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# Usability Evaluation of Humanoid Embodied Conversational Agents on Mobile Serious Game Applications

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**Abstract**

My research focuses on the usability of humanoid embodied conversational agents (ECAs) within a serious game for mobile devices. Hence, I examine through usability experiments which level of the multimodal output interface is perceived as more usable by the user and how agents with different roles within the application affect the usability. The overarching aim of this research is to examine how ECAs can be used to foster usability in serious games on mobile devices.

**Author Keywords**

User experience; usability engineering; data science; HCI; embodied conversational agents; speech recognition systems; mobile applications; serious games; experiment design.

**ACM Classification Keywords**

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous;

**Motivation--Embodied conversational agents and mobile devices**

There are many theoretical advantages in favour of embodied conversational agents (ECAs) and spoken dialogue systems because they provide a more "natural interaction" [1]. Although there is a growing pool of empirical data relevant to the effects of ECAs, there is still lack of empirical evaluations proving that ECAs are more usable on mobile devices. Given the lack of evidence on the potential effect of ECAs on serious games, there is a major risk related to the introduction of ECAs in serious game mobile applications. Therefore, whether usability and quality are to be enhanced by using an ECA in a multimodal human-machine interface must be decided for each application anew [2].

According to recent studies the interaction with spoken dialogue systems, either in the form of an embodied agent or not, is still inferior compared to other approaches that allow a direct manipulation of the system to which the user responds instinctively, despite the theoretical advances of ECAs and dialogue systems [2]. However, the way users interact with mobile devices is called to change since the latest generation of mobile devices include voice driven virtual assistants (Siri, Google now, S voice) [3]. Although, there are still

a lot of questions surrounding the effectiveness of using ECAs in user interfaces and additional research is needed in order to evaluate the impact of the combination of gamification and ECAs, the existing findings reveal their strong potential in provoking enhanced player learning in serious applications [4]. This is also a strong reason to examine if ECAs enhance usability over current interaction paradigms in serious game environments, even more so in mobile devices as there is a recent trend towards mobile serious games. [5][6]

### **Objectives:**

- Examine if the addition of a humanoid ECA to a mobile serious game leads to an increase in usability.
- Examine if the presence of a humanoid ECA improves the quality of the interaction for the given domain and task.
- Identify which attributes of the humanoid ECAs (per role) improve the overall usability.
- Explain the results obtained in terms of existing theories such as persona effect.

### **Progress to date**

I have so far run two pilot studies of usability experiments in order to answer my research questions.

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