Crowdsourcing for Virtual Reality experiments

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Introduction

The recent pandemic has pushed social science researchers to rethink their practices. While different research design call for different forms of contingency, experiments using virtual reality (VR) have been particularly affected. While some researchers have opted for switching to online videos without a VR headset, others have turned to crowdsourcing, relying on participant's own equipment (e.g. XRDRN.org, LiminalVR). Studies show that the process is not new (Steed et al., 2016) and is reliable despite the absence of supervision, given more caution to participants' personal factors (Mottelson et al., 2021). Can online VR studies complement lab studies for mixed methods experiments?

This Study

To complement a lab-based VR experiment looking at the effect of conceptual priming (calm vs. awe) and its framing (implicit vs. explicit) on the emotional experience of awe, this study will crowdsource participants online and, as an additional aim, compare data quality and reliability in a between comparison (crowdsourced vs. lab) within 4 groups corresponding to different conditions. The lab-based experiment (n=100) will inform the design of this crowdsourced experiment (n=200) for a more accurate data collection and processing. Both lab and online participants will be presented the same VR experiences (two calm-inducing as baseline and two awe-inducing).

Methods

FRAMING AND CONCEPT	IMPLICIT AWE	IMPLICIT CALM	EXPLICIT AWE	EXPLICIT CALM
LAB BASED (N=100)	n=25	n=25	n=25	n=25
CROWDSOURCED (N=200)	n=50	n=50	n=50	n=50

Material

Four emotional experiences (two calm-inducing as baseline and two awe-inducing) developed by LiminalVR, slightly altered to fit each online experimental condition, compiled into a standalone application will be distributed to participants directly. Surveys will be computer-based.

Measures

- **Personal factors:** demographics, owned device, VR setting (use frequency, space, interruption likeliness), willingness to participate with expected payment, VR user experience, openness to new experiences.

- **Data quality:** completion time, verification items in surveys.

- **Self-reported measures:** frequency and intensity of autonomic arousal (goosebumps), awe experience through a set of subscales, other experienced emotions with their intensity.

- **Quantitative repeated measure:** time flow perception ability (baseline), time flow perception after each experience (index of experienced awe through mental schema accommodation).

Participant recruitment

- **Research-oriented platforms:** XRDN.org (platform dedicated to mixed reality studies), Prolific (allows to pre-select participants by demographics).

- **Social media:** Facebook, LinkedIn, VR-related subreddits in Reddit, Steam and specific VR social platforms (Rec Room, VRChat etc…)

- **Personal networks**

Data analysis and expectations

1) Assessment of **data validity for autonomic arousal** (goosebumps) between measured (lab-based) and self-reported (lab-based + crowdsourced) will be performed comparing **Pearson's correlation coefficient** for lab-based measures-lab-based self-reports with lab-based measures-crowdsourced self-reports.

We expect a similar high positive correlation for both coefficients, suggesting a high validity for self-reports as a measure of autonomic arousal.

2) Assessment of **data reliability for self-reported measures** will be performed comparing **Cronbach's α** between lab-based and crowdsourced surveys data.

We expect similar α scores across lab-based and crowdsourced self-reported data, suggesting a high data reliability for online unsupervised VR studies

3) Assessment of **data reliability for time flow perception** will be performed with a **T-test comparison** between lab-based and crowdsourced data, complementing descriptive statistics.

We expect no significant difference from the T-test comparison but similar measures of variation and central tendency between crowdsourced and lab-based data.

Post-hoc analyses will probe for performance-moderating factors in demographics and performance-mediating factors in experimental design.

References

Mottelson, A., Petersen, G. B., Lilija, K., & Makransky, G. (2021). Conducting Unsupervised Virtual Reality User Studies Online. Frontiers in Virtual Reality, 2(May), 1–12.

Steed, A., Frlston, S., Lopez, M. M., Drummond, J., Pan, Y., & Swapp, D. (2016). An "In the Wild" Experiment on Presence and Embodiment using Consumer Virtual Reality Equipment. IEEE Transactions on Visualization and Computer Graphics, 22(4), 1406–1414.