Digital contents as a tool to address research reproducibility crisis in psychology: A case study on sexual attraction under conditions of high arousal

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Abstract. In the field of behavioral sciences, a crisis of the replicability of data took place. Among the reasons of the crisis, there is the difficulty of replicating some classical experimental settings and the lack of reproduced studies. Nowadays, digital contents might provide valuable opportunities to re-create specific environmental situations and manipulations in a safe and cost-saving way. The present study is a preliminary attempt to replicate the relationship between arousal manipulation and sexual attraction as it was assessed in the classical study by Dutton and Aron in 1974. Here, 30 male subjects will be randomly assigned to high or low arousal condition (induced with digital contents) and then asked to rate attractiveness of a female brief video. The objective of this preliminary study is to assess whether the same pattern of results from the classical study of Dutton and Aron will be confirmed with a virtual reprise of the experiment. Theoretical and practical implications will be discussed.

Keywords. Arousal; experimental manipulation; digital contents; sexual attraction; replication

1. Introduction

Up to now, in the field of psychology and behavioral science a crisis of reproducibility of studies took place. Such a crisis raised concerns about the reliability of scientific results, and it is due to several reasons, ranging from statistical issues to the fact that priority has been given more to novelty than to replication. Despite that trend, replication offers the fundamental confirmation of patterns that are likely and renders psychological data more reliable [1].

In the present work, authors propose to address the issue of the replication of specific categories of studies in the field of psychology by reproducing experimental manipulations with video remotely sent. Specifically, authors claim that technologies which can reproduce complex stimuli (i.e., 360° videos, virtual or augmented reality), might be used to replicate those studies, which present environments difficult to be reproduced for ethical reasons, costs, and availability of the stimuli. Indeed, having the sensation of being present in front of digital stimuli or inside virtual environment might

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constitute a valuable alternative to try to reproduce the key components of the subjects' experience previously realized in real experimental settings.

The idea of using technologies for the replication of study is not new. Slater and colleagues [2] already gave a seminal example of how VR can be used to re-test the relationship between psychological constructs, in this case as it has been done in the well-known classical study on obedience from Milgram [3].

Here authors propose to address the issue of reproducibility of studies with the aims of replicate classical findings, assess whether and to what extent digital contents can be used as a manipulation device on specific psychological variable, and finally to expand on practical implications of classical studies.

Authors identified studies dealing with these three categories: a) arousal and emotional manipulation, b) research involving specific environments such as natural spaces and their relationship with well-being, c) investigations of vicarious learning (the Bobo doll experiment). For all these classes, understanding how to efficiently manipulate psychological variables with digital contents would mean the possibility of performing training and interventions without having physical objects in a time and cost saving manner. The present pilot study is our first attempt to test if and to what extent an internet-based experiment can offer reliable experimental manipulation to replicate the well-known the relationship between arousal enhancement and sexual attraction, as it has been explored in the classical study by Dutton and Aron [4].

2. Materials and Methods

30 male subjects were enrolled in the study. Inclusion criteria were being a male in an age range between 18 and 65 years, native Italian speaker, with no neurological and psychiatric diseases and no disturbs impairing visual or auditory functions. Participants completed an online consent form; the study was conducted according to the Declaration of Helsinki. Overall, mean age was 33.6 years (s.d. 6.8; range: 18-52). For what regards educational level, 1 subject (3.3%) had primary school degree, 14 (46.7%) had high-school diploma, while 12 (40.0%) had a university degree and 3 (10%) had a Ph.D. or a postgraduate educational degree. Considering occupational status, all the participants were employed, 6 (20.0%) were blue-collar workers, 9 (26.6%) were white collar workers, 2 (6.6%) were health care professionals, while the remaining reported other occupational status (e.g., Ph.D. student, researchers). Finally, 12 (40.0%) of the participants were single, 13 (43.3%) were married or lived with their partner, and 5 (16.7%) were in a relationship.

Subjects received a link with a Qualtrics survey and were randomly assigned to one of these two conditions: a) high arousal-anxiety condition, b) low arousal-relaxation condition. In the first condition, volunteers saw two 360° videos with a shark cage and a slackline acrobat, while in the other group subjects saw two 360° videos displaying a walk in a winter and a spring forest. Before the videos, volunteers were instructed to either find a quiet place and turn on the audio of the device. To enhance the likelihood of participants to watch the entire video, a timer was inserted during the reproduction of the videos. Each video lasted 55 seconds, and the order of presentation was randomized within conditions. To test their efficacy in arousal modulation, the videos were pre-selected with a pilot study on 17 male volunteers enrolled with the same inclusion criteria of the present study. After the 360° videos, subjects were asked to rate perceived attractiveness of a brief video with a female actress on 6 visual analogue scale (VAS). Perceived psychophysiological state was also measured through two Visual Analogue Scales (VAS) (from 1 to 100) administered pre- and post-the videos on perceived stress/activation ("How much do you feel stressed or activated right now?") (which was our manipulation check) and on perceived relaxation ("How much do you feel relaxed right now?").

Data were analyzed with nonparametric statistics. To test if levels of activation were modified by the exposure to videos, we performed a Wilcoxon signed-rank test on both the groups, while the differences between groups in activation post exposure were assessed through a Mann-Whitney U test. Differences in perceived attractiveness scores of the female video were assessed with the same test. The data were analyzed with SPSS version 26.00.

3. Results

After the exposure, stress/activation scores of the high-arousal group (*Mdn*= 60) were higher than those of low-arousal group (*Mdn*= 37). The Mann-Whitney test indicated that the difference was statistically significant U = 58, z=-2.26, *p* = .023, r= -.58.

Median activation scores were compared before and after the exposure to videos in both groups. Overall, subjects in the high-arousal condition reported higher scores of stress/activation after the exposure to videos (*Mdn*= 60), compared to the scores given pre-exposure (*Mdn*=30). A Wilcoxon signed-rank test indicated that the difference was statistically significant, T= 83, z= -2.26, p =.009, r= -.58. While in the low-arousal condition, volunteers reported slightly lower scores of stress/activation after the exposure to videos (*Mdn*= 37), compared to the scores given pre-exposure (*Mdn*=40). A Wilcoxon signed-rank test indicated that the difference was statistically significant, T= 3.5, z= -2.45, p =.014, r=-.63. The same pattern was observed for the VAS on relaxation levels, which showed that level of relaxation increased into the low arousal group and decreased in the high arousal one ($Mdn_{\text{High arousal group}}$= 70, $Mdn_{\text{Low arousal group}}$= 61 before the videos and $Mdn_{\text{High arousal group}}$= 62, $Mdn_{\text{Low arousal group}}$= 70 after the videos).

Overall, considering differences in perceived attractiveness scores of the female video, high-arousal group gave higher scores on almost all the assessed dimensions (Table 1). However, the Mann-Whitney test indicated that none of these differences was statistically significant and all the effect sizes were small.

Table 1. Differences in perceived attractiveness scores in the two groups

Attractiveness items	High-arousal group (*Mdn*)	Low-arousal group (*Mdn*)	Mann-Whitney test
Beauty	66	60	*U*=99, z=-.56, *p*=.57, r=.10
Attractive	65	60	*U*=105.5,z=-.29,*p*=.77,r=.05
Sensuality	62	54	*U*=104,z=-.35, *p* =.72, r= .06
Pleasantness	66	72	*U*=106,z=-.27, *p* =.78, r= .05
Erotic	55	40	*U*=91.5,z=-.87,*p*=.38, r= .16
Funny	70	64	*U*=103,z=-.39,*p* =.69, r= .07

4. Discussion

This pilot study is our first attempt to test the suitability of digital contents in the replication of classical studies on arousal and emotional manipulation with the ultimate scope of providing practical guidelines on the efficacy of digital contents as a manipulation tool to address the issue of reproducibility of results.

In the present work, we aimed at studying the relationship between arousal enhancement and sexual attraction, as it has been explored in the previous classical study [4]. Specifically, we speculated that we could effectively manipulate arousal with digital contents, to test if levels of activations yielded to different perceptions of attractiveness. Our results showed that digital contents employed in the present study (i.e., brief videos remotely sent to volunteers) effectively manipulated the level of arousal. However, we did not find any significant difference in the scores of perceived attractiveness and the computed effect sizes were small. Hence, our analysis did not repeat the classical relationship between arousal heightening and sexual attraction.

At the current state, we cannot rule out the possibility that enlarged sample size would get significant results in perceived attractiveness, nor we can exclude that different technological tool (e.g.: virtual reality), with enhanced sense of presence, could have given a stronger manipulation. Furthermore, in future studies, psychophysiological measures should be paired with self-report questionnaires, to add objective data on the manipulation of arousal and emotional states.

We concluded that brief 360° videos constitute a valuable mean for the manipulation of emotional and arousal states and that they can be used as effective stimuli in online experiments. On the other hand, further studies, with enlarged sample sizes, are required to establish the relationship between arousal and sexual attraction as assessed by Dutton and Aron [4].

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