Chapter 3

Individual Reasoning within a Reasoning Community

ABSTRACT

In this chapter, the nature of the process that each participant engages in individually in order to contribute to collective reasoning is discussed. The design of technological systems that will best support reasoning in its communal context requires the specification of schemes for representing knowledge and for the inference of new knowledge. Further, it is also necessary to articulate a model for the process that individuals engage in when reasoning in groups. The assertion we make is that the process iteratively includes phases of engagement, individual reasoning, group coalescing, until decision making. Representations, including the classical syllogism, first order logic, default reasoning, deontic reasoning, and argumentation schemes, are surveyed to illustrate their strengths and limitations to represent individual reasoning.

INTRODUCTION

It is not really difficult to construct a series of inferences, each dependent upon its predecessor and each simple in itself. If, after doing so, one simply knocks out all the central inferences and presents one’s audience with the starting-point and the conclusion, one may produce a startling, though perhaps a meretricious, effect.

Sir Arthur Conan Doyle (1859 - 1930), Sherlock Holmes in “The Dancing Men”

A participant in a community of reasoning is involved in reasoning individually and independently from others though constantly communicates with others to exchange knowledge and insights. A reasoning community iterates through the phases of engagement, individual reasoning, and group coalescing until the issue and all views are sufficiently well canvassed that the group moves to the decision phase to reach an ultimate decision.

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Within the individual reasoning phase an individual performs two main tasks:

- **Individual coalescing:** The coalescing, by an individual participant, of relevant background knowledge, facts, claims and reasons asserted by others.

- **Individual judgment:** The determination of assertions that an individual holds as their own.

Before launching into ways that reasoning has been represented, it is useful to step back and identify the kind of reasoning that is the focus of our attention. Broadly, reasoning types can be discerned based on the tasks to be achieved:

- **Spatial Reasoning:** High speed reasoning used in movement and balance.
- **Social Reasoning:** The type of reasoning which allows an agent to reason about other agents. In particular it involves the calculation of dependence relations and dependence situations.
- **Verbal Reasoning:** Being able to reason about future events and actions that might cause these is an important abstraction from the social reasoning mentioned above. Verbal reasoning can be the process of forming ideas by assembling symbols into meaningful sequences. Verbal reasoning can then be built into quite complex chains. Such chains can go on indefinitely, provided each link makes a valid argument by using the conclusion of the previously developed link as the antecedent of its conditional premise. It allows the expansion of sentences such as, If A then B into reasoning chains which are explaining, convincing or simply the sequence of steps that need to be executed to get to the destination.
- **Narrative Reasoning:** Narrative reasoning addresses situations that find difficulty in being addressed with the sequential form of verbal reasoning. The situations often involve multiple causes and multiple effects. Many social phenomena are like this and it would be fair to say that the great body of our accumulated social wisdom is expressed as narrative. Narrative reasoning could be viewed as an efficient way of dealing with complexity. Whereas verbal reasoning relies on long chains of logical steps, each small enough to be considered proven, narrative reasoning addresses situations that cannot be addressed in this way.

Other terms advanced as types of reasoning include practical reasoning, theoretical reasoning, diagrammatic reasoning cut across these areas of reasoning. Reasoning might be associated with thought in the abstract or thought without any representation or embodiment outside the thinker. More complex thought is built upon the communication of ideas with others and against the backdrop of an accumulated mass of recorded knowledge and ideas. This at least requires verbal reasoning but verbal reasoning soon reaches its limit. Very often, a complex verbal argument is found to involve circular reasoning or the fallacy of begging the question, petitio principii, arguing in a circle or circulus probandi. As depicted in Chapter 1, Schmandt-Besserat (1996) argues that writing was invented starting in Mesopotamia in the fourth millennium BC to create records that enabled traders and taxation officers to deal with complex arguments. Literature, history, and philosophy came later. Writing is a significant advance over unaided verbal processing because it brings reliable memory and permits greater examination and rigor to be applied to a piece of reasoning. However, as a representation of reasoning it suffers from certain disadvantages in terms of clarity as arguments become more complex.

Processes involved in individual reasoning are described in the next section prior to a discussion on ways that reasoning has been represented in the past.
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