Effects of Augmented Reality in Soccer Broadcasting on Viewing Experiences: *An Experimental Study on the Differences of Sports Experts vs. Laymen*

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Aim

The use of emerging technologies like drones or virtual and augmented reality are seen as promising concepts to enhance the viewing experience of televised sports events and hence foster commercial success. However, little is known about the fundamental effects of those technologies as well as potential interaction effects with different targets audiences (e.g. sports experts vs. laymen). This study examines the actual effects of augmented reality in soccer broadcasting on viewing experiences.

Theoretical Background and Literature Review

Augmented reality has been used in sports coverage for a long time, to project scores and data (Kipper & Rampolla, 2013). With the rise of sports streaming companies (e.g. BBC Sport Online, Eurosport Player, DAZN), mobile devices, and data analytics, visually enhanced presentations of sports events got more and more sophisticated. Today, broadcasters rely on 3D animations, virtual offside lines or real-time information about athletes' performances to meet the changing viewing habits of digital natives and to deal with the rising complexity in terms of speed and tactics (Schart & Tschanz, 2015; Wallace & Norton, 2014). Media richness theory (MRT) states that complex information can better be transmitted via media that provide more visual (rich) social cues than leaner (less rich) media (Daft & Lengel, 1984). Thus, MRT suggests that the use of augmented reality in high-performance sports broadcasting is a promising approach to improve viewing experiences. However, we also know from traditional media effects research that individuals process information differently as a function of personal involvement (Petty & Cacioppo, 1986).

RQ: What are the effects of Augmented Reality in sports broadcasting for different target audiences (Experts vs. Laymen)?

Research Design and Data Analysis

To test our research question, we conducted a two-factorial (augmented reality x audience type) experimental design. As a stimulus material, we took a scene from a soccer game broadcast by SKY Germany and applied video cutting software to produce two different versions (with AR x without AR) of the original scene. For version (a), we added various augmented reality elements that explained what was happening on the field. Version (b) did not contain any augmented reality elements. Next, we recruited participants (n=138) and asked them to fill out a questionnaire to measure their expertise level regarding soccer. We then divided our participants into two groups (experts vs. laymen) and showed version (a) of our stimulus material to 50 % of our soccer experts and to 50 % of our soccer laymen. Version (b) of our stimulus material was shown to the other half. Thus, we came up with a 2x2 cross-sectional design with four experimental groups. After reception of the soccer scenes, we measured the viewing experiences for each group. Our instrument for measuring these experiences consisted of 21 items (4-point Likert-scale) about "*Quality of Information*",

"*Professionalism*", "*Immersion*", "*Entertainment*" and "*Drama*" (Halim, Rauf Baig & Mujtaba, 2010).

Results and Discussion

For our data analysis, we conducted a two-factorial analysis of variance (ANOVA) to test for main effects as well as for interaction effects. Our results clearly indicate that augmented reality in sports broadcasting can have large positive effects. We find a significant main effect of AR on perceptions of *Quality of Information* [$F(1, 96) = 39.5$, $p = .000$, $\eta p2 = .29$], indicating that the mean score was significantly greater for participants in the "*with AR groups*" ($M = 2.92$, $SD = 0.07$) than in the "*without AR groups*" ($M = 2.28$, $SD = 0.07$). This large effect was not qualified by an interaction between *Augmented Reality* and *Expertise Level*. Further, we find a small significant main effect of AR on perceptions of *Professionalism* [$F(1, 96) = 4.28$, $p = .041$, $\eta p2 = .043$], indicating that the mean score was significantly greater for participants in the "*with AR groups*" ($M = 3.04$, $SD = 0.07$) than in the "*without AR groups*" ($M = 2.85$, $SD = 0.07$). Again, no interaction effects were found. Finally, the ANOVA with post hoc tests using the Bonferroni correction suggested an interaction effect [$F(1, 96) = 4.69$, $p = .033$, $\eta p2 = .047$], indicating that the positive effect of AR for perceptions of *Entertainment* is greater for *Laymen* than it is for *Experts*.

Conclusion and Implications

Our results suggest, that augmented reality in sports broadcasting can be very beneficial. In general, recipients rate sports broadcasting significantly better on a variety of relevant appraisal factors when AR elements are applied. However, the expertise level seems to play a crucial role, too. Sports broadcasters should take this into consideration and provide additional AR elements in a way that viewers can decide for themselves whether they want to see them or not. Hence, interactive online services might be an appropriate approach to address individual audience needs and to win new target groups for sports broadcasting.

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