University of Utrecht

Bachelor thesis Artificial Intelligence

Structuring Social Practices

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Abstract

In this thesis I will take a look at social practices using a model proposed by Dignum and Dignum [3]. With this model I will delve deeper in a single practice and look for possible inheritance when zoomed in. In the subsequent section that I will try to make a structure for a single practice going from an abstract level to a concrete practice and I will finally look at relations between different practices and how they influence each other. This is all done to start building a foundation from where others can build upon in an attempt to make a multi agent system which can survive in a social practice.

Contents

1 Introduction

Social practices are a part of our everyday life, may it be our morning commute, the first meeting on a Monday morning or grabbing a beer with friends. Every social interaction we make, big or small, is part of a social practice. When participating in a social practice, there are a lot of social rules on how to behave, how to be dressed or how to react in certain situations. Attending in yoga pants during a big company meeting might be frowned upon, but wearing them during a workout in the company gym is probably not a problem. Likewise, interrupting a friend in a bar will not be as bad as interrupting your boss during your half year review. However, one could argue that the meeting you have with your friends in a bar has the same parent, so to speak, as your half year review meeting. They are both meetings, most likely you planned it in advance, agreed on a time and place and during the meeting you will sit and talk. It might therefor be possible to describe some kind of structure for these social practices, where you start with a general, abstract practice and end with a very specific, concrete practice. But what is the point in making such structure? How can a structure of a social practice like this benefit intelligent agents and therefore artificial intelligence in general? We will take a look at these questions in section 5

An other part of my report will discuss the notion that every practice we do is a part of an other practice, like a handshake is a part of a meeting. To get a little head start on the idea, I will use the ontology used to represent knowledge [5]. It will probably not fit perfectly, but we can use it as an starting point. Upper ontology uses a framework in which the more general concepts are on top and the more specific concepts at the bottom.By working our way down, we will get more and more details.

Finally I will discuss social practices and their influence on other social practices. Some practices are connected in a special way, like having to do them in a specific order, and not the other way around. Sometimes a practice will hinder a future practice from being done. These relations will be explored in a later section.

Before we can do all that, I will introduce the general idea of what a social practice is in section 2 and I will introduce a model which is able to give us a somewhat formal way of describing these social practices in section 3. Section 4 will discuss the social practices within a parent social practice. In section 5 we will see that when you start with an abstract idea of a practice, you can find a variety concrete practices. Section 6 will focus on different kinds of relations between practices. And finally I will draw my conclusions in section 7.

2 What is a Social Practice

Social Practice Theory is a sociological theory, which is concerned with groups of people and their (inter)actions. Although the individuals in these groups carry out practices, this theory is not based on individuals and the perspectives of single agents, but on groups of individuals. However, in order to shift the perspective to the individual, which is needed to use it for our purpose, we need to know how we can represent this for a single agent. We want to do shift the perspective because we want our intelligent software agents to think for themselves when they are socially interacting with others. Knowing how an individual sees these social practices helps us determine in what kind of social practice the agent is and how the agent should behave. Social Practice Theory is a general theory about a practice and in reality, not every individual has the exact same representation model. These differences are a result of individual experiences. Trying to make the best generalization would be a good start to get our agents going and could maybe result in self correcting behaviour in future agents when they recognize their behaviour was not proper.

2.1 Reckwitz's Social Practices

An important philosopher on this subject is Andreas Reckwitz. He describes a practice as follows:
"A practice (Praktik) is a routinized type of behaviour which consists of several elements, interconnected to one other: forms of bodily activities, forms of mental activities, things and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge. A practice (...) forms so to speak a block whose existence necessarily depends on the existence and specic in-terconnectedness of these elements, and which cannot be reduced to any one of these single elements." [4]

The elements he talks about, can be classified in three categories: materials, meanings and competences:

- Materials concerns all the physical aspects of a social practice. Things and forms of bodily activities fall in this category, according to Reckwitz. He names form of mental activities as a possible aspect as well.
- Meaning concerns everything that is connected to the physical level in terms of interpretation, understanding, etc. Reckwitz's states of

emotion, motivational knowledge and the use of things would be found in this category.

- Competence concerns the skills, knowledge and competences that are needed to perform actions within the social practice. Reckwitz's background knowlegde in the form of understanding and know-how count as elements of this category.

The individual is the link between these broad concepts. The concepts of meaning and competence are inherent to an individual. This does however not mean they are restricted to in a single individual or that they can not change over time, because these concepts are subject to learning. On the contrary, the materials are only used by this individual. These concepts are very broad and vague, and they do not provide a structured representation of social practices. Therefore, in the next section, I will show a model of representation.

3 A Model for Social Practices

For my thesis, I will be using a representation model proposed by Dignum and Dignum [3], which is a model of social practices that gives a more concrete representation of the concepts Reckwitz provided. The model represents the relevant parts for an actor in one single social practice. It is possible that this model is different for other participants of that same social practice, because everyone has there own perspective. In general, the model should provide a quick, but precise representation of the situation.

Table 1 gives an example of a social practice that uses the following scenario: A few co-workers are working on a company project. They started some time a go and have already finished some small deadlines. They decided to have a lunch meeting in order to discuss the past deadlines, plan for new ones and to get to know each other better.

3.1 Physical Context

The model starts with the physical context, which describes all the physical elements in the social practice. These physical aspects are a representation of the material part of the social practice theory, as it contains the objects, the actors and the location. However, it does not completely cover this category, because it does not contain the activity part. An argument for this particular choice is that this split provides a better separation between the

Table 1: The Model

Concepts	Lunch Meeting
Physical Context	
Resources	Table, Chairs, Food, Drinks
Places	Restaurant
Actors	Co-workers
Social Context	
Social Interpretation	Functional meeting in a informal way
Roles	Project leader, New colleague, The funny colleague
Norms	Respect each other,
Activities	Discussing work-related topic, gossip, eat, drink, ask someone what he has contributed to a project
Plan Patterns	start – order food – discuss topics – end
Meaning	Getting to know each other, discus small problems, call someone out for not doing the work
Competences	Work at the company, having lunch

situation and the performance of the social practice. The three subgroups of the physical context each represent different aspects of the physical environment.

- Resources are all the objects that are relevant to the social practice. Simple things as chairs and a table are relevant to a lunch meeting. The food is also relevant for this kind of meeting, but for meetings at the company it may not be, even if there is some food in the room. Of course, not every object in the room is relevant. Whether there is a painting on the wall or not, may be completely irrelevant, so this painting is not one of the object in our sum of objects.

- Places are all the relevant locations of the social practice. In this case this is solely the room where the meeting is held, but sometimes other places can be relevant. The meeting could for instance have already started when walking to the restaurant, or have continued with gossip in the bathroom. In these instances it may be relevant to include different locations, or divide the restaurant into different entities, such as the dining room and the bathroom.

- Actors are all the people involved in the social practice. This consists of all the co-workers who are having the meeting, but maybe also the waitress, if she has a relevant role in the matter.

3.2 Social Context

The social context is connected to the physical layer. It gives an interpretation to the objects, places and actors and is divided into three subcategories as well.

- Social Interpretation provides the social layer to almost everything, with the exception of the actors. It gives a social context for objects, places and situations of the social practice. This concept is very broad and it therefore remains rather vague. For example, the social interpretation of a normal chair is that it is intended for sitting. However, if there is a slightly bigger chair at the head of the table, the social interpretation for this chair can for instance be that it is meant for the project leader, or some sort of manager. Sometimes a slight physical difference can represent a big social difference. This means that an agent has to recognize these slight differences in order to be able to function correctly. The location of the social practice naturally has a social interpretation as well. A meeting in a restaurant makes it a lot more informal than when it is held in a conference room.

- Roles are given to the actors and provide a description of the type of behaviour we can expect from them. From the natural leader of the group of co-workers, we can expect some managing behaviour. The funny guy makes jokes and the shy guy has to be told to speak, otherwise he would be silent the whole meeting. These roles are in no way set in stone. Even though someone is shy, he can still be very vocal on a point he does not agree with. Being a project leader does not mean you have the competence of being a managing person. We can use these roles to anticipate certain behaviour from other agents or persons, but we have to be aware that behaviour is not always predictable.

- Norms are semi-official rules that define behaviour within a social practice. A lot of norms are not bound to one type of social practice. Listening to people, waiting for your turn to speak or even wearing clothes can be listed as norms. In our small model, it is not necessary to sum up all these almost global norms. Instead we will focus on norms that are different from the deviant norms. For example, drinking a glass of beer during a work related meeting might sound crazy, but certain particular situations (such as the meeting in a bar), the employees might be allowed to drink one.

3.3 Activities

Activities are the potential actions that can be expected within the social practice, either from the agent himself or from others within the same social practice. Because these are potential actions, it is not necessary that all of them are preformed. Having some gossip during the meeting is a possibility, but that is by no means a recurring part of the meeting. The same characteristics which apply to the physical aspects apply to activities when you look at the scope of the social practice. Taking a sip of water is technically an activity, but within the scope of our practice and the depth of our details we are not going to include it in our model. In section 4 we will see that when we zoom in on a practice, the activities we skip now, will rise to the surface.

3.4 Plan Patterns

Plan patterns describe a possible plan that the agent could follow. It structures activities into a sequence of actions. Plan patterns can be used to help in plan generation, for they limit the number of possible actions the agent has to consider. For example, if there is a norm which states that the meeting will officially start when the food is served, the agent does not have to think about meeting-topics if he does not see food on the table. Important to notice is that these patterns are not scripts, but merely provide guidance. There could be a situation in which it takes a lot of time before the food is served and there is only half an hour to discuss matters, so the project leader decides to start the meeting before there is any food on the table.

3.5 Meaning

Meaning is a concept that is strongly connected to plans and activities. It defines their social meaning and the effects of the activities on the social landscape. Some meanings are pretty straightforward, like ticking on your glass to get attention. Other activities can be rather ambiguous. If someone during this meeting asks someone else to tell what he has done, the meaning may be to call him out because he knows that the other person did not do his job. However, if the person he calls out is kind of new and he knows he has done a good job, the meaning could be the opposite.

3.6 Competences

Competences are the capabilities an agent should posses to be able to perform the activities within the social practice. You can compare it with the concept of competence from Reckwitz. Competences include all types of capabilities: skill, know-how, physical and mental abilities. Besides these types, sometimes an agent is simply not permitted to do a certain activity. He would technically be able to do it, but maybe laws or social norms restrict him in doing so.

4 The Part-Of Relation

4.1 A Logical Representation

Now that we have a definition and model of our social practice, we can start looking more in depth and detailed to our example. In the introduction, I mentioned upper ontology as a way scientist have described physical items. Lets expend a bit on this theory. Russel and Norvig [5] use first-order logic to describe membership of object in categories and properties of these objects. Take for example a particular basketball such as BB_9. Using first-order logic they can describe properties of this basketball like the fact that it is a member of the category Basketballs, that this category is a subcategory of balls and they can ascribe properties such as the fact that a basketball is spherical. We can look at this logic to get somewhat of an idea how we can represent things. However, for our social practice model, first-order logic is simply not sufficient. As show by Dignum and Dignum [2], who did research on describing a logic for agent organization, which has a lot in common with the social practice model, and they used different kinds of modal logic, like the time temporal logic CTL for the environment, the logical theory introduced by Kanger-Lindahl-Prn and abstract logics of agents agency for agent activity to accomplish a genuine start at describing a formal representation.

4.2 Applying it on a Social Practice

Because creating a sound and complete logic system for our model would be beyond the reach of this thesis, I will be using just a small aspect of it and see if we can relate it to our social practices. The part we are going to use is the subcategory. You can see a subcategory as a Part-Of relation. Just like Utrecht is a part of the Netherlands, is a part of Europe. The relation is a transitive relation and because of that, we can safely infer from this that

Table 2: The Model for a Subpractice

Concepts	Greeting in the Lunch meeting
Physical Context	
Resources	Hand, mouth, table, chairs
Places	Restaurant
Actors	Coworkers
Social Context	
Social Interpretation	A respectful start of the meeting
Roles	Equal coworker, higher coworker
Norms	Respect each other
Activities	Shaking hands, small talk
Plan Patterns	start – shake hands – small talk – sit down – end
Meaning	Start the meeting respecting each other
Competences	Work at the company, having lunch

Utrecht is a part of Europe. The Part-Of relation is reflexive as well, which means that everything is a part of itself. The question we want to answer is: does this type of relation work with social practices as well?
If we look at our own social practice, our lunch meeting, we can use the Part-Of relation as just described to say that this meeting is a part of our workday. A workday can also be describe a social practice, it is just a bit bigger and mostly consists of other social practices, like our lunch meeting. We could also go the other way and say that talking about a single point from the meeting agenda is a part of our lunch meeting. With this notion, we could say that the lunch meeting is also a social practice that consists of a lot of other social practices. In the object ontology, these subcategories inherited properties from their parents. Is this also the case with our social practice Part-Of relation?

To get to a place where we can see if this inheritance is present, we need to know what practices our practice consists of. We can use our activities as a starting point for this. Possible practices within this practice could be greeting co-workers, ordering food, starting the meeting with a word from the project leader, discussing the work that has been done and maybe end with a round of questions. Let's, for starters, take the greeting as our first subpractice [table2]. Does this practice share the same properties as our parent practice? To figure this out we are going to look at every part of the model and compare it with its counterpart in the parent practice.

4.2.1 Physical Context

Like last time, we are starting with the physical context. At first glance we see that there are some new ones. Some are the same and there are a few left out. For the ones that remained, we can easily say that they were inherited from our parent practice. But where did the new ones come from? And where did the other ones go? When looking at a subpractice, you are zooming in on the parent practice, and by doing that, a part of the physical context becomes irrelevant. The food that our subjects are going to eat is not yet in the picture, so we do not include it in our model. The new ones are here because they became relevant by zooming in on our practice. In our bigger picture we are not summing up all the practices which might potentially be used. We only write down the most important practices. When zooming in, smaller things become more important. From this, we can conclude that the Physical Context is not necessarily inherited by its subpractices.

4.2.2 Social Context

In the social context we kind of see a similar thing. Some parts stay, some go and some new ones appear. However, in contrast to the physical context, some things are not visible anymore, but when you look closer, they are still here. In our bigger social practice, we said the meeting was an informal meeting, which gives the meeting a certain vibe. An informal greeting could be like a high five, followed by a question about last weekend or the result of a local football club. So the informal notion from our parent practice is something we do not write down anymore, but we can have it in our subconsciousness. Properties like formality and functionality are properties that slip through every subpractice and probably their subpractices as well. When thinking about the bigger picture, we can see more clearly what these social goals are, but zoomed in, it is a lot harder to see this, even though we are still pursuing these goals. These subpractices do not really inherit these properties, like our object did, but there is still context to be gained from these goals.

4.2.3 Activities & Plan Patterns

We can be pretty straightforward about the inheritance of activities and plan pattern. Most of the time, the whole subpractice was described as one activity or one part of the plan pattern. This means they were already in our bigger practice and due to this, inheritance is out of the question. Sometimes the subpractice is a part of the plan pattern of the parent practice. You can take more than one piece of the plan pattern and use these as one subpractice.

Maybe the parent practice had included introducing yourself and shaking hands as two parts in the plan pattern, but you want the greeting to be one subpractice.

4.2.4 Meaning

The meaning of the subpractice is pretty much the same as the meaning of our parent practice. Our meaning is formed by the goals we want to achieve with our activities. These subpractices have their own subgoals, which have a 'Part-Of' relation with the goals of the parent practice.

4.2.5 Competences

The competences for our subpractice are practically the same as for our parent practice. When doing the parent practice, you should be able to do the subpractices. In the list of competences of the subpractice you will see a more detailed version of the competences of the parent practice. When a parent practice states that you should be able to greet, the subpractice might state that you should know how to introduce yourself and how to shake hands. These competences are subsets of the competence in the parent practice.

4.3 Conclusion

So what can we say about the inheritance of properties if we zoom in on a practice? Inheritance is not as simple as it is in the ontology of knowledge representation. For our physical context we could say something like: If it is used in the subpractice, it will be inherited from the practice, even though we can not always see it in our model of the parent practice. Social context is a bit harder to describe. Because it does not really inherit, but gives a certain context to the subpractice, it needs a more complicated logic to fully describe what is does. When a social practice has a Part-Of relation with an other practice, we can conclude that there is some kind of inheritance, but to fully grasp this notion, we need a more sound and complete logic to describe these practices and to see what is inherited.

5 Abstract to Concrete

An other way to look at our social practice is in an abstract to concrete way. A lunch meeting on Monday the third of May 2016 at 9 o'clock at the university canteen is a very specific, concrete, example of one social practice in the category "Meetings". However, a meeting with your friends at a pub

to discuss your next vacation destination is also a social practice which falls into the same category. We can obviously not use the same completion of our model for both practices, but there may be some key properties that we can find in certain groups of social practices. To look for these properties, I am going to structure these practices in the form of a tree. At the root of this tree is the general, the most abstract, notion "Meeting". Every single meeting can be placed underneath this root, from our lunch meeting to our friends in the pub. Every time we go a node lower in our tree, we get a little more concrete, fill out a little more details. Until, at our leaf, we have a practice as discussed in the beginning of this section.
The question may rise; why would we want to make such tree? Well, if we place an agent in a room with a bunch of people and the only thing the agent knows is that he is a part of a certain meeting, this agent could potentially make use of such tree to figure out in what kind of meeting he is. He can look around and pick up critical aspects of the meeting and go down one node in the tree every time he figures something out. Because our tree goes from an abstract level to more concrete levels of the social practice, you could say that there is a 'is-a' relation between a parent node and its children. Every child 'is-a' more concrete version of its parent. For example, if the parent is a business meeting, its child, which could be something like an internal business meeting, is still a form of a business meeting. By going down in this tree our agent can adapt his behaviour accordingly and eventually fit right in. In the end, the aim of the agent is to get as concrete as possible.
In order to be able make a tree structure for our social practice, we need to find certain criteria, which are needed to derive how we split our social practices. Also, we have to take a closer look at this 'is-a' relation and see if practices get more concrete, when they inherit their parents' properties.

5.1 Where do we find these Criteria?

As we indicated in the previous section, we are going to use our model as a starting point to find the criteria that make a tree structure possible. We will use the model of our lunch meeting as an example, though we are going to use another example to try to see if our criteria can be generalized.

5.1.1 Physical Context

We start with the physical context; the resources, places and actors. Is a social practice bound to a certain environment, and if so, does the environment determine the social practice? Or does the social practice determine the environment? If we look at our lunch meeting, we see that it is in a

restaurant, but it might as well be in a bar or maybe in a park on a sunny day. The environment is not certain for a specific meeting. We might be able to exlude several locations, but we cannot exactly pin point one specific place where it should be held. This feature makes it hard for us to be able to extract criteria from this aspect. For the other two aspects of the physical context we could use the same reasoning. The resources may help us, but a lot of them are random and the practice could be done without them. Actors also have this problem. Maybe not to in the same way, but a lunch meeting is still a lunch meeting if one of the colleagues is sick.

5.1.2 Social Context

The social context gives us a goal for a social practice, which is independent of the physical context. To give an example, the role of an actor gives that actor a motivation. If you look at the physical context, every colleague is just a colleague, but when one of them has the role of project leader, it gives him a motivation to get on with the meeting and to get things done. Without this role, the other colleagues may have no reason to do anything and the lunch meeting would just become a normal lunch. These kinds of motivations are captured in the social interpretation. In our example, the goal of the meeting is to be functional. It can not all be fun and games, things have to be done. However, it is also informal, which could mean that the funny colleague is allowed to make his occasionally joke. The concept of giving motivation to social practice, may give us a good way to extract criteria. It is important to know if our meeting is a functional or a non-functional meeting, for we may need to prepare for the way we act during this meeting.

5.1.3 Activities

There is a wide variety of things we can do during our social practice, called activities. They are, like the physical resources, determined by our goals. You could argue that they are a direct consequence of our social interpretation. If your goal is to be functional, than your activities will be focused to accomplish a functional meeting. An activity like "debate recent results", "talking about future goals" and "giving feedback to each other" can be helpful when thriving for such goals. Of course, there will also be activities that do not directly result in us getting nearer our goal, but they will always be there. Because activities are a result of the social interpretation, I think getting new criteria from this category is not viable.

5.1.4 Plan Patterns

A plan pattern is a way to create order in your activities, which one could you do before an other one. The patterns are not set in stone, it is just an indication of the global way of how things could be done. Most of the time when you are in a restaurant, you will be eating your food before you pay. However, in a lot of fast food restaurants, this plan pattern is turned around. Getting criteria from this section will be hard because this section is easily changed.

5.1.5 Meaning

Meaning is a tricky part of our model. Meaning gives reason for activities. It gives an answer to the question: "Why are we doing the activity?". Ordering food has the meaning of eating it, raising your hand has the meaning of wanting to say something. It shows you a goal for just one of the activities. As mentioned in the section 4, sometimes these activities are social practices themselves. The meaning of this activity then becomes the social interpretation of that practice. I think we could get a criterion from the meaning, but most likely, it will repeat the ones we already got from the social interpretation.

5.1.6 Competences

Last but not least in our model are the competences. These are the things you are literally able to do. Sometimes you are not able to do things, due to physical limitation or limits imposed by function or law. When thinking about competences and criteria, you can say that the competences are established after creating the social practice. It is not a coincidence that the competences are the last part of our model.

5.1.7 Conclusion

From this section we can conclude that the social context,and the social interpretation in particular, can help us find good criteria. In the following part, we are going to look into this a little deeper.

5.2 Criteria

We have to figure out what the criteria are, which are needed to create a tree structure. However, what does a criterion look like? Are there different

kinds of criteria? ow we are trying to figure out what these criteria are, but before that, we might want to know what type of criteria we may find.

5.2.1 Boolean Criteria

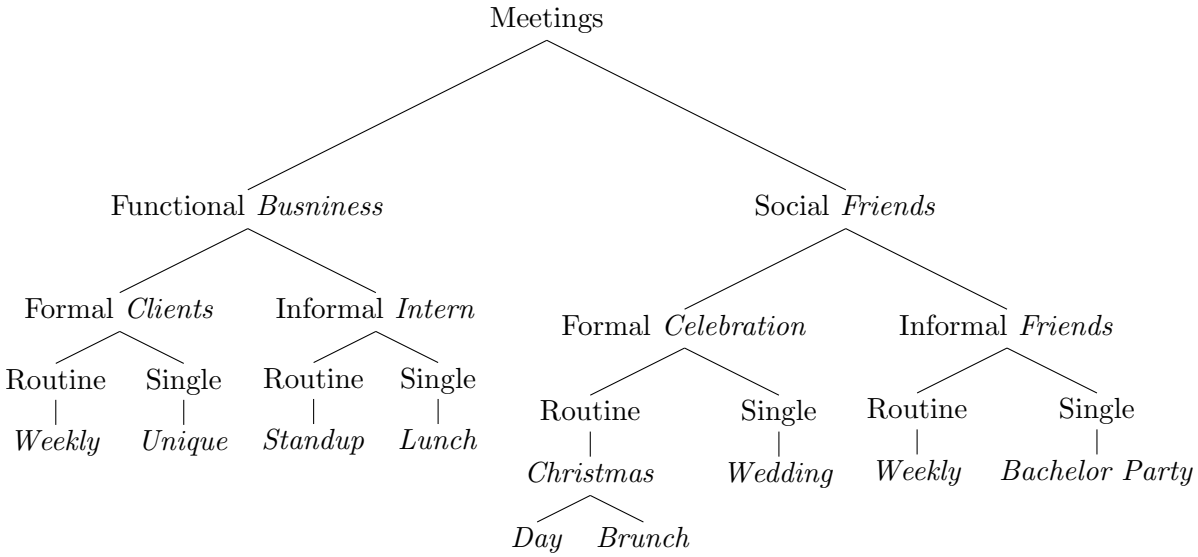
Boolean Criteria are the criteria that split our set of possible practices into two parts. If you are not part of one side, you are part of the other. There is no third option. In our section about Social Context we already pointed out one of these, namely functionality. Either a meeting is functional, or it is not. A name for this counterpart could be social. That way we can split our meetings into functional meetings and social meetings. The lunch meeting is an element of the functional meetings. An example of a social meeting could be a birthday party. It has, of course, some function, but the main vibe of this meeting is that it is a social gathering of people celebrating the birthday of one person.
If we look at the social context of our lunch meeting, we see that it is an informal meeting as well. Formality could also be a good criterion to split our set. A meeting is either formal, or it is not. There is no middle ground. A more formal meeting could be a meeting with a different company who likes to buy your product. The men are supposed to wear suits, there are conventions concerning who may talk when and so on.
If you do have these meetings every week, the mindset in which you are doing them will change. You may get less influenced by your nerves or become less exited, and they may even become more of a chore than a challenge. Even though the physical context may not be changing, the vibe of a weekly meeting is different from a meeting that happens only ones. This routine, when a meeting is done routinely based, could also be a criterion. The lunch meeting could be a one time thing, just to get the spirits of the employees up, something that would not work as well if it was done every week.

5.2.2 Open Criteria

Another type of criterion is the open criterion. This type of criterion does not necessarily split our set in two, but it can split it into infinite partitions. A great example of this kind of criterion is time consumption. A meeting can be short,long or somewhere in between. This criterion is very low in our tree, because it is a very concrete criterion. It does, however, say something about the goals of the practice. If someone schedules an hour long meeting for your yearly review or someone schedules just ten minutes, this might indicate that that person has a different approach to it. Another property of these open criteria is that they do not necessarily have to be there.

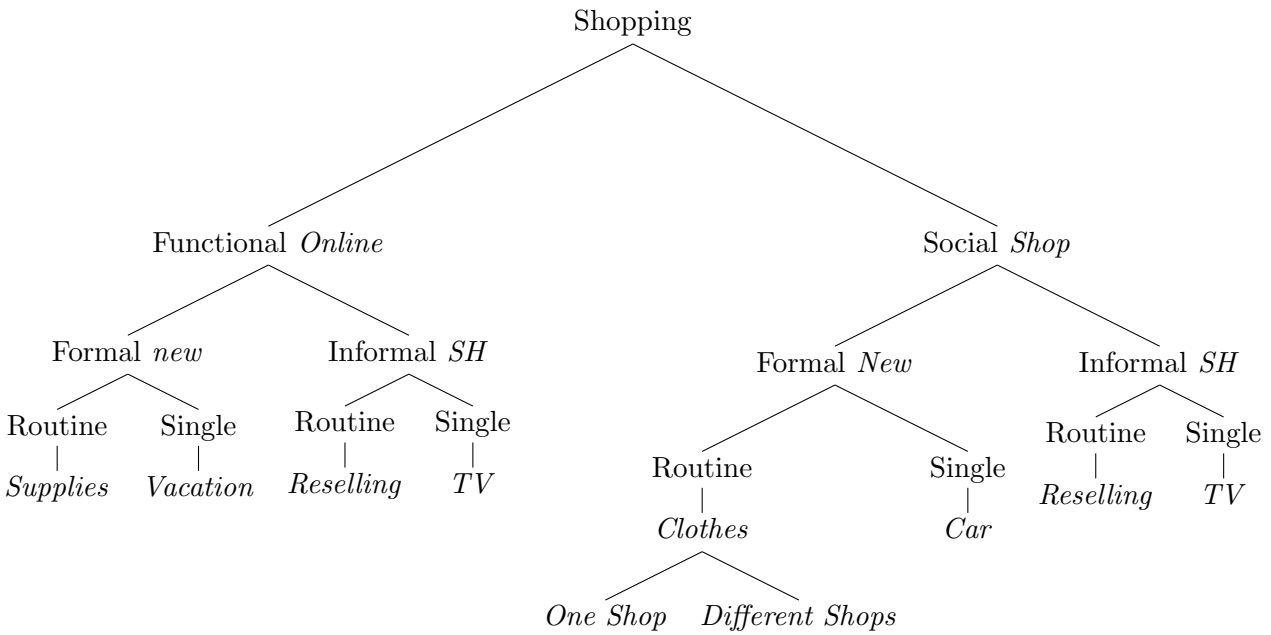
5.3 Generalization

In order to validate if these criteria can be generalized, I've put together two trees using two different types of social practice, but the same tree layout. To be able to compare these trees, I will first explain its contents.



5.3.1 Meetings Tree

I have made the Meetings Tree first, because in my research for criteria I used this practice as an example. The root is of course the main subject of the tree, in this case 'Meetings'. Then I started using my Boolean criteria to split our set in two. The first set are our functional meetings. As an example I used "business meeting", because the vast majority of business meetings have a functional role. These business meetings can again be split up, this time using formality as a criterion. Formal business meetings could be a meeting with a client. Usually these meetings are more polite and have more norms in general. The informal business meeting could have the form of an internal meeting with just colleagues. And all these types of business meetings can be split up in routine meetings and single meetings.
Our social meetings can be split up in the same manner. Celebration meetings like Christmas and Weddings on the formal side and our standard gathering with friends on the other side. Below our Christmas node, there are two leafs. These are formed from our open criterion 'time'. In this example I have only used two, but one could easily think of more, like only spending the afternoon with family or maybe even two days with a sleepover.



5.3.2 Shopping Tree

The second tree has as main social practice 'Shopping' and is made of the same structure as the previous one. It starts of with splitting into two sets, one functional and one social. The functional part is made of online shopping, because this type of shopping is mostly used by people who just want to buy something and get it done with. The social part consists of shopping in a real shop. There are a lot of people who go shopping without having the intention of buying something specific, but go for the fun of shopping. When it comes to formality, I have made a distinction between shopping for new items and shopping for second hand (SH) items. New items have warranty, you pay taxes over them, etc. When buying second hand items, you do not have these rules, which makes it less formal. The last nodes consist of the routines again, some goods you buy regularly and some goods you buy just once. For our open criterion slot I have used different shopping styles, one which uses more time than the other.

5.4 Inheritance in our Structure

An important question to ask yourself now, is that if we look at our model for a very abstract meeting, how much of that is the same compared to a very concrete meeting? Or maybe even more important, what stays and what goes away when we move one node lower. If we look at the model for just the 'Meeting' in the most general way, we can see that it basically states that there are people in this meeting wanting to discuss something. We are not even able to fill in the competences, except trivial things like being able to talk and being able to get

Table 3: Abstract Meeting

Concepts	Meeting
Physical Context	
Resources	time, location
Places	location of the meeting
Actors	people in the meeting
Social Context	
Social Interpretation	discuss something
Roles	chairman
Norms	central conversation, being on time, normal behaviour
Activities	discussion
Plan Patterns	start meeting – discuss stuff – end meeting
Meaning	to talk about something
Competences	trivial

Table 4: Business Meeting

Concepts	Meeting
Physical Context	
Resources	time, location, agenda, records
Places	conference room
Actors	chairman, secretary, employees
Social Context	
Social Interpretation	discuss work related things
Roles	chairman, secretary
Norms	central conversation, being on time, normal behaviour, chairman decides who speaks, everyone did their agenda points
Activities	discuss, vote, reflect
Plan Patterns	start meeting – discuss stuff – vote – end meeting
Meaning	to talk about something, show engagement
Competences	be an employee

to the location, which we do not know. If we subsequently look at a model for a business meeting, which can be found one node lower, we see we can fill in the model a bit more detailed. The concepts of the original model are still there, like they were inherited, but they are a bit more specific. However, without a sound and complete logic of our model, we are not really able to inference that there is real inheritance, like there would be if the relation between these two practices was an 'is-a' relation. When a model says that there exists a norm 'being on time' and a more concrete model replaces that with 'being there before 10am', is this really inheritance? These two norms are different from each other, but one could argue that 'being there before 10am' counts as 'being on time' in this particular example. This 'counts as' relation replaces a value from a more abstract model to another value in a more concrete way. It does not always mean that the two values are the same, or even that they imply that they have the same interpretation. If a donor patient needs an organ, it is a norm that the doctor should not know their age. In a more concrete model of this practice, the norm 'age of patient should not be in the file' could count as 'doctor should not know the age'. The doctor can, however, ask the patient what their age is, and thus not breaking the more concrete norm, to have a conflict with the more abstract norm. This means that the 'counts as' relation is not a direct inheritance, otherwise a loophole like this would not exist. We could say that there is no real inheritance in our model, but there is something like a 'counts as' relation that could take its place. These two relations are similar, but far from the same. If someone wants really clear up the differences between inheritance and the 'counts as' relation, one must make a formal way to express it, before concluding on it.

5.5 Conclusion

When we structure the social practices from an abstract to a concrete way, we can make a nice tree using only a few criteria. As shown, we can even use some of these criteria for more than one practice. Of course, these trees are not completely comprehensive, but they give us a general idea of what kind of types a social practice exists. This could be very useful for an intelligent agent, because he can look for the criteria and using the knowledge he gains from that moving down a node in our tree. This way the agent can fill in the model with more details and use appropriate behaviour to fit in. If an agent would like to use such system, a logic has to be created to describe all the actions, norms and values in a formal way. This can get very complicated, as we saw with our inheritance example.

6 Other Dependencies

Besides the 'Part-Of' and the 'Is-a' relation, there are other dependencies for social practices. Most people have more than one social practice a day. Most of these practices look like stand alone practices, but in the background, most likely they are influenced by their surrounding practices. Some fundamental elements of our practice make it so that we have to plan our practices carefully in order to make sure we can not only attend them, but sometimes even to be able to have the right competences.

6.1 Fundamental Elements

Take a random example of a social practice, like the weekly meeting of a big company. It starts at Monday morning at nine, ends at ten and always consists of the same people. They talk about the coming week and what has to be done. It is always in the same conference room at the same time. You could say that the resources time, place and people are set in stone. If Bob, one of the members of this meeting, wants to plan an other meeting, he will have to plan it around this meeting. The resource time gives a constraint that he is simply not available every Monday morning between nine and ten. One could argue that time is a fundamental resource. One person can spend his time only once. In a formal meeting like the one in my example, Bob makes it one of his priorities to have this time available every week. The same principle applies to place . Bob can only be at one place at a time, which means he has to make sure he is in the office at Monday morning. Not only that, he also has to take into account that he will not be able to travel to the other side of the country at eleven. On the other hand, the conference room has to be available. As it can only be used by one group of people. The final fundamental resource in this meeting is the people. Without Bob and his colleagues this meeting is not the same meeting. They are the foundation of this meeting.
These three elements, time, place and people, are the fundamentals of every social practice. A social practice can not exist when one of these elements is missing. How we use these elements can differ slightly. In my example of the weekly meeting, time and place are very strict, they are always the same and every participant should be at the same place at the same time. If we look at a somewhat less formal meeting, like a group of friends meeting in a pub to make plans for their vacation, we can see that time and place can be less strict. If they make the appointment to gather around nine, they will probably start a bit later. It is in this environment one can afford to be a bit late, something which is clearly frowned upon at our business meeting. For the participants applies the same principle. Perhaps someone has a friend who is not accompanying them on their vacation, but he just wants to join the drink a beer.
When planning a social practice, we have to take these fundamental elements

into account. Bobs meeting at eleven should not be too far away from his office, otherwise he could get in trouble. This other meeting is thus influenced by our meeting at nine.

6.2 GPGP

In a paper by Lesser et al. [1], about generalized partial global planning (GPGP), they talk about plannings for actions and argue that you cannot look at one single action. Every action is influenced by its surrounding actions and there are different relations between these actions. One should look at the bigger picture to completely understand any single action. In this section, I will try to apply the relations Lesser describes in his paper to social practices. There are three general relations:

- Consumes / Limits
- Facilitates / Enables
- Hindrances / Disables

6.2.1 Consumes / Limits

Some social practices are parts of bigger projects and have to distribute resources, like money and materials, but time as well. The resources are limited and non renewable. When a big project has a deadline, every meeting the team members have cuts into their time to do actual work on the project. It is of course important to have meetings, but there is a balance in how many you need. This type of balancing is important for resources that are limited and should be considered while planning practices that use these resources.

6.2.2 Facilitates / Enables

In some cases a social practice has to be done before we can do another social practice. A great example of this is that when we have a morning meeting at the office, we have to go to work first. The social practice 'going to work' so to speak facilitates the social practice 'Having a morning meeting'. The purpose of the first practice is to facilitate the other practice. You can look at this on an infinite amount of scales. One could argue that taking a left turn with your car facilitates the next corner, for as you cannot take the second corner if you did not take the first one. You can even go into more detail, but that would only make it more complicated. It is not possible to set one scale and use it for all purposes. You have to adjust the scope for your specific purpose.

6.2.3 Hindrances / Disables

If you are in meeting A in conference room 1, you are not able to attend meeting B in conference room 2, simply because us humans can not be at two places at once. if your attendance is important for both meetings, you will hinder meeting B by attending meeting A. Meeting C, scheduled in the same conference room as meeting A is also hindered, for as there can only be one meeting in one conference room at the same time. These are just two examples of hindrance, but there are many more. In practice, most hindrances will be caused by fundamental elements of the social practice, people, places and resources like time and money.

6.3 Plan Patterns

How can we use the relations from our last section for our agents? The first thing to notice is that these kinds op relations could be helpful for our plan patterns. However, these relations are about social practices, not about stages of a single social practice. Fortunately, we have already seen in section 4 that most social practices are made up of other social practices. If we would therefor use these kinds of relations on our subpractices, we can make a better plan pattern for our parent practice.

6.3.1 Sequence

A lot of the practices we participate in are not related to each other with one of these relations. They are just done routinely one after the other. This does not mean that they facilitate each other. Take for example the practice of bringing your kids to school on your way to work. We could see this as a single practice, but in the scope we are looking at right now, we can split it into two. First you bring your kids to school and then you go to your work. This routine is done almost everyday, so one might think that bringing the kids to school facilitates going to work. This is not the case however, because for example during spring break, when the kids do not have to go to school, you are still able to get to your work. This debunks the theory that is concerns a 'facilitates' relation. These two practices are just executed in a sequence. They are done routinely after one another, but the first one does not have the purpose of facilitating the second one. This does not mean, however, that social practices in a sequence do not limit each other. When you are bringing your kids to school before work, your only option as mode of transport may be a car. If you were to use a bike, you would be either way to early at the school or too late for your work. So the practice of bringing your kids to school does influence your next practice.

6.4 Conclusion

A GPGP like approach is a possible way to look at multiple social practices. I think it is important to look at the surrounding social practices to be able to completely comprehend a single one. The relations GPGP provides can be converted to social practices. An important note is that we have a lot of routines in our social practice, but that the routines are not necessary; the practice can still be done without these sequences.

7 Conclusion and Future Work

This thesis discusses possibilities for ways to look at social practices in order to start a path where (multi)agent-systems could behave appropriately in said social practice. We started by looking at a model proposed by Dignum and Dignum to describe social practices. Using this model, I have looked into a few different approaches to look at social practices. We started by out zooming in on a concrete social practice and saw that the so called 'subpractices' had a lot in common with their parent practices, although inheritance could not yet be shown. After zooming in, we looked at the abstract levels of a single social practices and found a few criteria which can be used to make a tree, which starts with an abstract social practice in the root and concrete practices in the leafs. These trees are very basic and are far from complete, but they could be used as a start for further research. To be able to research this more, a complicated logic has to be created to be able to formalize the model. Without a formal way to express part of our model, like social interaction, roles and norms, we cannot use this information in an agent-system. Last but not least we took a look at our social practices in a horizontal way. Using GPGP as a reference, we saw that social practices are influenced by their surrounding practices and that it is important to look at a bigger scale in order to see the full picture. A lot has to be done to create a world where agents can fit in in our social practices, but I think it is possible, although it may be limited, that an agent can participate within a social practice alongside humans and other agents.

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