

The Dialectics between an Individual and His Role

- research abstract -

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1. Introduction

Agents are intelligent entities, situated in an environment and capable of flexible and autonomous behavior. Cognitive agents make use of different cognitive elements and processes in order to choose their behavior. Examples of such cognitive elements include an agent's beliefs, desires, goals, or his capacities of situation assessment or planning. In general, agents must interact to other agents in order to satisfy their desires. Because agents are not necessarily trustworthy, different mechanisms are used to ensure that the interaction takes place in a coherent manner. For example, an agent might use trust or reputation models to evaluate possible interaction partners (Sabater, 2004) or norms could specify the way agent interaction should be done (Boella and Lesmo, 2002).

Roles are often used to specify what is the expected behavior of an agent in a society. For example, a role in a negotiation protocol specifies how an agent playing it should negotiate. Or, a role and its associated norms in an agent organization specify what an agent is or is not allowed to and what it should do. There are various, more or less formal, ways in which the requirements of a role are specified. For example, one approach (Boella and van der Torre, 2003) is to agentify a role and describe it using the same cognitive elements as for an agent. We can thus talk about the beliefs or desires of a role, i.e., the beliefs/desires that an agent playing a role should have.

When an agent plays a role, its behavior and its cognitive elements and processes change. An agent playing a role is faced with the problem of integrating the cognitive elements of the role with its own. Moreover, when the internal motors of the agent change, its behavior is likely to change too. The behaviour of an agent is very different before, during and after it plays a role. An agent should also change its way of reasoning, to cope with the new

dimensions of its behavior, i.e., its mental processes are different when it plays a role.

While in some cases individuals are born playing roles or they do not have the choice of their roles, this is not always true. In open or dynamic societies or organizations, the agents might change the roles they play. Identifying how an agent's behavior and reasoning are modified by his role has a crucial importance in these cases. Before deciding whether to play a role or not, an agent should be able to assess the implications of this decision. He should thus be able to take into account what it will gain or lose by playing the role, i.e., what changes are likely to occur in his reasoning or behavior.

We are interested in the relationships that exist between an individual and his role. We therefore analyze and classify in this paper these relationships and the ways in which an individual's cognitive framework and behaviour change when playing a role. Our final objective is to integrate these relationships in the field of multi-agent systems, where artificial agents play roles in artificial organizations. However, the analysis presented in this paper is drawn from human societies – the examples used generally involve humans and not artificial agents. We therefore sometimes use the term *individual* to denote a human or artificial agent playing a role. We will often distinguish between the two cases by using the pronouns *it* for artificial agents and *(s)he* for human ones.

Playing a role changes so much the way an individual thinks and acts that he looks like a different individual. Sometimes these changes are so drastic, especially concerning the cognitive elements of the individual, that we believe the expression *wearing a role* is more appropriate than the one *playing a role*. In our view, when an individual *wears* a role, he identifies itself with it, while when it just *plays* it this is not necessarily true. We will discuss later, in Section 2.2, the difference between the two expressions.

This paper is a research abstract that does not pretend to solve the problem of what does it mean for an individual to wear a role. Instead, we make the first steps towards answering this question by analyzing the changes that, in our view, occur when an individual plays or wears a role. We can classify these changes in those affecting directly an individual those affecting an individual's relationships with others.

2. How wearing a role affects an individual

As mentioned before, we analyze in the following the different ways in which an agent's cognitive elements or behaviour change because of the role it plays. While some of these changes could be generalized in others, for a better understanding we prefer to discuss them separately.

2.1. Adopt the role's goals or desires

Most of the related work in multi-agent systems focuses on the need for an agent to adopt the desires or goals of its role. Generally speaking, an organizational structure is composed by several roles, each of them having assigned a set of objectives (see for example the MOISE+ formalism (Hubner *et al.*, 2002)). These objectives, which might be in the form of low- or high-level goals, are supposed to become the objectives of the agent playing that role. This approach is at the base of most formal organizations: to divide the global goal of the organization into subgoals delegated to its members, which are identified by the roles they play. This is true even in less formal organizations, like the emergent ones, although in this case the role's goals are sometimes implicit.

An important aspect is how and why an autonomous agent adopts the goals of its role. As other authors point out (Dastani *et al.*, 2003), an agent has its own set of goals and the role's goals can facilitate or hinder the achievement of its goals. The way an agent adopts its role's goals depends on several factors, like its degree of autonomy, its internal motivations, the existing organizational incentives, etc. If there is no conflict between the role's and the agent's goals, then an agent will adopt its role's goals and will try to pursue them. If there is a conflict and the goals cannot be satisfied together, an agent should choose what to do: it could either not adopt the role's goals, it could adopt them and discard its own contradicting goals or it could adopt all the goals and make a decision later which of its currently contradicting goals will pursue.

Let us consider for example an agent whose goal is to read a book and a role of security member in a museum. This role has the associated goal to watch the visitors in a room, which conflicts with the agent's goal to read a book. The agent might decide to not adopt the role goal (or to adopt it and not pursue it), thus being able to pursue his own goal. Or the agent might decide to adopt the role goal and to achieve it (he watches the visitors), but keeping also his own goal. In an appropriate context, like when there are no

visitors in the room, the agent will be able to achieve his goal too. Or, the agent might discard his own goal adopting the role goal and having only this goal: he will watch the room constantly, this being the only goal it has.

2.2. Adopt the role's beliefs

As several authors point out (Boella and van der Torre, 2003), besides goals or desires, an agent should also adopt other cognitive elements from its role: the role's beliefs. Some roles have associated a set of beliefs and an agent wearing that role should have these beliefs or at least should act as it has them. The following example illustrates this situation and allows us to underline the difference between playing and wearing a role. Consider an actor who plays the role of a sick person who cannot walk. The role's belief is that the person cannot walk, while the actor has the belief he can walk. The agent/actor should adopt the role's belief and act accordingly, i.e., not walk. If it just plays the role, he will still have the contradictory belief that he can walk, but he will use the belief of his role when choosing his behaviour. If however, it wears the role, it adopts the role's belief and discards his own: he really believes he is unable to walk.

Note that this example shows the probable origin of the expression *playing a role*: actors just play a role, no-one expects an actor to identify himself with his role. However, generally in multi-agent systems there is an underlying assumption that the artificial agents identify themselves with the roles they wear.

2.3. Acquire knowledge by learning, gain access to information

Autonomous agents accept to wear a role because of the benefits they will have from this. One form of benefits is the knowledge or the access to information they acquire. In order to ensure that its members are able to achieve their roles' goals, an organization usually gives these members access to sources of information or knowledge or trains them to better perform their tasks. For example, agents are trained on how to achieve their roles' goals or they get access to libraries where additional appropriate knowledge is found. Human organizations often use mechanisms (like information letters or seminars) to spread knowledge among the members and to facilitate information exchange. While some of the knowledge acquired by an agent wearing a role is meant to ensure the satisfaction of the role's goals, this is not always the case. Agents might use this knowledge for their own interest or they can take advantage from an information source (e.g., a library) to satisfy their own personal goals.

Knowledge is power, and an agent wearing a role acquires this power, either directly (training) or indirectly (access to information sources). While having knowledge can be a desire *per se*, it can also represent a way to achieve some goals. This knowledge might come in the form of plans to achieve a goal (or planning techniques to form these plans)

or in the form of know-how to execute new actions. An agent wearing a role increases his powers due to the training, the knowledge or the access to information sources that come with the role.

2.4. Acquire new powers due to permissions and resources

The knowledge-based way is just one of the ways in which an agent acquires more powers when wearing a role. A detailed discussion of the power theory is out of the scope of this paper and we invite the interested reader to (Castelfanchi, 2002) for more information. Generally the powers an agent has depend on its physical or cognitive resources, the actions it knows to execute, the deontic conditions, etc. As discussed before, wearing a role provides an agent with knowledge and access to information sources, which means the agent acquires new powers to achieve its goals.

Agents wearing roles acquire new powers also by using the resources that come with those roles and the associated permissions. An agent receives physical resources like money, a house, a car, etc. when wearing a role, but it also receives the permission to use many of the organization's resources. For example, an agent might receive the permission to use a computer, an Internet connection, a printer, etc. These permissions are assigned to roles in order to enable the agents wearing them to satisfy the roles' goals. However, sometimes the agents use these permissions and resources for their own goals. This is why some organizations give their members permissions to use a resource (like an Internet connection) only in "professional" interests. The acquired resources and permissions enable an agent to satisfy more goals than before wearing a role or at least to satisfy them more easily.

2.5. Lose powers due to prohibitions and obligations

Unfortunately for agents, they not only gain new powers when wearing a role, but also lose some. The prohibitions associated with the role are one of the reasons for losing powers. If an agent was able to satisfy a goal, it will not be able anymore if there is a prohibition to pursue that goal or to execute a key action in the plan to achieve that goal. Note that wearing a role might imply the agent loses powers not only because something is prohibited, but also because it loses the physical access to a resource. Consider for example the case of an agent playing the role of a soldier at war. Although he has the goal to write home and this is not prohibited, he cannot do so because he cannot send the letter, as the resource postal service might be missing.

Another way an agent loses powers when wearing a role is due to the obligations it has. The role's obligations hinder an agent's powers in a more subtle way, by obliging the agent to consume resources needed for other goals.

Consider the case of an agent playing the role employee, agent who is obliged to work a number of hours per day. In this time the agent consumes much of his energy and he is thus unable to pursue his own goal to spend time with his friends. It now lacks the energy (he is tired in the evening) and the time (he works all day long) to achieve his goal.

2.6. Put powers at the disposal of the group

Losing powers due to obligations is a particular case of putting its own powers at the disposal of a group. When an agent agrees to wear a role in a group, it signs a contract with the group. This contract is more or less formal or explicit, depending on the group's nature. Contracts for wearing a role in an institution are far more formal than contracts for wearing a role in a group of friends. These contracts generally stipulate what powers will be given to the agent (resources, permissions) and lost by the agent (prohibitions, obligations). These contracts also describe which of his powers an agent puts at the disposal of the group. Consider an agent able to read and write research papers and to achieve the goal of doing research (although we cannot give a detailed plan for this goal). He has these powers and he decides to play the role of researcher in a research institute in order to increase his powers (due to money gained, access to information, etc.). He thus agrees to put at the disposal of the institute his powers of writing papers and doing research. This means that although he is still able to achieve these goals, he no longer disposes of them: he will pursue these goals whenever the institute requires and not whenever he wants too. He thus loses the access to his powers.

Because a group disposes of an agent's powers, the agent will have to use these powers whenever the group wants. The agent thus loses other powers of his own, like spending time with friends and so on. He consumes some of his resources (like his energy) by using these powers and he uses the powers because he gave away the ability to decide about them. Moreover, putting powers at the disposal of a group means that the agent's decision process is no longer autonomous: his decision process is influenced (or even controlled) by an external entity. He thus loses other powers because he is no longer free to decide to use them.

While putting powers at the disposal of the group implies an agent loses some of his powers, this is fair in the sense that the agent also gains powers, as discussed above. Unfortunately, in human organizations the situation is often worse. An agent puts at the disposal of a group more powers than what it is officially agreed on when he begins to wear a role. For example, although an agent agrees to work a number of hours each day in which the organization will dispose of his powers, the organization might ask the agent to work overtime. Or, the organization might ask an agent to use some of his personal powers on behalf of the organization, even if this was not stated in the contract. The typical example is that of an employee that is requested to take care of the organization's newsletter (or

something similar), although putting this power at the disposal of the organization was not part of the initial agreement.

To resume, wearing a role means putting some powers at the disposal of a group. An agent loses these powers because it can no longer decide whether and when to use them. It also loses other powers because it is no longer able to access them as he must access the powers the group wants. Finally, it is sometimes obliged to put even more of its own powers at the disposal of the group when requested. These “unjustified” requests can be viewed as a group’s attempt to cheat the contract with the agent and use more of the agent’s powers than agreed on. This compensates somehow the agent’s attempts to cheat by using some of the powers received for his own goals and not only for his role’s goals.

2.7. Desire the best for the group

In the case described above, an agent uses some of his powers in the group’s interest whenever it is requested. He does so because it gave away the access to these powers, either when it agreed to wear his role or when the group requested it. But why does an agent accept unjustified requests like the ones described above? One reason is that the agent is afraid that if it refuses, it might be expelled from the organization, i.e., it will no longer wear the role. Another reason is that agents, even if they are self-interested, usually desire the best for the organization they belong to.

In general, if an organization does well, then its members do well. This is not true for example in companies where even if there are more profits, they all belong to the owner of the company and the employees’ salaries do not change. However, the employees have the desire to ensure the company makes enough profits to survive, otherwise they will be without a job. The desire to ensure the best of the group it belongs to is often implicit in an agent (especially in the case of multi-agent systems), but is behind many decisions made by the agent when wearing a role in that group. This is why agents agree to put more of their powers at the disposal of the group when requested and even if they are not requested. Often agents use their personal powers (such as money, relations or time) to help the group they belong to, even if they are not explicitly requested to do so. A special case is when an agent plays two (or more) roles into different organizations and it uses the powers acquired from a role for the goals of another role. For example, a dishonest politician who has the power of choosing a company to fulfill an important contract will give this contract to one of his companies.

This desire to ensure the best of the group should be present in all roles and agents should adopt it when wearing these roles. It might affect agents’ behaviour in many ways, like using their personal powers for the best of the organization, but also by enabling a functional violation of norms (Castelfranchi, 2005). Agents could

decide to disobey the norms imposed to their roles if they believe that by doing this they increase the well-being of the organization. We believe that is important in multi-agent organizations to make explicit not only a role’s goals and norms, but only this desire with its high importance, thus enabling agents to violate norms if it’s in the organization’s best interest.

3. How wearing a role affects an individual’s relationships with others

In the previous section we discussed how an agent’s goals, beliefs, knowledge or powers are affected by the fact it wears a role. In this section we discuss how its relationships with other agents and thus its behaviour are affected too.

3.1. The *count-as* effect

One of the most interesting ways in which an agent’s behaviour is modified by playing a role is because of its new status. The physical or communicational actions of an agent have a completely different meaning when it wears a role than before wearing it. When an agent that wears a role executes an action, the other agents interpret this as being the role that executed the action, and not the agent. The same thing happens for the communication between agents, for example, a command has a different meaning coming from a role with authority or from a simple agent. It is very important for agents to have a means to express whether their actions (or communications) *count as* the actions (communications) of their role or not.

Even if an agent specifies that its action does not count as the action of its role, but as a personal action, other agents might interpret this as the role’s action. This has a particular consequence for the beliefs of an agent playing a role, who might have personal beliefs different from the beliefs of its role. Not only its behaviour should reflect the beliefs of the role (as discussed before), but it cannot communicate to others its personal beliefs. This is usually the case of public persons, like politicians, who cannot express their personal beliefs about a subject because their role is supposed to have different beliefs.

The way an agent is viewed by others changes dramatically after it wears a role. All of its actions, communications, beliefs, etc. are interpreted as being the ones of its role. Agents should be aware of this and act accordingly, which limits the ways they can behave. Moreover, in human societies and for certain roles, it is impossible for agents to stop wearing a role, even temporarily.

3.2. Acquire or lose powers due to power over relationships

There are many existing relationships between roles in an organization, relationships that are inherited by the agents wearing the roles. The authority relationship is the most

common: a “superior” role has authority over an “inferior” role for something. Generally, this authority relationship is not absolute, for example a role has authority over another for a goal, but not for all possible goals. However, there are cases in which the authority is absolute, as in the master-slave relationship. The meaning of authority is that whenever an agent wearing the superior role delegates a goal (or an action, etc.) to an agent wearing an inferior role, the latter must adopt and achieve it.

The powers of an agent wearing a role are modified by these relationships. Because an agent wears a role with authority over another, it gains a power over the agent playing the inferior role. This means that the first agent disposes whenever it wants of one of the powers of the second agent (the power for which it has authority). The first agent thus gains an indirect power, while the second agent loses its power, by losing the possibility to decide about it.

The higher the role of an agent in the role hierarchy, the more indirect powers it gains. However, due to the relative nature of authority, an agent could have power over others for something, while the others will have power over it for something else. In democratic societies, there is no absolute power, no matter how high an agent’s role is in the society, the lower members always have some power over him. This is not true in despotic societies, where the despot – the agent wearing the highest role – has power over all other agents, who do not have any power over him.

3.3. The dependence relationships of a role and the ones of an individual

Authority is not the only relationship that gives agents power over each other. Even in a non-organizational context, when not wearing any roles, agents depend on each other. These dependence relationships (Sichman *et al.*, 1994) are due to the lack of power of achieving goals, generally because of the lack of the needed resources or know-how. The dependence relationship is also relative, i.e., an agent might depend on another for a power and not for another power. Due to these dependencies, agents gain power over and powers of influencing each other. An agent could use dependence networks – maps of the relationships between agents due to the lack of powers – to reason with whom and how to interact. These networks are dynamic, in the sense that these relationships change when powers are acquired or lost.

Not only agents have dependence networks, but also roles (Hannoun *et al.*, 1998). More or less formal dependence relationships exist between roles in organizations. Agents wearing the roles inherit these relationships and usually are obliged to use the role’s dependence network instead of their own. For example, a director depends on his secretary to make his appointments. It does not matter if the director agent has the power of making his own appointments and thus not depending on anyone. Nor does it matter that this agent prefers to use another agent. When wearing the role

of a director, this agent is obliged to depend on his secretary for this task and to use the agent wearing that role to make appointments.

Wearing a role modifies an agent’s dependence network because of the powers it gains or loses, as discussed before. But it also inherits the dependence network of his role and sometimes he is obliged to use this network instead of his own. An agent should not solve only conflicts between his goals, beliefs, etc., and the ones of his role, but also conflicts between his personal dependences and those of his role. An interesting situation is when an agent wears several roles in the same time. He must put together and use several dependence networks, situation from which an agent might benefit sometimes. This is the case of the dishonest politician described before, who uses powers or dependencies of a role (politician) to the benefit of another role (company owner).

3.4. Being more (or less) trusted by others

Trust relationships (Sabater, 2004) between agents change when they wear roles. An agent can be trusted by others simply because it plays a role in an institution (institutional trust (Castelfranchi and Falcone, 1998)). The others’ trust in it comes from their beliefs in the characteristics of the role inherited by the agent. They believe that this agent inherited from its role competence and motivations, thus becoming more trustworthy. The typical example is the trust people have in a doctor, simply because of their belief that wearing the role of doctor implies for the agent to be competent and to have several goals (like to heal, etc.).

Another reason to trust more an agent wearing a role in a group is because the group acts of an enforcer: there are incentives for an agent to obey the role’s specifications. Using the same example as before, people trust a doctor not only because of his associated competence and motivations, but also because they believe he will be sanctioned if he does not fulfill his role’s goals. This is an example of the count-as effect: agents do not trust another agent to behave in a given way, but they consider its behaviour counts as the one of its role and they believe the role’s behaviour will be the one expected. We believe that trust is one of the reasons agents decide to wear roles: the trust the others will have in them will enable an easier satisfaction of their desires. It is also worth mentioning that sometimes an agent wearing a role is obliged to trust or mistrust another agent. An agent does not adopt only goals, beliefs, dependencies, etc., from a role, but also trust relationships.

4. Conclusions

In the previous sections we presented several ways in which we believe an individual is affected when he plays or wears a role. This analysis might not be exhaustive and different situations or changes might be considered. We believe that identifying these changes and analyzing the

dialectics between an individual and his role is useful, especially in open societies. We believe it is important for an individual to be able to estimate how his cognitive framework and behaviour will likely change when he plays a role, thus being able to decide whether to play a role or to choose between several available roles.

The analysis provided in this research abstract represents only a first step towards our objective to enable artificial agents with this reasoning. Our examples were drawn from human societies and our discussion uses several concepts that are not yet used in the field of multi-agent systems. Future steps consist in better identifying the relationships between an agent and its role, formalizing the concepts used and thus providing formal and explicit means for artificial agents to reason about their roles.

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