# PSYCHO-MOTOR AND PSYCHO-PHYSIOLOGICAL CORRELATES OF AFFECTIVE-STATE WHILE EXPLORING 360° VIDEOS USING HEAD-MOUNTED VIRTUAL REALITY

ABSTRACT

The study investigates the relation between virtual affective experience and 360° exploration of emotional environment. Extreme pleasant and extreme unpleasant emotional videos were selected from Stanford affective database and displayed to participants on head-mounted virtual reality. The participants' task was to explore the video and report their affective experience using SAM scale.

The exploration behavior was analyzed using head-tracking parameters. The Beck Depression Inventory-II (BDI-II) was used to assess participants' mental and emotional state and that led to group the total 30 participants into four categories. The relationship between virtual affective experience and 360° exploration behavior is discussed in the light of these categories.

Sr.no	Video Name (Index)	Time (sec)	Observed Valence	Observed Arousal	Stanford Valence	Stanford Arousal
1	Abandoned City (3)	45	3.75	3.25	3.33	3.33
2	War Zone (14)	165	2.88	4.5	2.53	3.82
3	Solitary Confinement (16)	208	4.29	3.29	2.38	4.25
4	The Nepal Earthquake Aftermath (19)	230	3	4.2	2.73	3.8
5	Zombie Apocalypse Horror (21)	235	4.34	4.78	3.2	5.6
6	Instant Caribbean Vacation (23)	150	7.4	4.2	7.2	3.2
7	Getting Licked by a Cow in Ireland (26)	50	5.78	3.23	7.07	3.21
8	Puppy Bowl XII (47)	177	6.72	4.43	7.44	4.75
9	India's first ever 360 Wedding Video (49)	153	6.72	2.15	7.07	4
10	Tahiti Surf (70)	172	6.8	5.2	7.1	4.8
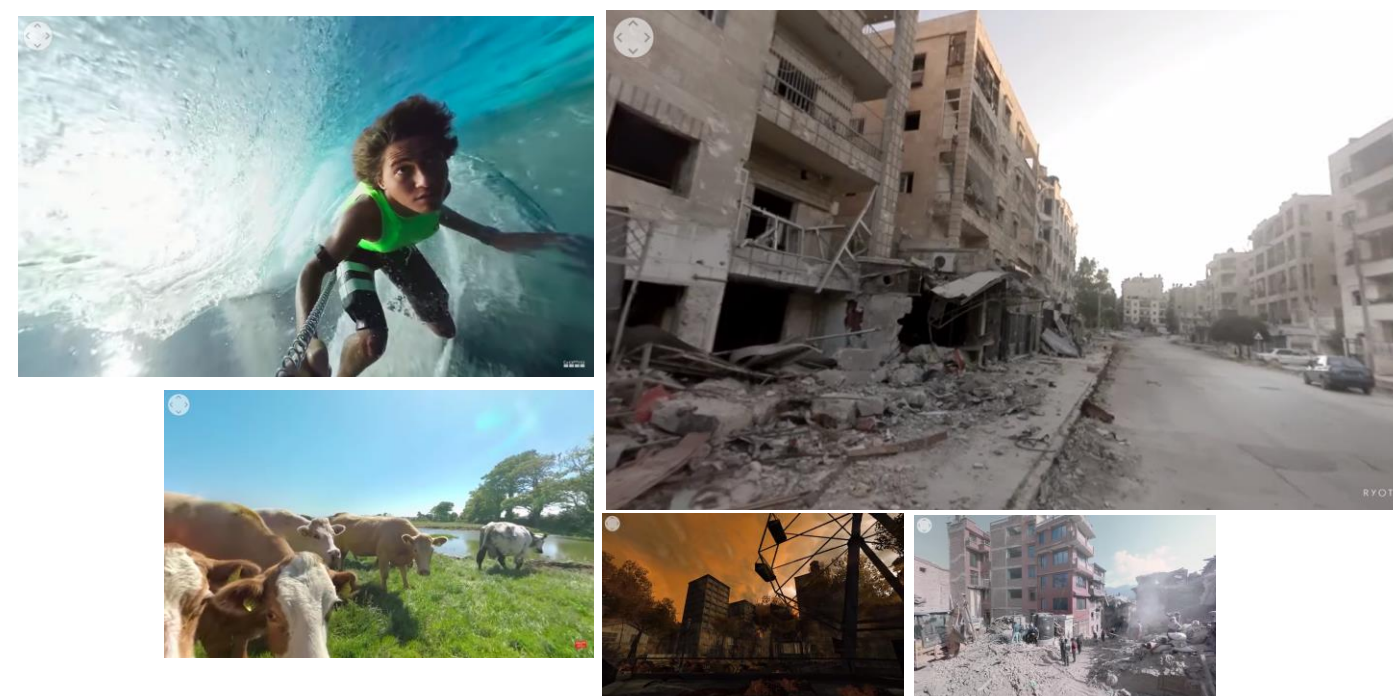
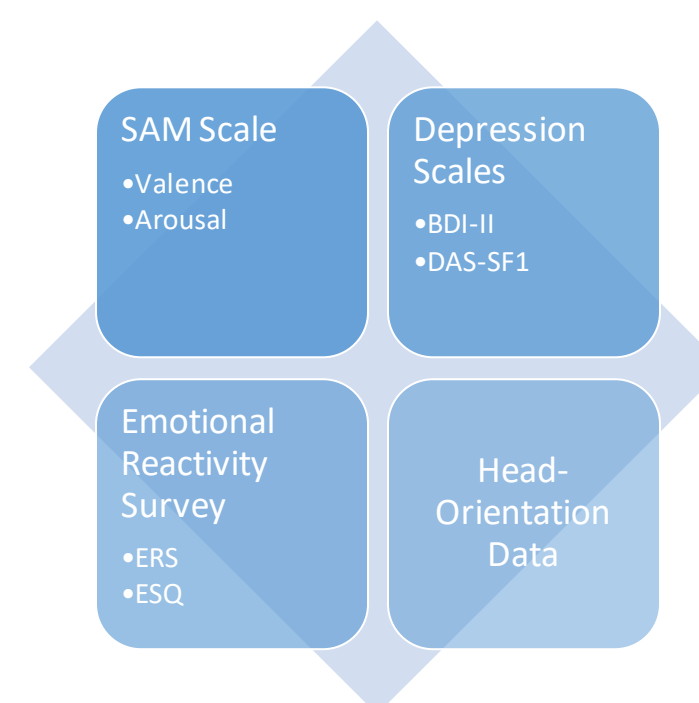## DESIGN

Stimuli

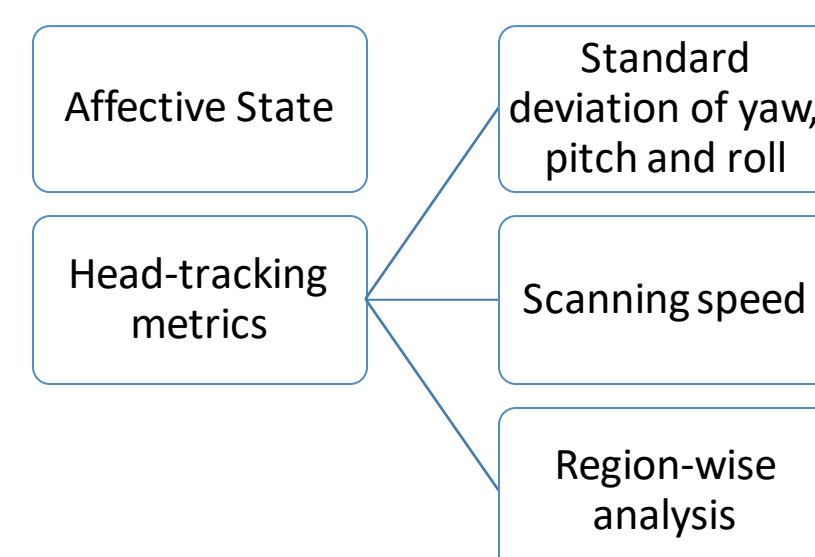|	
360° VR Immersive videos	5 Pleasant / 5 Unpleasant
Each explored 4 videos	2 Pleasant / 2 Unpleasant
Pseudo-randomized	
Each video was explored by at-least 11 participants	

Participants

30 IIIT students	22 Males	Age (years): 18 – 27 (20.96)

Material

SAM Scale — •Valence •Arousal

Depression Scales — •BDI-II •DAS-SF1

Emotional Reactivity Survey — •ERS •ESQ

Head-Orientation Data

Measures

Affective State → Standard deviation of yaw, pitch and roll

Head-tracking metrics → Scanning speed

Region-wise analysis

PROCEDURE

Feedback session
Non-clinical Surveys
Clinical Surveys
Self-report (4 time)
Video Exploration (with head-gear)
Instructions
Visual Screening
Consent
Welcome

SAM Scale

VALENCE AND AROUSAL

Circumplex Model of Affect

II — High-Arousal, Negative-Valence
I — High-Arousal, Positive-Valence
III — Low-Arousal, Negative-Valence
IV — Low-Arousal, Positive-Valence

Arousal high / low — Valence negative / neutral / positive

Tense, Excited, Angry, Delighted, Frustrated, Happy, Depressed, Content, Bored, Relaxed, Tired, Calm

Basics of Head-Tracking

Region Distribution

3 Degrees of Freedom (Yaw, Pitch, Roll)
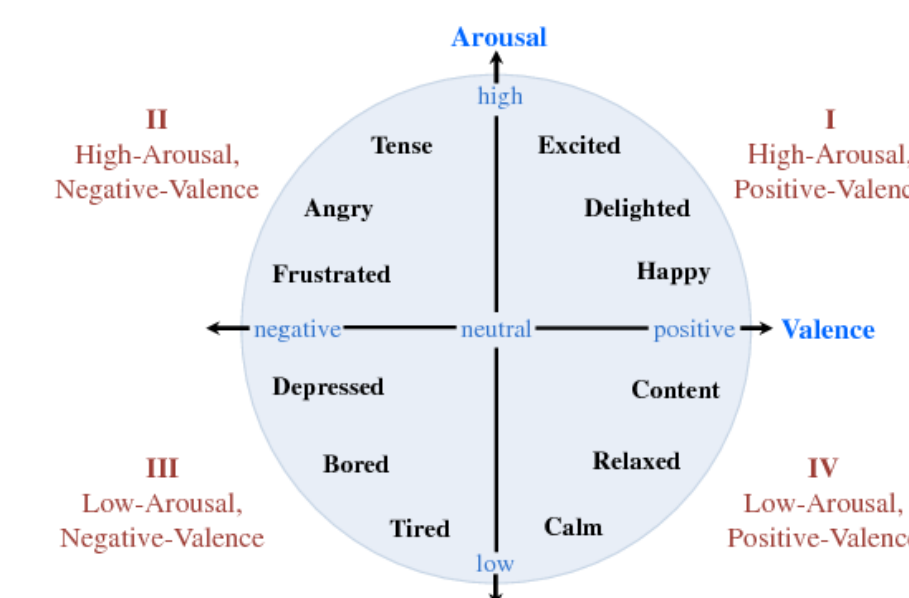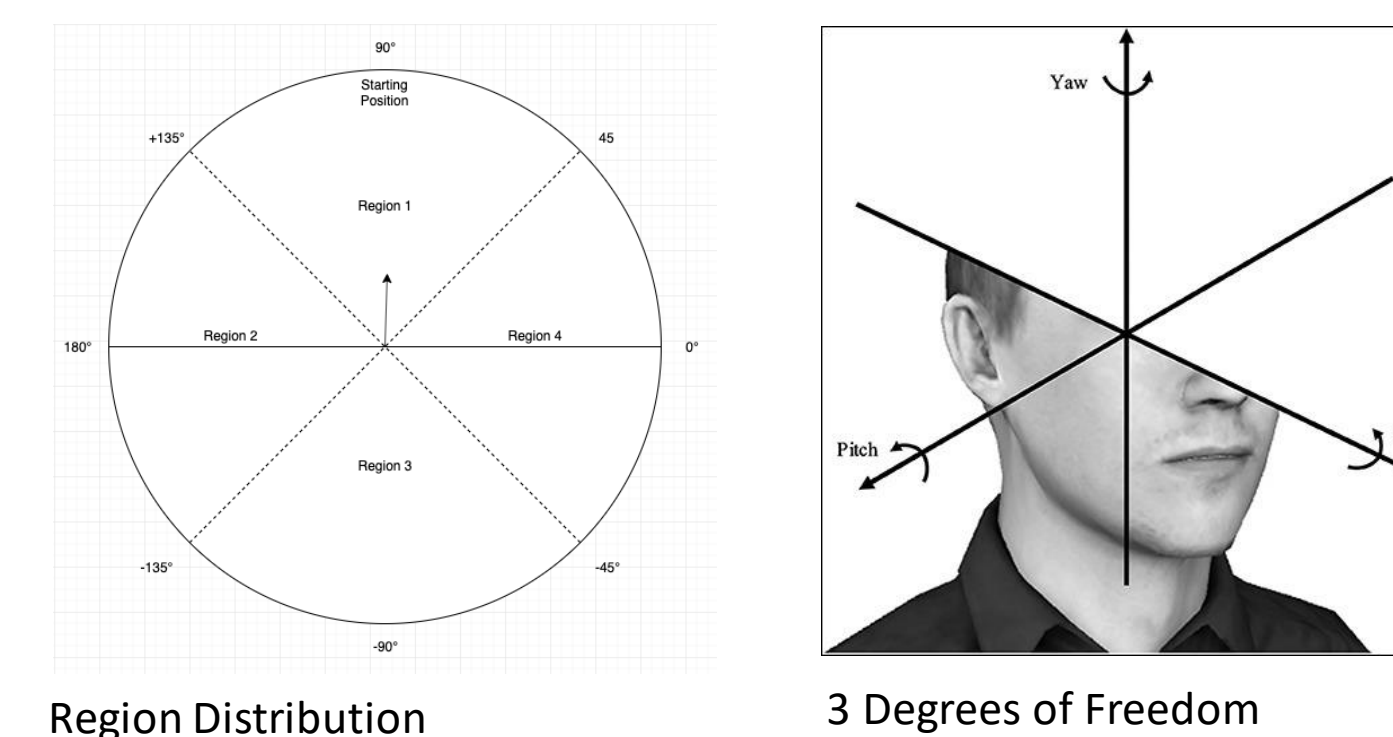
FINDINGS

Correlation Plots

Region-wise Analysis

Region exploration — •Largely explored: Region 1 (front-view) •Least explored: Region 4 (rear-view)

Exploration behavior same as in natural settings
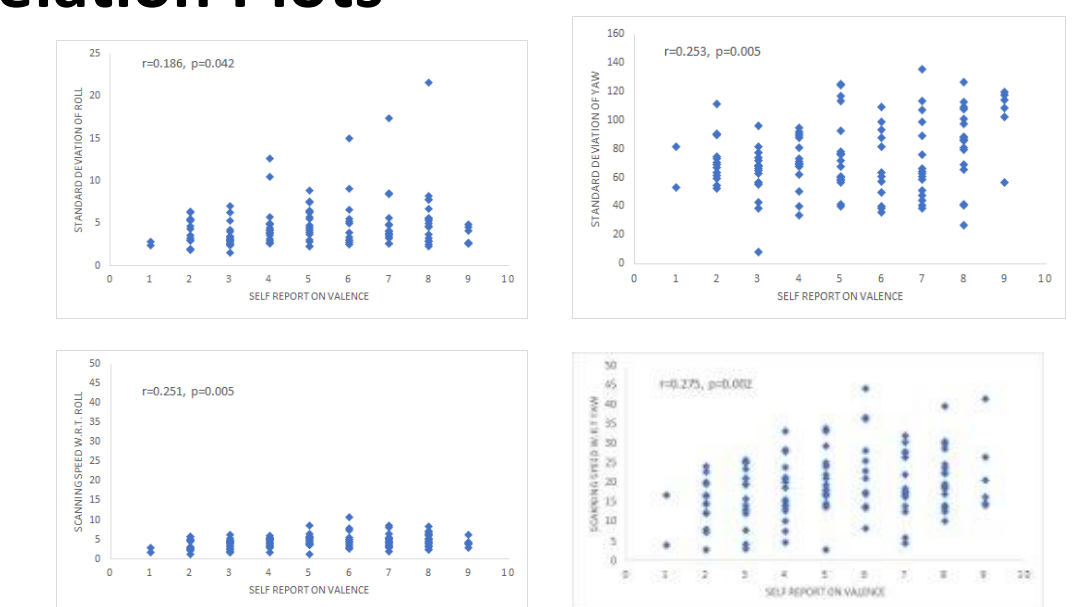
Cultural Differences
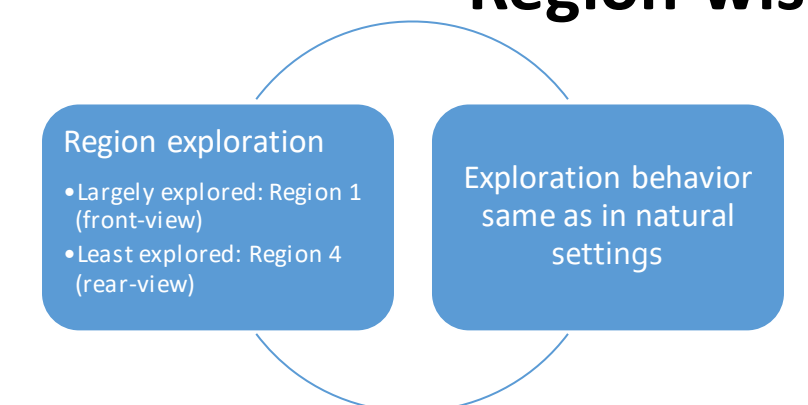
Observed values vs Stanford values
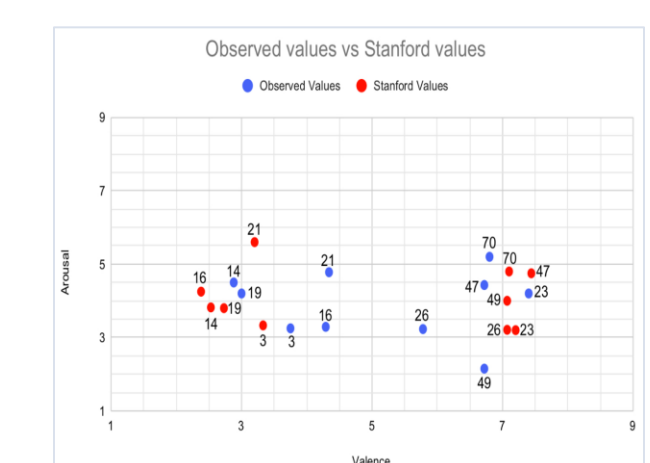
Summary

This study majorly observed positive correlation between standard deviation of head-movement and valence, and positive correlation between scanning speed and valence. The findings are in-line with the Li et al. (2017) study and support positive theory of emotion (Fredrickson and Branigan, 2005), which says that pleasant experience not only broadens the scope of attention but also motivates to seek more information to know the environment. This study can be extended to know more about depression.

References

• Li, B. J., Bailenson, J. N., Pines, A., Greenleaf, W. J., & Williams, L. M. (2017). A public database of immersive VR videos with corresponding ratings of arousal, valence, and correlations between head movements and self-report measures. *Frontiers in psychology*, 8, 2116.

• Fredrickson, B. L., & Branigan, C. (2005). Positive emotions broaden the scope of attention and thought-action repertoires. *Cognition & emotion*, 19(3), 313-332.

Authors: Minaxi Goel, Priyanka Srivastava*, Mayank Agrawal, Runa Chand, Rishabh Singhal, Baijesh Ramesh | Research Center Name: Cognitive Science