

# When agents meet: empathy, moral circle, ritual, and culture

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## ABSTRACT

Creating agents that are capable of emulating the same kind of socio-cultural dynamics found in human interaction remains one of the hardest challenges of artificial intelligence. This problem becomes particularly important when considering embodied agents that are meant to interact with humans in a believable and empathic manner.

We propose a list of basic requirements for these agents to be capable of such behaviour and we introduce a model of the social world intended for implementation in affective agent architectures. In our framework culture alters agents' social relationships rather than directly determining actions, allowing for a deeper representation of empathy.

## Categories and Subject Descriptors

H.5.3 [Information Interfaces and Presentation]: Group and Organization Interfaces—*Theory and models*; J.4 [Social and Behavioural Sciences]: Sociology

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Design, Human Factors

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## 1. INTRODUCTION

*Horatio and his girlfriend Nadia are two agents sitting in a bar. They've been together as a couple for a while now. When they order a drink, a lady bartender agent walks by and Horatio starts to talk with her. After a few minutes, Nadia stands up, walks away, and shouts over her shoulder: "It's always the same with you!"*

Based on the information above, humans would have almost no difficulty trying to describe what Nadia must have been feeling. This is because we are able to make assumptions about the social relationship between the boy and the girl.

However, for an agent to be able to make the same assumptions, it needs to have clearly operationalized parameters of the social world. What is the relationship between the boy and the girl? Why does the boy talk to the other girl for a few minutes? Why does the girl stand up and walk away? These are instances of what we call socio-cultural dynamics: given any social situation, depending on the participants' personalia and cultures, how does the situation unfold?

Besides being able to make assumptions about the social world, there is also the issue of making social judgements; what is right and what is wrong. Changing a few simple elements of this scenario could change our perception of right and wrong, and this is something that an empathic agent should be able to do as well.

These judgements would become even more complicated when you take culture into account. What if talking to the other girl was an acceptable thing to do where you are from? What if it didn't mean that you might be romantically interested in them? It adds an extra level of complexity to the already quite challenging level of social behaviour. As basis of the article we take the stance: All people are moral, but culture modifies that morality.

In this paper we aim to identify and take the first steps to create a conceptual model for social behaviour in virtual agents. There are no theoretical bounds to the level of social complexity that we want to represent in our model. However, the model should be as simple as possible, but still rich enough to allow for short emergent interactions between agents with different cultural configurations. Through these simple interactions, people will be able to see the effect of culture on behaviour.

To establish the minimal modelling requirements, we will use a story of two agents meeting each other on the street. They don't know each other and one of them needs a favour from the other. This short, and simple, setup allows us to identify important requirements for empathic agents. Since this paper only focuses on the creation of a conceptual model for social behaviour, many questions related to the implementation of these requirements will be left unanswered.

The paper is organized in the following manner. We will start by describing related work on cultural agents. The following section will focus on the notion of *rituals*, a construct through which behaviour gains social meaning for a group of agents that have shared attention. After that we focus on different interpretations of these actions by having different *moral circles* active in the mind of an agent based on the ritual. In the last part of the paper we will look at how culture can modify these rituals and moral circles to create culturally-varying behaviour in agents.

## 2. RELATED WORK

The increasing need for embodied agents to interact in a social and empathic manner has lead researchers to address different aspects of social interaction. Particularly related to the work presented in this paper is the Synthetic Group Dynamics (SGD) model, proposed by Prada and Paiva [1], as it aims to create believable interactions in social groups formed by autonomous agents. In order to achieve this, agents build social relations of power and interpersonal attraction with each other. They also have the notion of belonging to a group in which they are regarded as more or less important, according to their status and/or level of expertise.

Similar to the SGD model, our proposed model also places a strong emphasis on embedding group dynamics and social relationships in the agent's mind. However, differently from SGD, we also address the relationship between culture and the dynamics of groups.

When designing social agents, culture has often been overlooked despite its huge influence on human behaviour. Without taking culture into account, we argue that the social richness of agent-based simulations becomes significantly limited. For instance, it becomes difficult for agents to empathise with users from different cultures, if they lack the ability to interpret actions from different cultural perspectives. Moreover, modelling culture has been an essential endeavour when considering agent-based applications for intercultural

training such as ORIENT [2], ELECT BiLAT [3], or TLTS [4].

Research on cultural agents is steadily rising. So far, several systems have focused on the adaptation of directly observable features of conversational behaviour to specific cultures. For instance, the work of Jan et al. [5] addresses differences in proxemics, gaze and speech overlap between the North American, Mexican and Arabic cultures. Similarly, the work of Endrass et al. [6] addresses the integration of non-verbal behaviour and communication management aspects, considering differences between the German and Japanese cultures.

While the aforementioned models focus on modelling the effects of culture on communication aspects, the research presented in this paper addresses another important facet of culture. Namely, how it influences decision making and behaviour selection.

In the model proposed in Mascarenhas et al [7], two of Hofstede's dimensions of culture, individualism and power distance, are directly used to influence the agent's decision making and appraisal processes. However, this is done only at the individual level without considering important elements from the social context such as group membership and relational variables.

Another agent model where culture affects decision making is the model proposed by Solomon et al. [8] which concerns the definition of specific cultural norms. The model allows defining links between specific actions (e.g. show-picture-of-wife) and one or more cultural norms (e.g. respectful-of-modesty). An association link can either be positive in the case where the action promotes the norm or negative in the opposite case. One drawback of this model is that it requires a great deal of manual configuration as it tries to associate culture directly to individual actions.

One step towards generating culturally appropriate behaviour within an agent model was taken by Mc Breen et al. [9] who propose the concept of *meta-norms* to operationalize culture. These use the Hofstede Dimensions of Culture to explain how you can create a set of generic rules that give agents a propensity to behave in a certain way in certain relational contexts.

In our proposed model, we argue that actions are often selected not because of their instrumental effects but because they are an important symbolic step of an on-going ritual, thus making rituals an essential part of social interaction.

The idea that rituals are important to model cultural differences in embodied agents was also explored in Mascarenhas et al [10], where a computational model of rituals was implemented and integrated into an affective agent architecture, developed by Dias and Paiva [11]. One limitation of their proposed model is that it assumes that agents have a shared knowledge of rituals. This assumption is not true when

considering scenarios where agents from different cultures may meet as exemplified in this paper.

### 3. MODELLING CULTURAL AGENTS

#### 3.1 The Structure of a Ritual

*Horatio is in a city he doesn't know, and is trying to find his hotel. After walking around for a while, he is unsure in which direction to continue and decides that it would be best to ask somebody on the street for more information. At that moment, Claudius, who is on his way to work, is walking in the opposite direction of Horatio. Horatio decides to draw the attention of Claudius...*

Some actions may be purely instrumental, e.g. picking up an object that has fallen on the floor. However, in a social world, such actions usually have a symbolic effect as well. For instance, what objects would you pick off the floor, in which places, and with which people present? To create an empathic agent, they need to be able to understand the social effect of these actions.

These symbolic elements of actions have some effect on the relationship between yourself and others. However, such an action will only take effect if the other is paying attention; if not, the social meaning of the action might be lost on him.

The first requirement for our model of social behaviour is:

- Groups of agents should be able to have a degree of shared attention and purpose within a certain environment.

This requirement closely matches the definition of a ritual, found in Rothenbuhler [12]. He states that rituals range from the ceremonial and memorable to the mundane and transient. In fact, any group of people (in our sense of the word, as a collection of people gathered in one place) that has a degree of shared attention, can be said to be engaged in a ritual.

Rituals help mediate changes in social order and are thus an essential element of social behaviour. As Hofstede et al. [13] say in their work, rituals are: "Collective activities that are technically superfluous to reach desired ends but that, within a culture, are considered socially essential."

*...In Horatio's mind there is a certain structure to asking a favour of a stranger. First you would politely greet him, and after exchanging pleasantries you would then proceed to ask him for help. Doing so would make the stranger feel obliged to help you...*

In a further operationalization of the ritual, Hofstede [14] explains that a ritual consists of three elements: a beginning, a body, and an end.

The *beginning* is characterized by an initiating move and a response. This initiating response carries the social meaning of the ritual. The response can be classified as running along

two dimensions: direction (going along or opposing) and strength of the response (ranging from low to high). Depending on the response, a ritual is either initiated or aborted; if the purpose of the ritual is clear to both parties and agreed upon, they proceed to the *body* of the ritual.

Within the *body* of the ritual, the actual social change is put into actions. Depending on the type of change, the participants of the ritual must act in an appropriate manner.

The last stage of the ritual would be the *end*, in which the social change is reinforced in an appropriate manner and the ritual is brought to its conclusion.

#### 3.2 Different Interpretations

*On his way to work, Claudius sees a stranger walk up to him with an uncertain look on his face. This kind of behaviour is typical of people who need directions and have need of somebody to help them on their way...*

Not all behaviour will be interpreted in the same way. This issue might be particularly true for people from different cultures, but even within the same culture there is no guarantee that you 'speak' the same language.

In the example above, Claudius recognizes that when Horatio walks up to him in a certain way, it means that he needs a favour. Now if someone would do that at night in a shady part of town, it might mean that they want to steal your valuables.

Different interpretations don't just depend on the environment that you're in, but also on the people that you interact with. In our example, Claudius and Horatio don't know each other. But what if they had been old friends? Would Horatio still have walked up to Claudius in the same manner and, if so, would it have meant the same thing?

The second requirement for our model is:

- The same action needs to have different interpretations for different people in different environments.

Within our models we choose to have rituals as events that have an impact on the social world. In our model we represent this social world through the use of *moral circles*, which can be created or changed by rituals. Moral circles are a pragmatic concept that we can use to define relational variables and social order in groups of people.

A first, informal definition is as follows. A moral circle is comprised of three elements: the people to whom it applies, their mutual perceptions of social attributes, and the social norms that regulate their behaviour.

Why use the concept of a moral circle? To begin with, it is generic. Hofstede et al. [13] use it as a general indication of a human unit of social agency, ranging from a few people to all of humanity, taking inspiration from evolutionary biologist David Sloan Wilson, who describes humans as a 'eusocial'

species, i.e. one in which the group has supplanted the individual as the main level of evolution.

Now, while in most eusocial species it is rather simple to determine the unit of evolution – it would be the colony of bees, for instance – this is not so in humans. Yet the assumption is that we have a biological propensity, including moral sentiments, to act as group members. In other words, acting for the survival and prosperity of our Moral Circles is in our nature. It is this propensity that is the main justification for our concept of moral circle – which we shall often abbreviate ‘MC’ from this point onwards.

*... Claudius wonders if he has time to help this stranger. In an hour he has an important deadline at work and he still has some things left to prepare. So he is left with a choice: he can either stop for a few seconds and talk to the stranger or he can ignore the stranger and carry on to work...*

Each context shapes its own MC typology, which depends on who is involved and what MCs they perceive to be relevant to the situation. A person can belong to many different MCs at the same time. While these MCs will affect the actions of any one person at any time, one MC is usually more salient than others. For instance, in most cultures, leaving work duties to marry or bury a family member would be allowable, or even endorsed. The priority between events is itself symbolic of a prioritisation among MCs.

MCs come in different types. They can range from the default MC of “all people who count as people”, to which strangers may or may not belong, to long-lasting organised groups, such as families or ethnic communities or companies, to the relatively informal, such as groups of acquaintances.

A more formal MC has both more specific social norms (rules of appropriate behaviour) and a strong inertia in membership; whether you’re in or out is usually being determined by clear attributes e.g. employment or club membership. Membership changes in more formal MCs are usually mediated by formal rituals, often denoting a change in status.

More informal MCs can be, for example, groups of specific friends (some you might know from your studies, others from your sports club). These more informal MCs still develop guides to appropriate behaviour. Membership of such an informal MC is often not as clearly defined as in more formal MCs. The relevant social norms for an informal MC will not be stated in any text and can evolve more freely through an emergent consensual process, than is usual in formal MCs.

A particularly difficult social issue is how to behave when more than one MC could be relevant. Culture can help determine the relative salience of these MCs.

This leads to the third requirement for our model:

- There needs to be some mechanism that helps determine the salience of Moral Circles based on the ritual that the agent is participating in.

### 3.3 Who They Are to You and What Effect That Has

*...Horatio walks up to Claudius and recognizes that he’s dealing with an older man who is wearing a very formal suit. The old man is looking at his watch and Horatio realizes that the older man is probably in a hurry...*

There are different relational primitives that can be present between members within a MC. Imagine that the stranger on the street is older than you are? How would that influence your behaviour? What if they were younger, would you treat them differently? Normally speaking we talk about *hierarchical* status in the sense of formal roles, such as a boss in the work environment. But it could even be an elderly gentleman, who might have higher status due to his age.

Status helps to establish dominance, which is used to establish the pecking order within a group. Many difficulties between individuals arise because there are differences in perceived status (You’re not in charge, I am!). To avoid such conflicts, formal MCs usually have formal roles with explicit rights and obligations, which can range from that of the managing director of a multinational company to the most junior trainee.

In the example above, Horatio is able to make an assumption about the status of Claudius because of two factors: his age and the suit he is wearing. Note that Horatio might be wrong in his appreciation of these attributes; these symbols might mean something different to Claudius than they do to Horatio.

The fourth requirement:

- Agents must be able to infer the status of characters, either through public variables, or through observation and interpretation of symbols.

### 3.4 The Agent’s Social World

At this point it becomes necessary to specify in some more detail the social world in which our agents live (see figure 1 on the next page).

In our simulations, some variables are taken for granted and will not change throughout a session in which a group of agents interact. This includes the uppermost level in the figure, the components of which will be described in more detail below. Other components that may or may not change can be found in the middle level. The bottom level shows the elements that make up the visible part of the agent interaction.

An important aspect of the figure is the realization that when there is no data available from the middle level, an agent will fall back on their top level attributes. This might be the case

# Model components for empathic agents

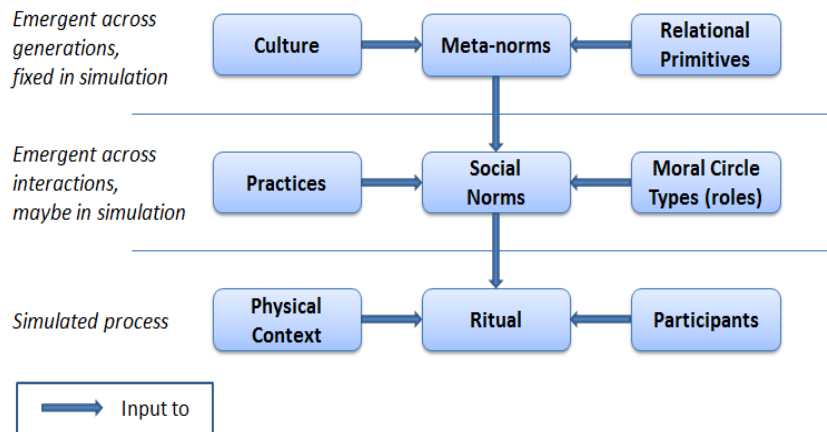


Figure 1. From culture to actions: model components for empathic agents

when an agent is put into a new and ‘strange’ environment, where they have no specific rules for behaviour. We shall now first look at the middle level.

## 3.5 What Is Right and What Is Wrong?

### 3.5.1 Social

... Claudius has no idea where the hotel is that Horatio is looking for. In his eyes, a young man like Horatio should be better prepared in planning his trip. Claudius tells the man that he has no idea where the hotel is, wishes him good luck, says he has to go, and rushes to work. If he had more time, he would have helped Horatio more...

How does one behave within a ritual? To answer this question, we need to look at social norms. These norms can be considered the practices of a group and while they reflect underlying value structures, they are not determined by them. They evolve to be accepted by the larger part of a society, or a segment of that society, as a short-term guide to proper moral behaviour.

Both the interpretation of the moral quality of behaviour and the translation of intentions into actions, are mediated by the current social norms. These social norms are very malleable; a population can come to believe that drink-driving or smoking indoors in the presence of non-smokers are normatively wrong, in a relatively short period of time.

However, the underlying value structure and MC dynamics will not have altered significantly, if at all. The detailed functioning of MCs in practice reflects the underlying cultural values, as culture moulds the social norms of a society. Social norms are one of the tools for interpreting the moral quality of the actions of others. They also indicate what behaviours are allowed (and effective) for translating social intentions into actions.

In our example Claudius is judging Horatio for his behaviour: Horatio should have been more prepared. As a result, Claudius believes that it is more important for him to carry on to work, instead of helping this youth, who should have been better prepared.

- For all MCs, rituals and contexts that are simulated, social norms should be present and tied to MCs and rituals.

### 3.5.2 Cultural

Horatio is left confused: Where he is from, people usually help strangers, even if you are in a hurry. He decides to carry on and continues on his journey...

In their work, Mc Breen et al. [9] propose the concept of meta-norms to operationalize culture. They use the Hofstede Dimensions of Culture to explain how you can create a set of generic rules that help determine agent behaviour.

Meta-norms as defined by Mc Breen et al. model agents’ propensity to behave in a certain way in certain relational contexts. In contrast to the shorter-term guides to behaviour, social norms (middle level of figure 1), meta-norms are longer-term guides to social behaviour (upper level in figure 1). They are about the fundamentals of social life and they are shared within any society that has the same culture. They deal with the basic question of how people should behave with respect to each other depending on who they are. They are close to the values of a culture, in the Hofstede sense of ‘cultural programming of the mind’, shared tendencies to perceive the social world, and act in it, in certain ways.

In our example Horatio has a different way of determining the importance of MCs from Claudius. For Horatio is it unthinkable that you would leave a stranger needing help on the street to go to work. This shows one way how culture would influence the behaviour of agents.

Within our model, culture will influence two elements: the social structure of moral circles and their social norms (SNs is what follows). The culturally modifiable parameters are the weight of MC primitives, the salience of MCs and the salience of SNs (see Table 1). The most salient MC and the most salient SNs can be established using this operationalization of meta-norms, e.g. “duties of work prevails over social duties towards strangers”, or “what my boss wants of me is more important than what anybody else wants of me”. There should be room to add culture as a weighting and salience mechanisms for MCs and SNs.

**Table 1. Parameters that can be modified by culture**

Culturally Modifiable Parameters
Weighting of MC primitives
Salience of MCs
Salience of Social Norms

### 3.6 Reputation

*Where Horatio is from, you can always rely on getting help from strangers.*

In Horatio’s culture there is a salient meta-norm about helping the needy, whatever the context. Living up to meta-norms and social norms play a paramount role in determining reputation. This is a measure of how well a person lives up to their MC derived obligations and their respect for the rights of other MC members. It can be named ‘standing’, a variable that could be binary or scalar. An agent can be ‘in good standing’ versus ‘in bad standing’ with its fellows [15]. Reputation is essential for agents that can recognise each other and act empathically based on previous interactions.

Within our model we want to represent moral behaviour. This means that two important elements need to be present within our model: actions have to be judged as to whether they are moral or not and members of the moral circle need a perceived level of morality (with unknown people these will be primarily based on meta-norms and on perceived attributes). These are the concepts that will be instantiated as Moral Circle Reputation (MCR) within our model.

Each MC has certain rights and obligations conferred on its members, depending on their roles in the MC. So if a member of a MC does something that goes against expectations based on an understanding of these rights and obligations, it has an effect on their perceived MCR. Each member of the MC has a perception of the MCR of other known members and of their own. So you might think less of yourself if you have done something wrong and others might also think less of you. This decrease can, depending on the level of MCR change, be attenuated by an appropriate atonement.

*...Horatio is in town to attend an academic conference. The next day he encounters Claudius there as a senior member of the host university. He wonders whether he should speak to Claudius or not, as his first impression was unfavourable, but maybe that’s just how people behave here...*

To be able to model these kinds of interactions within empathic agents, it is important that agents are able to keep some form of relational bookkeeping. This leads to the following requirement:

- Some memory of previous interactions is necessary to represent believable behaviour in agents. This memory will concern other agents’ personal information and MC memberships, including status and reputation. It will be shaped by the agents’ social norms and meta-norms.

### 3.7 The Effect of Culture

*...Horatio needs to request something from his hosts. He speaks to Claudius, who remembers him and asks if he found the hotel without too much difficulty. Horatio replies that he was helped by a shopkeeper shortly after approaching Claudius. Claudius then deals with Horatio’s request efficiently and in a very friendly manner...*

Horatio feels that there is a contrast in the behaviour of Claudius in both situations. He wonders what the underlying reason is for that contrast. Is it due to his status as a guest at the conference?

Every culture, through the different modifications it brings to the content and salience of MCs and social norms, will cause agents to behave differently and to judge the behaviour of others differently as well.

How can we begin to represent these varying behaviours and judgements in agent architectures? We propose to do this using the Hofstede dimensional model of culture [13].

### 3.8 Operationalizing Culture

We give an example of modifying the behaviour of agents based on their cultural background by linking the weighting of MC primitives to the Hofstede Dimensions of Culture.

#### 3.8.1 Hierarchy: Large Power Distance Versus Small Power Distance

The importance given by agents to *status* depends on the dimension of Power Distance, which deals with how hierarchy is perceived in a culture.

This is the extent to which the less powerful members of a society expect and accept that power and rights are distributed unequally. Large PDI splits up the MC into status levels MCs that are not permeable and depend on position in society. Agents in cultures of large power distance will respond

differently to others depending on how they perceive their MCS relative to their own. Status differences will be effective barriers to communication; particularly to volitional behaviour travelling upwards.

Horatio will feel that the behaviour of Claudius was appropriate if he comes from a Large Power Distance culture. Indeed, if Horatio was from a very Large Power Distance culture he would never have approached Claudius in the first place. The fact that he did so implies that he is from a Small Power Distance culture.

### 3.8.2 *Aggression and Gender: Masculinity Versus Femininity*

The importance given to *reputation* depends on the cultural dimension of Masculinity.

This dimension is about assertive dominance and emotional gender roles. It contrasts a strong-handed, competitive orientation in ‘masculine’ cultures, in which people in general do not assume others to be trustworthy, men are supposed to be tough, and women subservient and tender; versus a consensus-seeking and care-taking orientation for both women and men in ‘feminine’ cultures. For our MC primitives in masculine cultures, moral circle reputation will be very unequally divided across the MC, with a tendency to blame the weak and admire the strong. MCR will be more evenly distributed in feminine cultures and will not change so radically with poor behaviour.

In our example Horatio would tend to judge Claudius harshly for not helping him, just as Claudius would judge Horatio harshly for being ill-prepared. In a feminine culture both would be more forgiving of the apparent faults of the other and would expect this same forgiveness of others for their own mistakes.

## 4. CONCLUSION

The series of requirements that we have presented during the interaction between Horatio and Claudius represent elements that are important to consider when designing empathic virtual agents. Taking these requirements as a starting point, we have discussed elements of our model that will help show realistic social behaviour that can be modified by culture.

Through rituals, in which a set of agents have shared attention in a certain environment, agents are able to act appropriately by applying the relevant moral circles and their social norms. This selection mechanism allows for different interpretations in different contexts.

Culture can then be applied in two ways: through meta-norms and culturally modifiable parameters. In the absence of appropriate moral circles, and the social norms that apply to that moral circle, meta-norms provide guidance. These meta-norms will be particularly relevant for intercultural training, as one generally has difficulties recognizing moral circles and its relational primitives in ‘foreign’ surroundings. Culture also

has an effect on behaviour through the weighting of social norms and moral circles. This structure allows us to have culture influence social relationships rather than act directly on behaviour.

We believe that this paper makes some necessary steps to make virtual agents more empathic. In future work we aim to put the concepts presented in this paper into an affective agent architecture to create believable culturally-varying behaviour in agents for educational purposes. The translation of the concepts presented in this paper to operationalized elements of an affective agent architecture will allow us to discover flaws and additional modelling requirements for empathic agents.

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