Linking Norms and Culture

John Mc Breen†, Gennaro Di Tosto*, Frank Dignum*, Gert Jan Hofstede†‡

*Dept. of Information and Computing Science, University of Utrecht, Utrecht, The Netherlands
Email: gennaro@cs.uu.nl, dignum@cs.uu.nl

†Dept. Information Technology, Wageningen University and Research Institute, Wageningen, The Netherlands
Email: john.mcbreen@wur.nl, gertjan.hofstede@wur.nl

‡Man-Machine Interaction Group, Delft University of Technology, Delft, The Netherlands

Abstract—The goal of this paper is to propose a method of modelling the evolution of social norms in different cultural settings. We analyse the role of culture in shaping agents’ normative reasoning and hence their behaviour. The general notion of ‘value’ is discussed from the perspective of the BDI framework as a means to represent cultural regularities in social interactions. Culture is described as a system of shared values, which are linked to the Hofstede dimensions of culture. This system is represented by so-called meta-norms that define appropriate, culturally-varying, behaviour in different relational contexts. In this way culture affects the possibility of normative changes, in particular the acceptance of policies designed to issue new norms in a society. Throughout the paper a scenario related to the enactment of smoking ban policies in Europe is presented to discuss the evaluation of normative change in specific cultural settings.

Keywords—culture; social norms; values; multi-agent simulation.

I. INTRODUCTION

Normative behaviour displays a wide range of variability from culture to culture. In this paper we propose a method for integrating important cultural variations in beliefs and behaviours within the existing normative multi-agent-system paradigm. Defining the role of culture in a Multi-Agent-System is the first step in the analysis of its effects in policy-making. Exploring the circumstances in which newly issued deontic norms are more likely to successfully change the relevant social norms of citizens is our goal.

Specifying the interaction rules between social agents can help us to theoretically predict the consequences of changes in deontic (legal) norms within an artificial society. For this purpose, we propose a conceptual framework where the decision making abilities of the agents about norms are linked to the dimensional model of culture proposed by Hofstede et al. [1], in order to enable the design and implementation of multi-agent simulation models that can facilitate cross-validation with empirical data collected on samples belonging to different cultures.

An example of cultural variability in normative behaviour is the implementation of the ban on cigarette smoking in public places recently issued by the authorities in many European countries, intended to reduce exposure to Environmental Tobacco Smoke (ETS). The actual social norms, with regard to smoking in bars, pubs, and restaurants that emerged since these bans, varied considerably across countries [2].

We shall illustrate the interaction of norms and culture in a simple bar scenario populated by artificial agents with the ability to reason and take actions based on norms. We assume that agents have the same goal to to be together in a bar to enjoy each other’s company. However, they can have different sub-goals (or habits and preferences) with regard to smoking. After a no-smoking norm is issued by a legal authority, the interactions among agents in bars will help determine if this legal norm is transferred to a widely adopted social norm against smoking in bars.

The selected scenario can help us frame questions related to the analysis of decisions agents make when confronted with obligations and their violations: If an agent smokes while the other wishes to avoid ETS what would the behaviour of the non-smoking agent be in reaction to this violation of the no-smoking norm. What are the variables that influence it? How can he affect the behaviour of the smoking agent?

We answer these questions in the following sections of this paper which is organized as follows. Section II introduces our conception of both culture and norms. In Section III we shall describe how the cultural differences between groups can be integrated smoothly into the normative reasoning of autonomous agents, by setting culturally appropriate ‘Meta-norms’1. Section IV gives a more detailed account of how some aspects of culture could be included in a model of the evolution of social norms around smoking after a deontic (legal) norm is issued. And section V concludes the paper describing directions for future work.

II. CULTURE AND NORMS

Culture can be described as a normative system: it exerts pressure to conform to established conventions on its members. It is advantageous to the individual to imitate and learn from others, because social learning save us the cost of testing the environment through a process of trial-and-error [6]. But culture will also operate through

1The term meta-norm has previously been used to mean ‘norms over norms’, see [3] and [4] and also has been used to designate fundamental social attitudes such as the ‘norm of reciprocity’ [5, sec. 1.6].
different mechanisms—direct teaching, sanctioning of deviant behaviours, etc.—that pressure individuals to adopt the practices of their group. This process of socialization (as described in sociology by [7] and [8]) defines and strongly preserves the social norms in a given culture through time.

In the context of Multi-Agent Systems the socialization process responsible for the reinforcement and preservation of norms in a society is transferred to—and implemented through—intelligent normative agents interacting together.

Social norms are fundamental for the regulation of natural societies and have been transferred to the field of Multi-Agent-Systems as an artefact for establishing social order among autonomous artificial agents [9]. Norms have been traditionally interpreted in two ways: (a) what is commonly done, i.e. conventions; (b) what is approved or disapproved, prescribed or sanctioned. In both cases norms inform agents’ expectations about the behaviour of others and provide incentives for conformity. However, achieving coordination between agents through norms while preserving their autonomy is not trivial, as social order relies on the ability of agents to effectively reason about norms, i.e. their normative intelligence, and on the social mechanisms that instantiate and enforce such norms.

A. Previous Work

Previous works have explored the connection between norms and agents’ preferences proposing design principles to represent different personalities in normative reasoning [10] and different cultural effects at the population level [11].

Dechesne et al. [11] classify norms in three categories: legal, social, and personal. The term legal norm is used to refer to society’s laws, which are centrally issued and explicitly formulated. Social norms, on the other hand, emerge from the behaviour of the social actors. Personal norms are described as the standards of behaviour a person holds for him- or herself. They are moulded by the personal history of an agent and most are social in origin.

Potential conflicts arising from the three types of norms are resolved through operationalization of the concept of value. Values are defined as ‘ideals that are deemed worth pursuing.’ And they are used to filter out competing norms for the generation of agents’ goals and subsequent plans of action. In this way, norms that promote the agent’s value will be selected as input for the agent goals; norms that demote the value will be discarded. Hence the model of normative behaviour based on values from [11] can be summarized in the following table:

<table>
<thead>
<tr>
<th>Value</th>
<th>Norm Type</th>
<th>Goals/Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance</td>
<td>Legal</td>
<td>Prescribed actions</td>
</tr>
<tr>
<td>Conformity</td>
<td>Social</td>
<td>Customary actions</td>
</tr>
<tr>
<td>Integrity</td>
<td>Personal</td>
<td>Personal preferences</td>
</tr>
</tbody>
</table>

The choices of agents over these norm types are linked to the dimensions of culture of Hofstede et al.[1], who distinguish six dimensions of culture based on factor analysis of survey data. These dimensions have been shown to correlate with a wide range of empirical data in the social sciences [12], notably marketing data [13].

The tendency to value compliance is linked to Power Distance (PDI), which is the degree to which less powerful members of a group expect and accept that power is distributed unequally, and ‘compliance’ is also linked to Uncertainty Avoidance (UAI), which denotes a society’s tolerance for uncertainty and ambiguity. The value of conformity is correlated with a low Individualism (IND) index, which indicates the extent to which individuals see themselves integrated into groups. ‘Conformity’ is also linked to low PDI and a more feminine society, i.e. low MAS, as cultural femininity is associated with caring for others. ‘Integrity’ is presented as an expression of high IND and MAS (due to agents’ assertiveness), and well as low PDI.

Previous applications of cultural dimensions to normative reasoning [11], [10] use the notion of values to link the effects of culture to agents’ normative decisions. Our framework for integrating culture into decisions of artificial agents about social norms differs from the framework of [11] in a number of respects. Firstly, we explicitly allow for sanctioning when norms are violated. Secondly, we take into account that the relational context may change the behaviour of agents with respect to a norm. Thirdly, our agents’ values can modify their behaviour with respect to the specific norms that relate to that value, rather than relating to a preference over types of norms.

III. VALUES AND META-NORMS

Values are dispositions to choose one state of the world over another. While formally it is possible to reduce values to an order over a set of alternative outcomes [14], the task to include them in the deliberation cycle of a BDI (Beliefs-Desires-Intentions) agent is less straightforward, mainly due to the overlap between the concept of value and other relevant mental constructs, like: beliefs, goals and desires, and norms.

Miceli and Castelfranchi [15] define values as a special kind of evaluation. Such an evaluation ‘consists of an assumption of agent E (Evaluator) about X’s power (means, properties, capabilities, skills) to reach a certain goal G’. An evaluation informs the agent that the entity X (be it a tool, another agent, an institution, etc.) is a good means to reach a specific end. What happens with values is that the notion of the goal against which we are evaluating X disappears,
hence X becomes “good” in itself, and the agent holding the value pursues it through terminal goals, instead of as a means for something else.

In this perspective values are implicit evaluations: they are still susceptible of practical reasoning considerations, but they become absolute in the psychology of an agent. What are the consequences from the point of view of culture and the corresponding socialization process? Every infant will check his social environment for consistent guidance about behaviour, and is also likely to be the object of direct teaching on the part of the older members of the community—be it in the form of explicit communication, sanctioning of deviant behaviours, praising of appropriate actions, etc. In this way he will learn what is desirable in his society, and what is expected of him. But this is not simply acquired knowledge of detailed cultural recipes and conventions; values provide a general reference that can inform agents’ choices in a wide range of social settings and interactions.

When considered part of the life of a group and its members, values possess a prescriptive power. If norms mandate specific actions or states of the world (i.e. goals), values give the agents a reason for pursuing the goal (i.e. because it is “good”).

To express the structural relationship between values and norms in a cultural context we here define the notion of meta-norm, the classification of how agents organize and combine:

1) different (potentially conflicting) normative inputs (i.e. legal, social and personal norms),
2) a set of shared beliefs about relational variables such as: status, roles, affiliations and their meanings in specific settings,
3) the values that guide their choices in order to select the appropriate goals, and to assign the appropriate importance to these goals. The influence of the meta-norm maybe to create a new goal, or to strengthen or weaken the importance given to an existing goal. Meta-norms shall also influence the intentions, that is the concrete actions that agents shall derive from their goal. Agents may have many goals at one time and meta-norms shall help agents both, to choose among their goals, and how best to try to achieve them. The exact method of choosing among goals is beyond the scope of this paper.

Personal norms and values are closely related. Personal norms are created by agents’ personal history, they may be, and especially may be perceived to be, more independent of social norms in individualistic cultures. Values are tendencies to prefer one state of the world over another, and are hence less tied to specific behaviours than personal norms are.

A. Meta-norm notation

Meta-norms are denoted by pre-conditions, based on the relational context and the agents’ values and culture and post-conditions that influence the goals that agents adopt.

Meta-Norm Notation

<table>
<thead>
<tr>
<th>Pre-conditions</th>
<th>Relational Variables (S, R, M, F); Dimensions of Culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-condition</td>
<td>Tendency to create, strengthen or weaken a goal</td>
</tr>
</tbody>
</table>

Culture dimensions are noted in meta-norms’ pre-conditions using the three letter codes in Table I, with a plus or a minus to describe at which extreme of the dimension the meta-norm shall be stronger.

Shared beliefs can function as a short-cut for abilities that would otherwise require mind-reading capabilities on the part of the agent to calibrate its social behaviour in view of other agents’ reactions. For our purpose we introduce a set of social variables that define the social roles and guide the decisions agents make during interactions mediated by norms.

- **Status** S: Depending on the culture, it is determined by the agent’s wealth, power, age, gender and role.
- **Role** R: Examples are: institutional authority (e.g. policeman), parent (father or mother), employer or employee, peers and friends, etc.; they are accompanied by a set of duties and rights.
- **Membership** M: The groups every agents belongs to. Examples are: family, ethnicity, profession and colleagues. Their strength vary from culture to culture, and they define the more enduring moral circles, M, of agents. A moral circle is any social group, however fleeting, that attributes rights and obligations to its members [1, ch.1].
- **Friendship** F: The personal ties of the individual agents: the groups the agents actively seek to enter—which can differ from its group membership: e.g. two cousins are members of the family group (α, β ∈ M), but may not be friends.

IV. SMOKING BAN SCENARIO

To illustrate the role of culture in normative behaviour, we outline a scenario around a ban on smoking in bars, which shows how the concept of meta-norms can be put into use to model and analyse the behaviour of autonomous agents.

In the bar scenario we distinguish four goals that agents may adopt. Two are social goals, and two are linked to smoking—the behaviour regulated by norms. The goal ‘Affiliate’ refers to the creation, maintenance or deepening of personal friendships, and is directed towards an individual. The goal ‘Preserve Moral Circle, M’ is concerned with the well-being of a group as a whole. The other two goals are

---

2 Beliefs are shared within a homogeneous culture, but in cross-cultural interactions, differences in these beliefs can be sources of misunderstandings.
either to smoke, whose strength is linked to the preference ‘Addiction’ or to avoid ETS, whose strength is linked to the preference ‘Irritation at ETS’, see Table II. Each of these goals shall influence the likely behaviour of agents, and for this reason we extend the meta-norm notation to include the actions triggered by the activated goals. Both social goals, and the goal to smoke, provide reasons for agents to attend the bar.

Agents who have a goal to smoke have to choose whether they really wish to do so in the social context in which they find themselves. This decision is influenced by their personal preferences regarding smoking (A), and the relational context. This context includes the strength of individual friendships $F$ with non-smokers present, and the preferences $I$ of these friends, as well as the relative status $S$ of the non-smokers. Finally the social and legal norms in place shall play a role as well. Culture will modify the relative importance agents give to these different factors.

Assuming other agents smoke, non-smoking agents’ decisions to act to achieve their goal ‘Avoid ETS’ are influenced by their preferences $I$ regarding ETS, $F$ regarding the strength of their bond to their drinking companions as well as their norms of behaviour relating to status and group membership, which are influenced by culture.

Agents have a discrete set of actions that define their possible choices regarding smoking, when in a bar, see Table II. We propose two levels of sanctions, which we call Inform and Blame, as the nature of sanctions varies with social context and with culture. The action Acquiesce means that a non-smoker accepts to stay in the presence of smokers.

This simple scenario abstracts from some aspects of the real-world implementations of the legal norms forbidding smoking, such as whether or not both the violating smoker and the bar owner are fined (Italy), or just the bar-owner is fined (The Netherlands)[2]. Some countries also allow separate smoking areas in bars, which can affect the development of social norms around smoking. However, we can reasonably model the implementation of the various smoking bans by assuming that punishment for violation is non-zero in each country.

**Legal norms and social norms:** Here we draw some important distinctions between jurisdiction-wide legal norms and social norms that can vary across groups and subcultures.

Legal norms are generally known to all the agents, they have a definite scope, and specify the sanctions that apply on violation, and the agents authorized to administer them.

Social norms are more emergent from society and therefore they are more dependent on the nuances of culture. Like legal norms, the behaviours they regulate are culture dependent; but in the case of social norms culture also defines: their scope, the situations and the agents they apply to, and the appropriate reactions to violations. The types of agents who are more entitled to sanction these violations is also encoded in culture.

### A. Pre-Ban Interactions

A group of young, relatively low status agents, are in a bar together. They have different levels of Addiction $A$, signifying whether or not they are smokers. The non-smokers have higher levels of $I$, which indicates their greater irritation due to passive smoking. No legal norm, or social norm forbids smoking in bars. In this situation the smokers are likely to form a goal to smoke.

The non-smokers have a decision whether to ask the smokers to stop, though no norm forbids them from smoking, to leave or to stay. Assuming that smoking is acceptable behaviour in bars before a ban is introduced, the choice between leaving and staying is likely to be influenced by each non-smoking agents’ $I$, their friendships with the individual group members $F_i,2,...,n$, and finally the value they ascribe to being a good member of their group, which is related to Individualism. More individualistic agents are more likely to form goals that improve their personal satisfaction with their surroundings, i.e. to avoid ETS. While more collectivistic agents will give the cohesion of the group greater importance, that is have a strong goal ‘to preserve $M’$. This can be represented through the following meta-norm.

<table>
<thead>
<tr>
<th>Pre-conditions</th>
<th>Post-condition</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>∀S,∀R,if $M \in M$, ∀F</td>
<td>create/strengthen Goal Preserve $M$</td>
<td>Stay in bar</td>
</tr>
</tbody>
</table>

This meta-norm operationalises the value of belonging for collectivist cultures. A meta-norm related to the same value and leading to the adoption of the same goal influences agents’ propensities to copy the behaviour of others in their group, in order to more strongly belong to their group.

If we assume that a high status agent is seated close by in the bar, the younger agents are unlikely to dare to provoke the higher status agent by smoking, if the agents are from a high PDI culture.

### Table II: Features of the Bar Scenario

<table>
<thead>
<tr>
<th>Agent’s Goals</th>
<th>Actions</th>
<th>Agent’s Preferences</th>
<th>Agent’s social variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoke</td>
<td>Stay in Bar</td>
<td>A. Addiction</td>
<td>Status</td>
</tr>
<tr>
<td>Affiliate</td>
<td>Leave Bar</td>
<td>I. Irritation at ETS</td>
<td>Group membership</td>
</tr>
<tr>
<td></td>
<td>Smoke</td>
<td>F. Friendship</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inform</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acquiesce</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Individualistic agents are likely to resent such restrictions more, but are likely to obey them nonetheless if they are from high power distance cultures.

In a small power distance culture the absence of such self-censorship shall increase the likelihood of sanctions for deviant behaviours. The nature of sanctions are likely to be modulated by both the IVR and the MAS index of the culture, with more masculine cultures sanctioning more firmly.

**Pre-conditions**

( if $S_{MY} < S_{other}, \forall R, \forall M, \forall F$) and if PDI+

**Post-condition**

if $I > 0$, strengthen Goal Preserve $M$

**Actions** Acquiesce

---

**B. Post-Ban bar interactions**

We now analyse the same scenario in the presence of a deontic norm against smoking in bars. This norm may, or may not, be reinforced by a developing social norm against smoking in bars. The role of culture in the evolution of such a social norm is the subject of this simple scenario.

The smokers in the group of youngsters may find they now have no clear understanding of whether or not it is acceptable to smoke. If so, they shall be provoked to explicitly reason over norms in deciding how to act.

High IND may mean that smokers are more likely to follow their personal wishes, while also increasing the likelihood that non-smokers will sanction smokers, in order either to satisfy their personal preferences, or, more strategically, to bring the norm into line with their preferences. The nature of these sanctions may be important with stronger (see previous Meta-norm) sanctions more likely to reduce the overall level of smoking, thus favouring the emergence of a ‘no-smoking in bars’ social norm to mirror the deontic norm.

Assuming the reaction of the group of youngsters is not to smoke an interesting normative conflict may arise in a high PDI culture, if a higher status agent begins to smoke in the bar. The legal norm against smoking, as well as the potentially developing social norm, would push the youngsters to sanction, while their lower status will push them not to sanction. They are also likely to be influenced in this decision by the level of irritation they experience due to ETS. The most likely course of action is then to leave rather than sanction a higher status member.

**Pre-conditions**

( if $S_{MY} < S_{other}, \forall R, \forall M, \forall F$) and if PDI+

**Post-condition**

strengthen Goal Preserve $M$

**Actions** Acquiesce; Leave Bar

However, they may take the higher status agents’ lead and revise their previously agreed non-smoking group norm such that the smokers in the group may begin to smoke. In a small power distance culture agents would be more likely to follow the majority behaviour of their moral circle if one was established. Hence a smoker in a bar where the majority of people accept smoking would be likely to smoke:

**Pre-conditions**

( $\forall S, \forall R, \forall F, \forall M$) and if PDI-

**Post-condition**

strengthen Goal Preserve $M$

**Actions** Smoke

These, and other potentially critical decisions in the early development of social norms in the context of a newly issued deontic norm are very much influenced by culture. Finding ways of representing this influence is necessary in order to test the both the individual assumptions about these influences with real subjects from the cultures concerned, and the system level social norms that develop in our models with the reality in different countries. Meta-norms such as those proposed above may be tested with subjects from the target cultures through questionnaires or by evaluations of virtual environment simulations [16], with agents influenced by different meta-norms.

---

**V. Conclusions and Future Work**

We have proposed a method for developing multi-agent models of norm dynamics informed by culture. The use of meta-norms that are part of agents’ mental make-up allows important cultural differences in appropriate behaviour in social settings to be included, alongside social norms and preferences, as part of a simulated agent’s deliberative cycle. Integrating meta-norms on the same level as social norms means that agents are influenced by their cultural background, but not controlled by it. Personal experience may cause an agent to change both the social norms in which it believes and its personal goals, both of which can conflict with meta-norms and potentially overrule them.

We can validate models that attempt to investigate the role of culture in the evolution of social norms in a number of ways. It is possible to test assumptions about typical behaviours (meta-norms) in a culture directly with human subjects from the cultures concerned. The frequency of behaviours at the aggregate level in simulations can be compared with real data. Data on the prevalence of social norms in societies allow comparisons of the actual distribution of beliefs about social norms to be compared to the mental states of simulated agents. Such data is available in the case of smoking norms [17].

The simulation of the bar scenario evoked in this paper, both before and after the introduction of a smoking ban, with cultural configurations drawn from European countries that
have had varying success in integrating the ban into citizens social norms, is the next step in this research.

The integration of other influences on agents’ behaviour that are dealt with differently across cultures is a future goal. Basic personal drives are a central factor influencing our behaviour. Normative justifications are often offered in defence of decisions based primarily on the desire to satisfy basic drives. The most widely accepted set of basic human drives is found in Maslow’s work [18]. For a concise description of these basic drives and their potential application to multi-agent models see [19]. All of these drives are subject to regulation by culture.

In the examination of policies that have widely differing success in different countries the role of culture should be considered alongside other influences on the acceptance of laws and the evolution of social norms. We have proposed a method for including cultural differences in multi-agent models of evolving social norms, in order to examine how these differences can affect the success of new regulations. While it is clear that culture is only part of the complex process of the adoption or rejection of norms issued by governmental authorities, as it is a factor that is always present, a better understanding of how to influence groups in line with their culture and values is a goal worth pursuing. This paper is a first step in harnessing the flexibility of multi-agent models to explore the underlying structures of the process of social norm evolution across different cultures.

ACKNOWLEDGMENT

The authors would like to thank the SEMIRA project for funding this research, as well as SEMIRA projects members for useful discussions. We also thank Nick Degens for many informative comments.

REFERENCES


