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SURVEY ON INDUCTION AND PROFILING OF STRONG MULTI-COMPONENTIAL EMOTIONS IN VIRTUAL REALITY

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Abstract: **Mental speculations of feeling have regularly characterized a feeling as concurrent changes in a few mental and bodily parts. What's more, evaluation hypotheses accept that an examination segment inspires changes in the other feeling segments (e.g., motivational, social, experiential). Neither the componential meaning of feeling nor evaluation hypothesis have been efficiently meant ideal models for feeling enlistment, a significant number of which depend on passive feeling acceptance without a reasonable hypothetical structure. Accordingly, the watched feelings are regularly powerless. This investigation investigated the capability of augmented reality (VR) to bring out forceful feelings in biologically substantial situations that completely drew in the psychological and real segments of the member. Members played a few VR amusements and investigated their feelings. Multivariate investigations utilizing various leveled grouping and staggered straight demonstrating demonstrated that members experienced extraordinary, multi-componential feelings in VR. This work recognized satisfaction and dread bunches of reactions, each including changes in evaluation, inspiration, physiology, feeling, and direction. Examination factors were observed to be the most prescient for dread and delight forces, contrasted with other feeling parts, and were found to clarify singular contrasts in VR situations, as anticipated by evaluation hypothesis. The outcomes advocate overhauled philosophies for the acceptance and examination of feeling forms**

Keywords: Emotion, Emotion Elicitation, Appraisal Theory, Mental Component, Virtual Reality

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I INTRODUCTION

There is a broad consensus in psychology that an emotion episode involves changes in multiple mental and bodily components simultaneously. Commonly cited components of emotion include a cognitive, a motivational, a physiological, a behavioral, an experiential (feeling), and a regulation component. Their joint pattern of changes defines what is understood as an "emotional reaction", and it is believed that specific qualitative emotional states (e.g., joy, fear, anger) are characterized by a particular combination of changes in these components. A theory of emotion causation that has generally subscribed to the componential definition of emotion is appraisal theory. This theory presents that emotional reactions to a given situation are driven by cognitive evaluations (i.e., appraisals) about the personal importance of that situation. That is, a person must appraise how a situation affects their personal goals, desires, or beliefs in order to react emotionally to it. From a componential view, appraisal theorists identify the cognitive component as the primary driver of changes in the other emotion components. A certain appraisal or combination of appraisals it is assumed that the organism will prioritize certain actions (e.g., escaping from an appraised threat) and invest an effort in those actions through a coordination of mental and bodily changes. Appraisal theorists have put forward concrete predictions about how appraisals can generate emotional episodes that are patterned across multiple components, including motivation, physiology, expression and feeling.

The explicit causal hypothesis underpinning appraisal theory, one would expect this to be a popular basis for paradigms that induce emotions for scientific study. Surprisingly, this turns out to not be the case. In fact, many conventional paradigms for emotion induction appear to be

lacking in proper theoretical justification entirely. This raises the concern that such paradigms may fail to induce strong and/or multi-componential emotions altogether, preventing emotion processes to be studied accurately. Studies that did base induction on appraisal theory have been mostly conducted within the field of appraisal theory research itself and although these paradigms are faithful to the theoretical framework, in practice the paradigms suffer from other restrictions that also cast doubt on their ability to induce strong emotions. It sought to ad dress these problems in the present study by combining appraisal theory with the medium of virtual reality (VR), showing empirically how VR can induce strong multi-componential emotions with theoretically justifiable scenarios that also allow the testing of hypotheses related to emotion theory.

II LITERATURE SURVEY

2.1 Enhancing Our Lives with Immersive Virtual Reality[3]

This Virtual reality (VR) started about 50 years ago in a form we would recognize today [stereo head-mounted display (HMD), head tracking, computer graphics generated images] although the hardware was completely different. In the 1980s and 1990s, VR emerged again based on a different generation of hardware (e.g., CRT displays rather than vector refresh, electromagnetic tracking instead of mechanical). This reached the attention of the public, and VR was hailed by many engineers, scientists, celebrities, and business people as the beginning of a new era, when VR would soon change the world for the better. Then, VR disappeared from public view and was rumored to be "dead." In the intervening 25 years a huge amount of research has nevertheless been carried out across a vast range of applications from medicine to business, from psychotherapy to industry, from sports to travel. Scientists, engineers, and people working in industry carried on with their research and applications using and exploring different forms of VR, not knowing that actually the topic had already passed away. The purpose of this article is to survey a range of VR applications where there is some evidence for, or at least debate about, its utility, mainly based on publications in peer-reviewed journals. Of course not every type of application has been covered, nor every scientific paper (about 186,000 papers in Google Scholar): in particular, in this review it have not covered applications in psychological or medical rehabilitation. The objective is that the reader becomes aware of what has been accomplished in VR, where the evidence is weaker or stronger, and what can be done.

2.2 Fitting Linear Mixed-Effects Models Using lme4[4]

Maximum likelihood or restricted maximum likelihood (REML) estimates of the parameters in linear mixed-effects models can be determined using the lmer function in the lme4 package for R. As for most model-fitting functions in R, the model is described in an lmer call by a formula, in this case including both fixed- and random-effects terms. The formula and data together determine a numerical representation of the model from which the profiled deviance or the profiled REML criterion can be evaluated as a function of some of the model parameters. The appropriate criterion is optimized, using one of the constrained optimization functions in R, to provide the parameter estimates. Authors describe the structure of the model, the steps in evaluating the profiled deviance or REML criterion, and the structure of classes or types that represents such a model. Sufficient detail is included to allow specialization of these structures by users who wish to write functions to fit specialized linear mixed models, such as models incorporating pedigrees or smoothing splines, that are not easily expressible in the formula language used by lmer.

2.3 Affective basis of judgment-behavior discrepancy in virtual experiences of moral dilemmas. Social Neuroscience[5]

Although research in moral psychology in the last decade has relied heavily on hypothetical moral dilemmas and has been effective in understanding moral judgment, how these judgments translate into behaviors remains a largely unexplored issue due to the harmful nature of the acts involved. To study this link, authors follow a new approach based on a desktop virtual reality environment. In this within-subjects experiment, participants exhibited an order-dependent judgment-behavior discrepancy across temporally separated sessions, with many of them behaving in utilitarian manner in virtual reality dilemmas despite their non-utilitarian judgments for the same dilemmas in textual descriptions. This change in decisions reflected in the autonomic arousal of participants, with dilemmas in virtual reality being perceived more emotionally arousing than the ones in text, after controlling for general differences between the two presentation modalities (virtual reality vs. text). This suggests that moral decision-making in hypothetical moral dilemmas is susceptible to contextual saliency of the presentation of these dilemmas.

2.4 Bodily maps of emotions [7]

Emotions are often felt in the body, and somatosensory feedback has been presented to trigger conscious emotional experiences. Here authors reveal maps of bodily sensations associated with different emotions using a unique topographical self-report method. In five experiments, participants (n = 701) were shown two silhouettes of bodies alongside emotional words, stories, movies, or facial expressions. They were asked to color the bodily regions whose activity they felt increasing or decreasing while viewing each stimulus. Different emotions were consistently associated with statistically separable

bodily sensation maps across experiments. These maps were concordant across West European and East Asian samples. Statistical classifiers distinguished emotion-specific activation maps accurately, confirming independence of topographies across emotions. Authors proposed that emotions are represented in the somatosensory system as culturally universal categorical so matotopic maps. Perception of these emotion-triggered bodily changes may play a key role in generating consciously felt emotions.

III TECHNIQUES USED

In The study of emotion processes has involved the development of numerous paradigms for the induction of emotion. These paradigms can be broadly categorized according to whether they occur in the field or a laboratory, and whether the induction scenario is passive or active. In practice, passive scenarios (i.e., a person is passively confronted with an emotion-inducing stimulus) occur more often in the lab, whereas active scenarios (i.e., the person actively participates in the emotion-inducing scenario) occur more often in the field. By far the most popular paradigms for emotion induction involve passive emotion induction in the lab and include viewing pictures (e.g., International Affective Picture System (IAPS) database;), viewing emotional facial expressions, watching film clips, listening to music, reading emotional words, recalling a past emotion experience, or imagining an emotion episode, for reviews. These paradigms have a number of appealing advantages, such as experimental control of stimulus presentation, standardization of viewing and measurement conditions, and elaborate measurement of emotion (e.g., multiple wired devices simultaneously) with minimal risk of interference.

However, passive paradigms for laboratory induction of emotion (e.g., pictures, videos, music) are difficult to connect to the assumptions made by componential emotion definitions and appraisal theory. Rather than presenting the subject with a scenario that can be appraised according to personal relevance and that can be acted upon by a meaningful choice of action, the subject is confronted with an isolated stimulus whose "affective quality" is expected to transfer to the passive observer (e.g., a fearful face induces fear). The underlying causal model appears to be one of "contagion", but this is not a widely held theory of emotion causation. Moreover, the presented stimuli are assumed to possess intrinsic affective qualities, whereas appraisal theories posit that such qualities are irrelevant compared to how the stimulus is appraised. Finally, due to the passive nature of the task, the meaning of important emotion components is rendered ambiguous or inappropriate, such as motivations (e.g., action tendencies) and behaviors. It does not make sense to run away or avoid a picture of a spider on a lab computer, whereas that behavior might certainly be observed in a real-life encounter with a spider. In other words, there is a lack of ecological validity to presenting a stimulus that has an assumed intrinsic emotional quality, but is otherwise disconnected from its meaning in other components of emotion.

Emotional reactions that are elicited with classic induction paradigms are typically weak, in terms of their felt intensity (e.g., subjective fear intensity), their duration, and their componentiality (e.g., involving changes in all emotion components simultaneously). This drawback need not be problematic when the purpose of the emotion induction ultimately serves another object of study (e.g., inducing an emotional state to examine its impact on some cognitive or social task) but when the object of study is the emotion process itself this aspect is critical. Firstly, according to some emotion theorists, a state should not be considered as "emotional" until changes in all emotion components have been established. Secondly, some emotion theorists have put forward hypotheses that involve all components of emotion simultaneously, such as componential synchronization or experiential integration. Testing these hypotheses is prohibited in emotion induction paradigms that do not engage adequately all mental and bodily subsystems simultaneously.

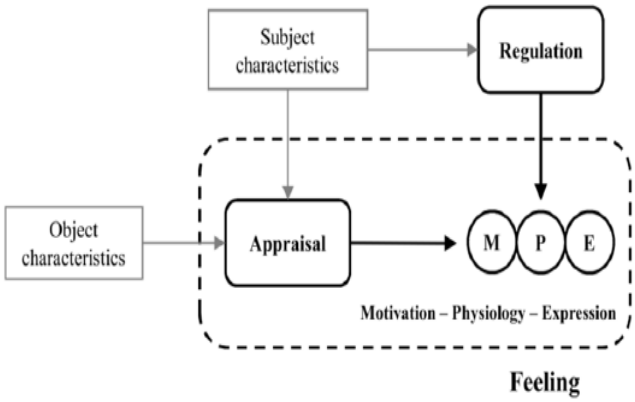

Figure 1 System Architecture

IV RESULTS & ANALYSIS

Prior to the analyses, the data were pre-processed. All ratings of the self-report questionnaire were subtracted, such that the "not at all" category corresponded to a numerical value of 0. Next, missing values were replaced by 0 values, which accounted for only 2% of all the data. This we did to avoid case-wise deletion of entire observations due to having just missing value. Zero imputation was favored due to being conservative.

V CONCLUSION

This scheme did not explicitly compare VR to other paradigms of emotion induction. This chose not to do this directly for a number of reasons, (a) because such a

comparison is inherently complicated by the fact that, as argued in the introduction, classic paradigms for emotion induction are largely incongruous with multi-componential definitions of emotion and appraisal theory, (b) the fact that there exists already much literature and data on classic paradigms that can be consulted for comparison, and (c) the fact that any systematic comparison between paradigms should in this opinion delve into exactly what makes these paradigms different (e.g., medium, presentation format, sensory complexity, narrative complexity).

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