

Modelling the social fabric for normative NPCs in MMOGs

Magnus Johansson¹, Harko Verhagen²

Abstract.

A computer game in an online setting is not something entirely new. But something that could be interesting to notice is that nowadays numerous researchers around the globe have their attention on online worlds. Most research is focused on questions such as: what is a game? Why do we play games? And how can we understand the player? Our approach is slightly different, and our aim is to make games more interesting and challenging. We believe that if we are looking at the interaction in MMOGs, the agents or “NPCs” as they are commonly referred to in games, are the most promising components of these games to improve storytelling and game-play. The problem is that game researchers often lack the skill to actually model behaviour of agents, to put it bluntly: NPCs are agents. So in order to develop the next generation of “smart” NPCs we need assistance from people skilled in deontic logic, and normative multiagent systems to develop these games further. This is an article and a proposal for future research in this field.

1 Introducing massively multiplayer online games

Massively multiplayer online games (MMOGs) are a game genre with approximately a 15 year long history, where new games have appeared on a regular basis ever since the beginning. Game designers discovered at an early point that people like to play computer games together, and with increasing computer power and Internet connection speeds, games such as “Everquest” and “World of Warcraft” have been commercial successes.

MMOGs are characterized by being persistent online worlds, with tens of thousands simultaneous players. To prevent lags in the game, players play on different servers, often called realms or shards. The fantasy genre is still one of the most common settings for MMOGs but Sci-fi settings and other settings exist. Most game worlds have a faction system where the players are divided into opposing teams in order to create a conflict.

The first step for a new player is to create a character from one of the factions by choosing race, class, gender, appearance and name. The class system of most games is balanced in such a way that certain classes are more efficient as solo playing classes, while other classes are more useful when playing in groups. Most MMOGs are designed to encourage social interaction and the class system is just one example where this becomes apparent. The different classes complement other classes with class specific skills, when players cooperate to defeat tough “Non Player Characters” (NPCs) and “MOBs” (Mobile Objects). Sometimes differentiation between what is a

MOB and what is an NPC is being made, but for the remainder of this article, we will use the term NPC for all computer - generated characters.

Depending on preferences players have different reasons for playing MMOGs, but many players try to reach the maximum skill-level in the game, often referred to as the level-cap. Some aspects of the game world are not accessible for players before they reach the level-cap. Therefore, gaining experience and leveling your character is one of the things that players strive for. In World of Warcraft the current level-cap is level 80, and to get there a player have to spend many hours (or weeks) in the game earning experience by completing quests and killing NPCs.

As mentioned above players can organize themselves in different kinds of groups. The most common types are called “Pugs” (Pick up groups), this is a small group with a short lifespan, often with a focus on completing a specific quest. Larger groups with a longer lifespan are called Guilds. Most guilds have rules and a focus on some aspect of the game. There are raiding guilds that are specialized in the specific instances of the game called raid instances. An instance is typically a cave full of monsters and treasures that are too powerful for an individual player.

As described in this brief description of MMOGs there are many opportunities for cooperation and conflicts in this type of games, making them an interesting area of research for various fields.

2 Normative multiagent systems and MMOGs

There are many ways of describing an agent, as there are to describe or define what is true about norms. We will not focus on or deliver a precise definition of agents or norms, instead we are concerned with how agents could coordinate themselves in groups, and how norms will serve as a way of organizing the agents. One definition that serves our purpose is: “social norms are always about observed behaviour” [7, p 24]. On a basic level what is important is that an action is observable and interpretable “On the level of meaningfulness human action is guided by symbols whose meaning is interpreted by actors” [5, p 119]. Intuitively norms are statements about what is appropriate behaviour in a certain context but in order to be consistent with previous work on norms, the following definition will be used for the remainder of this article: “Norms are statements about the appropriateness of an individual’s act which may result in a sanction being issued by another individual or an individual belonging to a specific class of individuals.”[10]. In addition to the definition on norms we can also note that norms are dynamic and change over time. Some will change more rapidly, while some will be fairly static. In addition to norms being flexible, the interpretation of norms is bound to be even more so.

¹ Dept. of Computer and Systems Sciences, Stockholm University, Forum 100, 16440 Kista, Sweden. Email: magnus@dsv.su.se

² Dept. of Computer and Systems Sciences, Stockholm University, Forum 100, 16440 Kista, Sweden. Email: verhagen@dsv.su.se

When discussing normative multiagent systems we can propose different traits that such a system should have and on different levels to be regarded as truly normative. We have proposed that MMOGs could be described as a normative multi agent system [10]. If we focus on the different kinds of agents in such a world, we can differentiate between two main categories: (human) player characters and non-player characters. (NPC). In MMOGs different NPCs have different levels of complexity and most of the time NPCs are just smart enough to make game play varied enough to fool a player. A technique called pathing is often used to decide how the NPCs should move in the world, according to some set of rules. For the observant player, the pathing of NPCs or the pattern in which they move can sometimes be predicted, which disrupts the illusion of the game world being inhabited by “smart” creatures. Pathing is not a problem that a normative multiagent system would solve, it is rather an example of the level of complexity the NPCs have today. Another problem with all NPCs is that they also have a predestined spawn point and spawn frequency. This means that if you kill a certain NPC, that NPC will re-spawn at fixed intervals, at a pre-determined location.

What is problematic with NPCs is that we do not see their full potential in terms of creating content, intrigue, and challenges or game-play in these games. This is of course a subjective statement but in any case much more could be done to make NPCs truly dynamic, interesting and creating a game experience where player characters actually can interact with NPCs or find them hard to outsmart just by observing their behaviour. Most of the MMOG worlds are distributed worlds accessed through a client installed on your computer, and perhaps the reason why NPCs are not allowed a higher complexity is a question of computing power and performance on the server side. If this is the case hardware development has been known to change rapidly, and this would thus be a temporary problem.

We believe that the field of Normative multiagent system research has reasons to look further at these worlds and that their contribution to the complexity of NPCs will change how we look at game worlds and human agent interaction today.

From a sociological point of view, we can potentially answer one of the classic questions about norms: when do they actually appear and at what point will a norm actually become a norm. This paper will also provide a proposal for how we can look at a normative multiagent system from a contextual “macro”-level, down to the micro-level mechanics that governs the “agent to agent” interaction.

2.1 A vision about future MMOGs

Regarding MMOGs, some say that the game actually does not get interesting until you reach what is called the “end game” content. To reach the end game you will have to play a fair amount of time being quite instrumental in your strategies to level the character as fast as possible. From a gamers point of view you can have lots of different reasons to play, and leveling your character to the level cap of that particular game perhaps is not a primary reason for playing. Still, the focus of most persistent worlds (all MMOGs are persistent worlds) is on quests and some repetitive elements where the gamer has to kill NPCs to gain experience, collecting loot and money to develop the character. These activities are sometimes called “Grinding” or

“Farming”, words that in a way communicate what a player has to endure to reach maximum level.

As mentioned above, NPCs behaviour tends to be predictable in ways that you either like or dislike. Some NPCs are easily killed due to their poor pathing and a player that has the intention of leveling will sooner or later find grinding boring, monotonous, and without variation. Some NPCs are slightly more intelligent and can, if their health reaches a certain percentage of maximum health, call for help from its nearest neighbour or run away in panic. But what if NPCs could cooperate, communicate strategies and norms in a more elaborate way in order to be unpredictable for a player?

3 NPC Types

In this section we will focus on two main types of NPCs, friendly NPCs that cooperates or helps the player, and hostile NPCs (these would traditionally be called MOBs). In most MMOGs the story behind the game revolves around some kind of conflict, since conflict is a good dramatic grip when telling a story. Given the division of NPCs into friendly and hostile NPCs all NPCs on the opposing faction in game are hostile NPCs.

3.1 Friendly NPCs

There are many NPCs that assist the player in MMOGs. Some of them are vendors where players can buy equipment or repair items. Others distribute quests for the player, where the quests most of the time involve killing hostile NPCs and collecting items that are essential in completing the quest. All these NPCs have predetermined ways of interacting with players and they are reduced to the function that they are programmed to facilitate.

A structural problem in most online worlds is that they are designed to have special places where players are meant to “socialize”. Most players will sooner or later go to a city in these games where the interaction between players is dense, and where NPCs provide different services. Our point here is that friendly NPCs could potentially have a more dynamic role in MMOGs than being vendors or quest givers. They could act as mentors tutoring new players and act as companions helping players working their way through the game to the end content. These agents will not be full surrogates for human players, but they could be a meaningful contribution to the interaction when your gaming friends are not online. If we consider making agents more responsive and interactive we should perhaps make friendly NPCs not only normative, as in that they can interpret and understand the norms of the players, but also mimic some other traits such as altruism and emotions, since altruistic actions without personal gain is something inherent in human behaviour [11]. Emotions in normative multiagent systems could be motivated through some of the sanctioning mechanisms that are used to maintain and communicate norms.

Other functions that could potentially be filled by friendly NPCs to enable more actively monitoring of norms is to enforce sanctions on for instance gold farmers, since this is a problematic behaviour that in the end leads to weakened in-game currency for all players (through mud-flation). What would the gains be from implementing friendly “law enforcement” NPCs, well one reason would be that of fairness, since Game masters (GMs) are not around in the case of a dispute between players. Disputes

that could easily be resolved most of the time with a “smart” and reactive agent that can interpret norms in a particular context.

3.2 Hostile NPCs (Mobs)

When a player is on a quest that involves exploring a cave full of dragons (hostile NPCs) the difference between encouraging instrumental play or trying to make every such quest a true adventure lies in how the NPCs behave. As mentioned above, most NPCs are fairly static and the ones that display some level of dynamic behaviour will not change their behaviour over time. This means that there is always a possibility for players to easily find a strategy in order to maximize their gain and minimize the cost of killing the dragons. If hostile NPCs could refine their tactics through cooperation and change their behaviour in response to players’ strategies, they would become harder to predict. Depending on preferences there is reason to believe that even the “achievers” from Bartle’s “Player categorisation” [1], would find NPCs with dynamic and unpredictable behaviour a much more interesting counterpart since it would demand skill and dynamic strategies to succeed in killing them.

Another scenario that would be interesting, even though it is bound to be hard to regulate the balance of a world full of such agents is, when the NPCs make up an ecosystem of their own with, e.g., predators and prey animals. If we decide to create a digital world where people will be part of some kind of balance between computer generated agents and human agents, it is fair (and much more interesting) if the NPCs actually have different societies with distinguishable norms of their own, and strategies to survive from all predators. A problem that is bound to happen in such a system is that prey animal can become an exhausted asset, since the spawn rate is the only way to regulate their occurrence that is if we are not going to implement evolutionary strategies as well.

4 How to realize our vision

To start with, we need a way of describing MMOGs on a contextual level, where we can get an understanding of the components from a macro level of the whole system, down to a detailed view of agents and how they interact. We have chosen Parsons’ “general theory of action” for the contextual level.

Next, we need a way to model how the interaction between agents works. Signalling has been used as a top-level construct in earlier attempts to implement normative multiagent systems [9]. We would however like to propose some alterations to existing systems to also incorporate mechanisms for trust and altruism between agents.

In addition to previous steps, we need to take a closer look at sanctions, rewards and the internal /external evaluation action taken by an agent.

5 Detailed description of a social system by Parsons

In guilds and clans, one of the most used strategies to make members get an idea about the norms of that particular society is to write them down on the forum or in some kind of rulebook. This is of course a way of signalling what kind of behaviour is

accepted in that context. But we believe that a normative multiagent system needs structure and differentiation into different subareas and levels to be useful, since the rules and norms of a whole MMOG, will not be made public as in the case with guilds and clans. The norm typology that we suggested [10] as a way of differentiating ways of sanctioning norm breaches should be integrated in the contextual model on a low level, in order for us to analyze the detailed interaction of agents.

Parsons elaborated a general theory of action containing three main components and a scheme for the analysis of social systems. We argue that MMOGs is a (hybrid) social system and Parsons’ scheme is particularly suitable since it is designed to describe social systems of different sizes, ranging from societies to small social groups. This is a kind of dynamic we need in order to differentiate various levels of interaction in MMOGs.

The main components are according to Parsons “Personalities”, “Social system”, and “Culture”. “Personalities” are the individual agents of the system, with personal traits, beliefs, thoughts and ideas. Relationships and the interaction between the agents create the “social system”. The “culture” in the system is the shared ideas about the social system.

These components and the interpretation of their interdependencies could potentially be what we look for in a contextual model for MMOGs as normative multiagent systems. The system should be viewed, as a whole since the interrelations between the components is what makes a working pattern.

In order to understand Parsons model we should view social interaction or social life as units, where the units are part of a larger whole (the social system). These units can be divided into classifications such as: family, friends, school, or government. Typically all “units” have a boundary, and can be seen as part of a larger whole, where there is a noticeable difference of belonging to the group, or being on the outside of it. In essence the group should have the means internally to maintain its status as a working unit, or put differently “There are two conditions any system must meet in order to survive: it must relate effectively to its environment; it must maintain its own internal integrity” [2, p 42]. These two conditions are divided into the four “functional imperatives” that follows:

1. Adaption – Any social unit has to create the means to achieve its goals as a collective. Adaption and adaptability are the means for a social group to coordinate their efforts towards goal attainment.
2. Goal attainment – Can be described as the expected output from a social unit or its goals. In order for a social system to attain its goals it has to be responding to the needs of the environment surrounding that particular system and its context.
3. Pattern maintenance and tension management – Any social unit that will maintain its cooperation must have a shared interest or shared goal. The members of the unit should ultimately be loyal to the shared goal and work towards it in order to provide “pattern maintenance”. If this proves to be hard labour that strains the resources of the group, “tension management” is imperative for the group to rest and recuperate.
4. Integration – any social unit will have relations to other social units or individuals. They will also be part of a larger whole and in order to regulate these relations, an effort towards integration is an important part of that social unit.

Figure 1 (at the end of the article) depicts some examples of different social systems and their interdependencies.

5.1 The signalling process

If we look at normative multi agent systems, we find that one of the most important aspects for the agents in the system is how they communicate the norms of the specific society. One model to describe this is called the signalling model. A model that in certain perspectives comes close to the signalling process is the work of Savarimuthu, T. et al [9] where all actions can be interpreted as a signalling process for other agents to observe in order to find potential norms. Through a procedure where candidate norms are being chosen from a list of special events that are events of specific interest, agents evaluate what will become a norm or not. What is unclear is if the world contains norms from the beginning or not, a problem that will not occur in the case of implementing normative agents in an existing MMOG, where the norms will be inherited from human agents.

5.2 Sanctions and evaluation

If we choose only to look at how sanctions are distributed when a norm has been breached, intuitively we will only find partial information of how norms are really being communicated in a society. Sanctions are probably the most obvious way of signalling what is a norm and what is not, but what happens to rewards? When an agent happens to strengthen a norm when complying with the rules and norms of a society, this should be seen as a signal that also has effect on the norms. Our assumption is that we need a normative multiagent system with the possibility to give rewards for compliant agents and altruistic behaviour, and a memory function for each agent in the system. We have briefly discussed the cost of sanctioning, the expectations from the group, and certain cases where the sanctioning is done by an agent of a specific status as mentioned in [10]. In the case of an agent that refrains from sanctioning another agent because of the cost or because of utility, a memory function of that event could prove useful. We have to keep in mind that an agent due to its status in the group might refrain from sanctioning certain norm breaches if the cost is too high for that particular agent. Furthermore, if we think about what it means for an agent to be sanctioned it is intuitive that a received punishment/sanction leads to an evaluation both internally and externally about something that we could call the agents reputation "The signalling theory suggests that any costly action can be a signal, that is, a mechanism for establishing or preserving one's reputation" [7, p 24]. It depends on if we prefer to have a focus on which norms will be communicated in our system or if we choose to look at the interaction between agents. If normative multiagent systems research wants to prove beneficial for the game industry a shift in focus towards mimicking human systems will be of importance.

5.3 Trust and responsibility – reputation

There must be a possibility for agents to remember which agents have the same beliefs about the norms of society (based on past behaviour) and which agent have a debt and should be willing to repay us in the future (incentives). If agents cannot cooperate we will lose the internal collective good [7, p 32]. Trust is something that can be hard to explain in terms of game theory, or rather it is easy to make a model but that model will

not explain why some agents act altruistically and refrain from utilitarian strategies. When we talk about trust we use Elsters' definition: "to refrain from taking precautions against an interaction partner" [3]. Different reasons for refraining from precautions exist but one of the most reasonable ideas is that the cost of taking precautions might exceed the cost of being fooled or as mentioned before that it is an inherent behaviour in humans that would be beneficial for the interaction between agents and human agents. There are a number of reasons for trustworthiness:

- past behaviour
- incentives
- signs
- signals

A way to solve this problem is to let the agent reason about reputation and confidence as proposed by [6]. Their example proved that reasoning about reputation and confidence makes it possible to see different possibilities in the choices of whom to interact with.

6 Conclusions

On a contextual level, Parsons general theory of action provides the structure needed to further reason about social systems where agents and humans interact. A system where norms change over time and where new norms are being created and communicated can help us answer at what specific point a norm becomes a norm. Norms in their infancy are statements of some kind of functional rationale that evolve into being part of a belief system that regulates how we act in a certain context.

By introducing concepts such as trust and responsibility in order to give us more detailed and observable behaviour we add to the complexity of systems inspired by the signalling theory. We argue that these additions to the signalling process are essential to create a normative multiagent system that can be integrated in MMOGs to increase the game-play, and overall impression of the AI in this game genre.

7 Future work

We have started to create a framework for further studies in this article. It is starting to be possible to make out the outlines of a normative multiagent system that closely resembles a social system with human agents and computer agents.

However some of the concepts that have been introduced above need a closer evaluation and further studies.

Sanctions and evaluation is something that we have discussed in the past [10]. Our model needs to be complemented with literature studies and a critical evaluation of an agent's external and internal evaluation of sanctions. Trust, responsibility, and reputation have been introduced on a conceptual level in this article and some indications on the direction of future studies have been made. An evaluation of the benefits from the Repage system [8] seems to be a promising next step to further develop this line of reasoning.

We have described a norm typology [10] based on the work of Gibbs [4] as an important part of our understanding the dynamics of norms in online worlds. The norm typology will be

studied further to fill in the gaps with data from both guilds and clans in the near future.

Terminology

Farming - see grinding.
Game Master (GM) - typically an employee at the game developer that helps solving problems in the game world. Mostly they are a scarce resource and hard to get in contact with.
Grinding - when a character kills NPCs just to gain experience as fast as possible or to get some specific loot from the NPCs, as part of completing a quest. Farming on the other hand implies that a player character collects items or gold to sell it to other players, transforming in-game currency into real world currency. We will not discuss the moral or normative aspects of this behavior, other than this could be the task of NPCs to sanction players that farms money and contributes to the in-game monetary inflation (often referred to as “Mudflation”).
Level cap - the maximum level a player can reach in the game.
NPC - Non Player Character, sometimes the term “Mobs” or Mobile Objects is used. The difference between NPCs and MOBs is that every agent could be considered being a mobile object in a game world but not all agents qualify as a NPC. NPC are usually characters with a function such as presenting the player character with game content e.g. quests. MOBs are most of the time creatures that player characters can kill to get experience points and equipment/money from.
MMOG - Massively Multiplayer Online games, game worlds typically with thousands of synchronous players.

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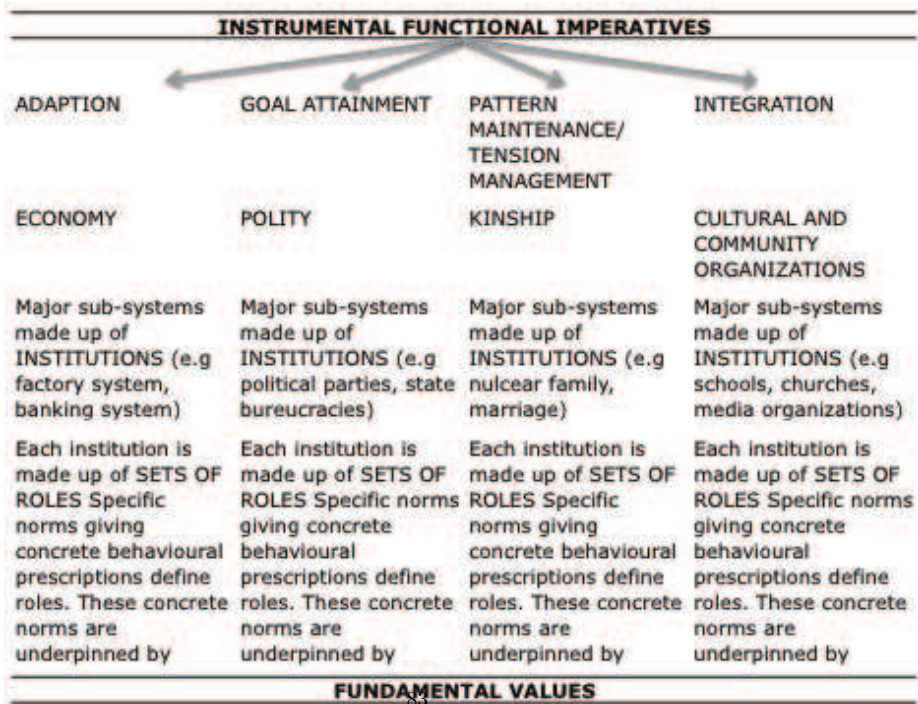


Figure 1 Parsons social system and interdependencies [2]