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Preparing for International Operations and Developing Scenarios for Inter-cultural Communication in a Cyberworld: A Norwegian Army Example

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Abstract. Understanding culture is an integral part of international operations in developing countries and conflict zones. Cultural encounters in countries such as Afghanistan might introduce a number of challenges. This article presents the experiences with the CAMO project (Cultural Awareness in Military Operations) seeking to address these challenges. Game-based simulations are to an increasing degree used for military training, but most of the systems are expensive to develop. The goal of the project has been to create an inexpensive game-based simulation in the 3D virtual world of Second Life for pre-deployment cultural awareness training among Norwegian military personnel preparing for service in Afghanistan. At the same time, due to the gradual withdrawal of troops from Afghanistan, training cultural awareness among civilian personnel becomes more important. This article presents the results of the CAMO project, discussing how the proposed methodology could be extended for non-military use as well, and outlining the challenges and directions for future work.

Keywords: cultural awareness; military training; game-based simulations

1 Introduction

In this paper, we present the results of the CAMO project (Cultural Awareness in Military Operations). The goal of the project has been to create an inexpensive and flexible game-based simulation for training cultural awareness among military personnel preparing for international operations (Afghanistan), which has the potential to be reused for civilians working in the area.

Overcoming cultural distances requires externalizations [1,2] in the form of boundary objects [3] that have meaning across the boundaries of the individual knowledge systems [4]. In this way, boundary objects allow different knowledge systems and communities to interact by providing a shared reference that is meaningful within both parts. Another way to overcome cultural distances is by 'perspective taking' which means to see a point of view from another person's position and then to act as though one were that person. Social scientists have studied how people take on the perspective of the other when they act on shared objects e.g., boundary objects. For example, during economic exchange, both buyer and seller must take each other's perspectives towards the shared object of exchange for proper understanding. Role-playing is a technique for learning perspective taking [5].

3D cyberworlds provide interesting possibilities for creating boundary objects. Game-based simulations and role playing in 3D cyberworlds have also been used for military training and as general learning and teaching methods for a long time [6,7]. They provide engaging learning experience and are used for demonstrating complex concepts in an intuitive way. Game-based simulations and educational role playing may have both positive and negative impacts (as discussed e.g., in [8]) that we considered in our design. We are also aware of the fact that the technology we apply may impose a number of limitations in terms of generalization, transfer, and application in real life settings [9].

An example of a complex concept that can be demonstrated and learnt in a 3D cyberworld is operational culture. Understanding culture is a basic component of operational planning, training, and execution. There are a number of commercially available game-based simulations and cyberworlds for training operational culture including systems such as Tactical Iraqi and First Person Cultural Trainer [10-12]. Such systems are typically very expensive to develop and primarily single-player, providing no or very limited support for collaborative learning and team training. In addition, there are no or very few possibilities for the user to generate own scenarios and modify existing ones, something that might be of high importance when the political situation in the region of interest suddenly changes. At the same time, there is a lack of research-based methods for using game-based simulations in military training [13], especially in the area of cultural awareness/operational culture. The use of such systems requires aids for scenario development, training practices, and performance measurement tools that currently do not exist [13].

The CAMO project seeks to address these challenges. The project is a joint effort between the Norwegian Defense University College, the Norwegian University of Science and Technology, the University of Oslo, and the Bjørknes College. The ADL (Advanced Distributed Learning) section at the Norwegian Defense University College has been coordinating the project. Other participants include Norwegian Military Academy, Norwegian Defense Language and Intelligence School, Telemark Battalion, and Norwegian Defense Media Center. Apart from developing the simulation, the project aims at creating research-based methodology, guidelines, and tools for developing 3D educational simulations for future use in the Norwegian Armed Forces [14].

As a starting point for developing such a methodology, we studied publicly available literature and guidelines for operational culture training, such as "Operational Culture for the Warfighter: Principles and Applications" [15] and recommendations

for developing cross-cultural competencies at the US Department of Defense [16]. We have also studied scenario methodologies developed at the UK Human Factors Integration Defence Technology Centre [17] and the Royal Netherlands Army/TNO Defense, Security & Safety/Delft University of Technology [18], which are well developed and rather systematized, but are primarily focused on tactical/operational tasks and not on operational culture. Therefore, these methodologies have been developed further during the project to be adjusted to the goals of the CAMO project [14]. Since the existing literature on Afghani operational culture is rather fragmented and/or classified, it was decided to use subject matter experts within the Norwegian Armed Forces and Norwegian academia as the major source of information for the scenarios.

In the following, we present the results of the project, including a detailed description of the scenario examples. We shortly outline the implementation of the virtual environment, and present the evaluation results with four data excerpts. We also discuss how the resulting methodology and design principles could be further developed and extended for civilian use in Afghanistan and other developing countries.

2 Background

A Norwegian military force operating in foreign countries would, regardless of the composition and organizational affiliation, have a need for culture-related knowledge – in order to carry out their missions in a best possible way (either missions taking place in Afghanistan, Sudan, Syria, the Balkans or other areas of operation). In brief, there are major cultural differences between what a Norwegian soldier is used to from Norway, and even other international operations, and what one is met with on the ground in Afghanistan – whether it is in Kabul or in a district such as Maymanah, Northern Afghanistan.

In this paper, the concept of culture is specified to encompass cross-cultural issues covering general operational culture, including aspects related to gender, language, and cultural artifacts, limited to tactical scenarios in Afghanistan. This is considered to be of primary relevance for the forces of Provincial Reconstruction Teams (PRT), Military Observation Teams (MOT), tactical mentors that operate in cooperation with local Afghan forces (Afghan National Army-ANA and Afghan National Police ANP), and Special Operations Forces (SOF). It would also be relevant to the staff officers serving in the International Security and Assistance Force (ISAF) headquarters, as well as other contributions, such as field hospital personnel, mine-clearing personnel, Norwegian police elements in Afghanistan, and other smaller units and individual officers serving in other NATO / UN positions in Afghanistan. In a wider context, some other actors, such as embassy personnel, non-governmental organizations and media personnel, could also benefit from the learning insights and knowledge derived from the project presented in this paper.

Since Afghanistan is very complex and ethnically diverse, it was necessary to prioritize, focusing in particular on the cultural aspects typical of the Pashtun ethnic group. However, the learning goals of this project caught up the cultural aspects of a more general character – with validity beyond Pashtuns – to the extent that was ap-

propriate and necessary to describe the cultural aspects. Furthermore, the project also focuses on the generic aspects of culture, such as religion, social norms, and gender aspects.

Operational culture in this context means practical, specific, and applicable knowledge about cultural issues related to, among other things, cultural artifacts: distinguishing a mosque from other buildings, rhetorical and linguistic factors: religion (Islam), myths, folklore and superstition, crime and local conflicts, interpersonal relationships and psyche, power, position, and social conditions.

Practically applicable knowledge means knowledge that a single soldier, a patrol, a team, or others should be able to use in their everyday work in interaction with and in the analysis of friendly as well as hostile local citizens and social structures in general – with the intent to implement their operations in the best possible way. Another perspective on cultural awareness/operational culture can be found in [19], which states that cultural awareness (in general) is about "Norwegian forces' understanding of the local [cultural] context in the operational area and their approach to local moral, ethical, cultural and legal borders, in cooperation with both the civilian population, allied military and the enemy."

Both definitions emphasize the importance of identifying the relevant aspects of culture that affect military operations and that helps us to understand the effects of our actions in the light of the socio-cultural composition of the operational environment. Focus on culture allows (theoretically) military units and partners to use knowledge of foreign culture for the following purposes:

- Understanding the specific socio-cultural motives for action (or non-action)
- Understanding enemy mindset
- Exerting influence on the population
- Improving interaction with other actors in the area of operation
- Justifying own actions

The above points also constitute the overall learning goals for this project. The practically applicable knowledge was conveyed through practical learning objectives that had been embedded into the simulated training including a virtual Afghan village and local 'Afghans' in a cyberworld based on Second Life (SL) platform.

3 Cultural Challenges and Scenario Development

The methodology for scenario development used for the CAMO project is based on a systematized set of learning goals and associated 'mini-scenarios', to obtain the maximum reusability of the content. Each 'mini-scenario' comes with a set of 'cues' [18], associated reactions from the gaming environment or feedbacks from the 'game master'. Cues can be defined as "the perceptual elements of the environment that influence the challenging decisions" [20,18].

These 'mini-scenarios' provide a basis for requirements for the virtual environment for every 'scene'/gaming sequence and the associated 'scripts' for the role players, especially the 'Afghans'. The scripts were not hardcoded, and the role-players were

free to interpret them in personally meaningful ways. Based on the consultations with the subject experts, the following major categories of learning goals were identified:

- T. Tactics: general tactics (in a concrete cultural context) e.g., identifying threats based on the relevant cues from the environment
- G. Gender: interacting with women in tribal/clan communities e.g., how to act towards Afghan women
- R. Religion: dealing with religious customs, practice, and symbols, such as recognizing a village mosque
- S. Socializing: observing local customs, e.g. dealing with children, visiting a house
- L. Language: basic language skills for simple tasks like polite greeting, asking for directions, identifying security threats; interactions between the interpreter, the locals, and the squad.

Though being initially identified for the project setting (focusing on international operations in Afghanistan), these categories are generally applicable for operational culture training and, as discussed later, for cultural awareness training of civilian personnel. Each of the learning goals categories are split into sub-categories, providing a basis for the corresponding 'mini-scenarios', for example:

- Tactics sub-goal T1. Identifying possible threats
- Religion sub-goal R1. Correct behavior during a prayer
- Religion sub-goal R2. Food during Ramadan
- Gender sub-goal G1. Close contact with local women
- Social interaction sub-goal S3. Dealing with children
- Language sub-goal L1. Basic polite phrases in local language.

Each of the learning sub-goals is further detailed with corresponding cues, appropriate reactions, typical mistakes, and typical responses in case of mistake. Below is an example of such a detailing for a gender-related learning sub-goal:

Learning sub-goal G1: Close contact with local women

- Cues: a local woman asks for/needs (medical) assistance
- Appropriate reaction: a female soldier approaches the woman, talks to her and provides necessary assistance
- Typical/possible mistake: a male soldier approaches the woman, talks to her and in the worst case touches her while attempting to provide assistance
- Typical response in case of mistake: the woman (other locals) gets upset/hostile, further efforts are needed to resolve the situation.

The scenario consists of eight 'scenes' with associated places in the virtual environment called 'zones' (Fig. 1). Before the start of the role-play, a 'mission order' was provided in the form of a short video. It contained the following information: threat level is medium, it is Ramadan, it is Friday, it is about 12.45 pm when the squad enters the village, and the squad does not know where the village chieftain and his house is, but they have an appointment to meet him in the village. The purpose of the meeting is to obtain information about possible Taliban activities in the area.

Fig. 1. Looking for the mosque in the virtual Afghan village

When the squad enters the village, they see three children playing along the road. While the squad passes by/possibly greets the children, the children come closer, attempt to touch the weapons, and beg for chewing gum and candy. A local woman appears from a house on the other side, shouts angrily at the children, and waves them away. The squad approaches the local woman to inquire about the whereabouts of the village chieftain (Fig. 2). After talking to her, the soldiers continue on the road, looking for the village mosque. Few characteristic features distinguish the mosque from ordinary houses (Fig. 1). The squad needs to wait outside and greet the chieftain and his two men appearing from the mosque. If the squad greets the chieftain properly, he might invite them to his house. While passing by a house, the squad observes a crying woman, visibly injured. After helping the woman, the squad arrives at the chieftain's compound. They enter his reception room where the squad and the chieftain are to discuss the security situation in the area.

Fig. 2. A male and a female soldier talking to a local woman (Example 1)

There are several possible paths to the village chieftain, depending on the players' preferences but also on their abilities to choose an optimal course of action for each situation. For example, if the soldiers give chewing gum to the children in the beginning of the role-play (Example 1), it might upset the local woman. Furthermore, if they talk to the local woman in the next scene (Example 2) in a way she perceives as disrespectful, she would be less inclined to share information about the whereabouts of the village chieftain and the position of the mosque where he is most likely to be since it is Friday prayer time (Examples 3 and 4). Consequently, the squad must spend more time locating the mosque, probably contacting the home base/ 'game master' for the assistance. If the soldiers fail to observe the cultural codes treating the locals in an impolite and inappropriate manner, the chieftain might get upset and unwilling to provide information about Taliban activities (Example 5).

3.1 Example 1: Dealing with Children

Three children play along the road. While the squad passes by, the children come closer, attempt to touch the weapons, beg for chewing gum and candy. A woman appears from a house on the other side, shouts angrily at the children and waves them away. The learning sub-goals are T1: Identifying possible threats + T3: Securing an area + T4: Keeping the civilians outside danger + S3: Dealing with children + L1: Basic polite phrases in local language. In this scene, the soldiers need to react to and reflect on the following cues:

1. Children touching weapons are in the way => potentially dangerous situation for the civilians?
2. Woman shouts angrily => locals dislike the contact between the soldiers and the children
3. Children play freely => says something about the security situation?

Based on the cues, there are different possible responses the soldiers could choose, with corresponding outcomes, from 'optimal' course of action to typical mistakes, as summarized below:

1. The soldiers give candy and chewing gum to the children (dropping a 'candy' object from SL inventory) => the children keep nagging, the woman might get more angry (shouting more, gesticulating) => another round attempting to resolve the situation ('worst case')
2. The soldiers give nothing to the children, yell at them => the children get disappointed, are no longer in the way, but the woman might get offended, the relations to the locals might worsen => to the next zone, where the woman will be less inclined to answer any questions
3. The soldiers give nothing to the children, try to avoid direct contact, waving friendly to them, stay calm, say some general phrases/ask them to step aside => the children stop nagging, nobody gets offended => to the next zone (Zone 2) ('best case')

3.2 Example 2: Conversation with a Local Woman

In this example, the squad approaches a local woman (who appears from her house to wave away the children) to inquire about the whereabouts of the village chieftain. The learning goals for this scene are composed of the following sub-goals: G3: Verbal contact with local women + S1: Polite greeting + L1: Basic polite phrases in local language + L2: Interaction between the interpreter, the locals, and the squad. In this scene, the soldiers need to react to and reflect on the following cues:

1. A local woman who has potentially useful information, her age and social status
2. Whether the woman is alone in the house
3. Whether the woman is neutral or unfriendly minded towards the Norwegians (after their interactions with local children)

Possible responses the soldiers could choose are summarized below:

1. One of the male soldiers approaches the woman (in the worst case, with a direct contact between the avatars) and greets her => the woman, especially if she is young, hides in the house, expresses fear, provides no information => another round with a female soldier attempting to resolve the situation/contacting the game master/'home base' for help ('worst case')
2. Male soldiers follow the woman into the house to talk with her without any of her family present => the woman might feel dishonored or protests => another round with a female soldier attempting to resolve the situation/contacting the game master/'home base' for help ('worst case')
3. One of the male soldiers greets the woman without approaching => the woman (especially if she is older) answers that the village chieftain is in the mosque but does not show where the mosque is, goes back to the house => proceed to the next scene
4. A female soldier/interpreter approaches the woman, possibly enters the house, starts asking questions => the woman perceives the greeting as not polite enough/is angry after what happened in the previous scene/misunderstands what is said by the interpreter, answers that the village chieftain is in the mosque but does not show where the mosque is, goes back to the house => proceed to the next scene
5. A female soldier/interpreter approaches the woman, possibly enters the house, greets her politely, starts asking questions => the woman answers that the village chieftain is in the mosque and shows the way there => proceed to the next scenes ('best case').

Table 1. Gender-related learning goals with associated cues, appropriate reactions, typical/possible mistakes and typical responses in case of mistake

Learning goals	Cues from the environment	Appropriate reactions	Typical/possible mistakes	Typical responses in case of mistake
G1. Close contact with local women	• A local woman asks for/needs (medical) assis-	• Female soldier approaches the woman, talks to	• Male soldier approaches the woman, talks to her and in the	• The woman gets upset/hostile • Negative reactions

	tance (e.g. her clothes are bloody) • Presence / absence of other family members	her and provides necessary assistance	worst case touches her while attempting to provide assistance • Male soldier enters the woman's house while no other family members are present	from the locals
G2. Female soldiers on a house visit	• Female soldier enters a house with several local men present	• Seating herself in the back, with her legs together	• Taking a seat too close to the men • Sitting in a 'tailor' position	• Negative reactions from the hosts
G3. Verbal contact with local women	• Meeting a local woman during patrolling	• Female soldier greets the woman	• Male soldier greets the woman • Male soldier enters the woman's house while no other family members are present	• The woman gets upset, does not answer, turns away • Negative reactions from the locals

Table 2. Religion-related learning goals with associated cues, appropriate reactions, typical/possible mistakes and typical responses in case of mistake

Learning goals	Cues from the environment	Appropriate reaction	Typical/possible mistake	Typical response in case of mistake
R1. Correct behavior during a prayer	• A man (men) praying	• Showing respect, not disturbing, waiting until the prayer is over	• Disturbing a praying man with questions	• The praying man/men might get upset
R2. Food during Ramadan	• Being offered refreshments during Ramadan	• Declining politely, finally accepting some tea/water if the host repeatedly insists	• Accepting food right away	• Upset locals, but probably no visible response
R3. Recognizing a mosque, correct behavior in/outside the mosque	• Building with Minbar, dome, minarets, possibly audible prayer calls	• No going inside and disrupting the prayer unless emergency • Respectful behavior (taking off shoes, silence)	• Failing to recognize the mosque, behaving without due respect • Entering / disturbing during prayer time • Entering without taking off shoes	• Offended worshippers, mullahs, locals in general

3.3 Example 3: Looking for the Mosque

The soldiers follow the way, looking for the village mosque. There are some characteristic features that distinguish the mosque from ordinary houses. The learning subgoals in this example are: T1: Identifying possible threats + T2: Interaction within the squad/home base + R3: Recognizing a mosque, correct behavior in/outside the mosque (see Table 2). The cues to react to and reflect on are given below:

1. A prominent building with a minbar, dome and possibly minarets => a mosque
2. Hearing a prayer call from a building => most probably a mosque
3. Cues/'intel' from the 'home base' about the location of the mosque => combining with the external characteristics/cues from the environment => identifying the mosque
4. Cues for continuous evaluation of possible security threats (e.g. presence of women and children in the village, their behavior) = > renewed evaluation

Possible responses the soldiers could choose are summarized below:

1. The soldiers do not manage to find the mosque based on the external characteristics (and possibly because of the missing info from the woman in Zone 2) => ask the game master/'home base' for assistance and get either concrete directions based on 'intel'/previous reconnoitering of the village or hints about typical characteristics of the mosque => find the mosque from the combination of cues and proceed to Zone 4/debrief 1 ('worst case')
2. The soldiers do not manage to find the mosque based on the external characteristics (and possibly because of the missing info from the woman in Zone 2) => back to Zone 2 for further questioning of the woman
3. The soldiers identify the mosque correctly from the external characteristics and/or information from the woman in Zone 2 => to Zone 4/debrief 1 ('best case')

3.4 Example 4: Outside the Mosque

The squad is to wait outside the mosque and greet the village chief/Malik and his two men appearing from the mosque. The learning sub-goals are: S1: Polite greeting + T2: Interaction within the squad/home base + R1: Correct behavior during a prayer + R3: Recognizing a mosque, correct behavior in/outside the mosque + L1: Basic polite phrases in local language + L2: Interaction between the interpreter, the locals and the squad (see Table 2). The cues to react to and reflect on are presented below:

1. Outside the mosque + it is Friday, Ramadan and prayer time (cues from the mission order) => is basically a normal situation, respectful behavior is required
2. Identifying the status (and age) of those exiting the mosque based on external characteristics (a large turban worn by the village chief) and mutual avatar position => distinguishing between the village chief and his entourage.

Responses and possible outcomes the soldiers could choose are summarized below:

1. The soldiers enter the mosque during the prayer looking for the village chief, interrupt the prayer, do not take off their shoes => the village chief and other villagers get offended/irritated => another round, the game master will possibly need to interfere with hints and help ('worst case')
2. The soldiers recognize the status of the chief incorrectly and make some serious mistakes in the beginning => e.g. greeting the chief's men first and him afterwards, the chief is greeted by a female soldier => the chief is less accommodating => another round, the game master will possibly need to intervene with hints and help

3. The soldiers are waiting outside the mosque until the prayer is finished, recognize the status of the chief and his companions correctly when they come out and make the appropriate greetings in the correct order => the village chief is pleased and attentive, and invites them quickly to his compound => to Zone 5 (possibly Zone 6 if the game master decides to skip a zone), possibly following the village chief directly ('best case')

3.5 Example 5: In the Village Chieftain's Reception Room

In this example, the squad/squad leader and the village chieftain are having a conversation about the security situation in the village in the chieftain's reception room. During the conversation, the soldiers are offered food and water, and they need to decide whether to accept it or not, considering that it is Ramadan (Fig. 3).

Fig. 3. Conversation with the village chieftain

The learning goals in this scene can be summarized as follows: S1: Polite greeting + S4: House visit + T2: Interaction within the squad/home base + T3: Securing an area + G2: Female soldiers on a house visit + R2: Food during Ramadan + L1: Basic polite phrases in local language + L2: Interaction between the interpreter, the locals, and the squad. Correspondingly, the soldiers need to react to and reflect on the following cues:

1. Being served tea and cookies during Ramadan and in the middle of the day (mission order) => the locals do not eat or drink, eating is rude unless the host repeatedly insists
2. 'Hierarchy' of both the Afghans and Norwegians present, in terms of external features (large turban worn by the village chief), the Norwegian soldiers' uniform, gender and mutual position of avatars => determining who sits where in the room
3. Shoes, helmet, and sunglasses are not suitable inside the house => should be removed when entering.

Based on the cues, the responses and possible outcomes can be summarized as follows:

1. The soldiers do not take off shoes / helmet / weapons => perceived as rude by the Afghans, the conversation is slow, the squad does not get the necessary information => another round trying to improve the situation ('worst case'/mistake)
2. The female soldier / interpreter sits too close to the village chieftain's place, or the Norwegian squad leader occupies the chieftain's place in the room => perceived as rude by the Afghans, the conversation is slow, the squad does not get the necessary information => another round trying to improve the situation ('worst case'/mistake)
3. The soldiers accept the refreshments they are offered right away even though it's Ramadan => perceived as rude by the Afghans, the conversation is slow, the squad does not get the necessary information => another round trying to improve the situation ('worst case'/mistake)
4. The interpreter fails to make the soldiers aware of their mistakes, and does nothing actively to rectify the situation => there are misunderstandings and confusion, the conversation is slow, the squad does not get the necessary information => another round trying to improve the situation
5. The squad leader goes straight to the point and starts asking questions about security situation in the village => the atmosphere might get tense, the conversation is slow, there is a need for more specific clarifying questions => another round to get necessary information
6. The interpreter speaks too little/unbalanced with one of the groups, or does not convey nuances correctly => there are misunderstandings and confusion between the two sides, in the worst case somebody gets insulted, and the conversation is slow, there is a need for additional clarifying questions => another round to get the necessary information
7. The squad/squad leader makes no serious mistakes, beginning with some polite 'small talk' and moving on to specific questions about the security situation, when offered refreshments first politely declines but finally takes some tea after the host repeatedly insists => the conversation goes as expected, the squad gets important information => the game master ends the game => to Debrief ('best case').

4 Implementation

The scenarios exemplified above provided requirements for the design and implementation of the virtual environment. As with the former, the focus during implementation was on low cost, short development time, and reusability.

The project scenario describes the main location for the educational simulation – the virtual environment of an Afghan village. At the same time, each mini-scenario required some additional specific content. The design and development of the environment went through several stages of implementation, following the description of the scenarios. The idea was to split the design of the environment into parts, which can be combined and reused. The environment consists of general content for creating the generally required context and atmosphere (such as landscape elements, animals, vehicles, parts of buildings, furniture, proper clothing for avatars, and relevant tex-

tures) and content designed for specific mini-scenarios (such as a mosque, a school building, a ball, a medical kit, a photo camera, a specific gun, and tableware).

First, the required objects had to be created or collected. Practically, some of the objects and avatar clothing have been acquired from the SL marketplace (a portal for trading virtual content) as well as searching free objects everywhere in SL. Many other VW platforms allow importing 3D models, which can be found in free online libraries. However, most of the specific artifacts required in the mini-scenarios were designed from scratch. They also usually need to be highly authentic.

Second, when the basic objects (or elements) were collected and platform is set up, building and co-locating the typical elements could be started. The basic elements could usually be reused in multiple places of the environment or joined in different combinations. These elements were later copied (sometimes slightly modified) and used in multiple places in the environment. After receiving feedback from the subject experts, some of them were modified or replaced.

5 Evaluation: Understanding Culture through Role-play and Perspective Taking

The study was organized as a one-day experiment conducted at the Norwegian Military Academy on November 25, 2011. It was preceded by a 'rehearsal' session the week before. In addition, the participants received two-hour training in SL (moving avatar, communication, teleporting, and choosing objects from inventory).

Totally 14 cadets from the Norwegian Military Academy participated in the experiment, playing roles of the Norwegian soldiers in the simulation (Fig. 4). In addition, six students and two teachers from the Norwegian Defense Language and Intelligence School participated in the experiment. The former played the roles of the Afghan civilians or interpreters for the Norwegian squad, while the latter played the role of the Afghan civilians and provided input to the scenario development.

Fig. 4. Cadets at the Norwegian Military Academy exploring the virtual Afghan village

The role-play was organized in two rounds. In each of them, a group of the cadets / squad executed the mission, proceeding through the different scenes of the scenario (see section 3). In the first round, the squad leader had a previous field experience from Afghanistan. Totally three debrief sessions conducted by an expert in Afghan culture were integrated in the role-plays, following the milestones in the mission plus one between the two role-play rounds.

The data have been collected through observation of the role-play and screen-capture recording, pre- and post-questionnaires (with 14 respondents), and three in-depth interviews of selected participants following the completion of the role-play. We used commercial screen capture software (BSR screen recording) to record the two role-playing rounds. This program recorded everything taking place during the simulation in SL (relative to the position of the observer's camera), including sound and image. Parts of this recording provided the data on interaction between the soldiers and the 'Afghans'.

The data that are presented here are a limited set of the collected data (for space reasons), but selected on basis of being representative for all the data: We provide a summary of the quantitative data and four snapshots of the qualitative data. The former provides an overview, whereas the latter goes into depth on some critical issues, namely how the Norwegian soldiers acquire better understanding of Afghan culture by perspective taking through role-play. Each type complements the other and contributes to the empirical evidence for our claims.

The complete overview of the evaluation results is outside the scope of this paper. The evaluation results have been also presented in [14].

5.1 Summary of Quantitative Data

The questionnaire results indicate that the soldiers were generally positive to the use of a virtual world as a learning environment for training cultural awareness. It turned out some of the soldiers were not active in the simulation, which was reflected in their responses some of the questions (they did not take part in the action because they were securing the area which prevented them from overhearing the communication taking place in the village). There was a variation in the answers on what categories provide most impact. For example, when it comes to cross-cultural communication, the majority agreed that the knowledge of the local customs and proper treatment of women is important. The responses concerning tactics were spread across different categories, with a majority of answers being "neutral" and "agree". To some of the questions there were no significance changes from before to after test, which implies there were other sources for learning about it, ranging from previous theory studies, the fact if having previously been to Afghanistan, and most significantly the debriefing sessions after the first round of role-play.

5.2 Qualitative Data Analysis

Proper perspective taking of key stakeholders is a prerequisite for the team to achieve its goals. It happens in stages, and more or less consciously. We show examples of

this below, organized into four data analyses sections: 1) Non-active participation, 2) communication with Afghan woman, 3) gender perspective, and 4) perspective taking as a dual process.

Data Excerpt 1: Non-active participation. The first data excerpt (Table 3) is a comment by one of the soldiers during a debriefing; the soldier describes the experience of those who were securing the area for the other soldiers. She said she "will not get anything out of the conversation," and that she will "not learning anything." In order to be able to hear what others are saying in SL, they need to be near in proximity, i.e. where the action is. In real military operations, this is compensated by radio communication. As this was not supported here, the gaming and learning experiences diminished for these participants. It points out that learning experience in SL requires active participation, which is a characteristic of sociocultural and constructivist learning environments.

Table 3. Debriefing session: Non-active participation

Solder:	The first thing I think of in terms of pure gaming purposes. It is fair enough that you need to secure the area, but I will not get anything out of the conversation so that I will not learn anything. And then it is just sitting and looking at the screen well okay what happens now? Unless I zoom in and seek information, but then I stop doing what I am supposed to do.
Project leader:	Yes, quite right. Good point, good point. And that is something we found out really fast huh. This does not function as the radio communication in the field. This is a function you lose. You have to be near people to hear and communicate, so it is quite right

Data Excerpt 2: Communication with Afghan Woman. The squad leaders mostly determined how communication with the Afghans developed, but the interpreters were in a unique position of being able to communicate with the Afghans directly. In Table 4, a squad leader asked the interpreter about the impression interpreter got from a woman they just talked to and how to act towards people who pray in the mosque.

Table 4. Discussion within the Squad after Talking to the Afghan Woman

Squad leader:	Interpreter, I need to talk with you.
Interpreter	Yes
Squad leader:	What impression did you have of the lady? […] Would she talk? Is this a Pashtun city?
Interpreter	She seems to be like that... She spoke Dari. She was shy and when we came in she asked the children to pull away and that this was dangerous. So I think it is useful to talk a little bit longer with those we meet […] To show that we are not a threat
Squad leader:	Yes, but it sounds fine. What do you recommend about the mosque now? I suggest that we stand here and wait until they come out.
Interpreter	Agree
Squad leader:	Now we just wait here until they come out

This excerpt shows that soldiers had to take into account the cultural and religious point of view of the Afghans. They also needed to use the knowledge they already

had of this area of deployment to solve various situations they encountered. Communication was essential to both the Afghans and the Norwegian soldiers in order to understand each other's perspectives.

An important point illustrated by this excerpt is the Gender Perspective (see also Excerpt 3). Gender perspective is a special form of perspective taking. In the scenario, the soldiers were confronted with gender-related challenges in several situations: in communication with men, women, and children. The Afghan woman in the scenario reacts differently depending on whether a woman or a man tries to talk to her.

By gaining an insight into how the villagers perceive the soldiers, it would be easier for the squad leader to understand the Afghan perspective and adapt communication in accordance with their reactions. In the situation depicted here, the squad leader gets the information that it is useful to spend more time talking with the local people they meet, so that people in the village feel safe around the soldiers and understand that they are there to help and not a threat.

Data Excerpt 3: Gender Perspective. The following excerpt illustrates how the soldiers can learn more about the people they meet in Afghanistan by considering the gender perspective during communication. The soldiers in the squad talk to an injured Afghan woman. She damaged her head when she fell from the roof of her house and needs medical assistance. The female soldier in the squad talks to the woman, using a female interpreter (Table 5).

Table 5. Gender Perspective

Female soldier:	Do you want us to bandage your wound? We can do that for you.
Interpreter (Afghan woman):	Thanks a lot, but it must be a woman who bandages me
Female soldier:	It is OK. I will help her with your head.
Female soldier:	Squad leader, I am going to use my medical kit to bandage her head. She wants a woman to help her.
Squad leader:	Received. When you are finished, tell her there is nothing more we can do, we don't have a doctor with us. Thank her politely and withdraw from the building, so that we can proceed to our primary meeting, over.

Data Excerpt 4: Perspective Taking as Dual Process. This excerpt from the reflection round after the debrief shows how the soldiers based on the knowledge they already have on cross-cultural communication reflect on how to deal with the Afghans in the village. The soldiers emphasize the importance of a dual process, i.e. as they show understanding and respect for Afghan culture, they expect the same in return form the Afghans (Table 6).

Table 6. After debrief Session: Perspective Taking as a Dual Process

Solder 1:	So we talk a lot about us respecting the Afghans, respecting the culture and being humble. But one must not forget that we represent a culture, too […] And the Afghans are also aware of that. If you are humbled by the people you talk to, it can give them a bad opinion of you. It is important that you dare to stand

	up for what you represent as well […] it is about pushing the Afghans a little bit and because […] they have a slightly different agenda than we have. We do not have the time they have […] so you have to push a bit […].
Solder 2:	It's a very big difference between being humble and being weak

During the reflection rounds after the role-play, the soldiers reflected on the perspective taking process and the importance of a dual process when bridging Norwegian and Afghan cultures.

Perspective taking is central ability of communication. It happens in stages, and more or less consciously. First, one must find the means of communicating, next be aware if its usefulness, then how it is exercised in practice, and eventually find a balance that serves both parties, as they have different goals. Proper perspective taking of key stakeholders in complex situation (e.g., international diplomacy, war time negotiation) is a prerequisite for all parties to reach their goals. These excerpts show stages of perspective taking as part of an online learning environment by users who are cadets and interpreters of the Norwegian Armed Forces.

5.3 Summary of Results

The interview data (not shown) provided further indications that the soldier' understanding of cross-cultural issues improved over the course of the experiment. One of the female participants noted: *"I got very much out of it during a very short time", "plenty of aha-experiences"*. She also reported a high level of immersion in her role. Another, male participant believed that: *"This (system) can provide several possibilities in a deployment environment to increase understanding among troops preparing for international operations"*.

The questionnaire data give tentative evidence of an increased understanding of the cultural and religious aspects. At the same time, some of the soldiers disagreed that the experience in SL was suitable for correct evaluation of the threat situation due to the lack of 'crowd feeling,' which could possibly indicate an ambush, and some did not feel part of the experiment as they were outside the range of communication. The cadets have been generally positive to the use of 3D cyberworlds for training cultural awareness. Overall, they reported that the simulation in SL has been a user-friendly, motivating, and fun experience. At the same time, the participants identified a number of limitations, especially, a limited selection of avatar gestures and body language that complicated expression and perception of certain cultural and social aspects.

6 Discussion

We believe that in this project we have demonstrated the potentials of 3D cyberworlds for teaching cultural awareness and inter-cultural combination by role-play, providing recommendations for creating flexible low-cost simulations, both in the military and civilian context, with a focus on resource reuse.

Our experience shows that this approach has several advantages:

- Virtual simulation provides a safe environment for exploration and experimentation, where the participants playing the roles of e.g., 'Norwegians' and 'Afghans' could improve their understanding of each other's cultural representations before critical encounters in real life, something that is especially important in a military context and generally in conflict areas all over the world.
- Virtual simulations provide possibilities for creating representations of cultural artifacts that may serve as boundary objects through virtual settings, objects, avatars, and scenario modules. These boundary objects created opportunities for perspective taking as the 'Norwegians' learned some aspects of 'Afghan' culture through the role play, such as learning how to commutate with woman without offending, proper procedure for initiating dialogue with village inhabitants of unequal stature, identifying a mosque and procedures for waiting.

However, the majority of currently available 3D cyberworlds have a number of limitations for supporting virtual simulation, something that was also identified during the evaluation of the CAMO project:

- The limited graphical possibilities of SL, especially in terms of body language, might lead to misinterpretations and oversimplified models of real cultural interactions.
- 3D cyberworlds such as SL require high bandwidth, making it complicated to use in developing countries. However, if used as a part of training program of a well-equipped educational facility prior to deployment, this problem is less critical.
- We identified two limitations of role-plays. First, by abstracting away significant features of the real situation, learning opportunities will be missed (threat authenticity, contextual information, etc.). Second, for optimal application of perspective taking, both parties should learn the other's position. Our scenarios focused more on Norwegians learning from Afghans (Afghan culture) than on Afghans learning Norwegian culture.

At the same time, we believe that the methodology could be easily extended and adjusted for non-military use in conflict areas as also mentioned in Introduction, for example, for embassy workers, non-governmental organizations workers (e.g., Red Cross), medical workers and journalists. Extending and adjusting from military to civilian use might have the following implications for scenario methodology:

- Exchanging existing tactical learning goals with safety learning goals, with similar triggers and responses. For example, in the learning goal "Identifying possible threats", encountering an empty village would indicate a possible ambush to civilians as well (such as Red Cross employees), the difference would be in a more passive appropriate response (e.g., hiding, not entering the village) as opposed to reconnoitering by the military.
- Gender, socializing, religion, and language learning goals could be used without any (or major) alterations.
- The mini-scenarios can be re-arranged and used as building blocks for different types of general scenarios, more relevant for civilians, for example Red Cross working in a refugee camp or journalists working in conflict areas.

- While a number of elements could be reused across areas and situations (such as learning goals related to Islam), for better credibility and realism it is important to take local nuances into account, such as Shia/Sunni Islam and different local customs (e.g., Dari vs. Pashtun village), with corresponding variations in learning goals. In order to systematize these differences, it is necessary to create a repository with appropriate metadata and annotations possibilities.

In addition, we identified the following implications for technology design and reusable design elements:

- Most of the 3D environment elements are reusable. For example, the same village can be used for simulating both military and purely civilian situations that can happen there.
- Most of the elements used for military simulations, such as the ones found in the village (houses, avatars, furniture, etc.) could be recombined to simulate other situations such as a refugee camp. At the same time, the library of objects should be further extended to encompass a greater variety of possible civilian situations, such as Red Cross or other humanitarian organizations in disaster and war-town areas.
- Similarly as for scenarios, a library of objects should be structured and systemized, including both generic and area-specific objects. These should be linked with the corresponding mini-scenarios and instantiated when the mini-scenario is used.

For flexible and effective development and extension of scenario and design elements base, a wiki-based approach could be most suitable. This will require establishing an open community for exchanging resources, something that was not quite feasible in a purely military context, but there are plenty of open communities for exchanging virtual resources in other domains with e.g., Second Life Community Resources portal.

7 Conclusions and future work

In this paper, we have reported the results of the CAMO project using 3D simulations for cultural awareness training in a military context, focusing specifically on scenario and design methodology for producing low-cost easy-to-use and reusable solutions. We reported the results of an evaluation of a one-day trial of the methodology. We consider the study presented in this paper a pilot one that will be followed up with a full-scale study to verify our tentative assumptions.

The methodology is an important outcome of the project and could be used further in connection with similar projects at the Norwegian Armed Forces. The authors are aware that the scripts developed using this methodology might provide an oversimplified representation of the reality. However, in accordance with the Naturalistic Decision Making approach [18,21], these scripts provide 'patterns' necessary for making decisions under critical conditions and a basis/skeleton for improvisation. This methodology could be developed further and reused for deployment in other countries than Afghanistan, but experiencing conflicts where peacekeeping troops are involved. Due to its modular structure, the methodology can be extended, reused, and adjusted in a

flexible manner at the mini-scenario level to be applicable for civilian use as well, especially in neighboring countries with a complex security situation. This will constitute an important direction for the future work.

In addition, in order to address the identified limitations, the Afghan village is currently being enhanced with NPCs (Non-Playing Characters), representing Afghan villagers. The goal of this development is to provide a more realistic simulation of village life as well as a more nuanced representation of various threat situations. The NPCs exhibit different appearances (women in burka, men in traditional clothing) and behaviors (walking, sitting, talking), with planned interactive features, such as simple conversations and certain reactions to e.g., soldiers approaching. Apart from increased realism, the presence of NPCs will contribute to activating and engaging the players.

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