

Representation of Cultural Role-Play for Training

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Abstract. The Department of Defense (DoD) has successfully applied a number of methods for cultural familiarization training ranging from stand-up classroom training, to face-to-face live role-play, to so-called smart-cards. Recent interest has turned to the use of single and multi-player gaming technologies to augment these traditional methods of cultural familiarization. One such system, termed CulturePad, has been designed as a game-based role-play environment suitable for use in training and experimentation involving cultural role-play scenarios. This paper describes the initial CulturePad effort focused on a literature review regarding the use of role-play for cultural training and a feasibility assessment of using a game-mediated environment for role-play. A small-scale pilot involving cultural experts was conducted to collect qualitative behavioral data comparing live role-play to game-mediated role-play in a multiplayer gaming engine.

Introduction

The recent shift in DoD focus from high intensity conflicts to the preparation for Stability, Security, Transition, and Reconstruction (SSTR) operations has many profound consequences on how we train U.S. forces for present and future missions. To support this shift, the U.S. military has recognized the importance of cultural and negotiations training and has applied several training approaches, such as live role-play exercises that typically utilize native Arabic role-players and focused training classes. These training methodologies have been used at the Joint Readiness Training Center (JRTC) at Ft Polk, National Training Center (NTC) at Ft. Irwin, Mojave Viper at Twenty-nine Palms, and Camp Pendleton.

Recent game-based cultural training approaches have focused on two types of computer-based interactions. The first provides cultural familiarization through role-play with artificial intelligence (AI)-controlled cultural avatars [1, 2, and 3]. The AI method has the benefit of making cultural familiarization training accessible on demand without requiring cultural experts to be present during training. However, the AI-controlled characters have a limited ability to adapt to novel situations.

The second computer interaction approach has been to create multiplayer-enabled simulation environments. These enable virtual role-play among multiple human role-players [4, 5] and make it possible for each user to have an avatar representing their own persona to engage in distributed role-play.

Of concern with this recent interest in using game based technologies is the limited research

comparing the effectiveness of a game-mediated system versus traditional (i.e., live face-to-face) role-play, particularly in a cross-cultural training context. To address this need, our effort was divided into four steps:

- Conduct a literature review to identify potential risks and limitations involving the use of role-play to explore complex cross-cultural issues irrespective of mode (i.e., face-to-face or game-mediated), as well as issues specifically involving game-mediated cultural interactions.
- Develop effective role-play strategies to mitigate the challenges involved in using a game-based platform for cultural training.
- Develop training materials to support live and virtual role-play and modify a game-based environment to enable effective culturally focused interaction.
- Conduct a pilot study to compare trainee satisfaction with the game-based role-play simulation versus satisfaction with live interaction.

In the following pages, we provide a synopsis of the literature review, the process for conducting the pilot, and a brief review of the pilot results. We end the article by providing conclusions derived from the pilot study results and offering guidance for revision and further testing of key relevant issues.

Use of Role-Play for Cultural Training

We began the literature review by identifying four areas in which to focus our investigation. The first three involve general issues regarding

use of the role-play method, while the forth concerns our specific interest in employing a game-based platform for role-play. These areas of investigation include: Use of role-play to elicit cross-cultural behaviors, sociological and cultural issues related to group interactions, interactions involving verbal and non-verbal forms of communication, and the use of a game-environment as a mediating form of interaction.

We developed literature-based mitigation approaches which guided implementation and testing of the game-based cultural role-play software. A summary of the key issues identified from the literature review is provided in the tables below. Table 1 identifies key issues involved with role-play in general, while Table 2 describes issues inherent in game-based role-play. In both tables the first column enumerates the salient issues identified during the review, while the second column includes our current risk mitigation approach or hypothesis, along with links to supportive literature.

It became clear through the literature review that our mitigation strategies would focus around two key themes. The *first* theme involved mitigating potential issues regarding use of role-play to explore cross-cultural issues and behaviors in both face-to-face and game-mediated role-play. This included such issues as: cognitive load imposed on role-play participants, factors related to optimal role-play, cross-cultural teams participating in a role-play context to explore cross-cultural scenarios, and typical inhibitions while participating in role-play related to group size or lack of anonymity. The *second* theme involved the need to provide effective user-interface metaphors to facilitate effective role-play and embodiment in game-mediated role-play [6]. This included specific issues such as complexity of mapping user inputs to non-verbal and other avatar behaviors, questions regarding required level of avatar fidelity required to convey subtle non-verbal communication, and mitigating cognitive load imposed by the game-environment.

An important finding from the literature review indicated that the degree of preparation has a direct, positive influence on the effectiveness of role-play [7, 8]. An integral component of preparation includes the creation of the role-play scenario itself including: specification of underlying scenario objectives, roles, motives, background information, and other features of the role-play scenario.

Pilot - Live vs. Game Cultural Role-Play

From these scenario specifications, collateral materials can be created and provided to role-play participants as 'role-play' guides. Further, the need to support directorial guidance to facilitate effective role-play was borne-out in the literature [9]. An important objective was to derive a framework that could be used to form the basis of standardized CulturePad scenario authoring guidelines. These guidelines would ultimately direct the creation of scenario-specific 'role-player guides' to drive role-play within the pilot but would also generalize as a descriptive model for application in other role-play contexts.

For the purposes of this cultural simulation, we designed a 20-minute scenario that required four participants, one for each role within the scenario. Further, each of the participants engaged in the role-play scenario in each of the two conditions (i.e., live and game-mediated).

The context for the role-playing in both conditions involved a scenario that requires proper Mosque etiquette. Within the scenario, a U.S. military representative, "Lt. Armstrong," was required to obtain intelligence from two local residents "Sheikh Mahmood," and his nephew, "Salim." Lt. Armstrong's objective was to obtain intelligence information regarding a person of interest with possible ties to recent violence within the city, while maintaining culturally sensitive etiquette.

The live role-play (see Figure 1) was conducted at a mosque located in southern Florida. Three of the participants had expertise in Arabic culture, but the fourth did not, thereby setting up a context in which cultural 'friction-points' could more realistically surface



Figure 1: Pilot - live role-play.

Table 1: Issues related to role-play in general

General Issues	Mitigation Hypotheses & Supportive Literature
Role-play between cross-cultural users may require more preparation or practice than a culturally homogeneous group.	Integrate team-building exercises into the role-play exercises. Vogel et al. [10] suggested that for intercultural computer-supported collaboration, team-building and workshop exercises increase collaboration effectiveness.
Lack of anonymity in face-to-face role-play may prevent engagement.	Providing a game-mediated approach can support an inherent form of anonymity during exploration of controversial cultural issues. Games can provide anonymity in role-play simulations [11, 12].
Large group size may cause social inhibition during role-play.	Minimize the size of the role-play groups. Given typical group dynamics, some have suggested that four to five players is the most preferred and often-cited size for a role-play group [13, 14]
Role-play may represent a threatening context for some players to explore cultural issues.	Use of a game environment may provide a safer arena for role-players to confront cross-cultural issues than a face-to-face condition. Game environments provide a safe, nonthreatening environment for individuals to interact and confront cultural differences [15, 16, and 17].
Role-play can produce "high cognitive load" particularly for novices.	Implement intelligent scenario authoring support to guide a scenario author in creating well-structured scenarios to optimize the execution of role-play. Role-player difficulties are minimized under conditions in which there is a well-structured role-play scenario and well-prepared role-play facilitators [7, 8].

Table 2: Issues related to game-mediated role-play

Game-Based Issues	Mitigation Hypotheses & Supportive Literature
Conveyance and interpretation of emotional disposition may not be intuitive.	Use natural verbal communication channels via Voice over Internet Protocol (VoIP). Research suggests that information in the human voice encodes information concerning the speaker's emotional state that is driven by involuntary physiological changes to the speaker's speech production as well as interpretation and encoding of cultural information [18].
Nonverbal behaviors may be difficult to map to physical and graphical control inputs.	Use in-game graphical affordances to create a cross-cultural interaction graphical metaphor (e.g., iconography). Evidence suggests that users are creative in establishing norms for encoding and transmitting nonverbal cues in alternative ways [19, 20, and 21].
Fidelity of visual avatars may not be adequate to convey required nonverbal communication in a game-mediated environment.	Establish fidelity requirements experimentally. If required, license premade avatars, as they provide high levels of visual and animation fidelity. Tromp and Snowdon [6] have shown that even visually crude block-forms can be successful in communicating nonverbal social cues.
Cross-cultural user populations have culture-specific interpretation for use of color, user preferences, and icons.	Use a configurable Human-Computer Interface (HCI) design approach that can be regionalized based on the user demographics. Design preferences vary across cultures and are culture-specific [22]. Also, analyses can be used to understand practical design considerations that exist for individual cultures of interest [23]

In addition to the military representative and the two local residents, there was a final role-player who acted as a “director”. The intention of the director was to act as a facilitator so that as the role-play unfolds (in either condition), the director can inject dialog, actions, and events to “move things along.” Each session (live action and game-based) lasted approximately 20 minutes. Each role-player was provided only with the role-player guide handout for their specific role, whereas the director was cognizant of all role-player handout content.

Cognizant of the issues and mitigation approaches synthesized from the role-play training literature, described in Tables 1 and 2, CulturePad used a modified version of a game-based training simulation for use in the game-mediated condition. This system, termed the Virtual Environment Cultural Training for Operational Readiness (VECTOR [24, 25]), was developed by CHI Systems to enable trainees to virtually interact with members of another culture through cultural familiarization scenarios. VECTOR users select dialogue options in order to interact with game characters controlled by Human Behavior Representations (HBRs) which are designed to reflect a Kurdish Arabic culture.



Figure 2: Pilot – game role-play.

The modified game-based simulation allows multiple users to control avatars behaviors via emoticons and behavior iconography. In addition, it has the added capabilities to record behavioral data from role-play sessions and support direct verbal communications through integration of Voice over Internet Protocol (VoIP). It also provides a scenario-authoring component to standardize CulturePad scenario development and create scenario-specific role-player guides for participants.

4. Pilot Results

The initial feedback about live-action and game-based simulation confirmed that preparation is key to a successful role-play experience.

Further, results suggest that although it has some limitations, game-based simulation is realistic, engaging, and an appropriate method to observe and practice culturally oriented behaviors.

A summary of the subject responses to the pilot questionnaire Likert-scale ratings and open-ended questions is provided in the table below. The scale ranged from 1 (Strongly Disagree) to 6 (Strongly Agree) with statistical means for each question provided below.

Table 3: Sample of participants’ responses to the pilot study questionnaire

Question	Mean
Role-playing scenario was realistic.	5.0
Gestures of the avatars were realistic.	4.8
In game Mosque added to fidelity of role-playing.	4.8
Scenario briefing was adequate.	5.0
I believe the game-based approach could be useful in eliciting culturally oriented behaviors.	4.5
Pressing action buttons is a viable approach.	4.0
I felt as engaged in game-based role-playing mode as I did in the face-to-face role-playing.	3.5

Open-Ended Question Responses

Talking seemed natural, but showing emotion was difficult.
It was difficult to express emotion in the game with the included head gestures, body language, and facial expressions.
I could express my anger better in face-to-face.
Increase time for practice.
Increase available body language.
Split screen so you can see yourself and the others.

5. Conclusions

Because of an increased need for cultural familiarization training for U.S. military forces, researchers have begun to test whether distributed multiplayer training environments would be an effective approach to provide cultural training role-play to a greater audience. The work described here investigated whether a game-based solution could reproduce the live role-play cultural training experience effectively.

Based on our observations and the results of the pilot, we found that two key elements are responsible for an effective application of cultural role-play. First, proper preparation and guidance in creating and enacting role-play based training are important, regardless of medium. Second, the type of game-based

interface is significant in enabling the user to convey and appreciate the cultural and interpersonal aspects of the role-play interaction. An important finding from our pilot was that specific cultural behaviors and gestures are transportable from a realistic face-to-face encounter to a game-based environment hosted on a computer.

Current efforts are under way to explore multiple interface configurations to increase the immersion and cultural training effectiveness of simulated role-play. We are also investigating input modality, in addition to the visual human-computer interface. Nontraditional game-based controllers such as the Wii remote are being examined in addition to more established devices such as keyboard, mouse and joystick-button combinations.

Although these various interaction methods are being studied for their ability to improve current training effectiveness and user acceptance, direct-mapping-based technology will be evaluated for its use in future systems. Avatar control that allows a direct mapping of users' intent and action – such as those involving eye-tracking, gesture-tracking, and physiological measurement – could provide a more seamless interaction experience. These technologies, though not currently practical for wide distribution because of issues such as high cost, intrusiveness, and imprecision, provide interesting options for the future, as they show promise for reducing the cognitive load [26] associated with role-play.

Additional research is needed to identify the specific learning principles and cultural competencies that apply to the use of gaming environments for cross-cultural role-play as a training medium. For example, perspective-taking is increasingly acknowledged as an important skill with regard to cross-cultural competency [27, 28]. We hypothesize that a game-based role-play environment may facilitate perspective-taking as learners utilize extraction skills to interpret subtle cultural cues from alternative roles within the game environment.

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REFERENCES

- [1] Barba, C., Deaton, J., Santarelli, T., Kerr, B., Singer, M., & Belanich, J. (2006). November Virtual environment composable training for operational readiness (VECTOR). In *Proceedings of the 25th Army Science Conference*. (pp. 25-32). Norfolk: World Scientific Pub Co Inc.
- [2] Hill, R. W., Belanich, J., Lane, H. C., Core, M. G., Dixon, M., Forbell, E., Kim, J., & Hart, J. (2006, November). Pedagogically structured game-based training: Development of the ELECT BILAT simulation. In *Proceedings of the 25th Army Science Conference*. (pp. 82-95). Norfolk: World Scientific Pub Co Inc. Orlando, FL: U.S. Office of the Under Secretary of Defense Acquisition, Technology and Logistics, Orlando FL.
- [3] Johnson, W. L. (2007). Serious use of a serious game for language learning. In R. Luckin et al. (Eds.), *Artificial intelligence in education* (pp. 67–74). Amsterdam: IOS Press.
- [4] Benton, D., & Santarelli, T. (June, 2008). Modeling cultural behaviors via multi-player gaming environments. Paper presented at the *International Training and Education Conference*, Stockholm, Sweden.
- [5] Mayo, M., Singer, M. J., & Kusumoto, L. (2005, December). Massively multi-player (MMP) environments for asymmetric warfare. In *Proceedings of the 27th Interservice/Industry Training Systems and Education Conference*. (pp. 220-231). New York; ACM Transactions on Modeling and Computer Simulation. Arlington, VA: National Training Systems Association.
- [6] Tromp, J., & Snowdon, D. (1997) Virtual body language: Providing appropriate user interfaces in collaborative virtual environments. *ACM Symposium on Virtual Reality Software and Technology* (pp. 37-44). New York: ACM.
- [7] Van Merriënboer, J., Schuurman, J., De Croock, M., & Paas, F. (2002). Redirecting learners' attention during training: Effects on cognitive load, transfer test performance and training efficiency. *Learning & Instruction*, 12(1), 11–37.
- [8] Sisk, D. A. (1995). Simulation games as training tools. In S. M. Fowler & M. G. Mumford (Eds.), *Intercultural sourcebook: Cross-cultural training methods* (Vol. 1; pp. 81–92). Yarmouth, ME: Intercultural Press.
- [9] Flowers, A. Magerko, B., and Mishra, P. (2006). Gamemasters and Interactive Story: A Categorization of Storytelling Techniques in Live

- Roleplaying. *Futureplay*, 2006. London, Ontario.
- [10] Vogel, D., van Genuchten, M., Lou, D., Verveen, S., van Eekhout, M., & Adams, T. (2001). Exploratory research on the role of national and professional cultures in a distributed learning project. In *IEEE Transactions on Professional Communications*, (pp. 114–125).
- [11] Freeman, M. A., & Capper, J. M. (1999). Exploiting the web for education: An anonymous asynchronous role simulation. *Australian Journal of Educational Technology*, 15(1), 95–116.
- [12] Raybourn, E. M. (2002). Toward cultural representation and identification for all in community-based virtual environments. In N. Carbonell & C. Stephanidis (Eds.), *Lecture Notes in Computer Science* (pp. 219–238) Berlin: Springer Berlin / Heidelberg.
- [13] Rosenberg, A. (2002). Introduction: Before the game. In *Gamemastering secrets* (pp. 3-22, 2nd ed.). Randolph, MA: Grey Ghost Press.
- [14] Bernard, R. M., de Rubalcava, B. R., & St-Pierre, D. (2000). Collaborative online distance learning: Issues for future practice and research. *Distance Education*, 21(2), 260–277.
- [15] Pedersen, P. (1995). Simulations: A safe place to take risks in discussing cultural differences. *Simulation & Gaming*, 26(2), 201–206.
- [16] Kass, A., Burke, R., Blevis, E., & Williamson, M. (1993). Constructing learning environments for complex social skills. *Journal of Learning Sciences*, 3, 387–427.
- [17] Gee, J. (2003). *What video games have to teach us about learning and literacy?* New York: Palgrave Macmillan.
- [18] Scherer, K. R. (1986). Vocal affect expression: A review and a model for future research. *Psychological Bulletin*, 99, 143–165.
- [19] Cherny, L. (1999). *Conversation and community: Chat in a virtual world*. Stanford, California: CSLI Publications.
- [20] Churchill, E. F., & Bly, S. (1999). Virtual environments at work: Ongoing use of MUDs in the workplace. In *Proceedings of the International Conference on Work activities Coordination and Collaboration* (pp. 99-108). New York: ACM.
- [21] David B. H., & Brewer, J. P. (1997). Electronic discourse: Linguistic individuals in virtual space. *Educational Technology*, 32(1), 53–67.
- [22] Evers, V., & Day, D. (1997). The role of culture in interface acceptance. In S. Howard, J. Hammond, & G. Lindegaard (Eds.), *Human Computer Interaction, Interact '97* (pp. 4-12). London: Chapman and Hall.
- [23] Barber, W., & Badre, A. N. (2001, June). Culturability: The merging of culture and usability. In *Proceedings of the 4th Conference on Human Factors and the Web*. (pp. 15-21). New York: Assn for Computing Machinery, Basking Ridge, New Jersey, USA
- [24] McCollum, C., Deaton, J., Barba, C., Santarelli, T., Singer, M., & Kerr, B. (2004, December). Developing an immersive, cultural training system. In *Proceedings of the 27th Interservice/Industry Training Systems and Education Conference*. (pp. 52-61).
- [25] Santarelli, T., McCollum, C., Barba, C., & Deaton, J. (2004). Applying a cognitive architecture to control of virtual non-player characters. In *Proceedings of the 2004 Winter Simulation Conference* (pp. 890).
- [26] Abbe, A., Gulick, L. M., & Herman, J. L. (2008). *Cross-cultural competence in army leaders: A conceptual and empirical foundation* (ARI Study ReportSR 2008-01). Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.
- [26] VanLehn, K., Ball, W., & Kowalski, B. (1989). Non-LIFO execution of cognitive procedures. *Cognitive Science*, 13, 415–465.
- [27] Rentsch, J. R., Gunderson, J., Goodwin, G. F., & Abbe, A. (2007). *Conceptualizing multicultural perspective taking skills* (TR 1216). Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (ERIC Document Reproduction Service No. ADA475106)