

DOUGLAS WALTON

ACTIONS AND INCONSISTENCY:
THE CLOSURE PROBLEM OF PRACTICAL REASONING

This article formulates a fundamental problem in the philosophy of action. It will become apparent that the same problem is also an abstract and general, but very important question for the field of artificial intelligence - and robotics in particular. As well, the nature of the problem, as revealed below, will make evident its importance in the field of logical evaluation of natural language argumentation. The problem is one of when a knowledge-based goal-directed inference leading to an action (or a recommendation for a course of action to be taken) may be said to be structurally correct (or closed), parallel to the sense in which a deductive argument is said to be valid (deductively closed).

Solving this problem will require a formalization of practical reasoning in the end, to be carried out in the way that the analysis of the problematic case developed in the article will indicate. However, being a philosophical contribution, this article will merely pose and sharpen the problem, making certain questions to be asked more precise. No claim is made that anything like a complete formalization of practical reasoning is given by the considerations brought forward in this article. However, by solving the philosophical and practical problem of closure, the way is opened to developing a formalization of practical reasoning as a distinctive type of reasoning that can be evaluated as normatively binding on a rational agent.

A structure of practical reasoning is presented, and it is argued that the job of evaluating cases of arguments based on a criticism of inconsistency of actions, or "not practising what you preach", is best accomplished by applying this structure. In general, the task addressed by the article is one of evaluating the argumentation reconstructed from the text of discourse given in a particular case, and then using this evidence to judge whether the given argument meets the standards of practical rationality or not, as defined by the structures that should be used to judge such cases. Thus the goal of this article is seen to be one of applied logic, or as evaluating argument, as "correct" or "incorrect", as opposed to being a psychological inquiry into the agent's actual intentions, the motives of my particular person, weakness of will, or my other deeper psychiatric matters that lie behind a given case. It is not that these psychological or psychiatric questions are uninteresting. Indeed, the framework presented in this article could be used as a means of assisting empirical inquiries into them. But such a psychological investigation is not our goal. Our goal is that of evaluating a given argument normatively, based on the commitments of the participants,

as far as these propositions can be inferred from the text and context of discourse in a case where the argument was used.

1. THE CLOSURE PROBLEM STATED FOR PRACTICAL REASONING

Practical reasoning is often equated in philosophy with Aristotle's notion of *phronesis* (practical wisdom), as characterized in Book VI of the *Nicomachean Ethics* particularly. A good guideline to philosophical usage is the following entry in Honderich (1995, 709):

practical reason. Argument, intelligence, insight, directed to a practical and especially a moral outcome. Historically, a contrast has often been made between theoretical and practical employments of *reason. Aristotle's 'practical syllogism' concludes in an *action* rather than in a proposition or a new belief: and *phronesis* (see book VI of *Nicomachean Ethics*) is the ability to use intellect practically.

The ingredients of *phronesis*, or practical wisdom, as expounded by Aristotle, however, are complex. Hamblin (1987, 206) classifies them into four groups: (1) knowledge group, (2) art or skill, and cleverness, (3) deliberative excellence, including judgment, and (4) moral virtue. In this paper, a narrower view of practical reasoning is adopted, comprising primarily (1) and (3), but excluding (4). What will be called practical reasoning below could be described as instrumental or means-end reasoning. More fully defined (just below), it would be called goal-directed, knowledge-based, action-guiding reasoning. There is not meant to be any necessary implication that the goal is good (morally or otherwise), that the reasoner is a good person, or that he or she or it is basing her or his or its reasoning on good intentions (although traditional philosophy is certainly right to think that such ethical notions are closely connected to, and even based on practical reasoning).¹

Practical reasoning is a goal-driven, knowledge-based, action-guiding species of reasoning that coordinates goals with possible alternative courses of action that are means to carry out these goals, in relation to an agent's given situation as he/she/it sees it, and concludes in a proposition that recommends a prudent course of action.² Practical reasoning is carried out by an *agent*, an entity with a capability for intelligent action. An agent does not necessarily have to be a person.³ An agent is an entity that is a self-contained unit that has goals, and that is capable of autonomous action, based upon its ability to perceive its external circumstances, and modify its actions in accord with such perceptions. A higher-order agent can have some grasp of the consequences of its actions, and can modify its actions and goals in light of its perceptions of these consequences. This characteristic is called *feedback*.

A *practical inference* has basically two premises - one states that an agent has a particular goal, and the other cites a means whereby the agent could carry out this goal, in the agent's present situation, as it sees it. An additional

premise states that if several such means are available, the means selected by the agent is the most satisfactory one, in relation to the agent's goals (and certain other factors that may be relevant, as indicated below). Practical inferences are chained together in practical reasoning.

The *closure problem* is that of determining the conditions under which an agent is bound (committed) to the conclusion of a practical inference, given that it is committed to all the premises, as holding in a given case. This problem can be usefully re-expressed as a negative question of defining *practical inconsistency*, the kind of situation where the agent is committed to a goal, and recognizes that a particular action is the most satisfactory means to carry out that goal in the given situation, but the agent is not committed to that action. The problem of closure then is one of determining the conditions under which one may correctly say, in a given case, that a practical (pragmatic) inconsistency exists. The problem is expressed below as one of determining when a conflict of commitments exists in the sense of Krabbe (1990).

The best way to pose this problem is to express it in an ordinary, and apparently simple kind of case where an agent maintains a stance that appears to be practically inconsistent. Using this case, some subtleties can be brought out, showing how an apparently simple case can conceal many subtleties in the chaos of everyday deliberations and arguments. But to frame the problem more sharply, it is useful to begin with the relatively well-defined idea of closure of a deductive argument.

The usual way to define deductive validity in logic is the following: an argument is valid if and only if it is logically impossible for the premises to be true and the conclusion false. An equivalent definition is given in the following entry in Honderich (1995, 894):

1. Deductive arguments, which are such that if the premises are true the conclusion must be true. Traditional logic studies the validity of syllogistic arguments. Modern logic, more generally, identifies as valid those arguments which accord with truth-preserving rules. (*Salva veritate.*) Any argument is valid if and only if the set consisting of its premises and the negation of its conclusion is inconsistent.

This negative way of defining deductive validity - by relating it to logical impossibility or inconsistency - is both instructive and useful, because it gives you an idea when closure has been achieved for a deductive argument, meaning that enough information has been given in the premises so that the conclusion may be inferred as following from those premises.

2. THE SMOKING CASE

To get a practical grip on the closure problem for practical reasoning, it is best to consider an ordinary and relatively simple kind of case. Consider the following example, sometimes called the *smoking case*, from Walton (1989,

141-142), which has the form of a dialogue.

Parent: There is strong evidence of a link between smoking and chronic obstructive lung disease. Smoking is also associated with many other serious disorders. Smoking is unhealthy. So you should not smoke.

Child: But you smoke yourself. So much for your argument against smoking.

The argumentation in this case is more subtle than it might appear at first sight. There are two sides to it. On the one hand, the parent may have cited good medical evidence that smoking is linked to lung disease, and her argument - that, therefore, smoking is unhealthy, could be (in this respect) a good argument. The child may be too hasty in rejecting this argument on the basis of his observations of the parent's actual practices.

On the other hand, the child does have a point worth considering, from his point of view, based on his observations. The parent smokes, and admits this practice. But at the same time, the parent advocates nonsmoking. Is this not inconsistent? It is not logical inconsistency, but it is inconsistency of a sort that might be called practical or pragmatic. And surely this practical inconsistency is a reasonable basis for the child's questioning the sincerity or the seriousness of the parent's advocacy of her own argument. If you look at it from the child's point of view, he is not really in a position to evaluate all this medical evidence, based on expert opinions he is not qualified to dispute. But he knows what he sees - the parent advocates non-smoking, but smokes, and admits it.

The kind of argument used by the child to question the parent's argument is not unfamiliar in logic. Traditionally, also, it has been called the circumstantial type of *ad hominem* argument. Traditionally, it has been categorized as a fallacious argument. But is it really? Let us take a closer look.

If you take the conclusion of the parent's argument to be the proposition 'Smoking is unhealthy.' - that is, as an impersonal statement - then her argument could be quite reasonable. But the child's reply does not really seem to be challenging this argument. If the child's reply is a rejection of this argument, then indeed it could be a hasty or fallacious *ad hominem* argument.

But looking at the child's reply from a different angle, it represents a different line of argument, which could be expressed as follows, by extending the dialogue.

Child: You say that smoking is unhealthy. Does that mean you think that being unhealthy is generally a bad thing, or something to be avoided? Is being healthy a personal goal for you?

In answering this question, the parent needs to be careful. If she admits all the following propositions, her argument will potentially be open to a certain kind of criticism or attack.

1. Being healthy is a goal for me.
2. Smoking is unhealthy.
3. I smoke.

A critic can question whether a person who is committed to all three of these propositions might be showing evidence of a certain kind of conflict, which could be called a pragmatic inconsistency or conflict of commitments.

But one needs to be careful here to clarify the exact nature of the inconsistency that is claimed or perceived. It is not just the propositions 1. , 2. and 3. that are at the heart of the conflict of commitments. For the parent (at this point) still has numerous replies to any claim that her reasoning is inconsistent. She could argue, for example: "Smoking is addictive. That is why you should not start smoking. I have tried to give up many times." She admits then she is weak-willed (*akratic*), but that is not the same thing as being pragmatically inconsistent, or exhibiting a conflict of commitments of the kind that makes your argument illogical or open to refutation as inconsistent. To get this kind of inconsistency, proposition 3. in the triad above needs to be changed to a stronger assertion which says something like, "Yes, I smoke and I'm proud of it." (meaning that I am committed to smoking as a practice or policy that I personally advocate or recommend).

But in what sense could this assertion, in the context of the case above, be open to refutation as inconsistent? The parallel is to a case of logical inconsistency, where an arguer is committed to the premises of a deductively valid inference, but then is also committed to the negation of the conclusion. But in this case, it is practical inconsistency, not logical inconsistency, that seems to be the root notion. To get closer to the notion of practical inconsistency, the form of practical inference must be more precisely expressed.

What is especially important to understanding practical inconsistency, and practical reasoning generally, is its relativity to a particular agent who is advocating a course of action as the practically rational thing to do for her (or for someone else, or for a group). The child only has a strong argument against the parent if the parent is expressing her own personal commitment to avoiding a practice that would endanger her own health. It is the first-person endorsement that makes the parent's practical reasoning binding on her as an agent that gives the child's criticism bite when he retorts that she smokes.

This special expressiveness of practical inferences in the first person, and its relation to expressive endorsements in the second and third person, has been pointed out by Clarke (1985). And in any analysis of practical reasoning, care must be taken to reconstruct any particular case in a way that makes clear the differences between first-person commitments and other kinds of commitments that may be binding only on another agent, or that may express a group involvement of some sort. Consequently, the analysis of the structure of practical reasoning given in the next section, will index a practical inference to a specified agent. In this key respect, practical inconsistency will be quite different from logical inconsistency (of the kind defined as a proposition

conjoined with its negation, or another proposition logically implying its negation).

3. INFERENCE SCHEMATA OF PRACTICAL REASONING

According to Table 1 below, reprinted from Walton (1990, 48), practical reasoning is based on the following pair of inference schemata where an agent, represented by the first-person pronoun 'I' is contemplating bringing about a state of affairs (A, B, C, \dots)⁵

Table 1
PRACTICAL REASONING:
THE BASIC INFERENCE SCHEMATA

Necessary Condition Schema

- (N1) My goal is to bring about A (*Goal Premise*).
- (N2) I reasonably consider on the given information that bringing about at least one of $[B_0, B_1, \dots, B_n]$ is necessary to bring about A (*Alternatives Premise*).
- (N3) I have selected one member B_i as an acceptable, or as the most acceptable necessary condition for A (*Selection Premise*).
- (N4) Nothing unchangeable prevents me from bringing about B_i as far as I know (*Practicality Premise*).
- (N5) Bringing about A is more acceptable to me than not bringing about B_i (*Side Effects Premise*).

Therefore, it is required that I bring about B_i (*Conclusion*).

Sufficient Condition Schema

- (S1) My goal is to bring about A (*Goal Premise*).
- (S2) I reasonably consider on the given information that each one of $[B_0, B_1, \dots, B_n]$ is sufficient to bring about A (*Alternatives Premise*).
- (S3) I have selected one member B_i as an acceptable, or as the most acceptable sufficient condition for A (*Selection Premise*).
- (S4) Nothing unchangeable prevents me from bringing about B_i as far as I know (*Practicality Premise*).
- (SS) Bringing about A is more acceptable to me than not bringing about B_i (*Side Effects Premise*).

Therefore, it is required that I bring about B_i (*Conclusion*).

According to the representation in Table 1, the agent is represented as a solitary reasoner with a single goal who is aware of some aspects of its environment (called its situation or circumstances), and is making a decision to go ahead with a course of action or not, based on its knowledge (or informed but changeable opinion) of this situation.

Another useful (but more complex) way to think of practical reasoning is as a dialectical structure that takes the form of a deliberation on how the two parties (or one party who is "of two minds" on how to proceed) should reason in the face of some problem or decision which requires a course of action. This framework is one of multiagent systems (Singh 1994) for multigoal reasoning. In the simplest kind of case two agents are involved, and they can communicate with each other. Each agent can have more than one goal. According to one account (Walton 1990, 85), the type of practical inference used in such cases has the following form, called *the argumentation scheme for practical reasoning*:

- (SP) *A* is the goal.
 B is necessary to bring about *A*.
 Therefore, it is required to bring about *B*.

Matching this argumentation scheme is a set of appropriate critical questions. Below, the fifth question has been added to the set of four given in Walton (1990, 85).

- (CQ) Are there alternatives to *B*?
 Is *B* an acceptable (or the best) alternative?
 Is it possible to bring about *B*?
 Does *B* have bad side effects?
 Are there other goals that are in conflict with *A*?

The argumentation scheme and the matching set of critical questions are used to evaluate the practical reasoning used in a dialogue exchange in a given case as follows. The proponent advances (SP) to convince the respondent that *B* is a prudent course of action in the circumstances. This putting forward of an argument in the form (SP) by the proponent shifts the burden of proof in the dialogue to the side of the respondent. She is then obliged to accept *B* as having been shown to be a prudent course of action unless she can ask one or more of the set of critical questions (CQ). Unless the proponent can answer the question adequately, the presumption in favor of *B* supported by his prior argument is defeated.

In the dialectical model of practical reasoning using (SP) and (CQ), practical inference is seen as a defeasible type of reasoning - a presumption is lodged in place as tentatively acceptable (as a commitment in the dialogue, in the sense of Walton and Krabbe 1995). In the model conveyed by Table 1, practical

reasoning is evaluated as an inference in which an agent is making a plan, or trying to devise a prudent plan of action to suit its own situation. Hence if all the premises are accepted by the agent, on the given information in its circumstances as it sees it, but it fails to accept the conclusion as a prudent course of action for it to adopt or carry out, then it may be said that this agent is practically inconsistent. This outcome does not necessarily mean that the agent is logically inconsistent, or that it has accepted a logical contradiction. But it does mean that its projected plan of action, as a whole, based on the situation as it sees it, does not represent a coherent chain of practical reasoning.

One reason there need be no logical inconsistency in such a case is that an agent's goals are normally stated at a level of abstraction that leaves room for intervening steps of reasoning between a goal and a specific course of action that would be a means (or part of a means) for carrying out that goal. Another reason is that an agent's estimate of a situation is typically based on presumptions that are not firmly known to be true (or false). But the most important reason is that the conflict or contradiction is relative to a particular agent who has expressed her personal commitment to the propositions that lie at the basis of the contradiction.

4. THE CLOSURE PROBLEM RE-EXPRESSED

The closure problem for the basic inference schemata of practical reasoning of Table 1 can be expressed by asking - what is meant by the word 'required' in the conclusion of the schemata? In this sense to say that B_i is required is to say that bringing about the state of affairs B_i is a prudent course of action for the agent in question, relative to the agent's goals, and the agent's knowledge of the circumstances, as stated in the premises of the inference. This is not to say that the agent actually will (or must) bring about B_i . For sometimes agents are weak-willed (akratic), or for whatever reason fail to act on their stated goals and assessment of a situation (in the case of a robot, it could be power failure). It is to say that bringing about B_i is the course of action that the agent is committed to, on the basis of its commitment to the premises of the inference. It means that given its acceptance of (commitment to) these premises, as applied to a particular situation as the agent sees it, on the basis of what it knows (or thinks it knows about the situation), the agent is committed to acceptance of the conclusion, i.e. to commitment to bringing about B_i as the course of action most appropriate for (or most practically reasonable in) this situation.

But, one may well ask - what kind of bindingness or closure is this? After all, presumably we are talking about some sort of real agent, whether it is a human being or not, that is acting in the so-called "real world." But the problem is that the real world is constantly changing. Moreover, an agent's knowledge or understanding of the situation it is in is (inevitably, in any

realistic case) far from perfect. Questions can always be re-asked about whether another alternative might be better, or whether a proposed course of action might lead to consequences that have not been fully appreciated, or taken into account yet. After all, practical reasoning is about the future, and involves the possible future consequences of one's contemplated actions. Such contingent factors, in any realistic case, are matters of conjecture, and questions can continually be re-asked about them, requiring a re-assessment of a practical inference. If so, how could a practical inference ever really be closed?

Aquinas posed this question very pointedly in the *Summa Theologiae* (Question 14, Article 6; Blackfriars Edition, p. 155):

Article 6. May deliberation go on endlessly?

THE SIXTH POINT: 1. Yes, apparently, for it is about the particular things which are the concern of practical knowledge. These are infinite. Accordingly no term is to be set to the inquiry of deliberation about them.

2. Further, we have to weigh up not only what has to be done, but also how to clear away the obstacles. Now any number of objections to any particular course of action can be put up and knocked down in our mind. Therefore there is no stop to our questioning about how to deal with them.

3. Moreover, the inquiry instituted by demonstrative science does not lead back indefinitely, but arrives at self-evident principles which are altogether certain. Such certainty, however, cannot be found in contingent and individual facts, which are variable and uncertain. Deliberation, therefore, goes on endlessly.

Aquinas' solution to this problem is to be found in his characterization of deliberation (Question 14, Article 4; Blackfriars Edition, p. 151) as a kind of process that is useful or necessary only when we need to look into a matter we are doubtful about. When engaged in habitual or skilled actions, there may be no need to deliberate, or to raise questions about which is the best course of action, or the best way to do something. This account suggests that deliberation is a kind of process. What begins it is the raising of questions, the expression of doubts on how to proceed. What ends it is the answering of the question, or the resolution of the doubt. But exactly when is the question answered, or the doubt resolved? Do we need to make an assumption at some point in a deliberation that a decision is now called for?

Closing off the process of deliberation, as opposed to going on and on collecting information, or continuing to deliberate on the pros and cons of an issue, seems to be an important aspect of the closure problem of practical reasoning. The problem is one of when to terminate the process of deliberation and close off the collecting of new information relevant to a case. This problem of judging the sufficiency of evidence required for rational acceptance of a conclusion has been studied by Clarke (1989, 73- in cases of inductive reasoning.

Clarke takes a pragmatic approach, pointing out that practical matters - like the costs of continuing to search for information - are often relevant to

acceptance of a conclusion and termination of an inquiry (p. 75). However, such pragmatic considerations can be easily overlooked, especially in the more traditional framework of decision theories, where optimizing (maximization) was stressed over more practical satisficing (Simon 1978) models of rational acceptance.

Using a pragmatic framework of the kind advocated by Clarke, one could argue with Aquinas that, in principle, deliberation in any real-life case could go on endlessly if one requires the best possible outcome, based on a maximizing principle of acceptance. But by a pragmatic standard of acceptance of a conclusion, clearly, practical matters, like the costs of continuing to collect information, ought to suggest closing off further deliberations, once a "good enough" solution to the problem has been reached. A "good enough" solution is one that solves the problem by arriving at a decision for a course of action that fulfills the goal, but also answers certain relevant questions in relation to what is known about the given situation, or alternatively recommends not taking action, on the grounds that one or more of these questions cannot be answered adequately.

5. THE CLOSED WORLD ASSUMPTION

Some complexities inherent in the closure problem are suggested by the observation that sometimes it is better to collect more information relevant to a situation, rather than rushing ahead with a decision to act on the presently known facts. The latter conclusion may be too hasty, and therefore may represent a significant type of failure of practical reasoning.

On the other hand, sometimes, doing nothing at all, while collecting more information, can be a bad sort of failure. One can overly research a problem while, in the meantime, the opportunity for optimally productive action has passed. Government inquiries and Royal Commission Inquiries, for example, can be used as stalling tactics to "study a problem to death," thereby putting off the need to move forward with any action.

A related complexity is the distinction between acts and omissions. In many cases, doing nothing at all can, in effect, be an action. Reason: doing nothing may have significant positive or negative consequences, in relation to a goal.

These complexities show that practical reasoning is very much a time-indexed kind of reasoning. The decision, in some cases for example, may be one between doing nothing now and doing something later. Or it may be one between doing something now, and doing something later (when more information has come in, and more is known about the situation).

Another complexity of the closure problem is that in some cases, trial and error is the most practical way to proceed, if a definite solution showing the best course of action is not yet apparent, and collecting further information

would not be speedy enough to make for a better decision. If it is difficult to collect more information, and the consequences of acting on a trial basis are not likely to be disastrous, it may be that the best solution is to go ahead and try something, to see where that may lead. Such a decision may not be "hasty action" so much as "getting on with it," even if some risk is involved, and one does not know which alternative is best, or even whether any of the given alternatives will bring about the goal that is supposed to be the objective.

In cases of interest as representing deliberation of the kind that is so familiar to us in everyday actions, the premises of the practical inference and the way it operates generally, cannot be fixed or closed off, as if the circumstances of the agent in a given case were no longer subject to additional changes. In these cases, practical reasoning is better seen as based on tentative premises that lead by tentative inferences to tentative conclusions. Practical reasoning in such cases is a defeasible kind of argumentation, in that it is nonmonotonic in nature - subject to revision as new information concerning the agent's changing circumstances comes to be known.

However, for purposes of studying the closure problem, the premises of a practical inference can be fixed in some cases by assumption, relative to a given case, to determine what follows by practical reasoning from a given set of assumptions.

According to Reiter (1987, 158), the *closed world assumption* is the inference drawn that any positive fact not specified in a given database may be assumed to be false, on the basis that all of the relevant positive information has been specified. An example (Reiter 1980, 69) is the default inference drawn when scanning an airline monitor, when no flight is listed from Vancouver to New York. The closed world assumption is that all the relevant positive information about the flights one could take at this time are listed on the monitor. So if a Vancouver to New York flight is not listed, one may assume that no such flight is available.⁶ This assumption can then function as a premise that leads, along with other premises as assumptions to a conclusion derived by practical reasoning. In some cases, the closed world assumption seems to be quite reasonable.

In *the blocks world* (Russell and Norvig 1995, 359), there are a set of blocks sitting on a table, and they can be stacked, one fitting on top of another. A robot arm can pick up one block at a time, so it cannot pick up one block that has another block on it. The goal is to build up a specified stack of blocks (specified by which blocks are on top of other blocks). Typical of the blocks world is a clearly stated goal, a small (finite) number of alternative means of implementing the goal, each of which is a definite series of steps that can easily be carried out by the robot, and an ignoring of any consequences of the robot's actions outside the blocks world. Also, there are no "outside forces" acting in the blocks world, e.g. to remove blocks or add new ones. The robot is the only

agent being considered. Thus the blocks world is a simplified kind of case of practical reasoning.

In the blocks world, the closure problem is easy to solve. If the robot's goal is to achieve a particular stack of blocks, and the requirements of the given situation are such that it must take a particular step right away, e.g. picking up a particular block and putting it on the table, then any act (or omission) other than taking that particular step is a practical inconsistency.

By contrast, in the smoking case, the action of smoking, even given that one's goal is health, and one argues that not smoking is necessary for health, does not appear to (necessarily) constitute a practical inconsistency. It constitutes enough of a *prima facie* case for practical inconsistency that some sort of explanation or response is called for. But there does appear to be room for various kinds of explanations that could resolve the apparent inconsistency. The problem is that while, in a sense, actions do "speak louder than words," inferring commitment to a particular proposition on the basis of a perceived or acknowledged action is by no means straightforward or automatic. Because one smokes, it does not necessarily follow that one is committed to smoking as a general policy that one approves of, or is advocating.

The key to achieving closure in the smoking case (and comparable cases) seems to reside in questioning the smoker (or the agent) to try to get her to make verbal commitments to specific commitments, based on her perceived actions, and on what those actions may be assumed (subject to rebuttal) to imply.

6. PROBLEMATIC CASES

Aquinas was right to insist that in typical everyday deliberation, a case is never really closed, for practical purposes. As he put it, deliberation "goes on endlessly." But there often does come a time when it is practically useful and reasonable to bring the closed world assumption to bear, and arrive at a prudent (if provisional) decision for action based on what one presently knows, in line with one's present goals. Once the premises of a practical inference are provisionally fixed, in such a case, propositions can be evaluated as following from these premises by practical reasoning, or as being practically inconsistent with these premises.

In principle then, the structure of inference represented in Table 1 provides the means for solving the closure problem of practical reasoning. But as the smoking case already indicated, applying this structure to ordinary "real world" cases of deliberation is by no means straightforward.

In some cases, there really does seem to be a pragmatic inconsistency, and yet the inconsistency can be explained by the person involved, so that her stance does not appear to be illogical, meaning that her practical reasoning is

defective. Examples of this sort of criticism, and responses to it, are very interesting to think about. One example is the case of a woman who had long argued that a certain type of income tax exemption ought to be abolished, but when an opportunity came by for her to take advantage of this exemption personally, in her tax return, she did it. But she argued that her position was not illogical, and that she continued to maintain that this exemption should be abolished legally. But she still argued that as long as the exemption was legally permitted for everyone, as a policy, she had every right to take advantage of it, along with everyone else. It is puzzling to understand her defence exactly, and some would not agree that it is legitimate. But it seems to turn on the distinction between laws that apply to everyone as public policy, and matters of individual conscience or personal conduct.

A similar case has been the subject of considerable controversy and analysis (Cuomo 1984).

A Catholic politician running for a high federal office declared that she supported freedom of choice on the abortion issue, even though, as a Catholic she personally opposed abortion. She argued that her personal views are not in conflict with her position on public policy. A Catholic bishop criticized this stance as illogical, replying that he did not see how a good Catholic, who should be against the taking of human life, could vote for a politician who supported abortion. She replied that as a Catholic she did not personally support abortion, but that she felt she had no right to impose that view on others, who might have different religious viewpoints. She stated that her political support of freedom of choice concerning reproduction was logically consistent with her personal opposition to abortion because of the separation of church and state (Walton 1989, 169).

In this case, the stance of the politician definitely does involve a pragmatic inconsistency, but her defence seems to explain the inconsistency in a way that takes the sting out of the criticism against her stance. Democratic politics being what it is, it seems that there will be cases where a citizen may support general policies that are supposed to apply to everyone, even if such a policy would support or sanction actions that she would be against, personally.

In this case, it does seem that there is a pragmatic inconsistency in the practical reasoning of the agent. But the inconsistency can be explained away, or resolved, by the group involvement of the agent in policies that affect the group as a whole. Even if an agent disagrees with the policy as an expression of her own personal goals, or standards of conduct, she may still have to support the policy as an expression of what is best for the group - even if, paradoxically, she is one of the individuals in the group.

In this kind of case, there is a kind of pragmatic inconsistency involved, but it can (arguably) be resolved or explained in a way that shows it not to represent a defect in the agent's practical reasoning. But this kind of case remains deeply problematic, and there is a lingering feeling that somehow the agent is compromised by voluntarily belonging to a group that lives by general policies that conflict with the personal goals of the agent.

This particular case, which, as many readers will know, is that of Geraldine

Ferraro, the vice-presidential nominee who in 1984, advocated the pro-choice position for women, while stating that she was personally opposed to abortion. In response to the subsequent criticisms of the Catholic bishops, a group of Catholic theologians, priests and nuns proclaimed in a full-page ad in the New York Times that a "diversity of opinion regarding abortion exists among committed Catholics." (Jonsen and Toulmin 1988, 1). Shortly afterwards, Vatican authorities issued a statement to the effect that the "direct termination of prenatal life is morally wrong in all instances." (Jonsen and Toulmin 1988, 2). One can see from the controversy generated by this case that the conflict at the basis of it is not an easy one to resolve, and has ethical implications.

One way to resolve the conflict is to draw a distinction between personal commitments and group commitments of a kind that arise from membership in a group. Tuomela (1992) makes a distinction between normative beliefs that involve a whole social group, and merely factual beliefs that relate only to personal beliefs an individual has. This analysis of group beliefs of the normative kind, as being distinct from personal beliefs, offers a way out of the conflict, by arguing that the perceived contradiction is based on an underlying ambiguity. Some would say, however, that holding political office creates a situation where the normative group belief overrides personal belief.

Some would say that when a person chooses to take up political office, he or she has given up the right to a private life, and should not complain if personal matters are reported - for example, by the media - and used in public deliberations on political issues. Others would say that it is a question of roles. As a public official who is a member of a group, like a political party, one has a role as a member of the group, and must base one's rational deliberations on what general policies to support this role. However, as a person with a conscience, who may, for example, have personal religious or moral convictions or codes of conduct, one has commitments based on a different role that may conflict with the other commitments stemming from the other role. One may, for example, be bound to vote for the acceptance of laws or general policies that are binding on a group - like a whole country or a state - that one may or may not feel obliged to follow as a private individual, who may have certain moral or religious views on a matter like abortion or joining the armed forces. In such cases, there can be an ambiguity involved in the different roles one is committed to play in a complex multiagent situation where one may be a member of different groups.

7. SOLVING THE CLOSURE PROBLEM

The solution to the closure problem is to be found in utilizing the structure for practical reasoning provided by the argumentation scheme (*SP*) and the matching set of critical questions (*CQ*). First, one has to relationize the decision in a

particular case to the text of discourse given, representing the sequence of deliberations to that point in the case, and to what is known (or thought to be known) by the two parties (in the two-person multiagent dialogue) in that case. The agent (proponent) must formulate a goal, and a proposed means, according to the form of the inference (*SP*). If both premises are reasonably acceptable presumptions in relation to the information known in the case, then a weight of acceptance is shifted (defeasibly) towards tentatively moving by inference from the premises to the conclusion.

But once such a forward-moving shift of an inference of the form (*SP*) is put into place in a dialogue, the respondent is obliged to ask one or more of the set of appropriate critical questions (*CQ*). If the proponent cannot answer any one of the critical questions asked, the burden of proof shifts back to her side and the practical inference is defeated. But if the critical question is answered satisfactorily, the inference is restored as binding on both parties. But then if the respondent asks another of the critical questions, the inference is once again suspended until that question is replied to adequately. Acceptance or non-acceptance of the conclusion (based on acceptance of the premises and the structure of the practical inference) shifts back and forth from one side to the other during the sequence of deliberations in the dialogue. However, if the proponent has succeeded in answering all five critical questions adequately, and no new information has come into the dialogue in the meantime that is relevant to the problem (issue) being deliberated, then the line of practical reasoning is *closed*, meaning that if the premises are acceptable in the dialogue to both parties, then the conclusion (by inference from the premises) ought (practically) to be acceptable too. In particular, if the respondent accepts the premises, then as a collaborative participant in the dialogue he ought (practically speaking) to accept the conclusion as well.

In exactly this type of case, as described in the previous paragraph, if any party in a deliberation accepts all the premises that rationally require acceptance of a particular line of conduct as the inferrable conclusion by practical reasoning from the given premise she accepts or advocates, but then clearly indicates her commitment to an opposite line of conduct, then she is open to criticism as being practically inconsistent (as judged by her commitments reconstructed by the text of the discourse of the previous dialogue in the given case). The smoking case, as reconstructed in the extended dialogue above, in section two, is just such a case. Once the parent has advocated non-smoking as a policy, based on her premises that smoking is unhealthy and that health is a goal for her, then the child is justified in citing her practice of smoking as proving a putative practical inconsistency for her that needs to be questioned and resolved. The burden is then on the parent's side of the dialogue to answer to the charge of practical inconsistency. Only if she can answer the question adequately is the inference restored as practically binding.

The closure problem is thus solved, using the structures (SP) and (CQ) in a framework of deliberation, relative to the information given in a particular case. But a secondary problem is raised that we have not (at any rate, completely) solved. What are the allowable and adequate responses to a well-founded charge of practical inconsistency (once such a change is made in a given case)? This problem is left for another occasion.

The closure problem is solved because, in the smoking case, as the extended dialogue develops between the parent and the child, the child reconstructs the parent's argument against smoking as follows. The parent has expressed a personal commitment to the goal of being healthy, as well as making a general statement that health is generally a good thing for everyone. The parent has also expressed a commitment to the proposition that non-smoking is a necessary means to health. These two propositions, expressed as personal commitments by the parent, in her argument indicating to the child that he should not smoke, shifts a weight of presumption to the conclusion that not only is smoking imprudent (practically speaking, not a rational course of action) for the child, but for the parent as well. But by admitting to the practice of smoking herself, the parent gives the child grounds for questioning the sincerity of her own argument. In other words, the child uses the closure of the parent's practical reasoning to set up the charge of pragmatic inconsistency. From this practical point of view then, the child's circumstantial *ad hominem* argument against the parent's prior argument can be reconstructed as a reasonable argument.

University of Winnipeg

NOTES

¹ The author would like to thank the Social Sciences and Humanities Research Council of Canada for a research grant that supported the work in this paper. Dave Clarke sent a number of insightful comments on the paper (by e-mail) that threw new light on some aspects of a previous draft, and helped in making revisions. Also, this previous draft was presented at the University of Western Australia on September 27, 1996, and the following participants in the discussion made comments or criticisms that led to important improvements in the second draft: Guy Douglas, Michael Levine, Barry Maund, Alan Tapper and Hartley Slater.

² This definition encapsulates the notion of practical reasoning analyzed in Walton (1990), but comparable accounts are given by Clarke (1985) and Audi (1989).

³ To minimize gender babble, we frequently use the pronoun 'it' in the sequel. We are assuming generally that a practical reasoner can be either a human or a machine, but the frequent use of 'it' suggests the application to robotics.

⁴ Looking through introductory logic textbooks that have a section on informal fallacies will tend to confirm this claim. Hamblin (1970) gives an outline of the standard treatment.

⁵ A state of affairs can be thought of as a temporally indexed contingent proposition (neither a logical tautology or a logically inconsistent proposition) of the sort that, in principle, could be made true or false by an agent.

⁶ This form of inference is called the argument from ignorance (*argumentum ad ignorantiam*) in logic.

REFERENCES

- Aquinas, Thomas (1970), *Summa Theologiae*, vol. **17**. Trans. Thomas Gilby, Blackfriars Edition, New York, McGraw-Hill.
- Aristotle (1954), *The Nicomachean Ethics of Aristotle*. Trans. and ed .by Sir David Ross, London, Oxford University Press.
- Audi, Robert (1989), *Practical Reasoning*. London, Routledge.
- Clarke, D.S., Jr. (1985), *Practical Inferences*. London, Routledge and Kegan Paul.
- Clarke, D.S., Jr. (1989), *Rational Acceptance and Purpose: An Outline of a Pragmatist Epistemology*. Totowa, New Jersey, Rowman and Littlefield.
- Cuomo, Mario M. (1984), "Religious Belief and Public Morality," *New York Review of Books* **31**, 32-37.
- Hamblin, C.L. (1970), *Fallacies*. London, Methuen.
- Hamblin, C.L. (1987), *Imperatives*. Oxford, Blackwell.
- Honderich, Ted (1995), *The Oxford Companion to Philosophy*. Oxford, Oxford University Press.
- Jonsen, Albert R. and Stephen Toulmin (1988), *The Abuse of Casuistry: A History of Moral Reasoning*. Berkeley, University of California Press.
- Krabbe, E.C.W. (1990), "Inconsistent Commitments and Commitment to Inconsistencies," *Informal Logic* **12**, 33-42.
- Reiter, Raymond (1980), "A Logic for Default Reasoning," *Artificial Intelligence* **13**, 81-132.
- Reiter, Raymond (1987), "Nonmonotonic Reasoning," *Annual Review of Computer Science* **2**, 147-186.
- Russell, Stuart and Peter Norvig (1995), *Artificial Intelligence: A Modern Approach*. Upper Saddle River, New Jersey, Prentice Hall.
- Simon, H. (1978), "Rationality as a Process and as a Product of Thought," *American Economic Review* **68**, 1-16.
- Singh, Munidar Paul (1994), *Multiagent Systems*. Berlin, Springer-Verlag.
- Tuomela, Raimo (1992), "Group Beliefs," *Synthese* **91**, 285-318.
- Walton, Douglas N. (1989), *Informal Logic*. Cambridge, Cambridge University Press.
- Walton, Douglas N. (1990), *Practical Reasoning: Goal-Driven, Knowledge-Based, Action-Guiding Argumentation*. Savage, Maryland, Rowman and Littlefield.
- Walton, Douglas N. and Erik C.W. Krabbe (1995), *Commitment in Dialogue: Basic Concepts of Interpersonal Reasoning*. Albany, State University of New York Press.