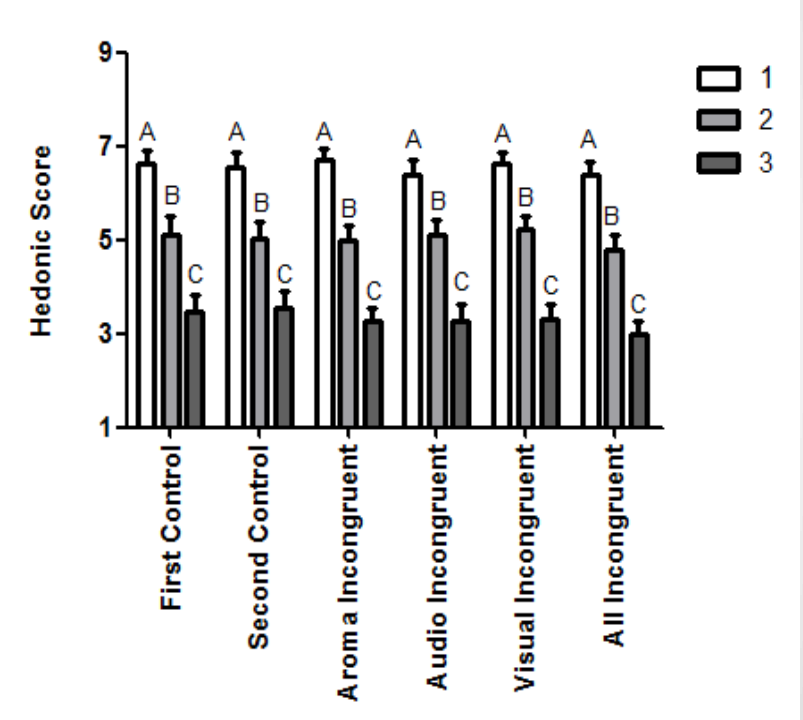
Recall


Panelists
50
45
40
35
30
25
20
15
10
5
0
94%
82%
26%
Visual
Auditory
Olfactory

Coffee Liking (organized by preferred coffee)

N=32

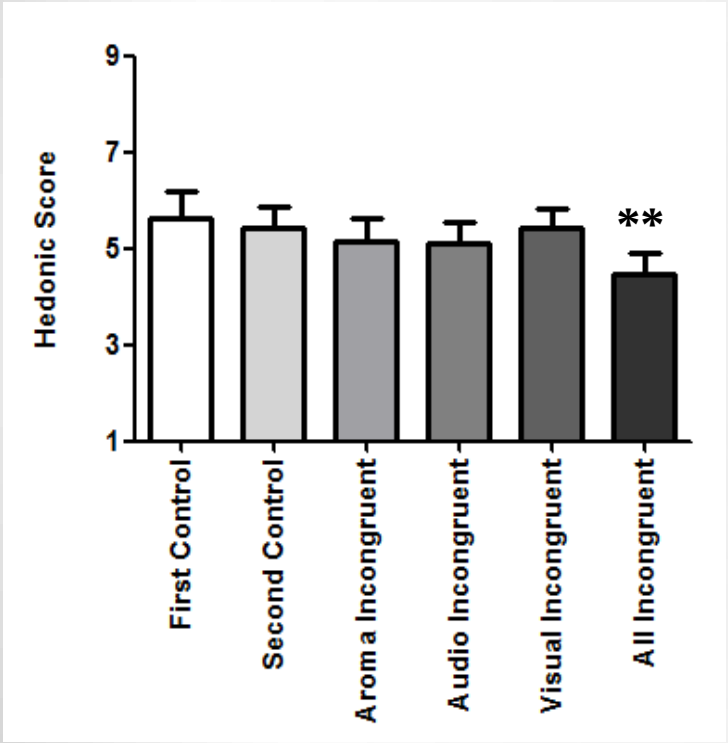


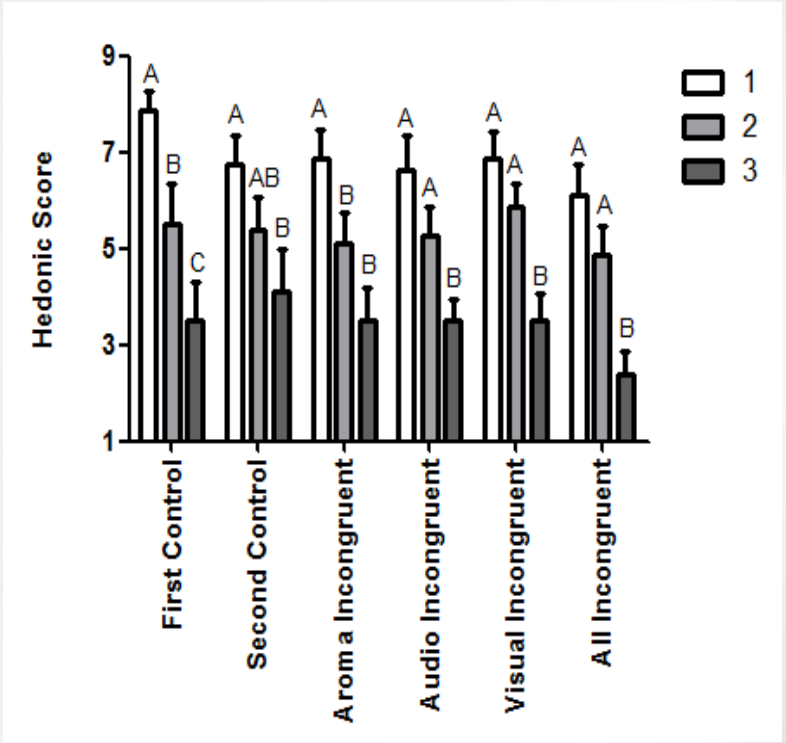


(*p<0.05)

Coffee Liking (organized by preferred coffee)

N=8



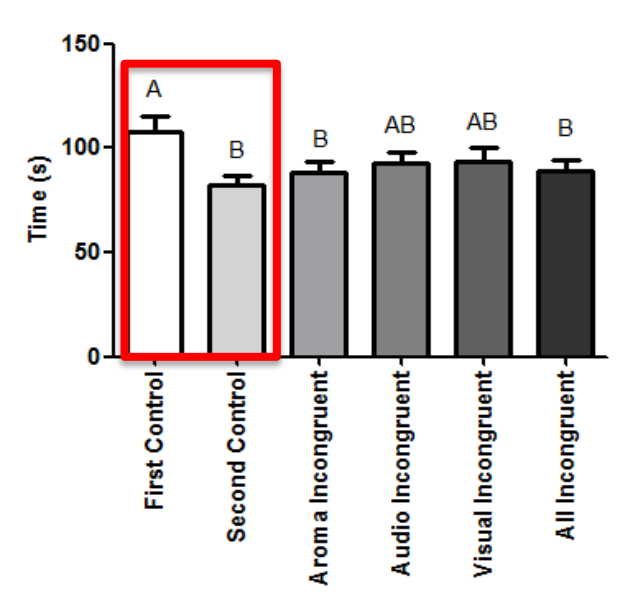


(**p<0.01)

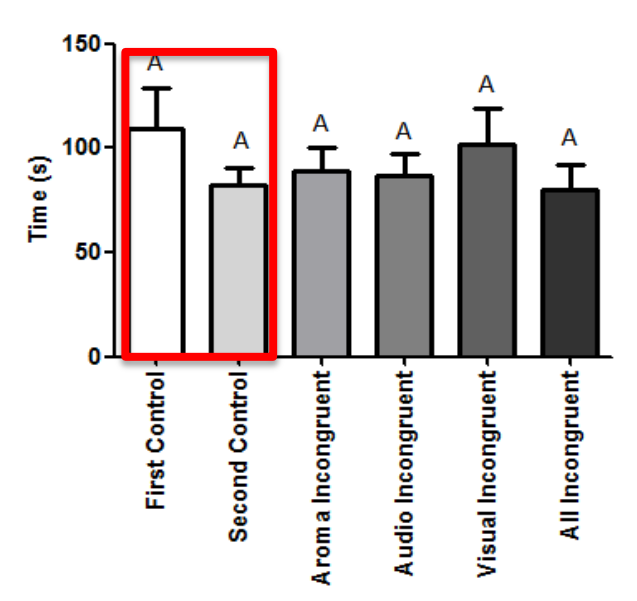
Time

- Significant difference in time spent between first and second control condition ($p<0.001$)

N=32



N=8



Take Home Message

- Immersive technologies improve consumer hedonic testing
  - Inclusion of contextual information restores ecological validity
    - Increased power
    - Improved reliability
    - Heightened subject engagement

- Modulation of contextual cue congruency can influence hedonic assessments of the most and least preferred products.
- Panelists attended most to the visual and auditory information streams. Olfactory information had a lesser priority.
- Repeated exposure to the contextually congruent environment impacted panelist assessment behavior.

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