

# A Simple Multi-player Video Game Framework for Experimenting and Teaching Cultural Understanding

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## ABSTRACT

We have created a game called Culture Code that allows researchers and teachers to host online games where teams have asynchronous abilities. Inspired by the game Barnga [11], which is designed to “explore factors related to communication problems in intercultural situations”, our game, Culture Code, takes Barnga’s basic mechanics and extends them. In Barnga, some players enter a game where they do not know the game rules resulting in a disadvantage compared to others who already know the rules. This mechanic is meant to simulate the disadvantages of someone entering a culture where the rules aren’t explained. We extend this idea into our framework in which players are divided into teams, and each team’s capabilities can be uniquely defined. This framework can be used to create a wide variety of scenarios to facilitate experiments and teaching points related to cultural advantages and disadvantages.

## CCS Concepts

K.8.0 Games

## Keywords

Game; framework; culture; education

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## 1. INTRODUCTION

In this work, we will describe our video game framework, Culture Code, that allows teachers and researchers to create multi-player online games where some players have unique advantages over others. The reason for such a framework is to allow these environments to be created for large groups of players (mainly college classes) to help teach the challenges experienced by people entering new cultures who do not understand the implicit rules defined by the members of the culture they are entering.

Barnga is a game first distributed in 1990 [10] and its 25th anniversary book provides thorough insights and experiences with the game as simulation [11]. The main idea behind Barnga is to provide an experiential event in which players are embedded in a cultural phenomena of not knowing the rules, but having to play the game. This is achieved by creating multiple sets of card games each with a specific rule set. Players then learn the rules to play one of these games in a group of four. After playing this game for some time, two players are moved from each group to a new group to play a different game without explanation of the new rules of the game. After this experience, a reflection period is used to debrief the activity. Barnga has been used in a number of situations to help teach and have players experience the idea of being in a new culture without knowing the rules [4].

Our goal is to extend the possibilities of learning about intercultural experiences with modern games and technology. In particular, we wanted aspects of Barnga to be experienced at a larger scale, with the use of an online tool, and we wanted to be able to have a flexible set of game rules so that we might be able to create other unique experiences that could help both researchers and teachers. We have built an open source game framework called, Culture Code, that meets these requirements.

In the remainder of this paper we will describe the game framework and how it is used within a classroom context. We are currently evaluating this framework in an undergraduate classroom setting. To support late-breaking publication of this work, we do not include any results of this test scenario here other than the basic set up of the framework for the class. The researchers

encourage others to implement this solution and draw their own conclusions in efficacy and benefit.

Our key contributions with this work are to:

- Create a game as simple as the Barnga framework
- Make this game scalable to a minimum of 50 players
- Create an online game playable online in a web browser
- Build a rule set to elicit culture disadvantage for specific players
- Release the game as open source software

We call our game a framework since the rule set is configurable allowing a number of scenarios to be created. We, also, believe that this flexibility will allow other re-search ideas to be tested; for example, you might test research ideas related to cooperation.

The remainder of this paper is organized as follows. The first section discusses some background and related work to culture based games and simulation. Section two describes the details of the game framework including both the technology and the rule configuration capabilities in the game. Section three describes the classroom setting that we are targeting our first real test of our framework and an explanation for how we will configure the game. The final section concludes the paper.

## 2. BACKGROUND

To understand how we are framing culture, we begin similarly to Hofstede et. al. [9] by using Hofstede's 1991 definition of culture [8]:

Culture is always a collective phenomenon, because it is at least partly shared with people who live or lived within the same social environment, which is where it was learned. It is the collective programming of the mind which distinguishes the members of one group or category of people from another. (p. 5)

Culture and intercultural understanding have been of research interest to many along a number of directions. For this work, our focus is simulation and games to help players understand and appreciate the complexities of operating in a multicultural context. Fowler et. al. [6] has an excellent survey paper as related to the use of simulation games for intercultural activities related to instructional activities.

Fower's work includes an introduction to one of the earliest of these types of simulations - BAFA BAFA [2]. Such games or simulations tend to assign players into invented cultures or synthetic cultures [9] in which players are then asked to interact with other synthetic cultures. These types of simulations have evolved with modern technology and continue to be developed with modern computing machines with games such as ARGONAU-TONLINE [12] and Study-Town [1].

Barnga [11] is a different type of intercultural game/simulation when compared to these deeper inter-cultural simulations since the game Barnga tries to emulate aspects of the feelings of being put into a new culture without defining or orienting participants in the specific culture. The key benefit to Barnga is the speed at which the simulation can be done [5]. Barnga activities take less than 30 minutes compared to the approximately 3 hours needed for a complete BAFA BAFA experience.

The shorter experience of Barnga does come at a cost. Barnga captures only some of Paige's 10 identified cultural differences in limited aspects. An effective design in exploring cultural

difference would aim at all 10 of Paige's identified cultural differences:

- ethnocentrism
- language
- cultural immersion
- cultural isolation
- prior intercultural experience
- expectations
- visibility/invisibility
- status
- power
- control

A game like BAFA BAFA, with more time, will elicit more of these cultural differences and potentially each difference will be felt more by the participants. However, no game can perfectly capture cultural experiences as should be expected from simulations [6], but this is one of the major trade-offs between games like BAFA BAFA and both Barnga and our game, Culture Code.

We propose a framework design for intercultural games based on the need for a simple game that can be executed online at a relatively large scale. This framework might be considered similar to Coenen et. al. [3] work where they provide a simpler design framework to create online massively multi-player games for various purposes. Note, this work is not a theoretical framework for analyzing intercultural learning as might be paralleled by Yusoff et. al.'s [13] conceptual framework for building serious games. However, their conceptual framework is employed to help us describe aspects of our game framework.

## 3. CULTURE CODE

Our game framework, Culture Code, was designed specifically with four goals in mind:

- Be playable online in a modern web browser
- Allow a class (minimum 50 students) to play the game
- Keep the game mechanics simple
- Be flexible in terms of defining different rule sets

The intended learning goal when playing our game is to become aware of how entering a new culture, unaware of the implicit rules, is a challenging and emotional experience beyond just learning language and basic day to day life. This essentially means to create a simple Barnga like framework with modern technology that can go to scale and is easy to facilitate.

Our beta version of this game satisfies all of the above goals. The game is playable in web browsers including both Firefox and Chrome (as clients) and uses javascript to implement the client-side game mechanics. The server is written in Java, and our distribution includes an executable file that simply needs to be started on the respective server. Technologically speaking, the game is a very simple client/server application that we have built so that anyone (some technical understanding of Linux is required) can use it which satisfies our first goal. We have tested the system on our local university network with 20 clients without any problems.

The game mechanics are simple as per goal 3 above. Figure 1 shows a screen shot from one of the players perspective of the game world. The player, in this case, is the green square in the center of the screen, and the yellow square to the upper left of the

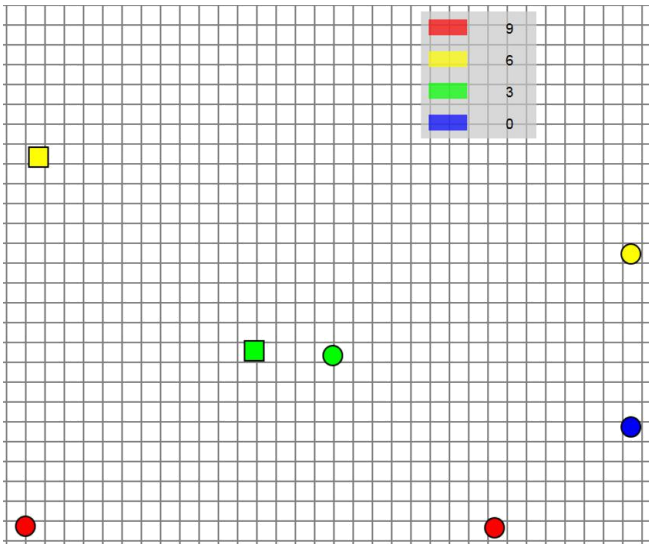


Figure 1. Screen shot of a sample client view of the game

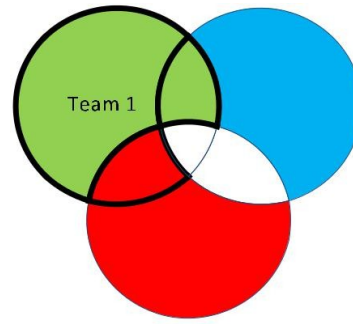
screen represents another player. The current score for all four teams (green, red, yellow, and blue) is shown in the top right corner. Finally, the circles (one green in the center, two reds on the bottom, one yellow to the right, and one blue to the right) represent points to collect.

The basic goal of the game is to collect points for your team by moving your avatar (the green square in Figure 1) in contact with each of the points. However, the rules in this game include a number of configurations in terms of what you can see, how you see it, and can you collect certain points. Figure 2 captures some of these rules with respect to the green team. In Figure 2 (a) the diagram shows that green will see the red team as red, but the blue team will appear as green; a rule like this makes it difficult to understand who is on your team. Note, this rule (and all other visibility rules) can be defined asymmetrically where, for example, the blue team could see the green team as either red, blue, green, or not at all.

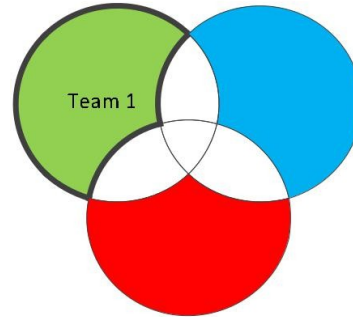
Figure 2 (b) shows that the green team can not see either the red or blue teams points. Finally, Figure 2 (c) shows that the green team can capture the blue and red teams points (even though they can not see them). In this case, the green team is unaware of where and how much other teams have for collectible points, but they can collect those points even though they can't see them.

As stated the game includes a configurable rule set, which as of the publication of this work includes:

1. How many teams there are in the game?
2. How big the world is?
3. How many points start in the world?
4. Is the end game triggered by all points collected or a set goal?
5. How people are assigned to teams, which includes a biased assignment?
6. Do new points appear as points are captured?
7. How many points your team gets per capture?
8. How teams see each other?
9. How teams see points?
10. What points teams can capture?
11. How fast are the avatars on your team?
12. Can you see the global score?



(a) Visibility of other teams



(b) Visibility of food

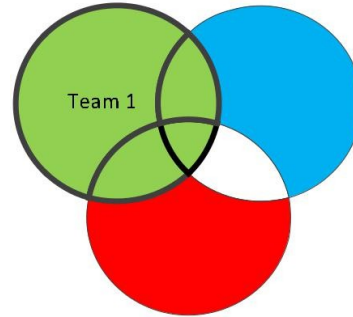


Figure 2. Three Venn diagrams expressing some of the rules with respect to the green team

From this e rules set a number of configurations here can create a variety of scenarios. For example, like the above rule, points could be colored to look like green can collect them, but are actually points exclusive to another teams. In this way, we can emulate what advantages your team has over others and if you can even understand what your goals are or even why a team collects points.

Rules 1 through 4 are global settings for the world, and rules 5 through 12 are rules that can be specified on a team by team basis. Therefore, rules 5 through 12 are the rules that allow for cultural/team advantages and disadvantages. All of these rules are defined in a text file read by the server to create the game, and rules 8, 9, 10 are implemented with N by N matrices where N is the number of teams and each column defines the nTH teams relationships. This satisfies goal 4 for a flexible rule set.

## 4. RULES AND WHAT THEY MIGHT EVOKE

Most of the flexible set of rules are created to allow for a bias in the game. Rule 6 allows a biased assignment of teams, which means some teams have more players and can collect items faster. Rules 8, 9, and 11 are properties that allow the designers to give different players physical (sense and movement) advantages. Rules 6, 7, 10 are properties that allow the designers to give players better opportunities in terms of how much and how many points are available to win with. Rule 12 is a feedback capability that helps you understand what points are worth and how are you doing comparatively to other teams.

With this flexibility of rules we can imagine creating a variety of interesting scenarios. For example, in one game you are assigned to a team, but if you can't figure out who is on your team (since all players look the same as you) how can you coordinate to work as a team. This type of rule is inspired by games such as Critical Gameplay Black/White [7]. These types of unique settings may allow researchers to explore other interesting social situations and interactions with the use of our framework.

## 5. GAME IMPLEMENTATION IN THE CLASSROOM

The flexibility of culture code allows us to create a wide variety of scenarios. For our pilot study in the classroom, we want to make the game feel much like Barnaga, and we think that all rules will be configured to be equal except the rule of who can collect and see the points on the map. We create a world with two teams of equal size. One team represents the players who know about the rules of the game - they can see all types of points as unique to a team, can see all types of players as unique to their respective teams, and can collect any type of point. The other team represents the players who can't understand the rules - they see everything as looking the same as them, but can only collect their type of points.

This set of rules is configured and the game is run for an education undergraduate class, called Educational Psychology, and the game will be played by 25 classroom participants. The game is played to a score of 350 points meaning each player has to collect approximately 30 points for their team to win. After this pilot study, we plan to extend the study to the full class of 250 students.

The reflective activity, one of [13] theoretical framework requirements for serious games, is not done within the game, which follows the same model as Barnaga. After playing the game, the group will discuss the game and what ideas were evoked by playing, and this will serve as the reflection.

## 6. CONCLUSION

In this paper, we presented a game framework, called Culture Code, which was created to extend the ideas in Barnaga to a modern web-based platform. Because of the technology, we can scale our games to a much larger group of participants, but by creating a number of flexible rules we can capture the essence of Barnaga and its use in teaching intercultural awareness. Culture Code satisfies four goals set for the creation of this game.

We are testing this framework in the coming weeks in a classroom setting. We, however, believe that this tool will be of use to a much larger audience of both teachers and researchers, and for this reason, we have released the framework as open source software. For those interested you can download the latest beta version of Culture Code at <http://culturecode.persuasiveplay.org/>

In the future, we hope to test the efficacy of this tool on improving cultural awareness for students.

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