

EVERYTHING YOU ALWAYS WANTED TO KNOW ABOUT  
AUTHORITY STRUCTURES  
BUT WERE UNABLE TO REPRESENT

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If we're ever to get programs to reason intelligently about activities that are governed by laws, we'll need a clear understanding of such concepts as obligations, politics, disputes, and enforcement. Our work on this topic started when we tried to build a program that could understand some legal correspondence from 17th-century England, and its current application is in a program that simulates social interaction among small groups such as families and schools. While the long-range applications are in natural language processing, this work is primarily concerned with fundamental issues of representation.

We first attempted to adapt the work by Schank and Carbonell [1,2] but later chose alternative definitions and representations, because we were looking at a wider variety of legal systems, where legal authority, for example, did not always imply the power of enforcement, and while they focused on the resolution of disputes, we were more interested in how decisions are influenced.

Authority structures can be found everywhere, in law courts, AI conferences, bridge games, friendships, and even restaurants. The language is used metaphorically even in such domains as everyday physics.

We define an authority structure in terms of a group of people who participate in some set of activities. There are many structures one could impose on a group for purposes of analysis, such as the sequencing of events, or the plans and goals that motivate the participants, and different contexts will provide different answers to the same question. For example, if we ask, "Why did John order a hamburger?" we might answer with

"Because he was hungry"  
or "So that the waitress would tell the cook"  
or "In order to initiate a contract with the restaurant" depending on the context.

An authority structure, then, is associated with a group, to pick a neutral term. A group has a set of participants, connected by a social net which specifies the attitudes they have about their acquaintances in the group. Every group has a set of normal procedures or activities, in which the participants take certain roles. For our present purposes, it doesn't matter whether those activities are highly predictable, goal-driven, or structured in any particular way. Some of those acts change the social net ("social" acts); others involve the exchange of goods and services ("economic" acts); and others are acts of authority (to be defined shortly).

An individual belongs to many groups at the same time. In fact, a pair of individuals may belong to two groups and relate to each other in different ways (e.g., role conflict).

Any group-associated act may have a legal status, an indication of its conformance with the laws. We define 6 types of legality:

1. An act (in the past, present, or future) is explicitly legal, requiring no permission. [Example: free speech.]
2. An act is legal only if permission has been given. [You need a license to practice medicine.]
3. An act is legal only if it is commanded. [A six-year old child taking medicine.]
4. An act is legal only if you are acting as someone's agent (for whom the act may or may not be legal). [A judge authorizes a police officer to search a house, even though he is not allowed to search it himself.]

5. An act is legally required. [In bridge, you must follow suit if you can.]
6. An act is explicitly forbidden. [You may not submit more than one paper to this conference.]

Of the many possible states, some are of concern to the law, such as ownership, legal responsibility, and right of claim (debt or injury). Disputes are questions either about the legal status of some act [Am I required to file a tax return by April 15th if I'm getting a refund?] or about the truth value of some law-related state [The defendant pleaded not guilty].

The "primitives" acts of authority are:

1. to define or decide the legal status of an act, according to the six types listed above, such as commanding or obliging someone to do something [Clean up your room]
2. to enforce a decision [Papers received after the program committee meets will be rejected automatically]
3. to create and revise the rules themselves [The voters approved the ERA]
4. to resolve disputes [The jury acquitted the defendant]
5. to change the position of someone in the group [You're hired]

Breaking the rules may entail punishment; non-compliance may entail enforcement; but then again, maybe not. In Tudor England, if a British shipping merchant were unable to obtain payment for goods he had delivered to a Dutch merchant, he could ask the Court of the Admiralty for a "Letter of Reprisal," a document that permitted him to seize any Dutch ship and to share in the worth of the ship and its cargo. Two aspects are important here. First, the Court in no way enforced its decision; it was not the British Navy that went out to capture a Dutch ship, but the merchant himself (or more likely, his agents). Second, he was permitted to commit what would otherwise be a highly illegal act.

Authority structures are often embedded in one another, and if a group has no rules governing certain actions, then it may inherit the rules from an embedding structure. For example, a contract is an embedded system specifying little more than mutual obligations. The embedding system takes care of the rest. Embedding is not universal, however. You can't sue your friends if they fail to show up for an invited dinner.

In general, your power within a group is measured by your ability to "make things happen," to cause social, economic, legal, or other kinds of actions. You incur a debt when someone acts to increase your power, and it is expected that you will reply, though not necessarily in kind. A bribe, for example, is an exchange of economic power (money) for legal power (position of authority).

Many activities call for decisions to be made. Some of these decisions are based solely on evidence and are simply evaluations, but in other cases, real choices must be made. A crucial part of the description of any participant in a group is the ability he has to influence decisions by whatever means, and we treat this as a special kind of power, categorized by the kind of decision being influenced. Politics is defined as the influencing of authority-related decisions, i.e., whether (or in what manner) to perform one of the acts of authority, such as revising the laws or admitting a new member to the group. Attempts to influence economic decisions range from friendly advice ["Try the cheeseburger"] to hard-sell advertising techniques. Finally, you might attempt to influence a decision about a social act, such as arranging a blind date for someone.

In some groups, the rules cannot be changed, in which case attempts to influence decisions are absurd. [I'll let you capture my rook if you let me ignore the fact that I'm in check for the next few moves.] On the other hand, in a highly reticulated authority structure, where the rules can all be changed, politics are likely. The simplest political acts are those that attempt to change the rules by following the appropriate procedures [working within the establishment]. Another method is to behave as if the rules had changed in the way you seek [defiance], which may mean that you've committed an illegal act. You might decide not to fill a role in a group whose rules you disagree with [Boycott

Coors and Carl's Jr.], and you can also exploit the embedding of inconsistent authority structures [sit-ins at lunch counters].

APPLICATIONS Perhaps the clearest applications of this work would be in a natural language understanding program, and would be visible in at least three places. First, acts would be categorized by their legal status. Some of these would be explicit [Johnny is allowed to stay up until 10 o'clock], but most are quantified to some degree [all personnel actions require the manager's approval]. We would have a more accurate meaning representation than we now do for examples such as "Mommy, can I go to the movies?" For kids (i.e., in the family-group), going to the movies might be directly labeled as requiring permission, but we might also be able to infer that from knowing that it involves leaving home and spending money, both of which require permission.

Second, understanding an authority structure would enable a program to make the inferences needed to connect and explain events in a story. Example: "Mary forgot to renew a book from the library. They sent her a bill." Without some understanding of the library rules, the second sentence is difficult to explain.

Third, we can use authority structures to make predictions about people's actions. If Mary orders her son Johnny to go to bed, we can make a set of reasonable predictions about what he might do and how Mary will respond. If Johnny's little sister orders Johnny to go to bed, the predictions are quite different since the authority relationship is obviously different. If Sue loans Tom some money, thus increasing his economic power, we can infer a state of indebtedness and expect him to repay her in some way. If a student slips a \$20 bill in an examination book, he probably intends to induce a state of indebtedness on the part of his professor.

CONCLUSIONS Our goal here has to been to organize general information about authority structures, providing a common framework in which we can describe specific cultural instances and define the relevant inferences. We envision using authority structures as a necessary part of the representation for groups of people whose behavior pattern is shared.

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