From stimulus to situation – tracking situational information manipulation in quantitative intervention-based game research

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INTRODUCTION

The study proposes for consideration situational information manipulation as a method of evaluating the internal validity of quantitative social and cognitive science studies on digital games.The proposal follows multiple calls to attention regarding the internal validity risks derived from the systemic complexity of digital games, which can be, among other causes, detrimental to controlling emergent, unwanted changes between conditions (Elson et al, 2015; Ferguson, 2007; Gundry & Deterding, 2019).

FROM STIMULUS TO SITUATION

Criticism addressing validity risks (Adachi & Willoughby, 2011a; Adachi & Willoughby, 2011b; Elson & Quandt, 2014) commonly focuses on studies using an intervention-based design, where games take the role of stimulus (Ivory, 2013). While the concept of the game as stimulus has been employed successfully, and prudently, in some studies (see Järvelä et al., 2012), the concept itself may encourage a monolithic view of a complex and multimodal system. The procedure the participant undergoes during interventions - actively engaging with the game - means that they are not confronted with one stimulus, but with a collection of heterogeneous stimuli, or a stimulus *situation*. While the distinction between stimulus and situation has historically been a contested boundary, the fitness of the concept for the analysis of changes at a molar level (Pervin, 1978) points towards an avenue of research worth pursuing.

The conceptualization of the game as a stimulus situation is not a new notion. The General Aggression and General Learning models (Bushman & Anderson, 2002; Buckley & Anderson, 2006), one of the most frequently used frameworks in game effects studies, conceptualize the influences of exposure to games as 'situational inputs.' However, there is little to no detail given with regards to situational structures or variables. The authors state that situational variables correspond to the environment surrounding the individual, as well as being inherent to the specific

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digital game, with examples such as factual recall, simulated models of reality, or rewards. Thus, one can recognize the indication to two nested situations. The first one relates to the situation of playing a game, while the second one references the particular *digital* situation that the participant experiences. It is this latter type of situation that is used in the variable manipulation process.

Situation psychology has developed several taxonomies of psychological situations (see Yang et al. 2009; Alaybek et al., 2018). One recent development by Rauthmann et al. (2015a) distinguishes between three types of situation information. Cues, which define the objectively observable and quantifiable stimuli, characteristics, which capture the psychologically essential meanings of the perceived cues, and classes, which are abstract groups or situation types that can be based on similar cues or similar characteristics. Using a framework that makes a hierarchical distinction between objective and perceived features allows the problem of circularity to be avoided (Rauthmann et al. 2014). Circularity occurs when a situation's characteristics are determined by participant evaluation, blurring the boundaries between what exactly is being measured – situational or individual factors.

CASE STUDY

The example study (Carnagey & Anderson, 2005) was chosen due to its interventionbased design, as well as the use of the same game across conditions, a measure employed for control of emergent variable changes. The study has been previously critiqued by Adachi and Willoughby (2011a) from the perspective of the lack of control of perceived competition. The present work adds to their critique from the perspective of situational cues, and cue dependencies, which produce an unaccounted change in the situation characteristics. Mapping the situational information encountered in the intervention conditions onto Rauthmann's categories will enable the possibility to track the diffusion of a cue level change to a situation characteristic change due to the systemic complexity of the game, resulting in unaccounted for changes in participant situational roles and goals (Argyle, 1981; Yang et al., 2009).

The study used *Carmageddon II: Carpocalypse Now* (Stainless Games, 1998) with the aim of observing the effects of reward structures on aggressive affect. The study was comprised of two interventions. In the present analysis, I will focus only on the first intervention. The first condition was an unaltered form of the base game where points were rewarded for pedestrian and opponent eliminations. In the second version, eliminating pedestrians and opponents was punished by subtracting points. Although rewards are subsumed under the notion of 'points,' which elides the distinction between time and credits, the two reward types granted for eliminations, we can infer that the manipulation occurred on the level of situation cues – the negative or positive feedback following an action. This cue-level manipulation is diffused through the systemic components that relate to credit accrual, like the possibility of repairing the car after taking damage, as well as those related to time, like the possibility of winning the race. The inability to make repairs will, in turn, affect both the player's capability of staying alive and winning the race, as well as the levels of attention they must provide to careful driving. A similar, but not an identical effect is elicited by the alterations made in the time system. In the base game condition, eliminating a pedestrian, or an opponent increases the time the player has at their disposal to finish one of the three possible objectives and win the game. Eliminating the possibility to increase the available time, and further, implementing the possibility of decreasing the time, drastically increases the urgency of the situation and the requirements of skill and precision. This change in situational

requirements occurs in the circumstances in which the first alteration in the credit system demands more considerable attention and care given to driving.

Thus, by modifying a cue level information (the reward feedback), the characteristics of the situation concerning the urgency, and precarity of the position that player finds themselves in is also changed. This, in turn, impacts the goal contents of the situation, highlighting the adversity characteristics of the situation and the role the player occupies in relation to their car, which, in the second condition, becomes a liability.

CONCLUSION

While situational psychology does not provide wholesale answers to the issues of internal validity, it might offer an avenue to understanding the situational levels the manipulation might impact, and thus, aid the analytic and explanatory power of the research. The tools it can contribute must be carefully integrated into a domain that deals with digital, designed situations, instead of ecological, natural ones, but the experience of the field provides promising avenues of exploration into creating better standards and practices for experimental enquires into digital games.

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