

INSTRUMENTAL REASONING RECONSIDERED

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ABSTRACT

Since Aristotle it has been common among philosophers to distinguish between two fundamental types of reasoning, theoretical and practical. We do not only want to work out what is the case but also what we ought to do. This article offers a logical analysis of instrumental reasoning, which is the paradigm of practical reasoning. In the first section I discuss the major types of instrumental reasoning and show why the accounts of most authors are defective. On the basis of this discussion, I demonstrate in the second section that different types of normative conclusions are derivable from instrumental arguments and I show that it is an argument's logical structure that determines what type of conclusion this is.

Keywords: instrumental reasoning, practical reasoning, necessary condition reasoning, sufficient condition reasoning, practical arguments, practical inference.

According to a division that stems from Aristotle, reasoning falls into two basic kinds. *Theoretical* reasoning is concerned with what to believe and *practical* reasoning is concerned with what to do. We apply the distinction between reasonable and unreasonable not only to beliefs, but to actions also; and even though it is, of course, possible to act without reason, we deliberate about our options more than we notice. Reviewing the courses of action open to us in a certain situation, weighing and balancing them against each other, and then deciding what to do is a natural process and need not even call attention to itself.

Practical reasoning is, however, a many-faceted activity that involves a variety of distinct types of arguments. For instance, some arguments, which are studied in deontic logic, have norms as premises and conclusions, and some kinds of practical reasoning include other agents and their decisions and are investigated by the theory of games. In this article, I have nothing to say about these types of practical reasoning. I shall confine the discus-

sion to so-called *instrumental reasoning*, which is the paradigm of practical reasoning and is not only at the intersection of most theories of rationality but is important to ethics also. Many ethical theories rely on a conception of instrumental reasoning, even though they may not explicate, let alone vindicate, that on which they rely.

Since many authors have too narrow a conception of instrumental reasoning, a few comments on its nature may not be amiss. It has been claimed that instrumental reasoning is concerned with the attainment of the agent's ends and it has therefore often been identified with *means-ends* reasoning (see e.g., Thornton 1982). Let me briefly explain why this view is mistaken. According to the usual interpretation of means, they are *causally* related to their ends (see von Wright 1963, pp. 163-165), but in instrumental reasoning, the relationship of an act to its outcome need not be causal, as this example can illustrate: 'If Jones wants to climb the highest mountain in Africa, he must climb Mt Kilimanjaro'. Climbing Mt Kilimanjaro is not causally related to climbing the highest mountain in Africa, climbing the former *is* climbing the latter. Put differently, the act is here identical to what is wanted, but calling an act a means to itself would certainly stretch the meaning of this term. As this example suggests, in instrumental reasoning there are no restrictions on the relationship of an act to its consequences and the kind of outcomes that need to be taken into consideration. Means-ends reasoning is therefore only a special type of instrumental reasoning.

Writers in the field of instrumental reasoning hold different views about its conclusion. While some follow Aristotle¹ and claim that the conclusion is an *action* (e.g., Anscombe 1963), and others maintain that it is a *decision* (Searle 2001, p. 91) or an *imperative* (Gensler 1996, p. 47), there is wide (though not universal) consensus that the conclusion of instrumental reasoning is a *normative judgement*, for instance, the judgement that an action ought to be performed.² I am in agreement with this view but it will not be my central topic because this issue has been extensively discussed by others (e.g., Barnes 1983, Clarke 1985, or von Wright 1963; 1983). The starting-point for this study is rather the fact that authors are not agreed on what *kind* of normative judgement is derivable from a practical argument and that, in addition, they draw different conclusions from the same argument. For instance, Black (1964, p. 173) draws a "should"-conclusion from an argument that entails a "must"-conclusion, according to von Wright (1983, p. 3), and Rescher (1966, p. 123) infers still another conclusion from the very same argument. One might object that this could be just slips of the pen; as a matter of fact, however, it reveals a profound misunderstanding of the nature of instrumental reasoning. Curiously, it has escaped the notice of philosophers that instrumental reasoning can have different normative conclusions, depending on its logical structure. As will appear

¹ Compare *De Motu Animalium* 701a12-14 or the *Nicomachean Ethics* 1147a28 (in Barnes 1984).

² See, for instance, Black 1964, Clarke 1985, Raz 1978, von Wright 1983, or Rescher 1966 who uses the technical term 'task thesis', symbolized as T(X: p), which is to be read and understood as "one thing for X to do (under the existing circumstances) is to make it true that p (p. 122)." But such a task thesis is just a kind of normative judgement.

from the discussion to follow, the conclusion of practical reasoning can be a practical necessity (expressed by deontic modals such as ‘must’ or ‘ought’), but sometimes the conclusion is weaker, for instance when we infer that *a*-ing is *better* than *b*-ing or that *a*-ing is *worse* than *b*-ing (where *a* and *b* stand in for some verbs of action).

I want in this paper to defend the thesis that instrumental reasoning entails different kinds of normative conclusions and to specify the type of conclusion that follows from a practical argument of a certain logical structure. To accomplish this, I shall discuss in Section 1 the main forms of instrumental reasoning and show why the accounts of most authors are defective. In Section 2 I shall demonstrate that it is a practical argument’s logical structure which determines the type of its normative conclusion.

Before going on to a detailed consideration of instrumental reasoning, there are some general comments I wish to make. (i) It follows from what has been said thus far that I assess instrumental reasoning from a logical viewpoint only. A logical investigation is concerned with the formal structure of arguments. This paper is therefore neither about practical reasons nor about practical rationality. Both issues require investigations that go beyond logic since they include epistemic and even metaphysical problems. Consequently, the paper is also not about instrumentalism, which can roughly be defined as the view that acting rationally means acting in a way that contributes to the agent’s intrinsic desires whatever they are. I do not endorse this view and this paper has no implication to the problem of instrumentalism.

(ii) In this study, I will take it for granted that a piece of instrumental reasoning can be logically conclusive; that is, that we can validly derive a conclusion from its premises. This view is by no means beyond dispute. Many logicians and philosophers endorse it,³ but several writers have argued against it (see e.g., Diggs 1960 or Mitchell 1990). Their main reasons are that the validity of an argument requires that it is impossible for the premises all to be true and the conclusion false, but the conclusion of a practical argument is neither true nor false, and that, according to Hume’s law, we cannot draw normative conclusions from only factual premises. Since a consideration of these objections would take us beyond the confines of the present work, and I have argued for the validity of practical arguments elsewhere,⁴ I shall not pursue this issue further here.

I wish to emphasize, however, that throughout this article I hold that conclusions follow from premises only *defeasibly*. Let me explain this. It is a characteristic feature of practical reasoning that it is defeasible or, in the technical jargon, *non-monotonic*. This means, if a conclusion follows validly from given premises, it need not follow from a larger set of premises, even if the original premises are included. In other words, saying that a conclusion follows defeasibly means that it follows relative to a given set of

³ See, for instance, Audi 1991, Black 1964, or Jeffrey 1983. Kenny 1978 and Clarke 1985 qualify their consent by using the term ‘prima facie valid’, and Broome (1999) avoids the term ‘valid’, but speaks of ‘correct’ practical reasoning.

⁴ See my discussion in Spielthener 2008.

options and their outcomes. Considering additional alternatives or new consequences may “defeat” the argument. Let a single example serve to illustrate this: You want to fly to Paris tonight, and you can get seats on Air France and Lufthansa. Since the fare on Air France is lower (and there are no other differences) you conclude that you should take Air France. But then you learn that KLM offers a flight to Paris also, for an even lower fare than Air France (again, *by hypothesis* there are no other differences). This additional premise “defeats” the original argument. It no longer follows that you should take Air France; the new conclusion is that you should take KLM.⁵

1. Paradigm cases of instrumental reasoning scrutinized

With those preliminaries out of the way, I now approach the main topic of this paper. As noted, instrumental reasoning occupies a central role in our everyday practical reasoning. However, I am not able to consider all forms of instrumental reasoning and therefore I shall restrict my attention to its most common patterns. In the literature one can find four main forms of instrumental reasoning: necessary condition reasoning for attaining a good or for avoiding an evil, and sufficient condition reasoning for attaining a good or for avoiding a bad outcome. In what follows I shall discuss these main patterns in turn.⁶

1.1 Necessary condition reasoning for attaining a good⁷

Many authors regard necessary condition reasoning as a valid type of instrumental reasoning.⁸ The following example, put forward by von Wright (1983, p. 3), has received a considerable amount of attention: “I want to make the hut habitable. Unless I heat the hut, it will not become habitable. Therefore I must heat the hut.” To see why this kind of

⁵ Philosophers have long been aware of this feature of practical reasoning (see e.g., Geach 1966) and have therefore held that practical reasoning is only *prima facie* valid (e.g., Audi 1991, Clarke 1985, or Kenny 1978), that it provides only *pro tanto* reasons (e.g., Kagan 1989) or reasons “other things being equal” (e.g., Baier 1953).

⁶ Since writers in the field of practical reasoning deal mostly with such types of unidimensional reasoning under certainty we need not consider probability distributions over possible outcomes because the outcomes are certain.

Another type of instrumental reasoning is the so-called *optimality pattern* (or *best-means reasoning*). For example, Audi (2004, p. 129) holds that if a means is the best way to achieve an end ‘it apparently does follow’ that the agent should do it. Similar views have been held by Clarke 1985, Searle 2001, and Broome 2002, p. 16 who gives this example of an ‘intuitively correct’ argument: ‘I am going to buy a boat. The best way for me to buy a boat is to borrow money. So, I shall borrow money.’ However, it should be noted that these authors have not developed a detailed account of this type of reasoning and therefore there is no need to consider it here.

⁷ In this essay, I mean by ‘good’ a state of affairs that is considered to be good by the agent, which means that the agent has a positive attitudes towards it. I do not imply that what is considered to be good is “objectively” good also.

⁸ An example that has an intention as a conclusion is this: ‘I am going to open the wine: in order to open the wine, I must fetch the corkscrew. I shall fetch the corkscrew’ (Broome 1999, p. 407). See also Audi 1991; 2004, Broome 2001, Gensler 1996, p. 46, or von Wright 1983, p. 73.

reasoning is only apparently valid, one needs to get clear what its basic logical features are. I therefore begin this section by outlining its logical structure.

The structure of necessary condition reasoning is such that *not* acting on the conclusion logically entails that the agent's aim will *not* be achieved. To illustrate this, let us return to von Wright's example. Acting on the conclusion means heating the hut. From *not* heating the hut and the second premise it follows logically that the end of making the hut habitable will *not* be attained. Of course, this is loose speaking because nothing follows logically from not *doing* something. The passage must therefore be understood as shorthand for the clumsy phrase, 'From the negation of the statement that describes the action which is prescribed by the conclusion, it follows logically that ...'. In short, necessary condition reasoning guarantees that an aim is not attained if the conclusion is not acted upon. But the point to emphasize now is that it leaves completely open what will happen if the agent acts on the conclusion; and as long as we do not know this, we cannot know what conclusion (if any) is derivable from the premises. Agents can therefore not know whether they should perform an act or better refrain from doing it as long as they do not *compare* the outcomes of the alternatives available to them. This may appear so obviously true as to be hardly worth saying, but most authors have overlooked this fact, which is crucial for understanding the nature of necessary condition reasoning.

Let us now consider an example to illustrate how available alternatives and their outcomes determine what kind of normative conclusion can be derived from a piece of necessary condition reasoning. Two mountaineers want to scale a peak. The standard ascent is the eastern route and we may therefore conclude that they should take this route. But this is far from obvious, as we shall see when we compare different circumstances.

(i) Suppose that they reach the peak if they take the eastern route, but do not get there if they take another path, and that, in addition, they prefer standing on the summit to not getting there. On these conditions, we can conclude that they *must* take the eastern route. Following von Wright (1983) and Grice (2001), I shall call conclusions of this kind *practical necessities*. It should be noted that taking the eastern route is now not only a necessary condition but is sufficient also; and only because acting on the conclusion is *both*, we can infer that they *must* take the eastern route. Observe, however, that I could have used any of a number of phrases to express the conclusion because ordinary language does not uphold a sharp distinction between different deontic modals. For example, I could have said just as effectively that they *have to* take the eastern route or that they *ought to* do so.⁹

(ii) Let us now consider a variant of this example. The mountaineers learn that there is a southern route also which does not lead to the peak but to a glacial lake in an area of

⁹ Although 'ought' is weaker than 'must' or 'have to', all of them are used to express practical necessities; and even philosophers sometimes regard 'ought' and 'must' as synonyms (e.g., Clarke 1985, p. 16).

scenic beauty. They still want to stand on the summit, but what they want even more is to see the lake. In other words, they *prefer* the outcome of taking the southern route. From these new conditions the opposite conclusion now follows that they *must not* take the eastern route – even though taking this route is still a necessary condition for something they want. I shall call conclusions of this type *practical impossibilities*; and in their linguistic expressions we can alternatively use words like ‘can’t’, ‘illicit’ or ‘forbidden’, all of which are often used as synonyms of ‘must not’.

Since this last claim may well be a controversial one, I wish to labour the point a bit. Let it be assumed that you want to attain two incompatible ends *E* and *F*, you prefer *F* to *E*, and *a*-ing is a sufficient means to *E* while *b*-ing is sufficient to *F*. *Not a*-ing (that is, *b*-ing) entails therefore missing *E* (by attaining *F*) and for this reason *a*-ing is a necessary condition for the end *E*. Nevertheless, since *a*-ing and *b*-ing are by hypothesis mutually exclusive, *a*-ing has to be avoided. Upon reflection, this should appear obvious and I shall say more about this later.

(iii) Let us change our example again. The mountaineers are now indifferent between the view from the peak and enjoying the remote mountain lake. The conclusion is now that it is *optional* which route they take. The eastern route is still necessary for reaching the peak, but since the outcomes of their options are of equal value to them, they can take the eastern or the southern route. Of course, instead of ‘they *can* take the eastern route’ we could also say here that it is *possible* or *permissible* to take this route.

(iv) Finally, let us make the example slightly more complex. Suppose that there is a western route also, which leads to a plateau. The mountaineers have now three options and they prefer the lake to the peak and the peak to the plateau.¹⁰ From this a number of different conclusions can be drawn, but we shall focus only on two. As a moment’s reflection reveals, it follows now that taking the eastern route is *better* than taking the western route, and conversely (v) that taking the western route is *worse* than taking the eastern route. These conclusions can be inferred despite the fact that taking the eastern route is still the necessary condition for achieving an aim of the mountaineers. Again, another linguistic expression of these conclusions could be that the eastern route is *preferable* to the western route, which is *not as good as* the former.

The upshot of what I have said so far in this section is as follows: In all cases considered in the previous paragraphs, taking the eastern route was a necessary condition for achieving an aim of the mountaineers, but – depending on the different alternatives and their outcomes – different conclusions followed. This shows that if an act is a necessary condition to something desired, *any kind* of normative conclusion can be inferred, and we do not know what is derivable as long as we do not compare the alternatives available to the agent.

¹⁰ Throughout this paper I shall assume that agents are not inconsistent in the sense that they prefer one thing to a second, the second to a third, and the third to the first. However, I do not assume that the outcomes are *completely* ranked. The may only be partially ordered, but completeness is, of course, not excluded.

I now want to apply the lessons we have learnt so far to a brief discussion of von Wright's example, which I have quoted at the beginning of this section. On the face of it, the argument appears to be valid. On closer examination, however, it is obvious that it expresses fallacious reasoning. Since heating the hut is a necessary condition for attaining the end of making the hut habitable, we know that the hut will *not* be habitable if it is *not* heated. But the argument provides no information about the effects of heating it. It appears to be valid only because it *implies*¹¹ that heating the hut makes it habitable and that this outcome is better than the consequences of the agent's other options. But this is not explicitly stated and therefore it is not possible to draw the "must"-conclusion, which von Wright derives.

It might now be objected that my interpretation is too uncharitable because von Wright often uses the term 'necessary means' instead of 'necessary condition'. It is important to differentiate between these terms, but even as careful a writer as von Wright seems to use them as synonyms (see e.g., 1983, 21, 70). However, a necessary means is more than a necessary condition. It is *necessary* for attaining some end, but as a *means* it is contributing (deterministically or probabilistically) to this attainment also. But a logical analysis of the arguments, which have been propounded by advocates of necessary condition reasoning, reveals that, with few exceptions (e.g., Black 1964), they do not distinguish between the two concepts and take the instrumental premise as expressing a necessary condition only.¹² I therefore conclude that the arguments presented by most proponents of necessary condition reasoning are *not* valid. The reason for committing this error of reasoning is, I submit, that they failed to recognize that a necessary condition determines only the outcome of *not* performing an act. But, as I have already mentioned, to draw valid conclusions, we need to know the outcome of performing this act also.

1.2 Necessary condition reasoning for avoiding an evil

For many of the decisions of everyday life we use inferences that are of the form of negative necessary condition reasoning. In fact, when we want to avoid something we often simply infer that a certain action has to be done because this is needed to avoid this negative outcome. Take this simple example, presented by Rescher (1966, p. 123): "Unless I do *x*, I'm going to land in the soup. I therefore must do *x*."¹³

At first sight, reasoning of this kind may be regarded as correct practical reasoning, but once its basic logical feature is clear, we shall realize that it is faulty. *Not* acting on the

¹¹ In this study, I use 'imply' in a non-technical sense. It means suggesting something indirectly rather than stating it directly.

¹² See, for instance, Broome 2001, Clarke 1985, pp. 21-52 or Gensler 1996 who holds that "Do end E" entails "If your doing means M is causally necessary for you to do end E, then do means M" (p. 46). But his formalization of this view as $\Box(E \rightarrow (\Box(\neg M \rightarrow \neg E) \rightarrow M))$ – where ' $\Box(\neg M \rightarrow \neg E)$ ' is the symbolization of 'causally necessary means' (Gensler 1996, p. 49) – shows that he takes a necessary means as a necessary condition only.

¹³ I have changed the example slightly to avoid Rescher's technical jargon.

conclusion (in our example, not doing x) logically entails a bad outcome (landing in the soup) and many authors have therefore held that we can infer from such an argument that we ought to act on the conclusion – that is, ought to perform the act that is a necessary condition for avoiding the bad outcome.

An example, taken from a newspaper, will be helpful to make clearer why this view is misguided. “We must toughen the laws that regulate the emission of greenhouse-gases or we shall suffer from the change in the earth’s climate.” By reconstructing this piece of elliptical reasoning, we get the argument that if we do not toughen these laws, we shall suffer from climate change and therefore we must change the laws. In other words, toughening the laws is a necessary condition for avoiding this bad result. Again, the argument provides only information about what will happen if we do *not* act on the conclusion (do *not* toughen the laws). But this is not sufficient for validly inferring a conclusion because, depending on the outcome of acting on the conclusion, *different* normative conclusions can follow from such an argument.

To make this clearer, let us briefly consider two cases: (i) Assume for illustrative purposes that toughening the laws has no effect on the emission of greenhouse-gases; that is, acting on the conclusion has the same outcome as not acting on it. Certainly, it does not follow now that we must toughen the laws. I think it is clear on an intuitive level that we can only infer that it does not matter whether we toughen them or not. In other words, acting on the conclusion is now *optional*. (ii) Let it now be assumed that the circumstances are such that toughening the laws has the opposite effect of increasing greenhouse-gas emissions and will worsen our suffering from the change in the earth’s climate. It now follows the normative conclusion that toughening the laws is *worse* than leaving them as they are.

It should be clear by now that the fact that an act is a necessary condition for avoiding an evil does not *eo ipso* justify a “must”-conclusion. We need to consider the outcomes of acting on the conclusion also, and we can infer *different* normative conclusions - depending on the result of this comparison. The chief reason, I suspect, why philosophers have often been tempted to think that this type of instrumental reasoning entails a practical necessity is that they have ignored the simple fact that drawing conclusions from a practical argument requires comparing and weighing the outcomes of available alternatives and not only considering the effect of a particular act.

At this point one might object that my discussion of necessary condition reasoning should have been more generous. After all, Kant’s celebrated passage in his *Groundwork*, “Whoever wills the end, wills (so far as reason has decisive influence in his action) also the means that is indispensably necessary to his actions and that lies in his power” is widely seen as expressing a valid principle of instrumental reasoning.¹⁴ Before embarking on the next topic, let us therefore take a closer look at it.

¹⁴ In passing, be it mentioned that in German the phrase reads as follows: “Wer den Zweck will, will (sofern die

To my knowledge, in the literature there are two main interpretations of this principle. On one view, it is a principle of practical *rationality* and expresses the opinion that whoever wants to attain an end is rationally bound to use the necessary means towards its attainment (see e.g., von Wright 1983, p. 9).¹⁵ On another interpretation, it is a *logical* principle that justifies inferences from willing an end to a normative conclusion.¹⁶ I align myself with this tradition, but my comments apply to the former view also.

To see more clearly whether Kant's passage expresses a sound principle of instrumental reasoning, we need to have a closer look at the concept of a *means*.¹⁷ Although 'means' sometimes signifies a *thing* (for instance, when we say that a pair of scissors is a useful means to cut a cloth), in Kant's passage it clearly refers to an *action*. Now, if an action is a means to an end, it can be a "productive means" (if performing this act produces the desired state of affairs) or a "necessary means" (if the production of this state requires performing this act). A productive means can be deterministic (if it is sufficient for attaining the end) or probabilistic (if it makes this attainment only more or less likely). If a means is both productive and necessary, we say that the means is "the only means" to the end in question (for instance, when we say that Jones had to run because this was the only way to catch the train).

Let us now return to Kant's principle. Since its validity depends on the meaning of 'means' and Kant did not clarify this term, some interpretation is required. The phrase 'the means that is indispensably necessary to his actions' makes only clear that he referred to a *necessary* means. But, as we have seen, this does not specify what normative conclusion is inferable; and since we do not know whether means are to be understood as productive also, Kant's principle cannot be used to justify normative conclusions (and it is not necessarily *rational* to act on this principle either). Only on the most charitable interpretation, when we take 'indispensably necessary' to mean 'the only means', is it a valid principle of practical reasoning. Indeed, if an act is the only means to an end (that is, it is necessary and sufficient), then it follows that performing this act is practically necessary. But Kant's principle is even on this interpretation defective because it does not allow distinguishing between the different types of normative conclusions that can be derived in necessary condition reasoning. I think it is fair to conclude, therefore, that the fame of this principle is quite undeserved.

Vernunft auf seine Handlungen entscheidenden Einfluss hat) auch das dazu unentbehrlich notwendige Mittel, das in seiner Gewalt ist" (page 417 in the pagination of the Prussian Academy edition). 'Means' (Mittel) is here a singular term and Ellington's translation 'means that are indispensably necessary ... and that lie ...' is therefore incorrect. Abbott's and Beck's translations of this passage are also inaccurate.

¹⁵ Korsgaard's 1997 critique of this principle is based on this interpretation. She therefore insists that having a reason to take the means to an end requires having a reason to pursue this end (p. 223); see to this also Miller 2007.

¹⁶ See, for instance, Binkley 1965 who holds that Kant meant that reasoning to a necessary means "should be valid" (p. 442), Donagan 1977, p. 212; Downie 1984, Hill 1973, p. 442, or Searle 2001, pp. 263-264.

¹⁷ By and large, I follow here von Wright's (1963, pp. 163-166) account, even though I do not endorse all views he defends there.

1.3 Sufficient condition reasoning for attaining a good

In instrumental reasoning, we commonly infer a conclusion in favour of an action that we do not consider a necessary means for realizing our end but regard only as a sufficient condition for its realization. Since A. Kenny (1966; 1978) has argued vigorously in support of this kind of reasoning, I shall illustrate it with one of his examples (see 1978, p. 63): “I am to be in London at 4.15. If I catch the 2.30 I’ll be in London at 4.15. So I’ll catch the 2.30.” Among the proponents of this type of reasoning is Dreier (1997) who holds that “if you desire to ψ and believe that by ϕ -ing you will ψ , then you ought to ϕ (p. 93).¹⁸ Other writers support this kind of reasoning only conditionally,¹⁹ and some authors flatly deny its validity (e.g., Searle 2001, p. 243).

Once more, in order to see what kind of normative conclusion (if any) can be derived from this type of practical reasoning, it is essential to understand its logical structure. In sufficient condition reasoning for attaining a good, acting on the conclusion logically entails the attainment of this end. Kenny based his “logic of satisfactoriness” on this logical feature and he maintained that the example above is valid reasoning because acting on its conclusion (catching the 2.30) and the minor premise entail that the major premise is satisfied (I am in London at 4.15). In contradistinction to necessary condition reasoning, then, this type of instrumental reasoning determines the outcome of acting on the conclusion, but it provides no information about the consequences of *not* acting on it. It is this latter fact that creates problems for sufficient condition reasoning because, depending on the outcomes of *not* acting on the conclusion, different normative conclusions follow from it. Since this can best be seen through cases, let us return to the case of the two mountaineers.

(i) Suppose that the eastern route is the only ascent in the sense that they reach the peak if they take it and they do not reach it if they do not take it, and let it be understood that they prefer reaching the peak to not getting there. On these conditions, it is a *practical necessity* to take the eastern route. It should be noted, however, that taking the eastern route is not only a *sufficient* condition for getting to the peak, it is *necessary* also. This result, in combination with what has been said in the section on necessary condition reasoning, suggests that the conclusion of an argument is a practical necessity if and only if acting on it is a necessary and sufficient condition.²⁰ (I will return to this topic in Section 2.)

(ii) Let it now be assumed that the mountaineers can reach the peak if they take the eastern *or* the southern route. Taking the eastern route is therefore still a sufficient con-

¹⁸ Other supporters are Davidson 2001 and Jackson 1942 who holds that “ x can be validly chosen on the ground that x would fulfil the agent’s strongest desire” (pp. 364–365).

¹⁹ For instance, Audi 2004, pp. 128–129 holds that only a “*prima facie* judgement” can be derived from sufficient condition reasoning.

²⁰ I have argued for this view in detail in my 2007.

dition, but a moment's reflection makes it clear that they are now not required to take it. What follows now is an *option*. They *can* take the eastern (or southern) route.

(iii) Changing the circumstances again, we assume that the mountaineers learn that the southern route leads to the peak *via* the glacial lake. They still want to stand on the summit, but they *prefer* to enjoy both the magnificent view from the peak and the scenic lake, which is only possible if they take the southern route. On these conditions, taking the eastern route is a *practical impossibility*. They *must not* take it, despite the fact that it is a sufficient condition for something they want (since standing on the summit is still one of their aims).

(iv) Finally, suppose that there are three routes to the peak, the standard eastern route, the scenic southern path and a northern route, which is steep, exposed and has some dangerous climbing sections. The mountaineers want to avoid the danger and prefer to reach the peak on a safer route. Taking the eastern route is still a sufficient condition for attaining an end of the mountaineers, but it follows now that taking this route is *better* than taking the northern route and (v) conversely it follows that taking the northern route is *worse* than embarking on the eastern route.

To summarize the previous paragraphs, if an act is a sufficient condition for achieving an aim, a piece of instrumental reasoning can entail that this act *must* or *must not* be performed, that it *can* be done, that it is *better* to perform it, or that it is the *worse* choice. What kind of normative conclusion follows is determined by the alternatives available to the agent and their outcomes.

Let us now return to Kenny's example and ask whether it is a piece of (*prima facie*) valid reasoning. In general, in Kenny's logic of satisfactoriness conclusions are so-called *Fiats*, which include intentions and commands. Since our example concludes in an intention to take the 2.30, we need to investigate whether this is warranted by its logical structure. As should be clear by now, this depends on the available alternatives. Leaving details aside for the present, if there is no other transport it follows that the agent *must* take the 2.30; if there is a bus that arrives in London at 4.15 also, he *can* take the train; and if this bus is cheaper than the train and the agent prefers the lower fare, then he *must not* take the train. As these possible options show, Kenny's example is defective because it does not specify any alternative and it therefore remains unclear what kind of conclusion can be derived.

At this stage it might be objected that we have sometimes only one option and then we cannot (and therefore need not) consider alternatives. It is, however, important in this connexion to note that instrumental reasoning presupposes at the very least two options – that is, actions the agent thinks he is free to perform. (In fact, he need not be free to do them. The mountaineers can argue that they should take the eastern route only to learn later that an avalanche has blocked it.) If I claim that I had no choice but to take the 2.30, I only mean that there was no other means of transport available. Nonetheless,

not going to London at all was an option, which I could have chosen instead. If we really do not have a choice – if we have slipped off the ladder or if our body is held immobile – then we do not deliberate what to do. Reasoning whether to commit an act requires that we must think that at least its omission is open to us.

1.4 Sufficient condition reasoning for avoiding an evil

A second form of sufficient condition reasoning, and one that is perhaps more frequently used, are inferences that start from an aversion towards some state of affairs and infer a requirement not to perform an act that is sufficient to bring about (or continue) this state. For illustration, consider this example given by Clarke (1985, p. 22): “I don’t want to be cold. My standing outside is sufficient in the present weather conditions for continuing this condition. I should therefore not stand outside.”²¹ Again, let us take a brief look at this example to see why this is only apparently correct practical reasoning.

The logical structure of this type of reasoning is obvious: A bad outcome (being cold, in our example) follows logically if the agent performs a certain act (standing outside), and from this it is inferred that this act should not be performed. But, as generally in sufficient condition reasoning, the premises do not provide any explicit information about the consequences of the agent’s *not* performing this act. It is only *implied* that not standing outside will have the desired consequence of not being cold.

For this reason, we can again derive different normative conclusions. A few examples will suffice to show this: If I don’t want to be cold and I will be cold if and only if I stand outside, it follows that I *must not* stand there. Standing outside, as will be clear by now, is then a sufficient and necessary condition for being cold. However, if we assume that it is equally cold inside the house, only a “can”-conclusion can be derived. It is then *optional* what I do, I *can* stand outside or go inside. And if it is less cold inside, it follows that it is *better not* to stand outside. As long as no alternatives have been specified, we cannot know what conclusion is derivable.

2. The diversity of instrumental reasoning

In the first section I have attempted to show that practical arguments can have different kinds of normative conclusions and I have, so far, been mainly considering examples to make my view plausible. The object of this section is to look more closely at this issue. In what follows I shall attempt to prove that the kind of normative conclusion that is entailed by a practical argument is determined by this argument’s logical structure.

²¹ Other authors who hold that negative sufficient reasoning is correct practical reasoning include Black 1964 and Korsgaard 1997.

This will require that I define the deontic terms, which have so far not been assigned a precise meaning, and since my reasoning will rely on what I call the instrumental value postulate, I shall first briefly explain and defend this postulate.

2.1 The instrumental value of acts

When we ask what instrumental value an act has, we do not want to know whether it is good for its own sake but whether it is good for the sake of something else. For the purposes of the present paper, only this instrumental value of an act is relevant. According to the instrumental value postulate, this value is determined by (i) the value of the (causal or non-causal) consequences to which this act is related in some way and (ii) the nature of this relationship.

Let me explain to make this postulate more plausible. (i) Suppose that an act a causes the state of affairs E , which is intrinsically good, but it causes F also, which is intrinsically bad. Some philosophers hold that a is therefore instrumentally good (because of E) and instrumentally bad (because of F) at the same time, while others hold that a is instrumentally good only if its consequences, taken as a whole, are good. Be that as it may, on either view it is the value of the consequences to which a is related that determines its instrumental value. (ii) Now suppose that two alternatives a and b are related to the same intrinsically valuable outcome E , but a promotes its attainment while b prevents it. This clearly renders a instrumentally good and b instrumentally bad. As a variant, let it be assumed that a and b both promote E , but a is sufficient for its attainment while b makes it only somewhat likely. In this case a is instrumentally better than b .

Taking (i) and (ii) together suggests that the instrumental value of an act depends on the value of its outcomes and its relationship to these consequences. If I am right in this, my instrumental value postulate is correct.

2.2 Some definitions of deontic terms

Let $A = \{a, b, c, \dots\}$ denote the finite set of all alternatives available to an agent, and, for the sake of simplicity, let it be assumed that the alternatives are mutually exclusive; that is, none of them is compatible with the others or included by the others. In the following definitions the comparative value term ' x is better than y ' is taken as basic; that is, the other terms are defined in terms of it.

Although the betterness relation is here taken as basic and we have an intuitive grasp of its meaning, it will not be futile to state some of its structural features to make this notion clearer. First, the betterness relation is asymmetric. That is, if a thing a is better than a thing b , then b is not better than a . Second, the betterness relation is irreflexive: nothing is better than itself. I take asymmetry and irreflexivity as self-evident. Whether the betterness relation is transitive also (that is to say, if a is better than b , and b is better

than c , then a is better than c) is controversial in the literature. In any case, nothing of what I say here will hinge on it.

Definition 1: An act $a \in A$ is *worse than* an alternative $b \in A$ if and only if b is better than a .

Definition 2: An act a is *practically necessary* if and only if it is better than any alternative.

Definition 3: An act a is *practically impossible* if and only if a is not better than any alternative b and there is at least one alternative c that is better than a .

Definition 4: An act a is *equally as good* as b if and only if a is neither better nor worse than b and any alternative c is better or worse than a if and only if it is better or worse than b .²²

Definition 5: An act a is *optional* if and only if it is equally as good as at least one alternative b and there is no alternative that is better than a .

Among the theorems that can be proved on the basis of these definitions are the following: 'If an act is worse than an alternative, then it is not a practical necessity.' 'If an act is better than an alternative, then it is not practically impossible.' 'If an act is optional, there exists at least one alternative that is of equal value to it.' 'If an act is optional, then no alternative is better than it.' 'If an act is worse than at least one alternative, then it is not optional.' 'If an act is practically impossible, then there exists at least one alternative that is better than it.'

2.3 The variety of normative conclusions entailed by practical arguments

It is now time to prove the central thesis of this paper that the logical structure of a practical argument determines the kind of normative conclusion that can be derived from it.

Theorem 1: If the structure of an argument is such that acting on the conclusion logically entails an outcome that stands highest in the valuer's ranking and choosing any alternative entails a worse outcome, then this argument's conclusion is a practical necessity.

Proof: From the assumption that (i) acting on the conclusion entails an outcome that stands highest in the valuer's ranking (i.e., is higher valued than the outcome of any other alternative) and (ii) the instrumental value postulate, it follows (iii) that acting on the conclusion is better than choosing any

²² I follow here the definition of 'A is equally as good as B' given by Broome (2004, p. 21). The definition may seem needlessly complicated, but it guarantees that the equality relation is *reflexive*, *symmetrical*, and *transitive*, as we intuitively expect it to be. To prove its reflexivity it must be assumed that 'better than' is irreflexive.

alternative. From (iii) and Definition 2, it follows (iv) that acting on the conclusion is a practical necessity.²³

Theorem 2: If the structure of a practical argument is such that choosing an alternative $a \in A$ entails an outcome that is preferred to the outcome that follows for alternative $b \in A$, then the conclusion of this argument is that a -ing is better than b -ing.

Proof: From the assumption (i) that a -ing entails an outcome that is better (according to the valuer's estimation) than the outcome of b -ing, (ii) the fact that the instrumental relationship of a -ing and b -ing to their consequences is identical (is one of entailment according to the standards of classical logic), and (iii) the instrumental value postulate it follows (iv) that a -ing is better than b -ing.

Theorem 3: If an argument is such that acting on the conclusion $a \in A$ entails an outcome such that none is better and there is at least one alternative $b \in A$ such that choosing it entails an outcome that is equal in value to the outcome of a -ing, then acting on the conclusion is optional.

Proof: From the assumptions (i) that acting on the conclusion a entails an outcome such that none is better, (ii) that there is an alternative b such that b -ing entails an outcome that is equal in value to the outcome of a -ing, (iii) the fact that the instrumental relationship of a -ing and b -ing to their consequences is identical, and (iv) the instrumental value postulate, it follows (v) that a -ing and b -ing are equal in value and that there is no alternative c such that c -ing is better than a -ing. From (v) and Definition 5 it follows (vi) that a -ing is optional.

Theorem 4: If the structure of an argument is such that a -ing ($a \in A$) entails an outcome that is worse (in the valuer's estimation) than the consequence of b -ing ($b \in A$), then this argument's conclusion is that a -ing is worse than b -ing.

Proof: From the assumption (i) that a -ing entails an outcome that is worse than the outcome entailed by b -ing, (ii) the fact that the instrumental relationship of a -ing and b -ing to their consequences is identical, and (iii) the instrumental value postulate it follows that a -ing is worse than b -ing.

Theorem 5: If acting on the conclusion $a \in A$ of a practical argument entails the worst outcome (that is, an outcome such that none is worse) and there is at least one alternative $b \in A$ such that b -ing entails a better outcome, then the conclusion of this argument is a practical impossibility.

²³ All theorems are conditionals and the method of proving them is by *direct proof*; that is, by assuming that the antecedent is true and then proving that on this assumption the consequent must be true also.

Proof: From the assumptions that (i) acting on the conclusion a entails the worst outcome and that (ii) there is at least one alternative b such that b -ing has a better outcome and (iii) the instrumental value postulate it follows (iv) that a is not better than any alternative and that there is at least one alternative that is better than a . From (iv) and Definition 3 it follows (v) that this argument's conclusion is a practical impossibility.

3. Conclusion

A barrier to progress in the field of practical reasoning has been the failure of philosophers to see that instrumental reasoning is a many-faceted activity that can, depending on its logical structure, entail different types of normative conclusions. In this paper I have specified the conclusions that follow from arguments of a certain structure. Let me conclude with one further example to summarize the main points of this study.

Unlike the more traditional energy sources of coal, oil, gas, and nuclear energy, energy from the sun produces no major environmental problems. It is therefore absolutely imperative that we use solar energy.

This piece of reasoning is, like most of our practical reasoning, elliptical because it does not state the obvious premise that environmental problems are to be avoided. The structure of this argument is such that acting on the conclusion logically entails an outcome that is preferred to the consequence of the alternatives, and therefore it follows that the use of solar energy is a *practical necessity* (Theorem 1). That this conclusion is verbally expressed by the phrase 'it is absolutely imperative' is immaterial. As noted, one and the same type of conclusion can be expressed by different phrases.

Suppose now that we add the further premise 'Wind energy produces no major environmental problems'. This new premise "defeats" our original argument. The structure of the new argument is now such that acting on the conclusion entails an outcome such that none is better but there is at least one alternative such that choosing it entails an outcome that is equal in value. We can, therefore, only derive an *option* (Theorem 3). It now follows that we *can* use solar or wind energy. Of course, this new argument can also be defeated, for example by new consequences, which have hitherto not been taken into account. If we consider the options coal, oil, gas, and nuclear energy and can valuationally rank their negative impacts on the environment, then we could, for instance, draw the further conclusions that nuclear energy is *better* than oil but *worse* than wind energy.

It is particularly important to note that instrumental reasoning is defeasible. Many ethical discussions are confused because debaters tend to propound one or a few reasons for their view and seem to think that settles the matter. Apparently, it does not occur to

them that their reasoning can be defeated by new options or consequences not yet considered. Awareness that instrumental reasoning is defeasible is important for another reason also. It partly explains why discussions about ethical problems (e.g., abortion) can drag on for many years without being ever resolved in a definite way. But if we understand this characteristic feature of practical reasoning we cannot expect that such intricate problems can be settled conclusively.

REFERENCES

- Anscombe G. E. M. (1963), *Intention*, 2nd ed., Oxford: Blackwell
- Audi R. (1991), *Practical Reasoning*, London-New York: Routledge
- Audi R. (2004), "Reasons, Practical Reason, and Practical Reasoning", *Ratio*, 17, pp. 119-149
- Baier K. (1953), "Good Reasons", *Philosophical Studies*, 4, pp. 1-15
- Barnes G. W. (1983), "The Conclusion of Practical Reasoning", *Analysis*, 43, pp. 193-199
- Barnes J. ed. (1984), *The Complete Works of Aristotle: The Revised Oxford Translation*, Oxford: Oxford University Press
- Bermúdez J. & A. Millar eds. (2002), *Essays in the Theory of Rationality*, Oxford: Oxford University Press
- Binkley R. (1965), "A Theory of Practical Reason", *Philosophical Review*, 74, pp. 423-448
- Black M. (1964), "The Gap Between 'is' and 'should'", *The Philosophical Review*, 73, pp.165-181
- Broome J. (1999), "Normative Requirements", *Ratio*, 12, pp. 398-419
- Broome J. (2001), "Normative Practical Reasoning" *Proceedings of the Aristotelian Society (Supplementary Volume)*, 75, pp. 175-193
- Broome J. (2002), "Practical Reasoning", in Bermudez & Millar 2002, pp. 85-112
- Broome J. (2004), *Weighing Lives*, Oxford: Oxford University Press
- Clarke D. S. (1985), *Practical Inferences*, London: Routledge & Kegan Paul
- Cullity G. & B. Gaut eds. (1997), *Ethics and Practical Reason*, Oxford: Clarendon Press
- Davidson D. (2001), *Essays on Actions and Events*, 2nd ed., Oxford: Clarendon
- Diggs B. J. (1960), "A Technical Ought", *Mind*, 69, pp. 301-317
- Donagan A. (1977), *The Theory of Morality*, Chicago: University of Chicago Press
- Downie R. S. (1984), "The Hypothetical Imperative" *Mind*, 93, pp. 481-490
- Dreier J. (1997), "Humean Doubts about the Practical Justification of Morality", in Cullity & Gaunt 1997, pp. 81-99
- Geach P. T. (1966), "Dr. Kenny on Practical Inference", *Analysis*, 26, pp. 76-79
- Gensler H. J. (1996), *Formal Ethics*, London: Routledge
- Grice P. (2001), *Aspects of Reason*, Oxford: Oxford University Press
- Hill T. E. (1973), "The Hypothetical Imperative", *The Philosophical Review*, 82, pp. 429-450
- Jackson R. (1942), "Rationalism and Intellectualism in the Ethics of Aristotle", *Mind*, 51, pp. 343-360
- Jeffrey R. C. (1983), *The Logic of Decision*, 2nd ed., Chicago: Chicago University Press
- Kagan S. (1989), *The Limits of Morality*, Oxford: Clarendon Press
- Kenny A. (1966), "Practical Inferences", *Analysis*, 26, pp. 65-75

- Kenny A. (1978), "Practical Reasoning and Rational Appetite", in Raz 1978, pp. 63-80
- Korsgaard C. M. (1997), "The Normativity of Instrumental Reason", in Cullity & Gaut 1997, pp. 215-254
- Miller Ch. (2007), "The Structure of Instrumental Practical Reasoning", *Philosophy and Phenomenological Research*, 75, pp. 1-40
- Mitchell D. (1990), "Validity and Practical Reasoning", *Philosophy*, 65, pp. 477-500
- Raz J. (1978), "Reasons for Actions, Decisions and Norms", in Raz 1978, pp. 128-143
- Raz J. ed. (1978), *Practical Reasoning*, Oxford: Oxford University Press
- Rescher N. (1966), "Practical Reasoning and Values", *The Philosophical Quarterly*, 16, pp. 121-136
- Searle J. R. (2001), *Rationality in Action*, Cambridge/Mass.: MIT Press
- Spielthenner G. (2007), "A Logic of Practical Reasoning", *Acta Analytica*, 22, pp. 139-153
- Spielthenner G. (2008), "The Logical Assessment of Practical Reasoning", *SATS–Nordic Journal of Philosophy*, 9(1), pp. 91-108
- Thornton M. T. (1982), "Aristotelian Practical Reason", *Mind*, 91, pp. 57-76
- Von Wright G. H. (1963), *The Varieties of Goodness*, London: Routledge & Kegan Paul
- Von Wright G. H. (1983), *Practical Reason: Philosophical Papers, Vol. 1*, Oxford: Basil Blackwell

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