

A Commonsense Theory of Microsociology: Interpersonal Relationships

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Abstract

We are developing an ontology of microsocial concepts for use in an instructional system for teaching cross-cultural communication. We report here on that part of the ontology relating to interpersonal relationships. We first explicate the key concepts of commitment, shared plans, and good will. Then in terms of these we present a formal account of the host-guest relationship.

1 Introduction

We have been developing a commonsense theory, or ontology, of microsociological concepts, to support an instructional system for teaching cross-cultural communication. By microsociology we mean the sociology of small groups, prior to large-scale institutions, including those aspects of social life that we would have had in pre-modern times. This includes concepts relating to interpersonal relations; group structure and roles; the presentation of the social self; authority, compliance, and sanctions; and conflict, negotiation, and resolution. This is in contrast with macrosociology, which concerns large-scale institutions.

In our project we have focused on microsociology as the most likely locus for intercultural differences. There can be different beliefs in any domain. But in the physical domain, the world imposes tight constraints on what we can believe about it; all cultures have concepts of “up” and “down”. The macrosocial domain is heavily influenced by global culture; all airports are alike. By contrast, the microsocial domain is less constrained by the real world because mutual beliefs and shared plans are constitutive of reality, and it is heavily influenced by traditional, pre-global culture.

Our ontology provides a conceptual vocabulary for expressing rules of behavior for conversational agents in an instructional system. To insure adequate coverage, we employ a detailed data development process that begins with interviews of subject matter experts (currently, native speakers of Dari who have lived in urban Afghanistan) by a team of anthropologists. The interview material is annotated with ethnographic observations.

Based on these, example dialogues are composed representing the performance target at which the final system

aims. The instructional system is intended to train users in cross-cultural communicative competency, using a task-based curriculum: learners engage in conversations that simulate the situations where they expect to use these skills (e.g. discussing humanitarian aid and reconstruction tasks, negotiating with local leaders, purchasing supplies). Thus, we have developed example dialogues with more successful and less successful outcomes. Excerpts from a more successful dialogue are as follows:

1	John:	Salaam Alikum, Aziz.
2	Aziz:	Salaam Alikum, John.
3	John:	... And how are things with your family?
4	Aziz:	My family is in good health, thank you.
5	John:	... We have some forms we need to fill out.
6	Aziz:	... I promise you that I will have the forms for you on Thursday.

Excerpts from a less successful dialogue are as follows:

1	John:	Listen, I need to talk to you about paperwork.
2	Aziz:	Oh yes? What is it?
3	John:	I have some forms that you need fill out.
4	Aziz:	... It is no problem.

The politeness or the friendship on display in the first example is absent from the second. In the first the task is presented as part of a shared plan and in the second it isn't. As a result, the expressed degree of commitment to the task is less in the second and the task is less likely to be done.

Ethnographic annotations on the dialogues are converted as faithfully as possible into expressions provided by the ontology. The microsocial ontology provides a formal way to specify the noted differences, and conversely, the dialogues provide a mechanism for evaluating the ontology—can the differences be expressed?

In this paper we focus on one aspect of the microsocial domain—interpersonal relations.

2 Commitment

We are building on previously developed theories of cognition, e.g., (Hobbs and Gordon 2010), and communication (Davis and Morgenstern 2005; Hobbs and Mulkar-Mehta 2010). We can define an interaction in terms of these. But an interaction happens only once, and when it is over, it is over. It is not enough to build a society on. For that we need interpersonal relationships that extend across greater stretches of time. The simplest of these relationships is ac-

quaintance. An agent is acquainted with another agent if there has been at least one interaction between them before, if the agents remember the interaction, and if they know some identity properties of each other, where an identity property is a property that allows one agent to identify another across time.

Being acquainted with one another is not a strong enough relationship to create a society from. For that we need commitment and shared plans.

Imagine a trapeze artist planning a maneuver. The plan consists of three steps: She swings out on her trapeze; she flies through the air; she is caught by her partner. How does she know this plan will work? She knows the first step will succeed because this is an action she is capable of executing. She knows the second will succeed, because physics will take care of that. But how does she know the third step will succeed? That's the role of commitment.

The expression `(committed a e)` says that agent `a` is committed to bringing about the actual occurrence of event `e`. The principal implication one can draw from a commitment is that, defeasibly at least, if `a` is committed to `e` happening at time `t`, where `a` can cause `e` to happen, then `e` will happen at time `t`.

```
(forall (a e e1)
  (if (and (committed a e1)(atTime' e1 e t)
    (agentOf a e)(etc))
    (atTime e t)))
```

The `(etc)` indicates defeasibility. This rule enables us to incorporate the actions of others in our own plans, because it gives us some assurance that the action will actually be performed.

There are many ways a commitment can be brought about. The most basic is by the speech act of promising, or asserting that one is committed to perform the action in question. Weaker evidence than the utterance "I am committed to doing `e`" is the utterance "I will do `e`." This has the form of a prediction, but if I am able to perform the action, it is under my power to make my prediction come true. There are other less direct ways to acquire commitments, for example, by accepting a role in an organization.

3 Shared Plans

In the strong AI perspective that treats people as planning mechanisms, when we do things, we are following an explicit or implicit plan. When we do things together, we are following a shared plan. Thus, shared plans are the basis of social life (cf. (Grosz and Kraus 1996)).

A group `s` of agents share a plan `p` just in case

- the group itself has the top-level goal.
- defeasibly the members of the group mutually believe the subgoal structure of the plan.
- if a member of the group is involved in an action in the plan, then the member is committed to performing that action.

Thus, we can define a shared plan as follows:

```
(forall (p s g)
  (iff (sharedPlan p s g)
```

```
(and (forall (a)
  (if (member a s)(agent a)))
(goal g s)(plan p s g)
(forall (a e g1 g2)
  (if (and (member a s)
    (subgoal' e g1 g2 p)
    (etc))
    (mb s e)))
(forall (a e)
  (if (and (member a s)
    (goalIn e p)(arg* a e))
    (committed a e))))))
```

The expression `(sharedPlan p s g)` says that `p` is a shared plan by a group `s` of agents to achieve goal `g`. Line 4 says that all members of `s` are agents. Line 5 says that the group has `g` as a goal and `p` is a plan for achieving the goal where `s` is viewed as the agent having the goal. The latter establishes that the causal connections are believed to be adequate for achieving the goal. Lines 6-10 say that all the members of `s` believe in the structure of the plan and believe the rest of `s` believes in it too; this implication is only defeasible because each member of the group may not know the entire plan. Lines 11-14 say that the members of `s` are committed to performing their parts in the plan.

Joint action, or doing something together, is executing a shared plan.

We can view people as planning agents continually going through the world developing, executing, monitoring the results of, and modifying plans to achieve the goal "To Thrive". For each member of a group `s` that has a shared plan, the shared plan is a subplan of their goal "To Thrive". The reasons someone might incorporate a shared plan into their own plan is that it promotes their own goals, or that it provides a resource for promoting their own future goals, which can be viewed as enabling conditions, and hence subgoals, of those future goals.

The incorporation of shared plans into personal plans has been presented here in a very rationalized manner, as though we came to the shared plans we participate in as fully free, independent thinking adults who judge alternatives and make sensible choices. But in fact we are born into society, and our beliefs about what is required to thrive are very much conditioned by the mutual beliefs and shared plans of that society. An Afghan child, for example, is born into successive layers of group structure, from the family, to the clan, to the tribe, to the world of Islam, each with its own set of mutual beliefs and shared plans.

In the full theory we explicate fairness in shared plans in terms of proportionality of cost and value to the agents.

4 Good Will

We would all like to live in a world where, whenever we needed help, there were people around us willing to give it, where everyone felt good will toward everyone else. The actual world is of course very far from this, but people have engaged in various efforts to make it more like this. In this section, we first construct a rationalized account of why it would be in an agent's interest to behave in a way that exhibited such good will to others. Then we will discuss very

briefly other factors that lead to this behavior.

There are various notions of the concept of “help”. What does it mean for one agent A2 to help another agent A1? In the simplest sense, agent A1 has a goal E, and agent A2 does actions in a causal complex for E. In this sense, John McCain helped Barack Obama become president by choosing Sarah Palin as his running mate. In a stronger sense, agent A2 has the intention that his actions bring about the goal E. For example, I might take away your car keys so you can’t drive home drunk from a party. In this way, I help you live and thrive, even though my actions are no part of a plan you have to live and thrive. The strongest sense of “help” is when agents A1 and A2 construct a shared plan in which A2 performs many of the actions required to bring about A1’s goal E. The sense of “help” we use here is at least the second one, involving an intention to help but not necessarily a shared, agreed-upon plan.

A world with good will is characterized by the axiom

```
(forall (a1 a2 e)
  (if (and (person a1)(person a2)
          (goal' e1 e a1)
          (believe a2 e1)(etc))
      (exist (e2)
        (and (help' e2 a2 a1 e)
              (cause e1 e2))))))
```

That is, if a person a2 believes person a1 has a goal e, then that will cause a2 to help a1 achieve e. This is close to a statement of the Golden Rule: “Do unto others as you would have them do unto you.”

This rule, however, is eminently defeasible, and the etc predication in the antecedent can be expanded in a myriad ways. People have developed a number of devices for reducing the defeasibility of this rule or tightening the rule to improve its reliability. Many types of interpersonal relationships can be viewed as having the effect of reducing the defeasibility of this rule.

Members of groups often engage in actions which contribute to the group goal but not directly to the individual agent’s goals. Among the rules that members are supposed to follow is often the injunction to help other group members. In the above axiom the etc predication would be replaced in part by the condition that a1 and a2 are both in a group with that principle.

There are at least two things an individual can do to promote good will. The first is to persuade others to accept the rule, whether as part of a larger system of beliefs or not. The second is to act in accordance with it. The latter is not exactly an exchange event. The person I help may never be in a position to help me. But I am performing exactly the part in the creation of a general good will that I have direct control over. When I act in accordance with the rule, we are one person closer to the rule being true in general.

This is a rational reconstruction of why one person would help another. It is a very weak kind of exchange. I help others in hopes that others one day will help me. But the reality is of course very much more complicated, though not unrelated to the rational reconstruction, involving evolutionary forces acting on human groups and cultural transmission of ethical principles.

5 The Host-Guest Relationship

The host-guest relationship is important everywhere, but perhaps nowhere is it more important than in the Middle East. American personnel in the Middle East need to be very aware of their obligations and privileges both as hosts and as guests.

The host-guest relationship rests on a distinction between “home” and “away”. When a person is home, he is generally secure, and he is more able to satisfy his various wants because of his local knowledge and a social network of friends to provide help. When a person is away, he is much less secure and lacks local knowledge and the supporting social network. Goals are thus more difficult to achieve.

Of course “home” and “away” are extremely complex concepts. But a very crude and preliminary start in characterizing the concepts is to say that there is a set of the agent’s goals that are easy to satisfy at home and difficult to satisfy away from home. Difficulty is defined in terms of obstacles that have to be overcome to achieve the desired state. We use home and away as properties of agents that say something about the local environment they are in.

It is convenient to give a name to the set of goals that are easy to achieve at home and difficult away; we will call the set the homeAdvantage. The concepts of “home” and “away” are very much wrapped up in location. A home is usually thought of as a place. But its significance here is rather in the resources it affords the agent for achieving goals.

The host in a host-guest relationship is at home; the guest is away from home. The host undertakes, or commits, to provide the guest with all, or at least some, of the advantages he or she would enjoy at home.

```
(forall (a1 a2)
  (if (host a1 a2)
      (and (home a1)(away a2)
           (exist (s)
             (and (homeAdvantage s a2)
                  (forall (e)
                    (if (and (member e s)(etc))
                        (exist (e1)
                          (and (committed a1 e1)
                                (help' e1 a1 a2 e))))))))))
```

The expression (host a1 a2) says that a1 hosts a2. The axiom says that if a1 hosts a2 then a1 is at home, a2 is away, and defeasibly a1 is committed to helping a2 achieve those goals that are normally part of a2’s “home advantage”.

The advantage of being a guest is getting the help of others. It is more problematic why someone would voluntarily agree to be a host. There is no necessary direct benefit to the host. But most people in their lives will be away from home, with all the attendant disadvantages and insecurities of that situation, and they will want the help of others. They are better off in a world in which good will spreads at least to the host-guest relationship. The host stands to gain from a universal ethic of hospitality, and one way to promote its universality is to act in accordance with it. Or putting it negatively, violating the ethic is a sure way of making it nonuniversal. The above axiom is the Golden Rule applied to the

host-guest relationship. If you are a host, you should do unto the guest as you would have the guest do unto you.

In the full theory we have also axiomatized simple exchanges as shared plans, favors and relationships of mutual interdependence, and friendship and that aspect of friendship that mimics friendship.

6 The Ontology in the Instructional System

The microsocial ontology is being used in a project that extends the state of the art for training cross-cultural competency, or the knowledge, skills, and attitudes required to communicate in a foreign environment. These include linguistic and cultural elements. The training system is being adapted from existing software that allows trainees to engage in real-time dialogue with conversational agents in an immersive 3-D environment. These agents recognize and respond to speech, gesture, and other actions taken by a human user of the system. As a result, users are provided with an opportunity not only to acquire declarative knowledge, like vocabulary, but to practice procedural skills in real time.

The microsocial ontology is applied in a conversational agent architecture, that employs a variant of the SAIBA framework (Vilhjalmsson and Marsella 2005), which separates intent planning (what to communicate) from production of believable behavior (how to express it). A player engages the agent by speaking into a headset microphone. An automatic speech recognition module produces a string representation. This is interpreted into a logical representation based on the ontology, and ultimately it is associated with a Communicative Act, along the lines of (Traum and Hinkelman 1992).

Heuristic rules are applied to formulate a response, also expressed in terms of the ontology. Currently, this output Act is passed to a module that generates behavior by selecting an appropriate pre-recorded sentence or non-verbal action, rendered by animations. In the future we expect to make response generation more flexible by using natural language generation techniques.

In addition to providing a vocabulary for Act-Response rules, the microsocial ontology creates the possibility of applying reasoning to assist in the generation of an output act. Because the ontology has been cross-validated with ethnographic data as described in Section 1, we have confidence that the result will be a believable model of behavior for conversational agents.

7 Future Directions

We are currently working on extending the commonsense theory of microsociology to cover other key concepts:

- Group structure as reflected in the group's defining shared plan, and the roles of members in that plan.
- The presentation of the social self, or the set of beliefs about an agent that the agent wants others to believe and acts in a way to make them believe.
- Authority within groups and the scope of authority.
- Conflict, negotiation, and compromise.

In addition, we are working on making the natural language processing of the instructional system more sophisticated, so that deeper reasoning will be possible and unanticipated utterances can be handled more appropriately.

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