

Cultural Dimension Theory Based Simulations for US Army Personnel

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Abstract. US Military Personnel are constantly operating in culturally diverse operational theaters and among multinational coalitions around the world. Though some cultural and linguistic criteria are considered when filling deployments, cultural missteps continue to plague the success of our combat operations. In order to address the increasing need for cross-culturally competent personnel the Department of Defense (DoD) requires scalable evaluative methods that supplement current measures primarily focused on evaluating linguistic skills for cross-cultural competence. This work investigates the integration of Cultural Dimension Theory and immersive avatar-based gaming systems with the goal of measuring and predicting cross-cultural competence. The objective of this effort is to assess the applicability of Cultural Dimension Theory as a means to interpret perceived cultural differences and to introduce a novel framework by which a Cultural Dimension-based simulation can be developed.

Keywords: Cultural simulation · Avatars · Cultural dimension theory

1 Introduction

Cross-Cultural Competence (C3) has been identified by both corporate and military establishments as a necessary requirement for success in both modern business and military operations [1, 2]. DoD Instruction 5160.70, Management of the Defense Language, Regional Expertise, and Culture (LREC) program, identifies regional expertise and culture as mission critical competencies for the Defense LREC program. Specifically, the Department of Defense (DoD) has recommended the creation of a developmental model for C3 expertise that prescribes the progression of competency development [3]. For this reason, we are developing an objective and quantifiable means of measuring cultural competence through the adoption of Cultural Dimension Theory and an avatar-based simulation. This paper describes exploratory survey results to identify the applicability of Cultural Dimension Theory. Additionally, this paper discusses the proposed Cultural Simulation Design Process which incorporate Cultural Dimension Theory in a simulation intended to measure C3.

2 Literature Review

2.1 Cultural Dimensions

Over the past several decades, several research efforts have investigated theories to characterize the abstract concept of culture. This research can be broadly characterized as an effort to define cultures across a common set of parameters and values that allow for cross-cultural comparison.

Despite broad research in the area, none have paralleled the widely accepted six dimensional model of Geert Hofstede [4]. After 30 years of critique and evaluation, this model or variations of this model continue to appear as the most utilized cultural dimension framework [5]. Hofstede characterizes culture across six dimensions: Individualism vs Collectivism (IDV); Power Distance (PDI); Uncertainty Avoidance (UAI); Masculinity vs Femininity (MAS); Long Term vs Short Term Orientation (LTO); Indulgence vs Restraint (IVR) [4]. Sixty-three countries have been evaluated across these dimensions. Other notable frameworks include Trompenaar's Cultural Dimensions and Kluckhohn's Value Orientations which, despite their research validity, were not considered for this research [6].

2.2 Virtual Reality C3 Simulations

The proliferation and recent sophistication of virtual environment development tools such as Unity3D and Unreal Engine have facilitated the growth of realistic, dynamic, and immersive simulations. The research efforts described below represent the notable efforts in the cultural domain. Despite the advances made in these efforts, they all appear to lack a formal foundation in Cultural Psychology.

Sandia National Laboratory in collaboration with the U.S. Army John F. Kennedy Special Warfare Center developed a multiplayer cross-cultural game to simulate joint host-nation operations [7]. Though non-player characters were used for simple game-progression interactions, human players played the avatars in order to create the most realistic interaction possible. The evaluation of a player's performance and C3 was performed by real-time observations by Subject Matter Experts (SME).

The Cultural Awareness in Military Operations (CAMO) project at the Norwegian University of Science and Technology developed a Virtual Afghan village in Second Life (SL) with the objective of simulating a military security operation. Participants and SMEs evaluated the realism and effectiveness of the simulation though performance evaluations of the participants have yet to be published [8].

3 Cultural Dimension Theory Applicability

In an effort to determine the applicability of Cultural Dimension Theory as a means of measuring the Cross-Cultural Competence of DoD personnel, we conducted a perspective-taking survey of United States Military Academy (USMA) cadets. Seventy-four USMA cadets whom had recently returned from semester exchanges were surveyed.

3.1 Objective

The objective of this survey was to determine whether the cadets' perceived cultural differences were consistent with the published Hofstede's Cultural Dimension studies of the same countries. Similar methods have been used in other cross-cultural studies with mixed results though no studies were found to have used the Hofstede's Values Survey Module 2013 Inventory in this fashion [9].

3.2 Method

All the cadets were administered Hofstede's Values Survey Module 2013. Once complete, the cadet's were immediately administered the same survey with the instruction to answer the questions as they would expect the people in their exchange country to respond. The cadet semester exchange countries were concentrated in five countries (Taiwan, France, Germany, Mexico, Brazil). All the cadets designated American as their primary culture. They were not given any descriptive information about the specific dimensions.

3.3 Results

Figure 1 depicts a comparison between the difference of means observed in this study and the difference of means observed in the published Hofstede results of the same countries. The scales of each of the dimensions from the higher values to the lower values are as follows: High to Low Power Distance, Individualistic to Collectivistic, Masculine to Feminine, High to Low Uncertainty Avoidance, Long-Term to Short-Term Orientation, Indulgent to Restraint. The numeric scale in Fig. 1 is the absolute difference between the mean score of the USMA cadets and the mean scores as published in previous Hofstede publications. This is intended to show whether the observed difference of means in this study trend in the same direction as Hofstede's results.

3.4 Discussion

In examining Fig. 1, twenty-four of the thirty calculated cultural dimensions spanning the five countries trended in the same direction as that of Hofstede's published results. However, a couple notable dissonances were observed. Though several hypotheses are proposed for these dissonances, we are unable to definitively explain the root cause without further investigation.

In the case of Taiwan, we observed that the survey participants' perceptions of Taiwan were generally more masculine than feminine in contrast to the more neutral perspective reported in Hofstede's work. Other studies have replicated the result we observed [10,11]. Wu et al. explained the difference due to the rapid change in the U.S. workforce and gender roles since Hofstede's results were published which in turn would change the comparative result.

Another notable difference was in Power Distance for France. Through discussions with the participants, it was noted that they observed a less rigid rank

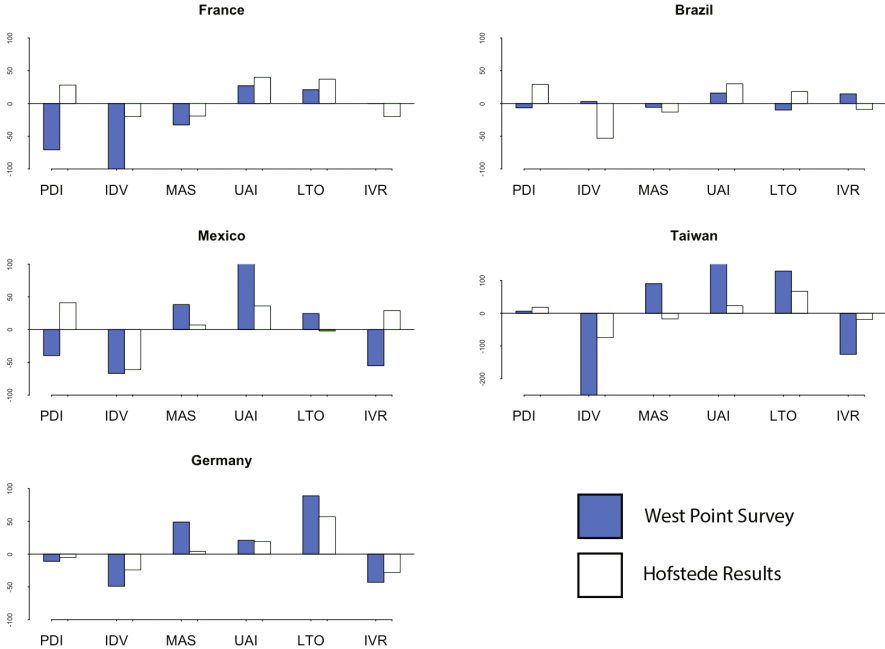


Fig. 1. Comparison of USMA results and Hofstede results for mean difference

structure among the French military than what they were accustomed to at USMA. This may be more representative of French military culture rather than French culture as a whole.

This result lends some evidence that the cultural dimensions can be correctly perceived which presumably would allow an individual to better interpret behaviors and respond accordingly. To provide further support to this conclusion, we plan to correlate these findings to established self-report measures of C3.

4 Cultural Simulation Design Process

Previous iterations of this research [12] and other related efforts have not attempted to incorporate Cultural Dimension Theory into their simulation design processes. As such, these simulations failed to present the users anything beyond rudimentary cultural interactions. As an evolution of the previously developed avatar-based cultural training simulation [12] and the results of the USMA study, this research effort systematically incorporates the previously discussed Cultural Dimension Theory into the simulation design process to address DoD requirements [3].

4.1 Overview

The Cultural Simulation Design Method extends existing Human-Computer Interface (HCI) design principles as described in other simulation design efforts [7]. This specific addition uses Cultural Dimension Theory to influence the development of the branched dialogues in order to increase the efficacy of the pedagogical value and assessment of the simulation.

Dimension Selection. In order to determine which Cultural Dimensions could be used to evaluate cross-cultural competence, we first determined the participant's most affiliated culture as well as the target assessment culture of the simulation. As an example, a participant considers himself most closely aligned with American culture and the simulation is designed to reflect Chinese culture.

We then determined which Cultural Dimensions were the most different between the participant's culture and the simulation culture. Hofstede's previous work shows that Power Distance, Individualism, Long-Term Orientation, and Indulgence have the most notable differences [13]. From these remaining dimensions, a subset was selected as the target dimensions in the simulation.

Dialogue Generation. In-game branched dialogues with avatars are the sole means of progressing through the simulation. These dialogues are contextually developed based on a predetermined storyline.

In response to an avatar, participants must select a response from a list of predetermined responses. The spectrum of these responses is crafted to capture the spectrum of the target cultural dimension. This methodology is repeated throughout the entirety of the dialogue trees in order to maximize the number of times a cultural dimension is exposed to the participant.

Cross-Cultural Competence Assessment. Given the integration of Cultural Dimensions into the dialogue structure, cross-cultural competence is assessed based on the number of culturally appropriate responses selected. We hypothesize that one's ability to recognize and respond to the appropriate cultural dimensions is reflective of a higher cross-culture competence.

4.2 Simulation Development

Using Unity3D as the simulation development engine and the previously described design process, we developed a five scenario simulation set in a Chinese university. The initial background model was purchased from the Unity3D marketplace and was subsequently tailored for our storyline. The avatars were each individually developed in Blender and Mixamo Fuse. Using the Pixel Crushers Dialogue System, we created branching text/voice dialogue trees.

5 Conclusion

This project builds upon previous work [12] to assess and improve a soldier's cross-cultural competence through the use of avatar-based simulation systems.

The Cultural Dimension survey of USMA cadets provides initial validity to the use of Cultural Dimensions to measure cross-cultural competence. Additionally, the novel Cultural Simulation Design Process introduces a systematic methodology to develop cultural simulations grounded in current theory.

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