ABSTRACT. In this paper, the defeasible argumentation scheme for practical reasoning (Walton 1990) is revised. To replace the old scheme, two new schemes are presented, each with a matching set of critical questions. One is a purely instrumental scheme, while the other is a more complex scheme that takes values into account. It is argued that a given instance of practical reasoning can be evaluated, using schemes and sets of critical questions, in three ways: by attacking one or more premises of the argument, by attacking the inferential link between the premises and conclusion, or by mounting a counter-argument. It is argued that such an evaluation can be carried out in many cases using an argument diagram structure in which all components of the practical reasoning in the case are represented as premises, conclusions, and inferential links between them that can be labeled as argumentation schemes. This system works if every critical question can be classified as a assumption of or an exception to the original argument. However, it is also argued that this system does not work in all cases, namely those where epistemic closure is problematic because of intractable disputes about burden of proof.

Practical reasoning is so fundamental to artificial intelligence that it is impossible to see how current computational AI systems of multi-agent reasoning could get by without it (Reed and Norman 2003). It is also fundamental to the basic notion of rationality in logic and philosophy, as well as being commonly used in familiar everyday deliberations and arguments (Clarke 1985; Audi 1989). However, there remain serious differences of opinion about how it should be identified, analyzed and evaluated as a form of argument. One early proposal (Walton 1990) was to analyze it as a defeasible argumentation scheme, a form of argument that can hold provisionally on a balance of considerations under conditions of uncertainty, but that can be defeated by the asking of critical questions that pinpoint weaknesses. Such a scheme can be used to identify and analyze practical reasoning, but the problem of how to evaluate it as a defeasible form of argumentation remains open. One issue is whether it should be seen as merely an instrumental form of reasoning, or whether it should be based on moral or social values.
Automated systems of practical reasoning for multi-agent deliberation between a human agent and a computer in electronic democracy (Gordon and Richter 2002; Atkinson et al. 2004a 2004b) take values into account. In this paper, solutions to the problems of identification and evaluation are worked out, as means to solving the latter problem.

The study begins by explaining how practical reasoning is foundational to current research initiatives in computing, including the project of designing systems for electronic democracy based on it. Next, some examples are given to illustrate how to formulate three models of practical reasoning, including a basic model and two more complex models. Having shown how to identify and analyze practical reasoning as a defeasible form of rational argument, I then take up the problem of how to evaluate it as a strong or weak form of argument in a given case. The method set out builds on the technique of using critical questions as ways of attacking or defeating an argument fitting the scheme. The conclusion reached is that earlier versions of the scheme, and accompanying sets of critical questions, need to be revised. These are replaced by two new schemes with a new matching set of critical questions for each. One scheme, called the basic scheme, represents a simpler model of instrumental practical reasoning while the other, called the value-based scheme, represents a richer model that takes values into account. It is shown how both schemes can be represented on argument diagram structures to represent two types of practical reasoning. The paper concludes by setting out a method of solving the problem of evaluating such arguments by fitting the critical questions onto the diagram structure, but in a way that does justice to variations on burden of proof requirements appropriate for stages of a deliberation that may be open or closed.

1. MULTI-AGENT PRACTICAL REASONING AND ELECTRONIC DEMOCRACY

Practical reasoning of the kind used most commonly in everyday argumentation is neither inductive nor deductive, but represents a different type of logical inference sometimes classified as abductive, but most commonly as defeasible reasoning. It is used by an agent to select a contemplated action as a hypothesis from a set of available alternative actions the agent sees as open in its given circumstances.